1000 A TOLERANCE STATE OF SUCCESSFUL LIVING DONOR LIVER TRANSPLANTATION AFTER BONE MARROW TRANSPLANTATION
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PURPOSE: The majority of organ transplantation recipients need life-long immunosuppressive treatment to maintain graft function. However, most recipients of HLA-identical sibling hematopoietic stem cell transplants (HSCT) can achieve stable tolerance and immunosuppressive agents can be discontinued within 6–12 months after transplant. Therefore, achieving immunological tolerance remains a final goal in organ transplant to maintain stable engraftment of grafted organs. Recent progress in HSCT has provided new methods (non-myeloablative SCT: NST) for reliable engraftment with sublethal conditioning regimens. NST has been successfully applied with minimal toxicity in the treatment of malignant disease and in the achievement of mixed chimerism. This NST approach might be successfully transplanted into the organ transplantation to achieve immunological tolerance. METHODS AND RESULTS: We performed NST followed by liver transplantation using an HLA-identical sibling donor in a 54-year-old male patient with both chronic myelogenous leukemia and liver cirrhosis. We investigated whether NST was possible to induce mixed chimerism and engraftment with or without additional immunosuppressive drugs. Treatment with NST to treat leukemia and to induce immunological tolerance has been well tolerated. 3 months later, following liver transplantation which used minimal immunosuppressive drug only for 3 months after transplantation, has been also tolerated without clinical manifestation of rejection. The patient was monitored for the donor antigen by PCR. At present, the patient has only limited GVHD, which responded to steroid treatment, and is still alive with good graft function by biochemical and histological examination at 20 months post-NST and 17 months of post-LT. We also confirmed immunological tolerance by donor skin graft. CONCLUSION: We postulate that a basis to induce immunological tolerance combining hematopoietic stem cell and organ transplantation is established through this clinical model.

1001 LIVER PRESERVATION BY HYPOTHERMIC CONTINUOUS MACHINE PRESERVATION USING A NEW COLLOID-BASED PRESERVATION SOLUTION
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INTRODUCTION: Recent literature has shown promising results in preserving livers by hypothermic machine perfusion (MP). The standard solution for MP is the University of Wisconsin-glucose solution (UW-G). In our search for a next generation MP preservation solution we have developed Polysol. This colloid-based perfusion medium contains free radical scavengers, buffers and is enriched with specific nutrients for the liver. We hypothesize that Polysol results in higher quality liver preservation after 24 h of hypothermic machine perfusion as compared to the standard UW-G solution. METHODS: In an isolated perfused rat liver model hepaticcellular damage and liver function were assessed during reperfusion after 24 h hypothermic MP in UW-G (n = 5) or Polysol (n = 5). To determine liver parenchymal damage AST, ALT, LDH and alpha-GST levels were measured at 10-minute intervals, during 60 minutes of normothermic reperfusion with oxygenated Krebs-Henseleit buffer. Liver function was assessed by measuring bile production during reperfusion. For comparison with static preservation, livers were reperfused after 24 h cold storage in UW (n = 5). RESULTS: MP with UW-G showed decreased levels of liver enzymes when compared with livers cold stored with UW for 24 h: ALT (t = 0); 4.62 ± 5.31 vs 0.42 ± 0.35 (p = 0.0251), ALT (t = 3 h); 5.42 ± 3.85 vs 0.55 ± 0.37 (p = 0.0215) and alpha-GST (t = 40) 125.5 ± 10.51 vs 101.6 ± 11.99, respectively. MP with Polysol however resulted in even less hepatic cellular damage when compared with livers cold stored in UW for 24 h: ALT (t = 0); 3.2 ± 2.05 vs 9.20 ± 5.81 (p = 0.0217), LDH (t = 3 h); 19.0 ± 6.26 vs 80.0 ± 92.2 (p = 0.0217) and alpha-GST (t = 40); 125.5 ± 10.51 vs 46.35 ± 9.11 (p = 0.0079), respectively. Livers machine perfused with Polysol also showed better results when compared with livers perfused with UW-G: alpha-GST (t = 40): 46.35 ± 9.11 vs 101.6 ± 11.99 (p = 0.0159), respectively. Bile production was increased after 24 h MP with Polysol as compared with both CS with UW and MP with UW-G, but did not reach statistical significance. Overall there were no significant differences in perfusate flow during reperfusion (ml/min) (28.91 ± 1.06 vs 31.96 ± 0.98). CONCLUSIONS: 24-h machine perfusion of rat livers with UW-G or Polysol results in less hepatocellular damage than 24-h cold storage with UW. Machine perfusion with Polysol results in better quality liver preservation as compared with machine perfusion with UW-G.

1002 A ROUX LOOP REMAINS THE OPTIMAL METHOD OF BILIARY RECONSTRUCTION IN LIVER TRANSPLANTATION FOR PRIMARY SCLerosING CHOLANGITIS
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BACKGROUND AND AIMS: Opinion is divided regarding the optimal method of biliary reconstruction following orthotopic liver transplantation (OLT) for primary sclerosing cholangitis (PSC). This study aimed to analyse the UK experience of OLT for patients with PSC, specifically asking whether the type of biliary reconstruction influenced the incidence of biliary complications and impact on graft or patient survival. METHODS: All patients with PSC who underwent first OLT in the 7 UK centres between May 1994 and April 2003 were identified from the prospective UK Transplant database. Details including type of biliary anastomosis, postoperative complications, date and cause of graft failure and death were collated. Categorical data were analysed using a 2-tailed Fisher’s exact test. Survival analysis was performed using the Kaplan–Meier method and log rank test. RESULTS: 375 patients underwent first OLT for PSC during the study period. 15 patients were excluded (anastomotic type not recorded). 264 patients (73%) underwent biliary reconstruction using a Roux loop (RL) and 98 (27%) had a duct-to-duct (DD2) anastomosis. The median follow-up was 52 months (range 1–108). Overall 17 patients (5%) developed a bile leak and 13 (4%) a biliary stricture. There was no significant difference in biliary leak rates between the two anastomotic types; however, biliary stricture occurred more frequently in patients undergoing a D2D biliary reconstruction (8% vs 2% for RL, p = 0.05). The mean graft survival of patients with an RL anastomosis was 85 (80–91 95%CI) months, significantly higher than those who had a D2D [74 (64–84 95%CI) months, p = 0.034]. Mean patient survival in those with an RL was 95 (90–99 95%CI) months, significantly higher than patients with a D2D [76 (67–86 95%CI) months, p = 0.001]. CONCLUSIONS: The UK Transplant data suggest an overall increased incidence of biliary complications and reduced graft and patient survival in patients with PSC undergoing OLT with a D2D anastomosis compared with those undergoing an RL reconstruction. These data support the traditional stance that patients with PSC treated by OLT should undergo biliary reconstruction using a Roux loop.

1003 LIVING DONOR LIVER TRANSPLANTATION NAVIGATED BY 3-D ANGIOGRAPHY IN MULTI-DETECTOR CT (MD-CT) UNDER THE INTRAVENOUS CONTRAST MEDIUM INJECTION
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Purpose: In living-related liver transplantation (LLRT), understanding of the anatomical variation of the hepatic artery and appropriate reconstruction is essential. Our purpose was to evaluate the accuracy and reliability of an intravenously enhanced 3D-CT hepatic arterial angiography for application for living-related liver transplantation. METHODS: 109 consecutive patients were enrolled in this study. 3D-CT angiography was performed as follows. CT equipment – GE LightSpeed Ultra. The contrast material-enhanced CT scanning was performed after intravenous injection of iopamidol (370) at a rate of 2 ml/s or 4 ml/s. 3D-Workstation; IntageRVise. The hepatic arterial branches identified in 3D-CT angiography were compared with those in the conventional angiography. RESULTS: 44

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patients were analysed at rate of 2 ml/s, and 65 patients at a rate of 4 ml/s. In 2 ml/s cases, major extrahepatic arteries (celiac trunk, splenic artery, common hepatic artery (CHA), gastroduodenal artery, proper hepatic artery, superior mesenteric artery (SMA), right hepatic artery (RHA), left hepatic artery (LHA)) were detected in 66–100%, but in 4 ml/s cases these were detected in all cases. At 2 ml/s, subsegmental hepatic arteries were detected in only 11–32%, but in 4 ml/s, subsegmental hepatic arteries were detected in 76–89%. In anatomic variations, at a rate of 2 ml/s, only half the cases (8/15) could be detected, but at 4 ml/s, all cases (23/23) were detected. CONCLUSION: Intraoperator enhanced 3D-CT hepatic arterial angiography provided necessary information on accurate anatomic variation of hepatic artery for LRLT. In donor preoperative examinations, this imaging is useful, with low cost and reduced invasiveness.

1004 INFLUENCE OF HLA COMPATIBILITIES ON OUTCOME AND FIBROSIS PROGRESSION AFTER LIVER TRANSPLANTATION

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Orthotopic liver transplantation (OLT) for end-stage hepatitis C-virus (HCV) infection is commonly complicated by recurrence of HCV and a significant number of patients will develop severe graft hepatitis after OLT. However, the relevance of HLA-matching in the recurrence of HCV is still under discussion. In this study we investigated the effect of HLA-compatibilities on outcome and fibrosis progression of HCV-positive patients after OLT. In a retrospective analysis 165 liver transplants in HCV-positive patients with complete donor/recipient HLA typing were reviewed for recurrence of HCV and outcome after OLT. Follow-up ranged from 1 to 158 months (median = 63.3 months). Immunosuppression consisted of either CSA-based quadruple induction therapy including ATG or an IL2-receptor antagonist or with tacrolimus and Protocol liver biopsies were performed after 1, 3, 5, 7, and 10 years and staged according to the METAVIR scoring system. The overall 1-, 5-, and 10-year graft survival figures were 81.8%, 69.11% and 62%, respectively. There was no correlation between number of HLA-compatibilities and graft survival in the study population. The number of rejection episodes was significantly increased in patients with less HLA compatibilities (p < 0.05). In contrast to this the fibrosis progression was significantly faster in patients with 1 or more HLA compatibilities when compared to patients with no HLA compatibility. In conclusion, HLA-matching does not influence graft survival in patients after OLT for end-stage HCV infection. However, despite less rejection episodes the fibrosis progression was increased in patients with more HLA compatibilities within the first year after OLT.

1005 LIVER TRANSPLANTATION FOR HEPATOCELLULAR CARCINOMA: CALL FOR NEW CLASSIFICATION OR CALL FOR NO CLASSIFICATION?

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INTRODUCTION: The preoperative tumor classification of patients with hepatocellular carcinoma (HCC) and underlying liver cirrhosis is important for their therapeutic management as well as for potential evaluation to liver transplantation. In order to evaluate the existing classification systems we analyzed retrospectively the data of transplanted patients with HCC. MATERIALS AND METHODS: From 04/1998 to 10/2003, 67 patients with HCC underwent liver transplantation (LTx) in our centre. Prior to LTx, 33 patients underwent tumor-specific bridging treatment, such as transarterial chemoembolization (n = 26) or radiofrequency ablation (n = 13). The clinical classification was based on radiological findings (MRT and/or AngioCT) which were evaluated by two independent radiologists. Taking into account the radiological description the patients were clinically classified according to the TNM (5th and 6th edn), UICC (5th and 6th edn), Milan- and UCSF criteria of classification. The same pathologist examined the explant livers. The preoperative clinical staging was compared with the pathological findings of the explanted liver. RESULTS: HCC was incidentally found in 15 cirrhotic patients. Best accuracy (59.7%) between the radiological and the pathological findings was shown when the patients were classified according to the Milan- and the UCSF criteria. According to the Milan criteria 14 patients (20.9%) were preoperatively underestimated and 13 patients (19.4%) overestimated as regards the stage of the disease. The corresponding percentages using the UCSF criteria were 22.4% and 19.4%, respectively. The classification of the patients according to the 5th and the 6th edns of the TNM/ UICC criteria showed accordance with the pathological findings only at a rate of 28.3% and 26.9%, respectively. CONCLUSIONS: According to our experience, the Milan and the UCSF criteria have the best accuracy, contributing to the evaluation of cirrhotic patients with HCC as transplantation candidates. Apart from the estimation of the vascular infiltration, the differential diagnosis between cirrhotic nodes and multifocal HCC still remains a problem. Our experience showed that the generally accepted tumor criteria for listing patients with HCC for liver transplantation are not sufficient, especially in patients with underlying end-stage liver cirrhosis.

1006 LIVER TRANSPLANTATION IN CHILDREN WITH UNDIFFERENTIATED (EMBYRINAL) SARCOMA OF THE LIVER

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BACKGROUND: Undifferentiated (embryonal) sarcoma of the liver (USL) is a rare tumor accounting for <10% of all pediatric liver tumors. Traditional treatment of USL has consisted of combined chemotherapy and surgical resection. The ability to completely excise the tumor strongly influences long-term survival. Without complete surgical excision, patients must undergo continued chemotherapy, exposing them to potentially life-threatening side effects in addition to a potential second surgery to remove residual tumor. Previous reports indicate >80% survival rate in patients with USL who have complete excision of the tumor +/- chemotherapy; patients with unresectable tumors treated with chemotherapy alone generally have not survived. Liver transplantation has been successfully utilized in other pediatric solid liver tumors but has not been reported as a treatment option for USL. We report a single-center experience of 2 patients with USL who underwent successful liver transplantation for unresectable USL. RESULTS: Patient A is a 6-year-old girl who presented with a 14-cm USL encompassing the anterior and posterior segments of the right lobe and the medial segment of the left hepatic lobe. Despite 6 months of intensive chemotherapy, her tumor was not amenable to surgical resection and she was referred for potential liver transplantation. CT scans were serially obtained to evaluate for metastatic disease and were all negative prior to transplant. She underwent a cadaveric liver transplant (LTx) with a primary duct-to-duct anastomosis with immunosuppression consisting of tacrolimus and steroids. Patient B is a 5-year-old girl who presented with a 15 × 11 × 12.4 cm USL involving most of the right hepatic lobe with extension into the medial aspect of the left hepatic lobe. Despite chemotherapy, her tumor continued to enlarge, thus she was referred for liver transplantation. CT scan prior to LTx was negative for metastatic disease. She underwent a cadaveric split liver transplant (S-LTx) with a right lobe hepaticojjunostomy with immunosuppression consisting of tacrolimus and steroids. At 20 months and 4 months post LTX respectively, both patients have normal liver synthetic function and no evidence of recurrent disease. Neither patient has received any further chemotherapy. CONCLUSION: LTX should be considered as a treatment option in children with USL whose tumors do not respond to chemotherapy or cannot be completely surgically excised. LTX allows for complete excision of the tumor, making it potentially unnecessary for continued chemotherapy and exposure to its harmful side effects.

1007 REVERSAL OF CALCINEURIN INHIBITOR-INDUCED NEPHROTOXICITY IN LIVER TRANSPLANT RECIPIENTS

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BACKGROUND: Calcineurin inhibitor (CNI)-based immunosuppression is a major contributor to the success of liver transplantation. A significant number of transplant recipients on CNI develop nephrotoxicity that may lead to renal failure. Sirolimus (SRL), a newer immunosuppressive agent with properties similar to CNI but without nephrotoxicity, may provide a safer alternative to prevent CNI-related nephrotoxicity. This report describes our experience of CNI withdrawal in stable liver transplant
recipients, showing signs of early renal dysfunction, using SRL as an alternative immunosuppressive. The study also assessed the safety of SRL conversion. METHODS: Stable liver recipients at least 6 months post transplant, with evidence of early renal dysfunction, i.e. 24-h creatinine clearance (CrCl) < 40–80 mL/min, were included. SRL was prescribed at 3–5 mg/day to achieve a target serum level of 6–10 ng/mL following which CNI was withdrawn. Renal function was assessed by 24-h CrCl at 1, 3, 9, and 12 months after enrollment. RESULTS: Patients (n = 20) were most male (60%) and Caucasian (95%) at a mean 4 years from transplant (range 0.5–11 years). The mean baseline CrCl was 64 ± 19 mL/min. Improvement in renal function was seen in the sirolimus arm at 1 month (75 ± 24 mL/min, p = 0.005), 3 months (77 ± 24 mL/min, p = 0.067), 9 months (78 ± 31 mL/min, p = 0.086), and 12 months (76 ± 29 mL/min, p = 0.135) after conversion. One patient required hemodialysis 13 months after conversion to SRL. There was only one episode of rejection and it was successfully treated with a steroid recycle. One patient required resumption of CNI for persistent rash. Three (15%) SRL recipients developed altered lipid profiles necessitating treatment. CONCLUSIONS: SRL-based immunosuppression appears to be a safe and effective alternative to CNI in liver transplant recipients. Withdrawal of CNI provides a significant functional recovery of renal function in stable liver transplant recipients with early renal dysfunction. Randomized trials are needed to further determine the role of SRL conversion in liver transplant recipients.

1008 HEPATOCELLULAR CARCINOMA IN LIVER TRANSPLANT RECIPIENTS: A SINGLE-CENTER EXPERIENCE
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INTRODUCTION: Cirrhosis is a well-known risk factor for HCC. We have reviewed our experience of transplantation for HCC in cirrhotic patients. METHODS: The records of 332 consecutive cirrhotic patients who received liver transplants at our institution between 6/1995 and 11/2003 were reviewed for the presence of HCC in the cirrhotic explant. Preoperative work-up for these patients included abdominal ultrasound, computerized axial tomography and/or magnetic resonance imaging. Explants were routinely subjected to 5-mm cut sections and careful assessment of all mass lesions was performed. Survival rates were analysed. Preoperative radio frequency ablation and/or transcatheter chemoembolization was used selectively. No patients received prophylactic postoperative chemotherapy. RESULTS: 57 patients had a diagnosis of HCC by pathological analysis of the explant (57/332, or 17.2%). In 31 (36%) of these 57 patients, the diagnosis of HCC was not suspected on pretransplant work-up ( incidental). In 45 of these 57 patients (78.9%), the etiology of cirrhosis was hepatitis C. In these 57 patients, tumors ranged from 0.5 cm to 8 cm in size. One incidental tumor was the biggest of the series (8 cm) and had macrovascular (portal vein) invasion. There were no instances of lymph node invasion in any of the tumors studied. Of a total of 9 HCC deaths, 4 (44.4%) were from recurrent HCC and 5 were from unrelated causes (3 hepatitis C-recurrence, 1 CVA, 1 sepsis). The actuarial 5-year survival of HCC patients (73.1%) was similar to that of non-HCC patients (72.7%). Also, there was no significant difference in survival of patients with incidental versus known HCC (p = 0.45). CONCLUSIONS: 1. HCC occurs in up to 17% of patients. 2. HCC patients have similar 5-year survival after transplantation when compared with non-HCC patients. 2. Incidental and known HCC had similar overall survival after transplantation. 3. Pretransplant work-up testing can miss up to one-third of HCC cases.

1009 LIVE DONOR LIVER TRANSPLANTATION IN CHILDREN – GUIDELINES FOR TRANSFUSION-FREE TECHNIQUES
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We describe techniques developed to avoid blood transfusion in pediatric Jehovah’s Witness patients undergoing liver transplantation. For medicolegal purposes a court order had been obtained to give blood transfusion if deemed necessary. Both patients had had major abdominal surgery prior to their liver transplant. Patient A had a Kasai hepatopancreatobilaryoenterostomy procedure, and the patient B had a prior liver transplantation. Both were coagulopathic with a Child score of 9 and had significant anemia. The following protocol was employed to circumvent the need for transfusion of blood products. 1. Preoperatively the patients received erythropoietin (300 units/kg/week), iron, multi-vitamin and folic acid to raise their hematocrit to 37.1 and 31.5, respectively. The allograft was the left lateral segment of the liver, harvested from the grandmother and the father respectively. The transplant was performed using the standard orthotopic piggyback technique. The biliary reconfiguration was completed using a Roux-en-Y hepatojejunostomy. 2. The intra-operative management included the use of acute normovolemic hemodilution (ANH) and cell saver. ANH was performed by removing up to 30% of the patient’s estimated blood volume from the central line immediately following induction. The blood was drained via gravity to a CPDA bag, maintained in continuity with the patient, and stored in a blood cooler in the operating room. Normal intravascular volume was restored with 5% albumin and plasma lyte infu- sion. A total of 170 ml and 250 ml of blood were removed for ANH then re-infused at the end along with 90 ml and 40 ml of blood from the cell saver after the implantation of the liver, when further blood loss was not anticipated. 3. Aprotinin was used in both patients, and activated recombinant factor VIIa (Novaseven) in one patient who continued to ooze during the hepatectomy. Postoperatively, blood draws were performed judiciously. The ICU stays were 5 and 3 days respectively. At discharge, the liver function tests were normal. Both patients are doing well at 33 and 30 months of follow-up. Our protocol used erythropoietin preoperatively, allowing us to raise the total red blood cell mass. ANH was achieved by diluting the hematocrit to as low as 20% at the start of surgery. The value of this technique is to preserve clotting factors and platelets in the blood saved for later re-infusion. Both platelets and clotting factors are completely depleted during cell salvage. The combination of these two techniques allows us to preserve both red cells and clotting products. Recombinant activated factor VIIa also facilitated with containing bleeding related to coagulopathy.
1011 CLINICAL EVOLUTION OF INFLAMMATORY BOWEL DISEASE IN PATIENTS TRANSPLANTED FOR PRIMARY SCLEROSING CHOLANGITIS
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BACKGROUND: Inflammatory bowel disease (IBD) is frequently associated with primary sclerosing cholangitis (PSC). In patients with end-stage PSC, orthotopic liver transplantation (OLT) is the only effective therapeutic option available. The long-term outcomes of OLT and immunosuppression may play a role in the evolution of IBD and could be risk factors for the development of colorectal neoplasia. OBJECTIVE: To evaluate the evolution of IBD in patients transplanted for PSC and the incidence of dysplasia and colorectal carcinoma. METHODS: 20 patients transplanted for PSC between 1988 and 2002 were included. Median follow-up post-OLT was 5 years (1–9 years). Immunosuppression was CyA- (n = 8) or tacrolimus-based (n = 12) plus steroids ± mycophenolate mofetil. Patients were evaluated pre-OLT with colonoscopy and multiple intestinal biopsies. Post-OLT patients were under a protocol of colonoscopic surveillance, with colonoscopies every 6–12 months or whenever it was indicated for exacerbation of colonic symptoms. RESULTS: Of 20 pts transplanted for PSC, 15 had associated IBD (ulcerative colitis (UC) 14, Crohn's disease 1) (75%). 7 pts had active disease pre-OLT requiring 5-ASA, sulfasalazine and steroids. 2 patients with associated IBD died post-OLT of perioperative complications. Among the remaining 13 pts, 8 presented quiescent colonic disease post-OLT, 6 of which were already quiescent pre-OLT and 2 had an improvement in their symptoms post-OLT. The 5 remaining patients were symptomatic pre-OLT and after a temporary improvement of their symptoms post-OLT, they aggravated between 4 months and 5 years post-OLT, requiring the re-introduction of 5-ASA and another course of steroids. Total colonoscopy was performed in 1 pt for moderate dysplasia 2 years post-OLT. 1 patient developed Duke A colon carcinoma and had a proctocolectomy with ileostomy. Among the asymptomatic pts post-OLT, 1 developed colorectal carcinoma and died of progressive disease 5 years post-OLT. CONCLUSION: More than half of patients transplanted with PSC and associated IBD remain with quiescent colonic disease. Yet, a group of patients, despite immunosuppression, had aggravated symptoms with an elevated incidence of dysplasia-carcinoma at 5 years. It is necessary that all patients transplanted for PSC with associated IBD be under a strict protocol of colonoscopic surveillance with periodic colonoscopies with multiple intestinal biopsies, independently of colonic symptoms.

1012 LIVER RETRANPLANTATION – OVERALL RESULTS IN A SINGLE-CENTER EXPERIENCE
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BACKGROUND: Liver retransplantation (ReTx) is the only life-saving procedure available for patients with irreversible graft failure. The retransplantation rate in the majority of centers varies from 5% to 22%. The aim of the study was to review and evaluate the results of liver retransplantation and to identify the factors that could improve the results. PATIENTS AND METHODS: From December 1994 to December 2003, 235 patients underwent liver transplantation at the authors' center. 16 of them (6.8%) underwent retransplantation for graft failure of various origins. There were 13 women and 3 men, mean age 38.8 years (23–55 years). The most common indication for ReTx was hepatic artery thrombosis – 2 patients (43.7%), biliary complications – 5 patients (31.25%) and recurrence of the disease – 3 patients (19%). On the emergency basis (UNOS 1 and 2A) the ReTx was carried out in 10 patients (62.5%). The average period from first transplantation to ReTx was 250 days, range 1–1284 days. Only whole liver cadaveric grafts were used. All but one of the procedures were performed with the use of venovenous bypass, classical orthotopic technique. RESULTS: The overall mortality was 25% (4 patients). 3 patients died from intraoperative complications and coagulopathy with the 1st and 6th postoperative day. All of them were UNOS 1 status. 1 patient died 3 months after ReTx from septic complications following late hepatic artery thrombosis. 1-year patient and graft survival rate following ReTx was 62.5%, and the longest follow-up reached 7 years, ranging from 3 to 90 months. Lengths of hospital and intensive care unit stay were significantly longer for the ReTx group, when compared with the primary-transplanted patients. CONCLUSION: Our data show that long-term survival can be obtained in >60% of all second liver graft recipients; however, it is a significantly lower survival rate when compared with first transplantation only. In emergency settings ReTx is a life-saving procedure with relatively high perioperative mortality.

1013 LIVER TRANSPLANTATION AND BLOOD CONSERVATION IN A JEHOVASH'S WITNESS
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Liver transplantation in general has become a fairly standardized and safe surgical procedure in many centers. Despite this fact individual patients may present with unusual medical and logistic challenges with regard to indication as well as management, such as the combination of acute hepatic failure, and the need to avoid blood products in a Jehovah’s Witness. Since published experience is limited this is a case report of a 16-year-old male who presented with acute hepatic failure from autoimmune hepatitis. Following admission and treatment with steroids and azathioprine the patient developed progressive encephalopathy and acites. In preparation for liver transplantation he was started on entropereostineos, ferrous sulphate, vitamin K and factor VII. As his hemoglobin and hematocrit dropped to 6.8 g/L and 21.4%, respectively, it was decided in consent with our blood conservation program to give 3 units of packed red cells before the transplant was even scheduled. Two days later a liver became available from a deceased donor with anoxic brain damage. The transplant surgery itself was done by a standard technique without bypass (OR time 6 h, anhepatic period 48 min, estimated blood loss 1350 ml, cell saver 450 ml), and went well without blood transfusions. The postoperative course was uncomplicated with rapid normalization of hematologic parameters, and the patient was discharged 13 days later with normal graft function. Review of the literature shows five publications on liver transplantation in 8 Jehovah’s Witnesses, including 7 adults. Six patients had chronic liver disease. Whereas 2 cases could be managed without blood transfusions, the only child who also had acute hepatic failure needed red blood cells at the time of transplantation. In comparison, our own patient had significantly lower hemoglobin and hematocrit as was discussed as the critical limits before transplantation in all papers published. Therefore, and in addition to preparative conditioning as well as minimizing the risk of surgery, blood transfusions could not be avoided in this case. As demonstrated, successful treatment of high-risk Jehovah’s Witnesses in need of an urgent liver transplant is not only dependent on careful medical management, but also close cooperation with an experienced blood conservation program.

1014 LIVER TRANSPLANTATION IN HEPATITIS C (HCV) CIRRHOSIS WITH AND WITHOUT HEPATOMA (HCC): A SINGLE-CENTER EXPERIENCE
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INTRODUCTION: HCV is the leading cause of cirrhosis, which is a well-known risk factor for HCC. The Milan criteria have generally defined our selection policy of transplantation for HCC. We have reviewed our experience of transplantation for HCC in cirrhosis. METHODS: The records of 187 consecutive patients transplanted at our institution for HCV cirrhosis from 6/1995 to 11/2003 were reviewed for the presence of HCC in the explant. Preoperative imaging work-up included abdominal ultrasound, CT scan and/or MRI. Explants were routinely subjected to 5-mm cut sections and careful assessment of all mass lesions was performed. Survival rates were analysed and compared with HCV non-HCC cirrhotic patients undergoing OLT. Preoperative RF ablation and/or transarterial chemoembolization were used selectively. No patients received adjuvant chemotherapy. Interferon was used selectively for HCV recurrences. RESULTS: 46 of 187 HCV cirrhotic patients had a diagnosis of HCC by pathological analysis of the explants (24.6%). The mean native MELD scores (without points for HCC) in the HCC patients were similar to the non-HCC patients (13.6 ± 6.1 vs 13.5 ± 5.2, p = NS). In 18 of 46 (39.1%) patients, the diagnosis was not suspected on preoperative imaging work-up (incidental). The maximum tumor size was ≤ 5 cm in 43 patients (93.5%). Patients with known HCC had significantly larger tumors (3.3 ± 1.8 vs 1.8 cm ± 1.9, p = 0.011). Overall, tumors were solitary in 65.2% (n = 30) and unilobar in
1015 INTRAOPERATIVE PORTAL VEIN STENT INSERTION IN LIVING DONOR LIVER TRANSPLANTATION
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BACKGROUND: Portal vein anastomosis in living donor liver transplantation (LDLT) is known as a simple procedure, and has fewer complications than other procedures. However, the indications for LDLT have increased to cases that were considered inoperable before, such as portal vein thrombosis or dysplasia, and some recipients should be transplanted with dual grafts. So a new possibility of portal blood flow insufficiency has also increased. We adapted intraoperative portal vein stenting in the case of portal insufficiency, and evaluated its indications and its results. RESULTS AND METHODS: We performed 527 cases of adult-to-adult LDLT from Jan. 2002 to Aug. 2003. If the portal vein flow seems to be insufficient clinically, we first evaluate it by Doppler sonography, then check direct portogram via inferior mesentric vein and insert the stents in the case of definite stenosis or pressure difference between two ends of anastomosis. RESULTS: 345 grafts were transplanted in 227 recipients, right lobe grafts in 120, left lobes in 61, and dual lobe grafts were used in 54 cases. 29 recipients had pathologic small portal veins (portal vein thrombosis in 26, portal vein dysplasia in 3). We performed portal venoplasty to obtain a wide diameter in 11 cases. There were 8 cases of type III portal vein anomaly, in which we used autographs with the portal vein confluence portion. We inserted a portal vein stent intraoperatively in 7 cases. Its indications were severe portal vein thrombosis in 3, uneven distribution between two grafts in 4, and portal autograft in 1. We performed venoplasty in 3 cases at the same time. In the case of large portal collaterals, we could evaluate the results by intraoperative direct portogram after collateral vein ligation. The portal veins have good flow without any stenosis or thrombosis during the follow-up. CONCLUSION: Intraoperative portal vein stent insertion can produce good results in some selected cases such as severe thrombosis and dysplasia, and multiple portal vein anastomosis.

1016 LIVER TRANSPLANT VASCULAR COMPLICATIONS
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BACKGROUND: Vascular complications after liver transplantation often involve graft loss and cause high morbidity and mortality. OBJECTIVE: Retrospective analysis of incidence, presentation and consequences of hepatic arterial thrombosis (HAT), portal vein thrombosis (PVT), and outflow obstruction (OFO) in a liver transplant series. METHOD: Between January 1988 and July 2003, 427 liver transplants were performed in 397 patients (30 re-transplants). Adult transplant (tx): 282 in 265 patients (249 whole livers, 4 reduced livers, 3 split, 26 living donors). Child transplantation: 145 in 132 patients (51 whole livers, 44 reduced, 3 splits and 45 living donors). Global vascular complications represented 8.5% (34 patients presented 35 complications). Adults: 5.2%; children: 15.5%. RESULTS: 20 pediatric patients presented 21 complications; 2 combined thrombosis (hepatic artery and portal vein) (1.5%), 4 HAT (3%), 6 early PVT (4.5%) and 3 late PVT (2.2%). 5 OFO (3.7%) early and late (the early ones caused graft loss and the late ones required a mesocaval shunt. 9 patients were re-examined (clot removal and reanastomosis) and 7 were re-transplanted. 8 patients died (40%). Factors related to PVT were low weight receptor and living-related liver transplant. OFO always presented in reduced liver. 14 adults presented 14 complications: 9 HTA (3.3%), 5 early and 2 late (7 patients were re-transplanted and 4 died). There were 2 OFO, one intraoperative and one late that was corrected by intervention radiology. HAT was associated with complex arterial reconstructions and the use of graft interposition. CONCLUSION: In our series vascular complications caused graft loss in 21 patients (61.7%), 14 were re-transplanted with a 35% mortality. With a close follow-up it is possible to rescue a good number of patients.

1017 ANATOMICAL STUDY OF THE ARTERIAL AND BILIARY SUPPLY OF THE LEFT LATERAL SEGMENT OF THE LIVER AND ITS SURGICAL APPLICATIONS
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The purpose of this communication was to study the arterial and biliary anatomy of the left lateral segment of the liver, or segments II and III, as well as its variations in order to characterize its various patterns and use them to help avoid left lateral segment ischemic and thrombolic complications and biliary fistula after partial liver transplantation. Twenty-five cadavers were studied. The hepatic artery and biliary duct were injected with acrylic in a liquid form with the purpose of obtaining the liver casts. The arterial supply to these segments was provided in 24/25 cases by the left hepatic artery as a branch of the common hepatic artery; in one case we found a substitute artery irrigating segments II and III coming from the left gastric artery and one case (1/24) of an accessory left hepatic artery branch of the left gastric artery. The left biliary duct received branches from segments II and III in all cases and in 23/25 livers casts we observed a branch coming from segment IV.

1018 LIVER TRANSPLANTATION WITHOUT EXTRACORPOREAL VENO-VENOUS BYPASS: A COMPARISON OF CONVENTIONAL VERSUS PIGGYBACK TECHNIQUES IN ADULT ORTHOTOPIC LIVER TRANSPLANTATION
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BACKGROUND: The use of the piggyback cavo-cavoplasty technique of IVC reconstruction at liver transplantation (CCP-LT) has an advantage over conventional caval replacement (CON-LT), as extracorporeal venovenous bypass is not required. In February 2002, we changed to this technique. This study analyses the impact of this change on peri-operative parameters, renal support, complications and outcome. METHODS: All data were prospectively collected on a dedicated database. A consecutive series of 384 primary liver transplants (2000–2003) was analysed. There were 138 CON-LT and 246 CCP-LT transplants. 220 were male (55%), median age 56 years (16–73). Indications and disease severity as judged by MELD scores were comparable in both groups. The two groups were compared with respect to patient and disease characteristics, ischaemia times, operating time, use of blood products, in-patient stay and morbidity and survival. Chi-squared test was utilized to study the differences between the two groups, p < 0.05 was considered statistically significant. RESULTS. (See Table top of page 70.) The requirement for respiratory support was higher (p = 0.03) in the CON-LT group. There was no difference in the requirement for renal support. 30-day patient survival was 89% for CON-LT and 91% for CCP-LT (p = 1.4; NS). Temporary porto-caval shunts (PCS) were used in 192 (78%) patients who underwent CCP-LT. The outcome parameters between those who had PCS and those who did not were not significant. However, the group without a temporary PCS had a significantly lower warm ischaemia time (p = 0.03). Conclusion: Conversion to cavo-cavoplasty has not had an adverse impact on surgery, graft and patient survival. We observed a reduction in FFP and platelet support. The CON-LT group had a higher requirement for respiratory support and a longer ITU stay, although the postoperative hospital stay and survival were similar in both groups.

1019 LIVE DONOR LIVER RESECTION – WATER JET DISSECTION OR ULTRASONIC ABRASION?
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The safety of the donor is crucial in live donor liver transplantation (LDLTx). In recent years several new technical devices have been
developed, and added to the surgical armamentarium of liver resection. Following an experimental study in pigs comparing different liver dissection techniques we have started to use the water jet in LDLTx. This is a retrospective analysis of 20 live donors undergoing hemihepatectomy for LDLTx (19 right, 1 left). Water jet dissection (Handy-Jet®, Saphar; HELIX Hydro-Jet®, Erbe) and ultrasonic aspiration (USA Exseler®, Valleylab) were used in 13 and 7 cases, respectively. Demographic and clinical patient data were comparable in both groups. Our preliminary results as illustrated in the Table clearly demonstrate that liver resection using the water jet is safe and efficient. It allows a contact-free and very selective dissection without major tissue damage. There seem to be several advantages over ultrasonic aspiration, such as shorter surgery and transection time as well as less blood loss. The cost-benefit ratio, which is particularly important in LDLTx, needs to be further explored.

### 1020 SAFETY AND EFFICACY OF IMMunosuppression WITH CYCLOSPORINE MICROEMULSION MONITORED BY THE C2 LEVEL IN LIVER TRANSPLANTATION

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BACKGROUNd: Reduction of acute cellular rejection, without toxicity or infection, is the main goal of transplantation. Cyclosporine microemulsion (CyA) has provided significant advance in the field of liver transplantation. The 2-h post dose (C2) blood level of CyA that correlates well with drug exposure (AUC), is becoming an accepted method of monitoring. C2 monitoring is associated with considerably fewer side effects compared with C0 monitoring. The aim of this study was to assess the short-term safety and efficacy of a CyA-based immunosuppression regimen with C2 monitoring in liver transplant recipients. METHODS: Following informed consent, 200 liver transplant recipients received CyA (6–8 mg/kg/day) and corticosteroids for post transplant immunosuppression. CyA dose was adjusted with C2 monitoring, maintaining levels between 700 and 1200 ng/ml in the first 3 months. Subsequently levels were maintained between 500 and 800 ng/ml. Patients were monitored for an increase in serum creatinine, new onset hyperlipidemia, diabetes mellitus and hypertension. Biopsy-proven acute cellular rejection, as well as allograft function, were recorded. RESULTS: Twenty-three patients (mean age 52 ± 8 years) were enrolled. Of these, 18 (78%) were male, 21 (91%) Caucasian and 2 (9%) were African-Americans. The mean follow-up period was 7 months (1–12 months). Indicators for liver transplantation included chronic hepatitis C in 12 (52%), hepatocellular carcinoma in 4 (17%), cholestatic liver disease in 3 (13%), alcoholic cirrhosis in 2 (8.5%), and cryptogenic cirrhosis in 2 (9%). Acute cellular rejection was diagnosed in 4 (17%) patients. Three (13%) rejections occurred early in the first 30 days. Mean CyA C2 level was 760 ± 202 ng/ml at month three after transplant and 610 ± 168 ng/ml at month six. Serum creatinine levels were stable during the study period. Seven patients (30%) developed moderate hypertension requiring treatment. Diabetes mellitus developed in 4 (17%) of the patients. Histological recurrence of hepatitis C was noted in 6 (26%) patients. No patient developed hyperlipidemia during the follow-up period. CONCLUSIONS: Early results from this study indicate that immunosuppression based on CyA monitored with C2 levels in the novel liver transplant patients is a safe and effective approach. Long-term benefits of effects of this approach are currently being monitored.

### 1021 LIVING-RELATED LIVER TRANSPLANTATION FOR EPITHELIOID HEMANGIOENDOTHELIOMA – A CASE REPORT

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INTRODUCTION: Epithelioid hemangioendothelioma (EH) is a rare, low-grade neoplasm of vascular origin that has an unpredictable malignant potential. EH arises preferentially in soft tissue and bone and rarely in liver. Biologically EH of the liver tend to be multi-focal and often incompatible with resection. OBJECTIVE: The outcome of one patient treated by a living-related liver transplantation (LRLT) is the subject of this report that represents as far as we know, the first case of LRLT used for the treatment of this type of liver tumor. CASE REPORT: The case reported involves a 39-year-old female patient with a huge EH of the liver involving segments III, IV, V, VII and VIII, with no other evidence of disease outside of the liver. This patient was submitted to a liver biopsy of the mass in another service and then referred to our group. As the prognosis of any treatment was considered unfavorable, a decision was made to submit her to a liver transplantation. Unfortunately the waiting time on the list for her was considered prohibitive, so then the group suggested a LRTL. The donor was her brother, a 36-year-old healthy male, with no evidence of any kind of illness, who donated to the patient the right lobe of his liver (segments V, VI, VII, VIII). The right lobe liver transplantation was then performed, the original liver of the recipient was a large liver with a very solid consistency with no evidence of nodes. The transplantation itself was done using a conventional LRTL technique and the patient recovered from surgery well and was discharged from the hospital on the 15th postoperative day using MMF + tacrolimus and corticosteroids. So far, at the 4th postoperative month there is no evidence of recurrence. CONCLUSION: Based on the present case, we suggest that transplantation for EH can be performed with acceptable survival. The LRTL opens a great chance for this group of patients who present with liver tumors that cannot wait for an organ in a waiting list. We also advise that in cases of node-positive disease there is a high risk of recurrence and this may be associated with lower patient survival.

### 1022 INFECTIOUS COMPLICATIONS IN LIVER TRANSPLANTATION: COMPARISON BETWEEN LIVING-RELATED AND CADAVERIC DONOR

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BACKGROUNd: Since 2001, adult liver transplantation with living-related donor (LRD) has been performed regularly in our hospital. Surgery is more complex and it presents a higher incidence of surgical complications than with cadaveric donors (CD). OBJECTIVE: To compare the incidence and type of infections that occur in patients (pat.) who receive a liver
transplantation with LRD versus CD. METHODS: Medical records from all the adult patients who received a first liver transplant between 01/01/2001 and 07/30/2003 in our hospital were prospectively registered. RESULTS: 25 pat, with LRD and 54 with CD were included. Sex: female; LRD, 52%; CD, 37%; median age: LRD, 52 years; CD, 49 years; indication: HCV, LRD, 36%; CD, 22%; B, 24% in LRD and 45% in CD; C, 16% in LRD and 30% in CD. Child-Pugh score was A: 56% in LRD and 20% in CD. There were no differences in immunosuppression between the groups. Mortality was 8% in LRD and 11% in CD. Surgical complications (SC): DVB, 7 episodes in 7 pat. (28%); biliary, 6 episodes – 5 bile leaks and 1 stricture. Vascular complications: 1 HAT, CD, 4 episodes in 4 pat. (7%); biliary, 3 strictures; and one hematomeurinem. The global incidence of infections was similar in both groups. Bacterial infections were the most frequent in both groups. The relative incidence was higher in LRD. Abdominal localization was more frequent and earlier in LRD. When only abdominal infections associated with surgical complications were analysed, the difference was significantly higher (p = 0.009) in LRD vs CD. The incidence density (no. of infections events per 100 patient months) was also significantly higher in the LRD group. CONCLUSION: Abdominal infections are significantly more frequent in LRD than CD, with a higher rate of surgical complications in this group.

1025 CRITICAL GRAFT SIZE AND FUNCTIONAL RECOVERY IN LIVING DONOR LIVER TRANSPLANTATION

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Cadaver organ donation is scarce in Asian countries. With the local high prevalence (10% of the population) of chronic hepatitis B carriers, living donor liver transplantation (LDLT) remains the only option for many patients indicated for LT in Hong Kong. The outcomes of LDLT are analysed to study the critical graft size and graft functional recovery. Between September 1999 and April 2003, 25 cadaveric, 16 living-related and one auto- LT were performed. Among the 16 LDLT recipients (mean age, 44.4 ± 14.4; mean weight, 61.9 ± 11.4 kg), one patient received a graft from a donor left lobe (weight, 400 g) in an auxiliary partial orthotopic LT (AOLT) for fulminating hepatic failure (FHF). Twelve received the right lobes (mean weight, 724 ± 179 g) and 3 received the extended left lobes (mean weight, 453.3 ± 110 g). Seven were for FHF (5 hepatitis B, 1 Wilson’s disease, 1 idiopathic), 5 for unresectable hepatocellular carcinoma, and 4 for decompensated cirrhosis (2 hepatitis B, 1 hepatitis C, 1 biliary atresia). Besides the AOLT with graft/recipient weight ratio (GRWR) being 0.42, the GRWR for the remaining 15 LDLTs were 1.11 (0.76–1.75). The GRWR in the 25 cadaveric LTs were higher 1.92 (1.05–3.65) (p < 0.001). Among the 12 successful LDLTs, there were 4/6 (66.7%) cases of small-for-size graft syndrome (SFSSG) in GRWR <0.8; 5/6 (83.3 %) in GRWR <1; none in the remaining 6 with GRWR >1. When the first 2 weeks’ post-LT graft functions were compared between LDLT and cadaveric LTs, the INR (1.42 vs 1.24, p = 0.033), ALT (382 vs 231) and AST (48 vs 68, p < 0.001) were significantly higher (with or without SFSSG) in the LDLT group. Among the LDLT, those with SFSSG had a significantly higher bilirubin (p < 0.001) and lower ALT (p = 0.01) than those without SFSSG. In conclusion, small-for-size graft syndrome can be avoided if GRWR >1, but often occurs if GRWR <0.8. In general, graft function in LDLT recovers more slowly than cadaveric LT. In spite of challenges, LDLT is still a highly effective therapy.
an optimal graft quality and ensure donor safety. Our protocol for evaluation of a potential donor for LRLT and complications for liver donation is presented. Potential donors are evaluated over IV phases starting from basic to advanced biochemical, haematological and virological investigations. The donor liver anatomy is worked out by use of CT/ MRI scans. Evaluation also includes a complete physical examination and anesthetist’s, physician’s and psychiatrist’s evaluation. We retrospectively analysed prospectively collected data of LRLT performed between February 2000 and January 2003 for donor complications. There were 16 LRLT performed during the study period. Donors (13 M, 3 F) were of mean age 30 (18–49) years. There were 5 donations from siblings, 2 from parents and 9 from offspring. Donated liver portions were 4 left hepatectomies (S2–4), 5 right hepatectomies (S5–8) and 7 modified extended right hepatectomies (S5–8). The average weight of donated liver was 619 (380–1292) g. Mean ICU stay was 1.06 (1–2) days and mean hospital stay was 9.12 (7–14) days. There was no mortality and no re-operation in this series. There were no biliary or vascular complications. Only 2/16 donors had morbidity requiring intervention (incision and drainage of wound infection and drainage of abdominal collection) and 4/16 patients had wound infections requiring conservative management. Liver function tests normalized in 10.25 (5–14) days post donor liver resection. We believe that a thorough and complete preoperative work-up helps in selecting a donor with good graft quality and avoids any surprises later and hence ensures donor safety.

1027 MULTI-MODALITY TUMOR CONTROL AND LIVING DONOR LIVER TRANSPLANTATION FOR UNRESECTABLE HEPATOCELLULAR CARCINOMA (HCC)

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Liver transplantation (LT) is an acceptable mode of treatment in selected patients with unresectable HCC. However, due to the scarcity of cadaveric donor organs and long waiting times, it is considered desirable for patients to opt for living donor liver transplantation (LDLT), or for those not being transplanted soon, to have some form of tumor control therapy. Such an approach in our program is analyzed and reported. In our institution, 42 LTs were performed between October 1999 and April 2003. Of these, 18 recipients (15 M, 3 F) had 27 HCC. The average number and size of HCC was 1.59 (1–4) and 2.31 (0.2–6.5) cm, respectively. The HCC in 5 (28%) patients were incidental, and discovered only on the pathology exam of the explanted liver. Another 13 patients were transplanted primarily for unresectable HCC. Seven patients (5 LDLT, 2 cadaveric LT) were transplanted soon (mean, 3.2 months) after listing; so did not required tumor control therapy. The remaining 6 patients waited for 11.8 (4–21) months before LT. Two patients had previous resection and presented with unresectable recurrence. Three patients underwent microwave coagulation therapy, and one of them also had 6 treatments of alcohol injection. One patient received 6 cycles of the novel PLAF (cisplatin, interferon, adriamycin and 5-FU) chemotherapy followed by selective internal irradiation (SIR) treatment with Yttrium 90 microspheres. One patient received SIR treatment. One patient received conformal radiation therapy. Overall, there were 2 postoperative deaths. The other 16 patients in this series are still alive with no evidence of tumor recurrence with a mean follow-up time of 20.4 (3.6–41.2) months. In conclusion, for patients with unresectable HCC, in areas with poor cadaveric donor rate, living donor should be the first option. If not available, then aggressive multi-modality therapy prior to cadaveric LT should be used.

1028 TRIANGULAR AND SELF-TRIANGULATING CAVOCAVOSTOMY FOR ORTHOTOPIC LIVER TRANSPLANTATION WITHOUT POSTERIOR SUTURE LINES

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INTRODUCTION: Cava preservation techniques have evolved in order to avoid the complications of the vena cava anastomosis – venous outflow obstruction and bleeding. With the increase in paediatric and live-related liver transplantation it is important to develop safer and better methods of cava preservation. We present two modifications of cava preservation technique – triangular cavocavostomy and the self-triangulating cavocavostomy, which have been designed with an added advantage of having no posterior suture line. METHODS: In both these methods the shape of the cavocavostomy is triangular with the apex being inferior and the base superior. The widest points are the corners of the bases and these represent the points where the hepatic veins of the donor liver lie. All suture lines are anterior. We use venoovenous bypass (VVB) routinely, although the self-triangulating cavocavostomy can be performed without VVB as a side-biting caval clamp is used. RESULTS: From October 1999 to June 2003, 28 triangular cavocavostomies and 17 self-triangulating cavocavostomies have been performed on an unselected group of patients. All patients are currently alive and the actual graft survival is 100% to date. There has been one incidence of right hepatic vein stenosis (in the self-triangulating group) on long-term follow-up giving a morbidity of 2.2%. Warm ischaemia times and blood transfusion rates compare favourably with conventional cavocavostomies. CONCLUSION: Triangular and self-triangulating cavocavostomies are an added tool in caval preservation techniques.

1029 SURGICAL TECHNIQUES ACCORDING TO ANATOMICAL VARIATION IN LIVING DONOR LIVER TRANSPLANTATION USING RIGHT LOBE

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PURPOSE: Right lobectomy has recently been shown to be safe for the donor and has permitted the wider application of living donor liver transplantation (LDLT). The right lobe has many anatomical variations in the vascular and biliary tree, which could lead to surgical complications. We need to define surgical technique according to anatomy. METHOD: From May 1999 to Oct. 2003, 60 LDLTs using right lobe graft were performed in patients with end-stage liver disease. The graft volume was measured by CT volumetry. The vascular and biliary trees were evaluated preoperatively with MR angiography and cholangiography. We classified anatomical points for safe harvest in hepatic artery, portal vein and biliary tree and described technical points based on anatomical variations. RESULTS: The average volume of the right lobe was 789 ml and 520 ml in the left lobe. There were many anatomical variations in the hepatic artery, portal vein and bile duct. Right hepatic artery arising from SMA was observed in 4 cases (type IV, 6.8%). Single end-to-end anastomosis using a microscope were performed in all cases except two patients. Portal vein variation was observed in 10 cases (10%): portal vein trifurcation (type II, 5 cases), early branching of right posterior portal vein from main portal vein (type III, 3 cases), anterior segmental branch originating from the left portal vein (type IV, two cases). Single anastomosis in type I and single anastomosis with or without plasty in type II was performed. Double anastomosis was performed in type III and type IV. Bile duct variation was observed in 10 cases (17%): 3 cases in type II and type IV, 4 cases in type III. The biliary reconstruction consisted of duct-to-duct anastomosis, hepatojejunostomy and combined method. CONCLUSION: LDLT using the right lobe can be performed safely, but there is potential operative risk because of various anatomical variants. To minimize operative complications, anatomical variations should be kept in mind to ensure a safe and successful operation.

1030 UNUSUAL DIAGNOSIS OF AN INTRADUCTAL PAPILLARY AND MUCINOUS CARCINOMA IN A LIVER TRANSPLANT RECIPIENT

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Evaluation for liver transplantation contains a well developed stepwise process of non-invasive and invasive procedures to identify all potential diagnoses and co-morbidity prior to elective and emergency transplantation. We report on a 56-year-old male patient who was admitted for liver transplantation. The patient suffered from progressive insufficienty of liver function. Etiology of the underlying liver disease was unknown and drug-induced toxicity was suspected. Liver biopsy, CT scan, MRI, endoscopy, and ERCP gave no further information for etiology. Due to progressive disease the patient was evaluated for transplantation status T2. Transplantation was performed orthotopically on 24.09.2003. Liver explant revealed congestion and cholestasis, but no cirrhosis. The graft had primary function and initial immunosupression consisted of tacrolimus and prednisolone. Despite declining transaminases, cholestasis parameters were elevated for a prolonged period during the postoperative course. Surprisingly, explant liver histology outlined a mucinous carcinoma with its origin from an intraductal papillary carcinoma with diffuse infiltrates. Also,
a signet-ring cell component of adenocarcinoma was present. Invasive tumor growth was seen especially in the hilar region. Cholangitis is related to intraductal mucus. Tumor was staged pT4 and due to lymphatic and hematogenic tumor growth resection margins were staged as R1 resection. Therefore, tacrolimus and prednisolone were immediately replaced by rapamycin monotherapy as an ultimate ratio approach. Repeated examinations revealed no extrahepatic malignancy. Despite meticulous evaluation of liver recipients, rare carcinomas might be undetectable at time of transplantation. Guidelines for treatment of intraductal mucinous papillary carcinoma after liver transplantation do not exist. It appears uncertain whether the avoidance of a potent immunosuppressive regimen is beneficial and if the switch to rapamycin might prevent tumor growth in such a situation. However, rejection was not present yet and follow-up of 2 months is without tumor recurrence.

1031 SIMULTANEOUS LIVER AND KIDNEY TRANSPLANTATION FOR POLYCYSTIC LIVER AND KIDNEY DISEASE
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AIM: We analyse indications, surgical technique, complications and results of initial experience of the first simultaneous transplantation of both these organs in an adult in Poland. MATERIALS AND METHODS: Since the beginning of the liver transplant program in December 1989, 246 livers have been transplanted at our department. We carried out one combined liver and kidney transplantation in a 58-year-old woman. She was on a chronic dialysis program before transplantation. Her liver function was still acceptable but she suffered from a huge liver mass. We harvested both liver and kidney from the same donor and performed simultaneous transplantation with a compatible blood group recipient. RESULTS: Liver function after transplantation was very good. Early function of the kidney was not satisfactory so the patient needed dialysis. On days 6 and 7 she was reoperated due to bleeding into the peritoneal cavity. Only one episode of renal rejection occurred 5 weeks after operation. The actual patient's status as well as graft function is normal. CONCLUSIONS: Simultaneous liver and kidney transplantation should be offered to patients for polycystic liver or kidney disease following insufficiency of these organs.

1032 BILIARY RECONSTRUCTION IN ADULT LIVER TRANSPLANTATION WITH HEPATOCITOGENUSM USING ROUX-EN-Y
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OBJECTIVE: To show the results of adult liver transplantation with whole liver from cadaveric donors using Roux-en-Y hepaticojejunostomy for biliary reconstruction. PATIENTS: We report 19 patients, 9 female (47.3%) and 10 male (52.7%) with a mean age of 48 years (range 18-57 years) transplanted, during the period of 39 months from March 2000 to June 2003. In 13 cases we performed liver transplantation using the classic technique and 6 cases using the piggyback technique. The most frequent aetiologies were primary biliary cirrhosis (31.5%) and alcoholic cirrhosis (26.3%). We used double esue of immunosuppression: one with cyclosporine A in 10 cases and the other one with tacrolimus in 9 cases. In all the transplants performed by our team we used Roux-en-Y (hepaticojejunostomy) for the biliary reconstruction, the material used was non-absorbable sutures stitch by stitch. RESULTS: The follow-up period is from 6 to 45 months, the incidence of acute rejection is 10.5%; survival at 1 year is 94.7%. We had only one complication, the last patient of our series: a man aged 58 years with the diagnosis of alcoholic cirrhosis and severe malnutrition and TIPS trombosed at 7 days post transplant, be developed abdominal sepsis. Partial disruption of enteric-enteric anastomosis represented the 5.2% of complications of that procedure. The patient went twice for re-operations and finally died. We did not have any other cases of early or late complications with this type of biliary reconstruction in our series. Conclusions: Biliary reconstruction using Roux-en-Y hepaticojejunostomy is a secure procedure if we use appropriate sutures and a fine technique during the performance of surgery, with good outcomes.

1033 LIVING-RELATED DONOR LIVER TRANSPLANTATION IN PAEDIATRIC PATIENTS: EXPERIENCE IN PERU
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OBJECTIVE: To report the results of living-related donor liver transplantation in the pediatric population. PATIENTS: We report 2 pediatric patients: one male, one female, with a mean age of 27 months (range 18-36 months), who were transplanted between March 2002 and May 2003. Biliary atresia cirrhosis was the common aetiology of both cases, Child Pugh-Turcotte grades were 8 and 9, respectively, UNOS status 3, ABO type compatible. Both children had undergone a Kasai portoenterostomy, at 6 and 8 weeks of age, respectively. Previously they had complications in their preoperative evolution; leg right bone fracture. Both transplants were performed using Roux-en-Y (hepaticojejunostomy) for the biliary reconstruction, the material used was non-absorbable sutures stitch by stitch. Immunosuppression was carried out with tacrolimus and prednisone (for 6 months). RESULTS: Follow-up was 6 to 30 months respectively, no cellular rejection was reported. In the girl an episode of autolimited type 6 herpes virus infection was detected at the 5th month after transplant, there was no CMV infection. There were no surgical complications in our patients. In both adult living donors the postoperative follow-up was excellent and no complications were reported. CONCLUSIONS: Living donor liver transplantation in paediatric patients is a reality in our country with very good results as in other liver transplant centers.

1034 DECREASED CD3-4 AND 4’ CHAIN RNA LEVELS IN CHRONIC HEPATITIS C: CORRELATION WITH TREATMENT OUTCOME AND IL-2/IFN-I RESPONSE DURING IFN-0 AND RIBAVIRIN COMBINATION THERAPY
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BACKGROUND AND AIM: Viruses that infect the immune system with an acute or chronic replication mode induce major down-regulation or activation of T-cell subsets. The purpose of our study was to determine the effects of HCV virusemia on a) T-cell antigen receptor/casr of differentiation (TCR/CD3) γ and δ chain messenger RNA (mRNA) levels in peripheral blood lymphocytes, and b) serum interferon-gamma (IFN-γ) and interleukin-2 (IL-2) response of chronic hepatitis C patients before and during interferon-α (IFN-α) and ribavirin combination therapy in order to correlate differences in these levels with eventual treatment outcomes. METHODS: Serum and peripheral blood lymphocytes from 10 study and 3 control group patients were collected and analysed for CD3-γ and γ mRNA transcripts using a semi-quantitative reverse transcription PCR assay and serum IFN-γ and IL-2 response by ELISA. Results were obtained at baseline levels and for subsequently scheduled intervals. RESULTS: Baseline levels of TCR/CD3-γ and δ chain mRNA were decreased in peripheral blood lymphocytes of chronic hepatitis C vs control patients (6.8 ± 7.4 vs 15.7 ± 3.9 × 10^5 counts mm^-3); p < 0.05 for CD3-γ; 0.99 ± 1.6 vs 6.0 ± 1.6 × 10^5 counts mm^-3); p < 0.01 for CD3-δ. Patients experiencing a restoration/preservation of CD3-γ gene transcripts and an increase in serum levels of IL-2 showed a sustained response to therapy. Differences from baseline levels after 2 weeks of therapy reflected eventual treatment outcome between responders and non-responders. CONCLUSIONS: In this pilot study, the combined expression and/or preservation of CD3 gene transcripts and an increase in serum IL-2 level in chronic hepatitis C patients may reflect T-cell-mediated elimination or clearance of serum hepatitis C virus RNA with achievement of a sustained response to combination IFN-α and ribavirin therapy.

1035 MULTIVARIATE ANALYSIS OF RISK FACTORS FOR LIVER ABCESS
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AIM: The aim of this study was to identify any risk factor associated with hospital mortality in patients with liver abscesses. METHODS: 126 liver abscesses patients treated during the years 1984–2003 were studied. Liver
abscesses were divided into seven categories: cholangiogenic – 70 (55.6%); cryptogenic – 24 (19.1%); abscess after blunt and penetrating trauma – 9 (7%); pyelonephritic abscesses – 5 (4%); after recent hepatic surgery – 7 (5.6%); direct extension from a contiguous disease process in gallbladder – 6 (4.8%) and amoebic – 5 (4%). Liver abscesses were also divided into solitary (63.5%), multiple (18.3%) and multiple microabscesses (18.3%). 50.8% were treated by percutaneous method only, 23% by surgical method, 23% cases received only drainage of biliary tree and antibiotic therapy (patients with biliary obstruction) and 3.2% were treated by antibiotic alone. Univariate analysis was performed using the Student's t test, χ² square test with Yates correction and Fisher's exact test, followed by multivariate stepwise logistic regression analysis to identify independently significant factors of mortality. Significance was taken as p < 0.05. RESULTS: The overall mortality was 23% in this study. Univariate analysis revealed that a bilary origin of the abscess, jaundice, pneumonia, biliary obstruction, malignancy, septic shock, perforation, multiple micro-abscesses, low hemoglobin level (<100 g/L), leukocytosis (>20,000/mm³), stab neutrophilosis (>10%), high concentrations of alkaline phosphatase (>400 IU/L), bilirubin (>80 mcL/L), BUN (>10 mmol/L), and creatinine (>2 mg/dL), positive blood culture and antibiotic therapy in biliary tree non-adequately drained patients were associated with a higher mortality rate (p < 0.05). The highest mortality rate (87.5%) was identified in biliary tree newly inadequately drained patients (7 of 8, p = 0.023) and the lowest in patients treated by percutaneous method only (6.3%). Multivariate analysis revealed that low hemoglobin level, high concentrations of bilirubin, BUN and creatinine, septic shock, perforation, multiple micro-abscesses and non-adequate drainage of biliary tree were the independent predictors of mortality. CONCLUSIONS: Evidence of multiple micro-abscesses and non-adequate drainage of biliary tree, besides anemia, hyperbilirubinemia, sepsis and MOF are the most important mortality predictors.

1036 SHOULD SURGICAL OR PERCUtaneous DRAINAGE BE USED AS FIRST-LINE TREATMENT FOR PYOGENIC LIVER ABSCESS? A COMPARATIVE AUDIT
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PURPOSE: The management of pyogenic liver abscess is associated with high morbidity and mortality. In recent years, the role of percutaneous drainage has gained wider acceptance in favor of open surgical drainage as first-line treatment as it is less invasive and associated with a lower morbidity. Surgery however, can provide a definitive treatment and a faster resolution of sepsis. However, no randomized control trial comparing outcomes from these two treatments has been conducted. At our institution, there is a dichotomy in the approach to pyogenic liver abscess (PLA) between these 2 strategies. This provided a unique opportunity to study these strategies as first-line treatment. Our aim was to conduct a study comparing percutaneous and open surgical drainage to see if there was a better outcome in one of the treatment arms. METHODS: A retrospective review of the Department of Surgery experience between December 1999 and August 2002 was carried out. All liver abscesses treated by percutaneous or surgical drainage were included (ruptured and amebic abscesses excluded). Clinical end-points included time to resolution of sepsis, success rates, adverse effects of each treatment, secondary procedures, morbidity and mortality rates. RESULTS: Over a 24-month period, a total of 83 patients with PLA were treated of which 76 patients were included in our study. The mean age was 57.5 years (range 26-86) with a male predominance. 47 % of our patients had underlying diabetes mellitus. All abscesses were 4 cm or larger and 73% were documented as loculated. Thirty patients underwent percutaneous drainage and 46 patients underwent open surgical drainage. The overall mortality of the series was 3/76 (4%). A comparison of the two arms shows no significant difference in abscess characteristics (loculation and size), time to resolution of sepsis, success rates and mortality. However, those in the percutaneous group underwent more secondary interventions (13 vs 4; p=0.03). CONCLUSION: Our aggressive treatment strategy is associated with a lower than previously reported mortality rate. Percutaneous and surgical drainage were equally successful treatment strategies but those in the percutaneous group required more secondary interventions. A randomized controlled trial is required to resolve this issue.

1037 ISOLATED HEPATIC TUBERCULOSIS
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Abdominal tuberculosis is a common clinical entity in the Indian subcontinent; however, hepatic tuberculosis in the absence of miliary abdominal tuberculosis is extremely rare. PATIENTS AND METHODS: Patients presenting to the single tertiary referral center between 2001 to 2003 and diagnosed as isolated hepatic tuberculosis (n = 6) were retrospectively analysed. The presentation, biochemical parameters, radiological findings, co-existence of tuberculosis of other organ system and immunodeficiency, treatment given and final outcome were studied. RESULTS: All patients presented with fever and hepatomegaly. Four of them had pain in upper abdomen and vomiting. Two of our patients were immunocompromised, one with HIV and one with lymphoma. All patients had normocytic normochromic anaemia with mean haemoglobin value of 9.03 (range 6.9-11.8) and raised erythrocyte sedimentation rate (mean 65, range 35-105, normal 20 mm at 1 h). Only two patients had leucocytosis (defined as a differential count >45%). Aspartate aminotransferase levels were mildly elevated in 5 (mean 67, range 45-91) and alanine aminotransferase was elevated in 4 (mean 97, range 55-159). Two patients had jaundice with direct hyperbilirubinemia. Alkaline phosphatase was raised in 5 (mean 445, range 247-626). All patients had low albumin (mean 2.3, range 1.3-1.7) with reversal of A: G ratio (mean 0.6, range 0.4-0.9). Prothrombin time was normal in all and LDH values were elevated in all (mean 794.4, range 402-1597). On ultrasoundography, one patient had multiple hypodense lesions 1 had coarse echotexture of liver, 1 had uniform hypoechoic pattern and 3 had just hepatomegaly without any specific pattern. Chest X-ray was normal in 3 of 6 patients, 1 was showing fibrotic nodule, 1 was showing pleural effusion with diffuse reticular shadow and 1 was suggestive of an ARDS-like picture. Sputum AFB was negative in all the patients. No liver biopsy showed caseating granuloma within liver. Three of these had visible acid-fast bacilli on AFB staining of tissue. AFB culture was positive in one patient. All patients were treated with 4-drug anti-tubercular drug chemotherapy. Five of these patients had complete resolution of liver lesions. The patient with lymphoproliferative disease died. CONCLUSION: Liver tuberculosis has protein manifestations with non-specific alteration of liver function tests. This is best diagnosed on liver biopsy showing granulomatous inflammation. Overall response to therapy is satisfactory.

1038 PERCUtaneous CATHERETER DRAINAGE OF LIVER ABSCESS: RESULTS FROM A LONG-TERM STUDY FROM A DEVELOPING COUNTRY UNIVERSITY HOSPITAL GENERAL SURGICAL SET-UP
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AIM: To evaluate results of percutaneous catheter drainage of liver abscess in a developing country university hospital general surgical set-up. METHODS: During a period of 4.5 years (June 1999 to Nov 2003), 44 patients with liver abscess who underwent percutaneous drainage with pigtail or malecot percutaneous catheter using the Seldinger's technique were included in the study. Diagnosis of liver abscess was made on the basis of clinical history and examination followed by ultrasoundography (USG). Chest roentgenogram, hemogram, bleeding time, clotting time and prothrombin times were assessed in all patients. CT scan and serological tests were not routinely performed in our study. RESULTS: The volume of pus drained ranged from 100 ml to 3300 ml. Average period of catheter drainage was 16 days with a range of 6-41 days. Although about 30% of our patients had minor complications, there was no major morbidity or mortality encountered in the procedure. The study shows a success rate of 84%. CONCLUSION: The study confirms that percutaneous catheter drainage of liver abscess is successful with a low morbidity and mortality. It is recommended as the first line of management in liquefied moderate to large sized abscesses. It is recommended that general surgeons, especially in developing countries, who are likely to see a large number of such cases, master this art and develop a working knowledge of ultrasoundography to be able to perform this procedure independently, without the help of a sonologist.
1039  EXAMINATION OF PATIENTS UNDERGOING US-GUIDED DRAINAGE FOR LIVER ABSCESSES
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We investigated 29 patients who underwent drainage for liver abscesses in our department during the past 20 years, including 3 patients undergoing additional drainage. The subjects consisted of 16 males and 10 females, with a mean age of 59.9 years, a mean duration of admission of 74.8 days, and a mean duration during which a drain was inserted of 38.6 days. Most patients complained of fever. Concerning the disease, 9 patients had hepatocellular carcinoma, comprising the highest percentage. Seven and 22 patients underwent drainage before and after surgery, respectively. Ten patients underwent hepatectomy (including microwave coagulomeric therapy), comprising the highest percentage. Concerning causative bacteria, Staphylococcus epidermidis was detected in 8 patients. Communications with the bile duct were observed in 8 patients. In addition, communications with the duodenum, large intestine, or bronchus were observed in 1 patient each. We clarify the clinical features of liver abscesses with a review of our series, and report US-guided drainage as a therapeutic strategy for liver abscesses with respect to indications and procedures.

1040  PYELEPHLEBITIS AS A COMPLICATION OF ACUTE APPENDICITIS
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Pyelephlebitis is defined as a septic thrombocephlebitis of the portal vein or one of its tributaries, usually secondary to infection in the region drained by the portal venous system. Pyelephlebitis is extremely rare today but a high mortality rate is associated with this disease. It can be a severe complication of acute appendicitis and other intra-abdominal or pelvic infections. One patient was a 54-year-old man. He was admitted with abdominal pain for 7 days. He underwent appendectomy with drainage for periappendical abscess. He was discharged on the 9th postoperative day. Four days after discharge, he developed high fever and chills and was readmitted. Abdominal ultrasonography revealed intra-abdominal abscess in the right paracolic gutter and a thrombus in the portal vein. The angiography showed portal vein thrombosis and superior mesenteric vein thrombosis. Reoperation was performed. Antibiotic therapy was continued but his symptoms were not improved. 25 days after the second operation, hepatic abscess developed which was treated with percutaneous drainage. He was discharged in good condition on the 45th postoperative day. The second case was 58-year-old woman patient. She had 3-day duration of diarrhea and high fever and right lower quadrant abdominal pain. Abdominal ultrasonography and computed tomography revealed peripancreatic mass and occlusion of the superior mesenteric vein. Appendectomy was performed and massive antibiotic therapy was applied. She was discharged with no complications. These patients had a favorable outcome with medical and surgical therapy, Early diagnosis, timely administration of antibiotics and the role of surgical therapy are important for pyelephlebitis.

1041  EARLY DIAGNOSIS OF BACTERIAL AND FUNGAL INFECTION IN CHRONIC CHOLESTATIC HEPATITIS B
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AIM: To investigate methods for the early diagnosis of bacterial and fungal infection in patients with chronic cholestatic hepatitis B. METHODS: 101 adult inpatients with chronic hepatitis B were studied and divided into three groups: direct blirein (DBI)/total bilirubin (TBb) >0.5, without bacterial or fungal infection (group A, n = 38); DBI/TBb <0.5, without bacterial or fungal infection (group B, n = 21); DBI/TBb >0.5, with bacterial or fungal infection (group C, n = 40). The serum biochemistry and pulse rate were analysed. RESULTS: The pulse rate in group A decreased compared with that in groups B and C (63.68 ± 6.38, 77.74 ± 11.42, 81.22 ± 12.21, respectively, p < 0.001). The level of ALP in group A increased compared with that in groups B and C (198.93 ± 67.98, 148.89 ± 50.46, 156.04 ± 42.84, respectively, p < 0.05). The level of TBb, DBI and DBI/ALP showed significant differences among the three groups (TBb: 219.558 ± 205.623, 59.474 ± 32.822, 370.050 ± 227.308, respectively, p < 0.01; DBI: 146.398 ± 136.255, 21.570 ± 11.645, 213.530 ± 142.887, respectively, p < 0.01; DBI/ALP: 0.7829 ± 0.7022, 0.1377 ± 0.0652, 1.6468 ± 1.5050, respectively, p < 0.01). The serum DBI and infection affect DBI/ALP (p < 0.05, p < 0.001, respectively). Independent of the effect of DBI, infection caused DBI/ALP to rise (p < 0.05). The equation (infection = 0.218 pulse rate + 1.064 DBI/ALP - 16.361), with total accuracy of 85.5%, obtained from stepwise logistic regression. Pulse rate (≥80 times/min) and DBI/ALP (≥1.0) was used to screen the bacterial and fungal infection in chronic cholestatic hepatitis B. The sensitivity is 62.5% and 64.7%, respectively, and the specificity is 100% and 82.8%, respectively. CONCLUSION: Bacterial and fungal infection depends on the pulse rate, hence, decrease ALP and increase DBI/ALP. The equation (infection = 0.218 pulse rate + 1.064 DBI/ALP - 16.361), pulse rate and DBI/ALP helps in the early diagnosis of bacterial and fungal infection with chronic cholestatic hepatitis B.

1042  SEPTICEMIA FOLLOWING THE PLACEMENT OF TRANSGIULAR INTRAHEPATIC PORTOSYSTEMIC SHUNT IN THE TREATMENT OF REFRACTORY ASCITES – A CASE REPORT
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INTRODUCTION: Since its introduction 10 years ago, transjugular intrahepatic portosystemic shunt (TIPS) has become a routine procedure in the treatment of portal hypertension in patients with cirrhosis. TIPS is a metal stent that uses a percutaneous approach and is inserted in the liver parenchyma connecting the porta vein with one of the major liver veins. Its function is to decompress the portal circulation in patients with portal hypertension. The increased use of TIPS on patients with portal hyper-tension can be attributed to some advantages over surgical shunts: it maintains the extrahepatic vascular anatomy in patients who are transplant candidates, it is not an extensive abdominal surgery and does not require general and local anesthesia. TIPS is associated with low complication rates, including encephalopathy (25%), bleeding (5%) and deterioration of liver function (up to 7%). Infectious complications are uncommon, being found in 1–10% of patients undergoing this procedure. OBJECTIVE: The objective of the present study is to report a case of sepsis after a transjugular intrahepatic portosystemic shunt (TIPS) was used in the treatment of refractory ascites. CASE REPORT: The case reported involves a 56-year-old patient with liver cirrhosis due to alcoholism and ascites difficult to control clinically. As the response to treatment was unfavorable, a decision was made to use TIPS to control ascites. The general status worsened as a result of other complications, with poor prognosis due to the non-typical and unfavorable evolution. There are few studies describing TIPS-related infections, but septicemia is a severe event that needs to be further investigated to improve diagnosis and treatment, as this complication has high morbidity and mortality rates. CONCLUSION: Based on the present case, we suggest the evaluation of criteria defined by the literature for risk groups and the systematic use of antibiotics with a wide spectrum as prophylaxis and as therapy in the high-risk groups, in order to minimize the likelihood of sepsis occurrence.

1043  A CASE OF RADIOFREQUENCY ABLATION THERAPY FOR RECURRENT HEPATOMAS WITH TUMOR FEVER – EFFICACY OF HEPATIC ARTERIAL INFUSION THERAPY OF ANTIMICROBIALS AND ANTICANCER DRUGS
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The efficacy of hepatic arterial infusion therapy (HAI) using antibiotics for hepatic abscess has been reported. However, we performed radiofrequency ablation (RFA) therapy after HAI of antibiotics and anticancer drugs for recurrent hepatomas with tumor fever, and they were effective procedures. A 67-year-old female with recurrent hepatomas with fever presented with a 6-cm recurrent hepatoma in the right lobe and IM in the both lobes. Her liver function was Child A with hepatitis C. On her CT scan, we found an enhanced 60-mm mass at early phase and it was washed out at delayed phase. First of all, we gave systemic medication of antibiotics, but could not reduce the fever. Therefore, we performed HAI with antibiotics and anticancer drugs. The patient’s temperature went down after 14 days, and we could cut down her tumor size. After HAI, we could completely perform RFA for recurrent hepatoma.
1044 LAPAROSCOPIC TREATMENT OF GIANT SOLITARY NON-PARASTIC SYMPTOMATIC BILIARY CYSTS

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INTRODUCTION: Although hepatic cysts are frequent and usually clinically silent, large cysts may become symptomatic. Different treatment options for symptomatic, benign and non-parasitic hepatic cysts have been proposed: enucleation, fenestration, donor or hepatic resections. The aim of the study was to analyse the technical feasibility and safety of these procedures by laparoscopy, and to evaluate the outcome on follow-up.

RESULTS: Between September 1994 and December 2003, 15 patients underwent laparoscopic hepatic surgery for benign cystic lesions. Eleven patients had one solitary cyst, two had two cysts and two had three cysts. There were eight males and seven females (mean age 56.4 years). Hydatid disease was excluded serologically and radiologically. The mean diameter of the cysts was 60.5 mm (30–170 mm). The mean operative time was 105 min and the mean postoperative hospital stay was 4.5 days. There was no mortality. During a mean follow-up of 24 months (range 3–78), one patient had to be reoperated for a recurrence of the cyst 4 months after surgery. DISCUSSION AND CONCLUSION: Laparoscopic hepatic surgery (laparoscopic fenestration or wide resection) may be the treatment of choice for solitary symptomatic hepatic cysts. Surgery remains indicated only in case of severe symptoms or rapid growth of the lesion.

1045 METHYLPREDNISOLONE ATTENUATES NF-B BINDING ACTIVITY IN POST-ISCHEMIC LIVER TISSUE, THEREBY REDUCING APOPTOSIS AND INFLAMMATION DURING ISCHEMIA/REFPERUSION INJURY

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INTRODUCTION: Living donation may be associated with temporary warm or cold ischemia. Hereafter, the associated ischemia/reperfusion (IR) injury may lead to hepatocellular damage, which might result in organ dysfunction. The aim of our study was to evaluate the protective efficacy of steroid administration, and the potential underlying mechanisms.

MATERIALS AND METHODS: After midline laparotomy male Wistar rats (250–300 g) underwent total vascular occlusion for 45 min. One group of animals received methylprednisolone (MP; 30 mg/kg BW), whereas one group served as ischemic controls. We compared both groups with regard to the extent of IR injury using AST-/ALT-/LDH- and histological changes. We measured the apoptotic (cytochrome C/RT-PCR, caspase 3/ Western blot) and inflammatory (ICAM-1 expression/Western blot, leukocyte tissue infiltration) activity, as well as the NFkB binding activity (EMSA) in post-ischemic liver tissue. RESULTS: All parameters indicating IR injury revealed a significant protection of MP treatment prior to liver ischemia when compared with non-treated animals within 24 h following ischemia. The post-ischemic apoptotic and inflammatory activity was reduced in MP-treated animals, when compared with non-treated animals, as was the expression of NFkB binding activity in post-ischemic liver tissue. DISCUSSION: Administration of MP significantly reduced hepatocellular injury after warm ischemia. The apoptotic and inflammatory activity was significantly reduced in the post-ischemic liver tissue, which we judged as a result of steroid-related suppression of transcription factor NFkB. CONCLUSION: In surgical situations requiring temporary vascular inflow occlusion, administration of MP might help to minimize postoperative complications due to ischemia-related organ dysfunction.

1046 THE ROLE OF S-NITROSOTHIOLS PLASMA LEVELS AS A MARKER OF NITROSATIVE STRESS IN LIVER ISCHEMIA-REFPERUSION INJURY

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BACKGROUND: Plasma nitrosothiols (RSNOS) may act as a circulating form of nitric oxide. Their role in liver ischaemia/reperfusion (IR) injury is largely unknown. This study has investigated changes in plasma RSNOs in a rabbit liver IR model. METHODS: Lobar liver ischaemia was induced in the IR group (n = 6) for 60 min, followed by 7 h of reperfusion. The sham group (n = 6) underwent laparotomy but no liver ischaemia. Serial RSNOS levels were measured in plasma by electron paramagnetic resonance spectroscopy (EPR). NO2-/NO3- plasma levels by electrochemistry, hepatic microcirculation by laser Doppler flowmetry. Because reactive nitrogen species (RNS) may cause formation of S-nitrosothiols in vivo we measured the oxidation of dihydrothromidine to thromidine by fluorescence, as a marker of RNS production. RESULTS: There was a significant increase in RSNOS levels 5 h post-reperfusion in the I/R group compared to baseline (558 ± 76.7 vs 202 ± 67 nm). At the same time points there was a significant decrease in microcirculation (148 ± 9.1 vs 218 ± 11.7 flux units). The changes in NO2-/NO3- plasma levels were not significant (43.6 ± 7.6 vs 51.4 ± 4.8 µM). There was significant production of thromidine at the end of the experiment in the I/R group. There were no significant changes in RSNOS levels in the sham group. CONCLUSIONS: The increased RSNOS concentration at 5 h post reperfusion correlates negatively with changes in the microcirculation, showing that there is marked upregulation of NO synthesis during I/R injury. Measurement of RSNOS levels is a better marker of nitrosative stress than NO2-/NO3- plasma levels.

1047 EFFECTS OF GRANULOCYTE-MACROPHAGE COLONY-STIMULATING FACTOR ON ISCHEMIA-REFPERUSION-INDUCED APOPTOSIS AND LIVER REGENERATION AFTER PARTIAL HEPATECTOMY IN RATS

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AIM: The effect of apoptosis on liver regeneration is still unclear. Experimental ischemia-reperfusion injury is an excellent model to evaluate the apoptosis in the liver. Granulocyte-macrophage colony-stimulating factor (GM-CSF) is a glycoprotein growth factor which delays the apoptosis of macrophages and polymorphonuclear leucocytes in vitro. The aim of this study was to investigate the effects of GM-CSF on ischemia-reperfusion-induced apoptosis and liver regeneration after partial hepectomy in rats.

MATERIALS AND METHODS: Fifty Wistar-Albino male rats weighing 200–275 g were used and they were divided into 5 groups, each containing 10 rats. Ketamine and xylazine were administered intraperitoneally for the anesthesia. A jugular vein catheter was placed in all animals except the sham group and normal saline infusion was started 1 h before operation. Sham group rats were killed after portal dissection. Total ischemia was performed in the other groups. After 70% hepectomy the occlusion was opened for reperfusion of the remnant liver. Before the operation (60 minutes) 0.02 ml normal saline was given to the control groups and 1 µg/kg GM-CSF to the study groups subcutaneously. Blood samples were collected from inferior vena cava for ALT, AST, LDH and Fas levels at 2 and 48 h of reperfusion with performing relaparotomy. Relative liver mass, malondialdehyde (MDA), mitotic index and Fas immunohistochemical staining evaluations from tissue samples were performed. RESULTS: Mitotic index and relative liver weights in the GM-CSF group were significantly higher at 48 h (p < 0.05). ALT, AST and LDH levels were high at 2 h in all groups. However, these levels had declined in the study group by 48 h and hepatic MDA level was high at 2 h but lower at 48 h than the other groups. Fas level and Fas immunohistochemical staining were similar in all the groups. But the levels were lower at 2 and 48 h in the GM-CSF group (p < 0.05). Ischemia-reperfusion injury was high at 2 h but both saline and GM-CSF groups were comparable. However, the injury decreased significantly at 48 h in the study group. CONCLUSION: GM-CSF increases the liver regeneration both morphologically and functionally after Pringle maneuver and partial hepectomy. This application also decreases apoptosis and ischemia-reperfusion injury at the advanced stages of reperfusion.

1048 A REGIONAL EXPERIENCE OF LIVER TRAUMA OVER AN 11 YEAR PERIOD

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PURPOSE: The aim of this population-based study was to assess the incidence, mechanisms, management and outcome of patients who sustained hepatic trauma in Scotland (population 5.26 million) over an 11 year period. METHODS: The Scottish Trauma Audit Group (STAG) records data on all trauma patients who are admitted to hospital for at least 3 days or are managed in the emergency department resuscitation room. Patients who arrive in the emergency department in a state of cardio-respiratory arrest and whose period of attempted resuscitation does not
exceed 15 minutes are excluded from the database. Paediatric data are not recorded. Details of all patients with an Abbreviated Injury Score (AIS) code of liver trauma for the years 1992–2002 were retrieved from the STAG database. Data on identified patients were analysed for demographic information, mechanisms of injury, type of injury, associated injuries, haemodynamic stability on presentation, management and outcome.

RESULTS: A total of 52,676 patients was entered on the database, of whom 783 (1.5%) were identified as having sustained liver trauma. Of these, 71% had major trauma, as defined by an Injury Severity Score of >15. The male to female ratio was 3.1:1 (595 males: 188 females) with a median age of 31 years (range 13–91 years). Blunt trauma accounted for 69% of injuries. Road traffic accidents were the commonest mechanism of injury (53.8%), followed by assaults (31.1%) and falls (10%). Liver injuries were associated with trauma to the chest (69.2%), head (34%) and spine (16.2%). Additional intra-abdominal injuries occurred in 483 patients (61.7%) and involved damage to spleen (n = 188), kidney (167), mesentry (135), colon (71), pancreas (52) and duodenum (32). 166 of the 783 patients (21.2%) died in the emergency department. Of those who left the emergency department alive, 61.9% had a laparotomy as their primary intervention. The overall mortality rate was 42.1%, being higher in patients with increasing age (p < 0.001), haemodynamic instability (p < 0.001), blunt trauma (p < 0.001), increasing severity of liver injury (p < 0.001), and increasing Injury Severity Score (p < 0.001). The mortality rate was inversely related to time taken to transfer to theatre (p < 0.001).

CONCLUSIONS: The incidence of liver trauma in Scotland is low but accounts for significant mortality. As observed in other European liver trauma series, blunt trauma was more common than penetrating trauma. Associated chest, head and other intra-abdominal injuries were common. Outcome was worse in patients with advanced age, blunt trauma, multiple injuries and those requiring an immediate/early laparotomy.

1049 INTRAPORTAL INFUSION OF PENTOXIFYLLINE IMPROVES REGIONAL HEMODYNAMICS AND REDUCES ISCHEMIA-REPERFUSION INJURY AFTER PROLONGED NORMOTHERMIC HEPATIC ISCHEMIA
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BACKGROUND: Many drugs have been tested to reduce the ischemia-reperfusion injury induced by portal triad occlusion. Pentoxifylline, a methylxanthine derivative, has been shown to have beneficial effects on intestinal microvascular and hepatic blood flow during shock and resuscitation. The beneficial effects of pentoxifylline can be associated with the inhibition of inflammatory cytokines, such as TNF-α and IL-6. Our objective was to evaluate the potential systemic and regional benefits of intraportal infusion of pentoxifylline during an experimental model of hepatic ischemia. METHODS: Hepatic ischemia was induced by portal triad occlusion during 45 minutes in 16 mongrel dogs (18.1 ± 0.7 kg), an active spleno-fermoral shunt was used during this period. The pancreato-duodenal vein was cannulated for normothermic hepatic perfusion using an automatic pump. The animals were then randomly assigned into 2 groups: RL (hepatic perfusion with Ringer's lactate solution, n = 8) and PTFX (hepatic perfusion with Ringer's lactate solution + 25 mg/kg of pentoxifylline, n = 8). After reperfusion the animals were observed for 120 min. Systemic hemodynamics were evaluated through a Swan-Ganz and arterial catheters, Gastric mucosal PCO2 (gas tonometry), portal vein and hepatic artery blood flow (PVFB and HABF, ultrasonic flowprobes), liver enzymes (ALT, AST, DHL) as well as systemic and regional O2-derived variables were evaluated throughout the protocol. RESULTS: The results are shown in the Table (values are mean ± SD, * p < 0.05 vs baseline, † p < 0.05 vs RL). CONCLUSION: We conclude that intraportal infusion of pentoxifylline improves systemic and hepatic oxygen delivery, with a significant reduction in markers of hepatic cell injury. These data suggest that regional infusion of pentoxifylline minimizes the deleterious effects of portal triad occlusion, and could be a helpful intervention during hepatic resections, mainly in cirrhotic or critically ill patients.

1050 THE ROLE OF ENDOGENOUS CANNABINOIDS FOR PATIENTS WITH HEPATOCELLULAR CARCINOMA SECONDARY TO CHRONIC LIVER DISEASE
Yui Ishii, Tokuyasu Yokota, Hideki Kanai, Hideki Matsushima, Yoji Yamazaki and Katsuhiko Yanaga, Jikei University School of Medicine, Tokyo, Japan

PURPOSE: Although cannabinoids (CB) have many biological functions, little is known about their role in chronic liver diseases such as chronic hepatitis (CH), liver cirrhosis (LC) and hepatocellular carcinoma (HCC).

In this study, serum levels of endogenous cannabinoids (anandamide, AEA; and 2-arachidonoylglycerol, 2-AG) were determined in patients with a history (under treatment and follow-up after treatment) of HCC developed from viral chronic liver disease (HBV, HCV). Furthermore, this study also examined the concentrations of AEA and 2-AG in cultured HCC cell lines.

MATERIALS AND METHODS: In 24 healthy volunteers and 9 patients with HCC and associated CH or LC, the serum levels of AEA and 2-AG were examined by gas chromatography combined with mass spectrometry (GC/MS), taking the status of individual case into consideration. The HCC cell lines (Hep G2, Hep 3B, HuH-7, Li-7) were cultured and the concentrations of AEA and 2-AG in the culture medium were determined and CB1, 2 receptors were also examined by Western blotting.

RESULTS: The serum AEA and 2-AG levels in healthy volunteers (n = 24) were 195 ± 174 pg/ml and 1872 ± 853 pg/ml, respectively. In patients with HCC (n = 9), the mean levels of AEA and 2-AG were 1004 ± 924 pg/ml and 12,315 ± 7,305 pg/ml, respectively, which were significantly higher than those in the healthy volunteers (p < 0.01). Taking the status of individual cases into consideration, the cases were classified into 3 groups. The high 2-AG group had multiple recurrence of HCC at the time of determination, while the low 2-AG group was in a stable state without recurrence after initial treatment. The third group occupied an intermediate position. On the other hand, a positive association between AEA and the HCC status was not suggested in this study. The higher production of 2-AG was observed in Hep G2, Hep 3B (proliferation period) and Li-7 (4-cell proliferation close to confluent).

Furthermore, CB2 receptor was expressed in these cell lines. CONCLUSION: 2-AG was suggested to be an indicator in the chronic liver diseases, i.e. CH, LC or HCC, and its clinical application for the management of HCC is under investigation.

1051 USEFULNESS OF MAGNETIC RESONANCE IMAGING IN THE EVALUATION OF HEPATIC HYDATID DISEASE
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PURPOSE: To study the role of magnetic resonance (MR) imaging techniques for the diagnosis, characterization and staging of liver hydatidosis. METHODS AND MATERIALS: Between 2000 and 2003 we examined 82 patients (105 hydatid cysts, 47 men and 35 women (among them 25 children), ranging in age from 5 to 69 years, with known hepatic echococcosis. MRI examinations were carried out on a 1.5T superconductive magnet (Visart, Toshiba Medical System) using T1w, T2w, RFE and fat suppressed (STIR technique) T2w sequences. MR, MR hydrography and MR cholangiography were performed with 3D and 2D FASE sequences. RESULTS: MR imaging correctly detected all the parasitic cysts on both T1- and T2-weighted images. Characterization was correct in all the cysts >3 cm in size, where typical features of hydatid disease were detected. MR, performed in 60 cases, showed normal bile duct caliber in 53 cases, smoothly dilated main bile ducts in 5 previously operated patients (laparoscopic cholecystectomy), while in another two cases, a cyst ruptured inside the bile ducts and the communication between the bile ducts and the cysts was clearly demonstrated. CONCLUSION: MR imaging is a valuable method in the study of liver echinococcosis. It could be recommended as the next diagnostic tool after US for evaluation, characterization, staging and preoperative planning of liver hydatidosis. It can replace CT in children in order to avoid unnecessary radiation.

IHPBA World Congress Abstracts
1052 MITOCHONDRIAL DYSFUNCTION AND OXIDATIVE STRESS IN THE PATHOGENESIS OF EXPERIMENTAL FATTY LIVER INDUCED BY DIFFERENT DIETS IN RATS

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BACKGROUND: Mitochondria are involved in oxidative phosphorylation and fatty acid ß-oxidation and are also the main source of reactive oxygen species in the cell. The aim of this study was to evaluate the role of mitochondrial dysfunction and oxidative stress in the pathogenesis of experimental fatty liver induced by different diets. METHODS: Fatty liver disease was induced in Wistar rats by choline-deficient diet (DC) or hyperlipidic (HL) diet for 4 weeks. The rats were randomized into three groups: DC group, fed choline-deficient diet; H group, fed hyperlipidic diet; control (C), fed a standard diet. Mitochondrial oxidation and phosphorylation were measured polarographically, by analysis of the respiratory control ratio (RCR), respiratory states 3 (S3) and 4 (S4) and ADP/O ratio. Oxidative stress was measured by superoxide quantification by lucigenin-amplified luminescence in liver tissue. RESULTS: DC group caused predominantly microvesicular steatosis while HL caused mild microvesicular steatosis in the perportal zone. An increase in oxygen consumption rate by liver mitochondria in S4, and a decrease in RCR and in the ADP/O ratio in DC-group as compared with HL and C-groups were observed. Nevertheless, oxidative stress was similar in both test groups (DC, HL). Serum tryglicerides and cholesterol were increased and decreased, respectively, in the DC group as compared with the HL and C groups. CONCLUSION: Choline-deficient diet causes macrovesicular steatosis with early disruption of liver mitochondrial function. On the other side, although hyperlipidic diet causes microvesicular steatosis, mitochondrial function is not disrupted. Oxidative stress verified by superoxide quantification was similar in both test groups, although histological, biochemical and mitochondrial parameters were different in these experimental models induced by diet. Probably, there are different pathogenic mechanisms in fatty liver in these models (see Table above).

1053 THE USE OF THE PROMETHEUS SYSTEM IN THE TREATMENT OF ACUTE LIVER FAILURE CAUSED BY AMANITA PHALLOIDES INTOXICATION

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INTRODUCTION: The authors present the results of treatment with the use of the Prometheus system in a female patient with transplanted liver failure in the course of cholestasis. MATERIALS AND METHODS: A woman (A.C., age 34 years) underwent orthotopic liver transplantation, due to the failure of her own liver in the course of PSC. Gradual increase in cholestasis of unknown etiology was observed from month 7 after OLTx. Possible causes of cholestasis included the recurrence of underlying disease and chronic rejection. Imaging examinations ruled out the complications within biliary-intestinal anastomosis. As these changes progressed, the patient qualified for retransplantation and the procedure with the use of Prometheus Fresenius Medical Care system. The main indication for FPSA was growing bilirubin and ammonia levels in serum and exacerbation of hepatic encephalopathy. Heparin infusion was used for anticoagulation. RESULTS: 2 FPSA procedures were performed, their total time was 14 h (average time of 1 procedure was 7 h). 6 h after the last procedure a successful retransplantation was performed. CONCLUSIONS: The use of the Prometheus system in the treatment of patients with increasing liver failure in the course of cholestasis allows for effective reduction of bilirubin and ammonia levels in serum. The system may be used in symptomatic treatment while the patient waits for transplantation organ. Further assessment of system effectiveness requires the continuation of clinical studies (Table).

1054 DIFFERENT PROBIOTIC STRAINS OF LACTOBACILLUS AND BIFIDOBACTERIUM AFFECT THE SEVERITY OF D-GALACTOSAMINE-INDUCED LIVER INJURY IN RATS DIFFERENTLY

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BACKGROUND: The intestinal microflora composition is important in physiological and pathophysiological processes in the human gastrointestinal tract. Septic complications represent frequent causes of morbidity in liver diseases and following hepatic operations. We therefore studied the effect of different Lactobacillus and Bifidobacterium strains on bacterial translocation, the extent of liver injury and intestinal microflora in an acute liver injury model. Method. Sprague-Dawley rats were used and divided into six groups, Liver injury control and five groups of liver injury with Lactobacillus and Bifidobacteria strain administration (Lactobacillus plantarum 299v, Lactoba- cillus paracasei 8002, Lactobacillus gasseri 5B3, Bifidobacterium 3B1, Bifidobacterium infantis DSM 15158). The bacteria were administered orally twice daily for 8 days. Liver injury was induced on the 8th day by intraperitoneal injection of D-galactosamine (1.1 g/kg BW). Samples were collected 24 h after the liver injury. Liver enzymes and bilirubin serum levels, bacterial translocation (to arterial and portal blood, liver and mesenteric lymph nodes), and intestinal microflora were evaluated. RESULTS: L. plantarum 299v, L. gasseri 5B3, B. infantis DSM 15158 decreased bacterial translocation to the liver compared with the liver injury control group. L. paracasei 8002 translocated to the river. The Enterobacteriaceae count in the cecum decreased in the L. plantarum 299v, L. gasseri 5B3, B. 3B1 and B. infantis DSM 15158 groups, while all the administered probiotics decreased it in the colon. The levels of alanine aminotransferase (ALT) and bilirubin were significantly lower in the L. plantarum 299v and B. infantis DSM 15158 groups compared with the liver injury control group. The B. infantis DSM 15158 decreased AST significantly compared with the liver injury control group. CONCLUSION: Administration of different Lactobacillus and Bifidobacterium strains in an acute liver injury model has shown different effects on bacterial translocation and hepato cellular damage. L. plantarum 299v and B. infantis DSM 15158 reduced bacterial translocation and hepatocellular damage. L. gasseri 5B3 reduced bacterial translocation but did not show a significant effect on hepatocellular damage. L. paracasei did not reduce bacterial translocation and hepatocellular damage, but translocated to the extraintestinal sites.

1055 POSTOPERATIVE HYPERBILIRUBINEMIA IS ASSOCIATED WITH SEPTIC EVENTS AND INCREASED MORTALITY FOLLOWING MAJOR HEPATECTOMY

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PURPOSE: To determine the association between postoperative hyperbilirubinemia, septic events, early and late mortality following major hepatoc-
1057 RADIOFREQUENCY ABLATION OF THE LIVER WITH SIMULTANEOUS COOLING OF THE BILE DUCTS: AN EXPERIMENTAL STUDY IN PIGS

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AIMS: Heat-induced injury to the bile ducts during radiofrequency ablation (RFA) of liver tumours results in sticture formation of the bile ducts (and is a severe complication). To avoid this complication, tumours close to major bile ducts are usually not treated with RFA. In our study we evaluated if this heat-induced injury to the bile ducts during RFA could be avoided with simultaneous cooling of the bile ducts with chilled saline.

METHODS: In an experimental model with 8 pigs under general anaesthesia, 16 RFA lesions were created adjacent to a major bile duct. Intraductal cooling (IDC) was obtained during laparotomy by introducing two catheters in the common bile duct, one for inflow and one for outflow. Cooled, 8°C saline was then infused. Eight lesions were created with IDC and eight without, one of each in each animal, in close proximity to the same bile duct. In each pair the distance to the bile duct was the same for both lesions. The RFA needle was placed using ultrasound guidance. After harvesting the liver and staining the lesion area an evaluation concerning the extent of heat damage to the tissues around the bile ducts and on the bile ducts themselves, was performed. A heat damage scale, described by other groups, was used by a blinded observer for the evaluation.

RESULTS: In six animals markedly less heat damage was observed with IDC than without, in one it was the same and in one the lesion performed during IDC showed more damage. CONCLUSION: Reduced tissue damage around the bile duct indicates a protective effect of IDC. IDC could be a method to protect bile ducts and thus increase the number of patients eligible for RFA.

1058 PERIOPERATIVE GUIDELINES FOR PATIENTS WITH LIVER DISEASE – AN EDUCATIONAL APPROACH

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Patients with liver disease who require surgery are at an increased risk for significant morbidity and mortality. Appropriate management is crucial to achieve good outcomes and should include a multidisciplinary approach. Herein, we describe guidelines utilized by residents and fellows that have enabled a systematic approach to the evaluation and perioperative management of patients with liver disease in our institution. Practice patterns within our institution were evaluated to determine if differences existed with relation to updated evidence-based literature. Guidelines were established to facilitate a multidisciplinary approach among health-care workers, whereby fundamental patient needs can be systematically addressed. Compliance was enforced and monitored by the teaching faculty through daily patient evaluations and discussions. The perioperative guidelines were categorized into the following: 1) Operative risk stratification, including the potential benefits, complications, and urgency of the planned procedure. Performance status and quality of life issues were discussed. 2) Calculation of the predicted survival for the proposed operation based upon assessment of the functional hepatic reserve using well-defined scoring systems, such as the Child-Pugh score. Additionally, estimation of the residual parenchymal volume for hepatic resection was based upon anatomical-resectional considerations. 3) Optimization of medical therapy to include other comorbidities. Examples would include: encephalopathy, renal dysfunction, ascites, electrolyte abnormalities, coagulopathy, etc. 4) The operative consent and potential for adjunctive procedures, whereby informative discussions are prepared for the patient and caregivers. 5) Anesthetic considerations, especially the method of delivery, routes of elimination, and impact on hepatic reserve. 6) Standardization of postoperative care and the preparedness for decompensation, impending disorders, and other potential sequelae. The perioperative management of patients with liver disease is complex and mandates a thorough understanding of impaired hepatic pathophysiology and subsequent management schemes. Ideally, a multidisciplinary team with coordinated objectives and adherence to established guidelines affords the most successful therapy to these morbid patients. Establishing such patterns of therapy in an educational setting may result in improved patient outcomes, but ultimately requires an astute, well-prepared team of health-care providers.
1059  DO ENDOXOAEMIA AND IMMUNE RESPONSES CONTRIBUTE TO RENAL DYSFUNCTION IN ACUTE LIVER FAILURE?
Jamshde Bashir, Tony John, Faisal Ali, Andrew Dodson, Fiona Campbell, Simon Herrington, Keith F Parsons and Robert Sutton, University of Liverpool, Liverpool, UK

BACKGROUND: Bacterial endotoxin, a potent renal vasoconstrictor, is often present in the circulation of patients with liver failure, and may cause hepaticorenal syndrome. This study sought to determine whether endotoxin and/or cytokines contribute to the development of renal dysfunction from liver failure. METHODS: Acute liver failure was induced in Wistar rats by 1.1 g/kg intraperitoneal galactosamine; controls received normal saline. At 24, 36 or 42 h arterial (ABP) and central venous pressure (CVP) were measured, then plasma, urine and tissue were sampled. Plasma endotoxin was measured by LAL Kinetic Calorimetric Assay (endotoxin units EU/ml); plasma monocyte chemotactic protein 1 (MCP1) and cytokine-inducible neutrophil chemotactant (CINC) by ELISA; liver and renal function by standard methods. Two blinded, independent observers quantitatively analysed liver and kidney TNF-α and MCP1 immunocytochemistry, with agreement assessed using kappa and Bland-Altman plots. RESULTS: Galactosamine caused liver failure and secondary renal dysfunction, with progressive hepatic damage but minimal renal abnormality on light and electron microscopy. ABP and CVP were unchanged by galactosamine. Plasma endotoxin was undetectable (<0.25 EU/ml) at all time points in all groups. After galactosamine, plasma MCP1 and CINC levels rose (mean +/- SEM mg/ml control vs 42 h, 1577 +/- 411 vs 3418 +/- 384, p < 0.01 and TNS +/- 154 vs 1626 +/- 185, p < 0.01, respectively), but hepatic and renal MCP1 expression was minimal; although hepatic TNF-α expression increased, renal TNF-α expression decreased. High levels of agreement were present for all immunocytochemical observations. CONCLUSION: These results do not suggest a direct role for endotoxin or cytokines in the development of hepaticorenal syndrome.

1060  BILARY HAMARTOMA AND METASTATIC CANCER: A DIAGNOSTIC CHALLENGE
Reza F Saad, Stephen G Remine, Sumeit Silapawswan and Micheal J Jacobs, Providence Hospital, Southfield, MI, USA

INTRODUCTION: Biliary hamartomas are rare benign lesions that were first described in 1918 by von Meyenburg. The biliary malign formation forms cystic structures of various sizes within an array of disorganized architecture. These lesions can mimic malignant tumors with resultant uncertainty, particularly in the presence of concomitant metastatic disease. Herein we report three such cases that were thought to represent metastatic cancer. CASE 1: An 89-year-old female was diagnosed with metastatic colon cancer following a previous partial colectomy. A preoperative computed tomography (CT) scan demonstrated resectable liver lesions that were thought to represent colorectal metastases. A laparotomy was performed and the liver was found to contain numerous nodular lesions suggestive of metastatic involvement. Wedge resections were performed on two lesions; however, the pathology was consistent with biliary hamartoma. The patient has remained alive 2 years post-resection and the additional liver lesions have remained stable. CASE 2: A 62-year-old male was admitted to undergo pancreaticoduodenectomy for carcinoma of the head of pancreas status post neoadjuvant therapy. A preoperative CT scan confirmed tumor reduction without evidence of metastases and the patient was prepared for surgery. Upon abdominal exploration, multiple nodules within the liver were identified and biopsied. The operation was terminated secondary to the probability of metastatic disease. The final pathology was consistent with biliary hamartoma and the patient subsequently underwent pancreatic resection for cure. CASE 3: A 44-year-old male presented with generalized lymphadenopathy. A CT scan of the abdomen showed multiple hepatic lesions within the parenchyma. The patient underwent a laparoscopic biopsy secondary to the location and nature of the lesions. The pathology revealed a biliary hamartoma. The patient was treated with antibiotics and the lymphadenopathy resolved. CONCLUSION: The presence of biliary hamartoma may cause diagnostic confusion in those patients thought to have metastatic liver disease. Suspicious lesions should be treated as malignancies, whereas obvious hamartoma may be monitored.

1061  DIFFERENTIATION TO HEPATOCYTES FROM MOUSE EMBRYONIC STEM CELLS: EXPRESSION OF CONNEKSINS 26 AND 32
Hideki Matsumata, Yuji Ishii, Tomokazu Matsuura, Masaya Saito, Hideki Kanai, Haruka Maehashi, Tadashi Asakura, Katsuhiko Yanaga, Yoji Yamazaki and Kiyoshi Ohkawa, Jikei University School of Medicine, Tokyo, Japan

PURPOSE: The shortage of available livers for transplant has promoted research into alternative methods for patient support. Cell transplant research and development of the liver function assistant treatment such as a bio-artificial liver are anticipated as alternative treatments. ES cells provided a unique source for tissue regeneration. We examined whether mouse ES cells can become the cell source of cell transplant and bio-artificial liver from the point of view of the gap junction. Hepatocytes, the parenchymal cells that comprise the bulk of the liver, are connected by a gap junction formed of two connexins – Cx32 and Cx26. MATERIALS AND METHODS: Undifferentiated mouse ES cells (Damippon Pharmaceutical Co., Ltd) were maintained in DMEM culture medium containing mouse leukemia inhibitory factor (LIF) with feeder cells. Getting rid of the LIF and feeder cells, differentiation was started, and growth factors (FGF1, FGF4 and HGF) were added. Furthermore, Matrigel (EHS gel) was used as an extracellular matrix (ECM), in sandwich incubation. The immunohistochemical analyses of Cx26 and Cx32 were observed with a confocal laser scanning microscope. RESULTS: The expression of Cx26 and Cx32 was recognized in the cultured mouse ES cells. The expression of Cx26 was found in the intracellular site (group with HGF0 ng/ml, 5 ng/ml). On the other hand, Cx26 was strongly positive on the cell membrane in the group with HGF500 ng/ml. Cx32 was also strongly positive in the cell membrane (spotty) in the group with HGF500 ng/ml. Cx32 was more strongly positive in the cultured cells in a sandwich of matrigel for a period, and oncostatin M(OSM) administered group. CONCLUSION: By the examination of the expression of Cx26 and Cx32, the combination of several growth factors (high dose HGF, OSM) and cell-matrix interaction (Matrigel) are thought to be useful for the differentiation from the ES cells to hepatocyte.

1062  FATAL PULMONARY HYPERTENSION AFTER DISTAL SPLENORENAL SHUNT IN SCHISTOSOMAL PORTAL HYPERTENSION
Marcelo AF Ribeiro Jr, Robeto De Cleva, Eleazar Chabi, William Abrão Saad and J Gama Rodrigues, University of Sao Paulo, Sao Paulo, Brazil

Mansonic schistosomiasis is the main cause of portal hypertension in Brazil. The pulmonary hypertension in the HS form of the mansonic schistosomiasis is a serious complication in the evolution of the disease and is the triggering factor for serious complications associated with any form of surgical approach. Surgical treatment is indicated for patients with a history of bleeding due to esophageal varices rupture based on world previous experience of poor results with endoscopic treatment. At present, we should choose between azygo-portal disconnection and splenectomy (AFPS) and distal splenorenal shunt (DSRS) for surgical treatment of such patients. All patients submitted to DSRA are carefully evaluated preoperatively with eletrocardiography, chest X-ray and transthoracic echocardiography to rule out pulmonary hypertension. We present two fatal cases of pulmonary hypertension arising after AFPS. Surgical treatment is considered the best alternative for schistosomotic patients with a history of bleeding from esophageal varices rupture because these patients present normal liver function and the only severe complication of the disease is digestive bleeding. The two modalities of elective surgical treatment are selective shunt surgery (Warren procedure) or an esophagegastrodevascularization procedure with splenectomy (EGDS). Shunt surgeries are effective for bleeding control, but are associated with postoperative encephalopathy and higher operative mortality rates when compared with vascularization procedures. The devascularization procedures are associated with high rates of recurrent bleeding (15%) and endoscopic sclerotherapy is routinely employed after EGDS with the intent of complete eradication of varices. Although recognizable as a complication of shunt procedures, acute and fatal pulmonary hypertension had never been previously reported after the Warren procedure for treatment of portal hypertension in mansonic schistosomiasis. There are only a few studies about the pulmonary involvement in mansonic schistosomiasis, so the group decided to report these two cases of this rare complication.
1063  THE INFLUENCE OF SPLEEN SIZE ON LIVER REGENERATION AFTER MAJOR HEPATECTOMY IN NORMAL AND EARLY CIRRHOTIC LIVER

Tsung-Ching Chou, Yan-Shen Shan, Yu-Hsiang Hsieh, Edgar D Sy, Nan-Tsing Chiu and Pin-Wen Lin, National Cheng Kung University Hospital, Tainan, Taiwan, Republic of China

BACKGROUND: The relationship between liver regeneration and spleen size after major hepatectomy in normal and cirrhotic liver was studied by single photon emission computed tomography (SPECT). MATERIALS AND METHODS: Twenty-six patients, 18 patients with normal liver and 8 patients with cirrhotic liver, receiving major hepatectomy were included. Liver and spleen volumes were measured by SPECT before major hepatectomy, 6 months, 1 year and 2 years after operation. The correlation of liver and spleen volume during liver regeneration was analysed. RESULTS: In both groups, the residual liver volume increased within the first year and decreased in the second year. No difference in regeneration ability was found. The spleen volume in cirrhotic liver was increased, with similar trend to normal liver during the first year. In contrast, the increased spleen volume persisted up to the second year in cirrhotic patients. Age per year, female gender, and body surface index had positive correlation with increase percentage of liver volume. The spleen volume per 100 ml with time played a negative role significantly on increasing percentage of liver volume, CI: -21.6 to -27.92. p = 0.01. CONCLUSION: Early cirrhotic liver within normal functional limits, the liver still could regenerate as normal liver after major hepatectomy in 1 year. Age, female gender, and body surface index had positive correlation but the size of spleen volume played a negative role in regenerative liver volume.

1064  LIMB ISCHAEMIA INDUCES REMOTE LIVER INJURY IN A RABBIT MODEL OF LOBAR LIVER ISCHEMIA/REPERFUSION

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BACKGROUND: A femoral arterial line is used for continuous monitoring of arterial blood pressure in many experimental studies. However, placement of the catheter in the femoral artery could produce acute limb ischemia with associated systemic effects. We have investigated the effect of femoral arterial line use on liver function, in a rabbit liver lobar ischemia-reperfusion (LIR) model. METHODS: 4 groups of animals (n = 6 in each) were used: groups 1 and 2 (blunt) underwent laparotomy but no liver ischemia. In group 1 an arterial line was placed in the femoral artery while in group 2 it was in an ear artery. In groups 3 and 4 (LIR) liver lobar ischemia was induced for 60 minutes followed by 7 h of reperfusion. In group 3 an arterial line was placed in the femoral artery while in group 4 it was in an ear artery. Alanine aminotransferase (ALT) activity and lactate levels were measured at different time points during the experiment. Results were expressed as mean ± SD. p values <0.05 were considered significant. RESULTS: There was a significant increase in ALT (384 ± 25.7 vs 102 ± 19.8 U/l), and lactate levels (9 ± 1.83 vs 5.9 ± 0.2 mmol/L) in the LIR femoral line group compared to the LIR ear line group, at 5 h post-reperfusion. Similar results were obtained in the sham groups (ALT: 92.3 ± 28.9 vs 32.5 ± 14.01 U/l; lactates: 6.5 ± 1.97 vs 2.8 ± 0.58 mmol/L, femoral vs ear line). CONCLUSIONS: Femoral artery cannulation induces remote liver injury. The use of the ear artery instead of femoral artery avoids remote hepatic injury.

1065  EXPERIMENTAL STUDY OF LOCAL AND SYSTEMIC EFFECTS OF RADIOFREQUENCY ABLATION (RFA) ON PORCINE LIVER

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AIM: To study the local and systemic effects of radiofrequency ablation (RFA) of liver in an animal model. METHODS: Five farm pigs underwent RFA under general anaesthesia. One lesion was created in the left lobe without portal clamping and two lesions were created in the right lobe with intermittent occlusion of left portal vein and portal vein after ischaemic preconditioning of the liver. Four pigs were sacrificed 30 minutes after the end of the experiment. One pig was revived and sacrificed 5 days later. After sacrifice the size of the lesions were noted and lesions underwent further histological examination. Throughout the procedure core body temperature was monitored and serial blood samples were collected for analysis of bilirubin, alanine transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP), gamma glutaryl transferase (GGT), prothrombin time (PT), glutathione-S transferase (GST), lipid hydroperoxide (LPO), iron, albumin, phosphate, urea and creatinine, as well as blood gas analysis. Immunohistological studies were carried out to detect apoptosis and heat shock protein (HSP) 70 expression. RESULTS: All the animals tolerated the procedure until completion. There was no evidence of significant rise in core body temperature during the procedure and arterial blood gas remained stable. There was no significant change in liver enzymes during the procedure. Prothrombin time and total GST were significantly higher at the end of the procedure. The lesions after portal clamping were significantly bigger in size than the lesions created without portal occlusion. There was evidence of apoptosis and increased HSP-70 expression in the 'marginal zone' surrounding the necrotic area in the lesions from the animal that was sacrificed after 5 days of ablation. CONCLUSION: RFA is a safe procedure which does not cause significant systemic derangements even after prolonged ablation. It does not produce any significant generalized liver parenchymal injury as evident from measurement of liver enzymes. However, a significant rise in a sensitive cellular injury marker like GST and rise in PT demonstrates the potential of prolonged RFA to produce generalized liver parenchymal injury. Portal occlusion increases lesion size. The 'marginal zone' surrounding the zone of ablation shows evidence of apoptosis and cellular stress in form of increased HSP-70 expression.

1066  MAJOR HEPATOBILIARY SURGERY DURING PREGNANCY – SAFETY AND TIMING

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INTRODUCTION: The challenges of diagnosis, management, and treatment of hepatobiliary disease are compounded during pregnancy. Maternal and fetal well-being must be continually assessed at all stages of the disease course. METHODS AND MATERIALS: We describe here three patients who underwent major hepatobilary surgery during pregnancy. One patient was diagnosed with an adenoma and two others with complicated symptomatic choledochal cysts. The details of the patients are shown in the Table. RESULTS: All three patients were successfully treated with open resection, excision, and/or reconstruction during the second trimester of pregnancy without requiring blood transfusions. Consistent pre-operative, intra-operative attention to detail resulted in a successful outcome. All subjects were discharged from the hospital within 10 days of surgery, and went on to give birth at term to normal birth-weight infants. DISCUSSION: Symptomatic choledochal cysts and hepatic adenomas are rarely encountered during pregnancy and must be diligently managed in order to avoid the potential catastrophic complications of adenoma rupture, pancreatitis, or cholangitis, resulting in subsequent loss of the fetus or potential threat to a patient’s life. Deferring surgery until the postpartum period may invite serious complications. In non-gravid patients, resection of hepatic adenomas

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age at presentation (years)</th>
<th>Gestation (weeks)</th>
<th>Clinical presentation</th>
<th>Ultrasound</th>
<th>MRCP</th>
<th>Operative procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>32</td>
<td>18</td>
<td>Abdominal pain</td>
<td>6 × 6 × 7 cm adenoma</td>
<td>Not done</td>
<td>Right hepatic resection</td>
</tr>
<tr>
<td>2</td>
<td>32</td>
<td>15.5</td>
<td>RUQ pain, fever, icterus</td>
<td>5 × 5 cm Choledochal cyst</td>
<td>5 cm choledochal cyst</td>
<td>Cyst excision and Roux-en-Y</td>
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<tr>
<td>3</td>
<td>19</td>
<td>22</td>
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<td>7.5 cm choledochal cyst</td>
<td>7.5 cm choledochal cyst</td>
<td>Cyst excision and Roux-en-Y</td>
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with free rupture carries a 5-10% mortality rate compared to 1% with elective resection. Scheduling surgery during the second trimester may lead to a preferred surgical outcome, and has been shown to result in a significantly lower preterm birth rate than surgery in the first or third trimesters. Unfortunately, general anesthesia and intra-abdominal surgery have been shown to be significant independent risk factors for decreased birth weight overall, although our patients, as well as others in the literature, have delivered normal birthweight infants. In a specialized center, adequately prepared patients can undergo major liver surgery with minimal risk to both mother and fetus. Each case warrants individualized attention to maximize the outcome for mother and fetus. Our expertise in major bloodless hepatopancreatic surgery, as well as intra-operative presence of an obstetrician, was instrumental in the successful outcome of our patients.

**1067 HEPATIC REGENERATION IN THE GREEK MYTHOLOGY**

Niki Papavramidou and Elizabeth Fee, History of Medicine Division, National Library of Medicine, National Institutes of Health, Bethesda, MD, USA

The accurate knowledge of surgical anatomy, the amelioration of post-operative processes and the continuously increasing experience of surgeons nowadays allow the performance of severe hepatic operations (e.g. wide liver resections, liver transplantsations, etc.). The success of these operations is even more assisted by the great regenerative ability of the liver. Thus, patients suffering from severe hepatic illnesses, such as cirrhoses or hepatitis, can hope to live a better and longer life. Greek mythology, being an important source of information on the beliefs, habits, and phenomena observed during Antiquity, reveals that hepatic regeneration was well known to ancient Greeks and this natural ability was established in two tales: the tale of Prometheus and the tale of the Giant Tytius. Prometheus was punished by Zeus for giving fire – a Godly element – to humans. He was suspended on a rock forever, while an eagle visited him every day and devoured his liver, which regenerated during the night, due to Prometheus’ immortal status. The Giant Tytius was also punished, this time by Apollo and Artemis, for trying to rape their mother, Lyto. His punishment consisted of being exiled to Flames where he was eternally tortured by two vultures that fed on his liver. The main concept of both tales, being the destruction and reconstitution of the liver, is almost the same. Both of the condemned were immortal and their liver regenerated in a night, providing thus, food for the eagles and eternal pain for the sufferers. In conclusion, the tales show that the regenerative ability of the liver was well known from early years and that the trust shown by the Gods in this ability, to cause eternal suffering is on a par with the trust shown by the modern surgeons in it, to assure a successful hepatic operation.

**1068 FULMINANT HEPATIC INSUFFICIENCY: SURGICAL MODEL IN RABBITS**

Mario A Secchi Sr, Lisandro Quadrelli Sr, Enzo Peralta Sr, Jose Scrgina Sr, Leonardo Rossi Sr, Joaquim Rodrigues Sr, Edgardo Guibert Sr and Maria E Mampaip Sr, UMCE and JUNIR Hospital Italiano, Rosario and F Farmacia y Biotecnica UNR, Rosario, Argentina

**INTRODUCTION:** The increasing demands for organs to treat terminal hepatic disease call for new cell transplant methods and biartificial systems. This requires the development of experimental hepatic insufficiency models in previously healthy animals in which hepatic damage would be the initial factor of the irreversibly multi-organic failure followed by death. The surgical model has always met these requirements appropriately. METHODS: 25 female rabbits (New Zealand race) were used. Group 1: control-sham (n = 6) under general anesthesia, laparatomy, hepatic mobilization, portal vein and IVC exposure. Laboratory tests were performed before laparatomy and after a 2-4 h postoperative period. Group 2: control and end-to-side porto-caval shunt (PCS) (n = 8). Group 3: fulminant hepatic insufficiency (n = 11), the same treatment as group 1 but first an end-to-side porto-caval shunt was performed and then a total heaptectomy (of 95%) (PCS + TH) and hepatic artery ligation. RESULTS: Group 1 sham: there was no mortality. From basal data until 4 postoperative hours no significant difference was found in the biologic parameters. Group 2: 5 rabbits survived to surgical PCS and lived >48 h. There were no complications or hepatic insufficiency. Similar (NS) biological results to group 1 were obtained and data are not provided. Group 3 PCS + TH: three animals died while adjusting the model. 8 animals tolerated the whole surgery and survived between 2 and 6 h. (X:

**1069 CAN WE CREATE A PORCINE PRIMARY LIVER TUMOUR MODEL USING HUMAN HEPATOMA CELL LINES?**

Rakesh Rai, PA Flecknell, Claire Richardson and Derek Manas, Hereford County Hospital, Hereford, University of Newcastle and Freeman Hospital, Newcastle, UK

ABM: As there is no suitable large animal liver tumour model is available, the aim was to create a primary liver tumour model in the pig to study the local and systemic effects of radiofrequency ablation and other surgical interventions for treatment of liver tumour. METHODS: Two mini pigs (specific pathogen-free) underwent injection of human hepatoma cells (HEP-G2) into the portal vein. The procedure was carried out under antibiotic cover, under direct vision through a small upper mid-line incision. Pigs were started on triple immunotherapy using cyclosporin, azathioprine and prednisolone 1 day before surgery. Immuno-suppression was continued throughout the experiment and tumour marker a-fetoprotein (AFP) were monitored every week. The animals were sacrificed 6 weeks after injection of tumour cells and liver was examined to detect any tumour growth. RESULT: Mini pigs tolerated the surgery and immuno-suppression well and there was no postoperative complication. Tumour marker AFP rose during the first week then normalized to base level without any further rise. At the end of the experiment, on laparatomy there was no evidence of any tumour in the liver or peritoneal cavity. Histological examination of liver did not reveal any evidence of tumour in the liver. CONCLUSION: Portal tolerance and immuno-suppression do not prevent rejection of human hepatoma cell lines by porcine immune system and further research is needed to find techniques to allow engraftment of human hepatoma cell line into the porcine liver.

**1070 ASSESSMENT OF RIGHT PORTAL VEIN LIGATURE BY HEPATIC VOLUMETRY**

Pablo Sisco, Carlos Capuñay, Nora Perrone and Gustavo Pagliarini, Pinovano Hospital, Buenos Aires, Argentina

BACKGROUND: Postoperative hepatic failure after major liver resections is considered a hazardous event. To predict it, we performed a virtual heaptectomy by multi-slice CT and we calculated the liver volume. When remnant liver volume results insufficient, portal vein shunt is considered a possibility to increase the future remnant liver volume. Our experience was developed in patients with colorectal liver metastases who underwent a two-step heaptectomy with portal venous ligation procedure.

**RESULTS:** From April 2002 to September 2003, we treated 14 patients with colorectal liver metastases: 10 bilateral and 4 unilateral. Ten patients were considered for surgery. Portal venous ligation was performed in 5 cases associated with resection of left liver metastases by metastasectomy. Three patients were female and two male, age range 52-73 (mean 61.5), one of them received chemotherapy with 5-FU, leucovorin and oxaliplatin. All patients were assessed after portal vein ligation by multi-slice CT, 8-10 weeks later. RESULTS: The lowest increase in left liver volume was 9.08% and the highest was 14.16%. During the second step of the two-step heaptectomy, we avoided dissection of the hepatic pedicile. CONCLUSIONS: 1) None of the patients who underwent portal vein ligation developed liver failure after the second resection. 2) In all cases contralateral hypertrophy was documented by multi-slice CT.

**1071 UTILITY OF 3D MR IMAGING IN EVALUATION OF HEPATOBLASTIC DISEASES**

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Three-dimensional (3D) imaging is playing an increasingly important role in modern diagnostic radiology. The recent improvement of 3D volumetric
reconstruction software has facilitated greatly the clinical application of 3D imaging. 3D imaging can be applied to imaging modalities such as CT and MRI. In this presentation, we focus on the utility of 3D imaging on various MR applications for evaluation of hepatobiliary diseases. 3D MR imaging has been shown to be helpful for evaluation and diagnosis of parenchymal lesions and vascular anatomy using a single acquisition technique. 3D imaging allows us to demonstrate the finer anatomic detail, manipulate the images by removing or making transparent unwanted overlying structures and emphasize the areas of interest. This allows radiologists and surgeons to better understand anatomic relationships of various structures. Thus, 3D MR imaging can be very useful for planning of surgical procedures such as preoperative evaluation of vascular and biliary ductal variation in living liver donors and assessment of vascular patency in patients undergoing surgical resection. The aim of this presentation is: 1. To address the various 3D reconstruction techniques used in MR imaging including maximum intensity projection, shaded surface display, volumetric rendering, minimal intensity projection and sub-volumetric maximum intensity projection. 2. To demonstrate the value of 3D imaging in various hepatobiliary diseases including but not limited to liver metastasis, hepatocellular carcinoma, cholangiocarcinomas, gallbladder carcinomas, portal vein and hepatic vein occlusion and staging of pancreatic cancer to name a few. 3. To discuss the role of 3D imaging in determining segmental liver volumes and tumor volume measurements.

1072  DEvascularization Procedure in Portal Hypertension (Modified Hassab Procedure with Spleenectomy)
Ashok K Mathur Sr, SMS Medical college Jaipur India
Between 1996 and 2003, 15 patients with portal hypertension referred from the medical gastroenterology department underwent surgery in a single surgical unit. Median age was 26 years (range 13–34 years). Male: female ratio was 8:7. 9 patients had repeated variceal bleeding, 6 patients came with overwhelming hypersplenism along with varices. As regards etiology, 8 pts were diagnosed with non-cirrhotic portal fibrosis, 5 pts had post-necrotic cirrhosis, and 2 pts had splenic vein thrombosis. Endoscopic banding, sclerotherapy had failed in 14 pts preoperatively. 1 patient did not bleed from varices but had severe hypersplenism. 13 patients were operated electively. 2 patients underwent emergency surgery with sengstaken tube in place. In the surgical procedure performed in all patients, splenectomy was done, along with extensive devascularization of the abdominal oesophagus and the upper part of the greater curve of the stomach. On the lesser curvature, the left gastric vein was ligated. Vagi were preserved. No oesophageal or gastric transection was added. Patients were closely followed regularly by upper GI endoscopy and biochemical investigations. The longest follow-up has been 7 years. There has been no mortality in either elective or emergency surgeries. Upper GI bleeding stopped in all patients and has not recurred. Blood chemistry became normal in all the patients with hypersplenism. Varices disappeared in 8 patients (NCPCF 4 pts, splenic vein thrombosis 2 pts, post-necrotic cirrhosis 2 pts). Varices decreased in grade and number in 4 patients (NCPCF 2pts, post-necrotic cirrhosis 2pts). Varices stopped bleeding although they did not change in the remaining 3 patients (NCPCF 2 pts, post-necrotic cirrhosis 1 pt). 1 patient underwent endoscopic transection. It is concluded that, in India and other developing countries where liver transplantation is available as a definitive procedure to select few patients with portal hypertension, the devascularisation procedure still enjoys a place once endoscopic procedures fail to control varical bleeding. Oesophageal/gastric transection with its own complication rates is not an essential part of the procedure. We have modified the Hassab procedure by restricting dissection of the lesser curvature of the stomach to only ligation of the left gastric vein at its termination.

1073  Treatment of Liver Metastases from a Solid and Pseudopapillary Tumor of the Pancreas
Roberto Gedeay, Jose Angel Garcia, Aboleib Toledoano and Victor J Zambrano, Pediátrica Metropolitana, Caracas, Venezuela
We evaluated a 46-year-old woman who had previous history of a cystojejunosmtomy in 1975 for a pancreatic pseudocyst. In 1998 she presented again with persistent right upper quadrant pain and the MRI showed a 10-cm mass in the head of the pancreas. She was re-explored and a Whipple procedure was performed at that time. Pathology reported a solid and pseudopapillary tumor. Three years later she developed liver metastases seen on MRI studies. She was considered to be a candidate for resection of the metastases since she had a slow growing tumor as reported by previous authors, there was no evidence of extrahepatic disease, a disease-free interval of 3 years and good cardiopulmonary status. A Mercedes Benz type of incision and lysis of adhesions were performed. On intraoperative ultrasound a total of 3 lesions was seen, two in the left lateral segment and one in the right lobe located in segments 5, 6 and 8 with >1 cm of margin from the edge of the tumor to the middle hepatic vein. Due to the location of the lesions, we decided to perform a right hepatectomy plus en block enucleation of the 2 lesions in the left lobe. Pathology reported a metastatic solid and pseudopapillary tumor with negative margins. This is certainly an interesting case, showing an unusual pancreatic tumor most commonly seen in young women, representing around 1% of all pancreatic tumors and 12% of all cystic tumors of the pancreas that was initially misinterpreted as being a pseudocyst. Masa et al. noted that only 14.7% of cases reported were considered malignant as defined by metastases to lymph nodes, distant organ metastases or direct invasion of adjacent organs. There are a few other aspects to point out in this case. In the past few years there have been an increasing number of articles showing the adequacy of resecting metastases from non-colorectal, non-neuroendocrine lesions on selected patients. Also not to be underemphasized is the difficulty of managing bilateral lesions, with surgical resection alone or in combination with ablation. We currently followed the guidelines published by Henderson et al using disease-free interval, curative resection and primary tumor type as the most important factors when deciding the adequate treatment for an individual patient with metastases from non-colorectal, non-neuroendocrine tumors. Our patient is still alive and disease-free 1 year after resection.

1074  JAundice in the Hippocratic Corpus
Niki Papavramidou and Elizabeth Fee, History of Medicine Division, National Library of Medicine, National Institutes of Health, Bethesda, MD, USA
Hippocrates was among the first who described jaundice (iktos). The Hippocratic Corpus has numerous appearances of the condition, where the etiology, the description, the prognosis and the treatment are provided. The connection made between the liver and jaundice was remarkable, bearing in mind that neither Hippocrates nor his followers performed dissections and that his medical views were based on observation. The Hippocratic doctors described six kinds of jaundice. Some were diseases of the liver and others of the spleen. They also described an epidemic of fever accompanied by jaundice that was fatal for numerous patients. The etiology was, as in most cases of diseases treated by Hippocrates, humoral imbalance. The diagnosis and prognosis were based on the color of the skin, the urine, and the feces and several other factors, such as the season of the year during which the disease first appeared, or the co-existing diseases. The treatment consisted of herbal medications, baths, diet, and bloodletting, depending on the type of jaundice in question. The influence that the Hippocratic writings exerted on the authors of the next generations was enormous. Pliny, Aretaeus of Cappadocia, Galen, and later Soranus of Ephesus cited the Hippocratic descriptions and the therapeutic methods proposed.

1075  Laparoscopic, Robotic-Assisted Transduodenal Biliary Stent Dilation for Biliary Dyskinesia
W Scott Helton, Santiago Horgan and Robert Berger, University of Illinois at Chicago, Chicago, IL, USA
A 32-year-old woman developed recurrent biliary colic 1 year after having an uneventful laparoscopic cholecystectomy. She was diagnosed as having sphincter of Oddi dysfunction and underwent ERCP. Due to a long sphincter, she had an incomplete endoscopic sphincterotomy and had a biliary stent placed. Her symptoms completely disappeared but when her stent was removed she had recurrent biliary colic. An operative sphincterotomy was indicated. This was performed laparoscopically via a transduodenal approach and with the help of the DaVinci Surgical Robot. To our knowledge this is the first time a transduodenal biliary sphincteroplasty was performed robotically. This video illustrates the facility and ease with which this operation can be performed robotically. The magnification, stereo vision, and articulation of the robotic instruments allow placement of 5-0 sutures in an accurate fashion. In addition, a two-layer duodenal closure can be accomplished quite easily. The patient did well and had no complications.
1076 SYSTEMATIC APPRAISAL OF THE ROLE OF METALLIC ENDODJLARY STENTS IN THE TREATMENT OF BENIGN EXTRAHEPATIC BILIARY STRICURE
Priyanka Srinivarsana and Ajith K Srinivarsan, HPB Unit, Department of Surgery, Manchester Royal Infirmary, Manchester, UK
INTRODUCTION: Self-expanding metallic endobiliary stents introduced for malignant obstructive jaundice are also used for benign strictures. The aim of this study was to carry out a systematic appraisal of the evidence for the use of metallic stents in benign biliary strictures in order to formulate a pooled evidence base on use and outcome. METHODS: A computerized search was made of the MEDLINE and EMBASE databases. MEDLINE was searched for the period 1 January 1966 through November 2003 using OVID (Version 9; Ovid Technologies, New York, NY, USA) and the MESH headings cholestasis, bile duct obstruction, extrahaptic and stents. Reviews and case reports were excluded. Restriction to articles in English and excluding animal studies produced 25 papers. No additional papers were discovered through EMBASE. Data were extracted on: number undergoing metal stent for benign stricture, recruitment period, etiology, and indication, number of stents occluded, delay to stent occlusion and management of occluded stents. RESULTS: The total published world experience of the placement of metal stents for benign stricture is 352. Principal etiologies (available in 307) were: post-surgical in 163 (53%), chronic pancreatitis in 72 (24%) and post-liver transplant in 38 (12%). The range of diameter of stent (available in 12 studies) was 7-12 mm. Procedures undertaken prior to metal stent placement (available in 22 studies) included balloon dilatation, plastic stent and surgical bypass. Time to index occlusion and 5-year outcome (data available for 256 stent placements) are shown in the Table above. Treatment of occluded stents involved stent-in-stent therapy (either plastic or metal), percutaneous cholangiography and irrigation and surgical biliary bypass. CONCLUSIONS: This is the most comprehensive analysis of outcome when metallic endobiliary stents are used for palliation of jaundice secondary to benign extrahepatic biliary stricture. The findings suggest that metal stents can be used for benign disease when life expectancy is under 2 years. Given the decline in primary patency after this period, metal stents should probably not be used in individuals with a predicted life expectancy of greater than 2 years at the time of index stent placement.

1077 THE DURATION OF HEMODYNAMIC DEPRESSION DURING LAPAROSCOPIC CHOLECYSTECTOMY AND THE EFFECT OF PRE-EMPTIVE SUBDIAPHRAGMATIC LIDOCAINE INSTILLATION
Sung Su Yun, Dong Shik Lee, Hong Jin Kim, Koing Bo Kwun and Sun Ok Song, Yeungnam University, Taegu, Republic of Korea
BACKGROUND: Although laparoscopic cholecystectomy (LC) is accepted as a standard operation for benign gallbladder disease with many advantages, hemodynamic changes induced by CO2 pneumoperitoneum during LC cause circulatory problems in patients with advanced cardiopulmonary disease. We designed this study to evaluate the extent of hemodynamic changes and the effect of subdiaphragmatic lidocaine instillation during LC under CO2 pneumoperitoneum. METHODS: 24 patients (25-65 years old) were enrolled in this study with informed consent and protocol was designed with prospective, randomized, double-blind method. Patients with cardiopulmonary disease (hypertension, COPD, etc.) were excluded. Ten minutes before CO2 pneumoperitoneum, the control group received normal saline 200 ml and the lidocaine group received 0.2% lidocaine 200 ml in both subdiaphragmatic spaces (150 ml in right side, 50 ml in left side). Blood pressure (BP), cardiac index (CI), systemic vascular resistance (SVR), central venous pressure (CVP) and endtidal CO2 (ET CO2) were monitored every 5 minutes during LC with the NICO system. Independent sample T-test and repeated measures of ANOVA in SPSS 10.0 version were used for statistical analysis. RESULTS: In the control group, all parameters were compared to baseline value. Baseline was defined as 5 minutes after induction of anesthesia. Ten minutes after 14 mmHg CO2 pneumoperitoneum, CI fell maximal y(31.8%) from 3.7 ± 0.9 to 2.9 ± 1.1 L/min/m2 (p < 0.05), but returned to baseline level 20 minutes after pneumoperitoneum. SVR was increased maximally (46.8%, p < 0.05) 10 minutes after pneumoperitoneum and recovered to baseline level 20 minutes after pneumoperitoneum. Mean arterial pressure, CVP, ET CO2 were increased gradually after pneumoperitoneum but returned to baseline level 10 minutes after desufflation of pneumoperitoneum. Subdiaphragmatic lidocaine instillation attenuated the adverse cardiac depression, SVR and mean arterial blood pressure, data at 25, 30 minutes after CO2 pneumoperitoneum were statistically significant (p < 0.05). CONCLUSION: Maximal adverse hemodynamic changes were observed 10 minutes after CO2 pneumoperitoneum but recovered 10 minutes later in healthy patients. Pre-emptive subdiaphragmatic lidocaine instillation before CO2 pneumoperitoneum induction may help the patients with advanced cardiopulmonary disease to attenuate the adverse hemodynamic effects during LC.

1078 EXPERIENCE WITH MAJOR HEMOBILIA IN A SPECIALIST UNIT IN A DEVELOPING COUNTRY
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Hemobilia is a rare but life-threatening clinical problem. In the developed world there has been an increase in the incidence of iatrogenic hemobilia with corresponding change in its management. The aim of this study was to analyse the etiology and management of major hemobilia in a specialist unit in a developing country. A retrospective analysis of 18 patients (14 males, 4 females; mean age 39 years, range 13-74) who presented with major hemobilia over a 5-year period was done. The etiology was iatrogenic in 9 patients. This included percutaneous transhepatic cholangiography (PTC) in 6, endoscopic retrograde cholangiopancreatography in 1 and liver biopsy in 1. Hemobilia was due to liver trauma in 6, liver tumors in 3 and post-cholecystectomy bleed in 1. Patients presented with melena (16), hematemesis (6), jaundice (5), and fever (1). Abdominal angiography was performed in 16 patients. One patient with venous bleed and another with a liver tumor did not have angiography. At angiography a pseudoneurysm of the right hepatic artery or its branches was seen in 11 patients, left hepatic artery in 1, an arterio-biliary fistula was found in 1, tumor blush was seen in 1 and no source of bleeding was found in 2. Eight patients were treated with coil embolization, 4 with glue embolization, 1 with chemoembolization, 2 were treated conservatively and 3 required surgery. Two patients underwent liver resection for liver tumors, and one laparotomy for massive uncontrollable venous collateral bleeding from a portal cavernoma. Eleven out of 13 patients responded immediately to embolization. One patient needed two sessions. One patient had an anomalous right hepatic artery from the SMA, which was missed on the first angiogram and responded to the second embolization. There were 4 deaths, 2 immediate and 2 delayed. One patient with EPHVO died of massive venous bleed which could not be controlled at laparotomy and the other due to liver failure 2 weeks after embolization had controlled bleeding from a liver tumor. Two delayed deaths were in patients undergoing PTC for carcinoma gallbladder and carcinoma pancreas who died 4 and 9 months later. The spectrum of hemobilia seen in developing countries is now similar to that in the developed world. Angiography and embolization is highly effective in controlling bleeding. Centres performing biliary interventions in the developing world should have access to emergency angiography and embolization facilities.

1079 BILIARY COMPLICATIONS IN ACUTE LITHIASIC PANCREATITIS (ALP), A PROSPECTIVE SURVEY OF 16 YEARS ABOUT ACUTE CHOLECYSTITIS IN ALP
Mario A Secchi Sr, Lisandro Quadrilli Sr, Fernando Serra Sr, Jose Forte Sr and Leonardo Rossi Sr, Hospital Italiano, Hospital Provincial and Hospital Clemente Alvarez, Rosario - Santa Fe, Argentina
INTRODUCTION: Biliary complications – acute cholecystitis (AC) and/or cholangitis in patients with acute lithiasic pancreatitis (ALP) – modify the therapeutic course of both diseases. This prospective survey gives data only about the association between ALP and AC and its impact on prognosis. METHODS AND PATIENTS: We have prospectively studied a group of 687 patients with ALP diagnosed by clinical, serologic and
1080 IS BILIARY DIVERSION A RISK FACTOR FOR PEPTIC ULCEER DISEASE?
Saied Saeedi, A. Chaudhary, S. Bhattacharyya, A. Agarwal, CP "Pant Hospital and Maulana Azad Medical College, Delhi, India"

PURPOSE: To determine the incidence and clinical significance of peptic ulcer disease following biliary diversion. METHODS: The study was prospectively conducted in 86 patients who had undergone Roux-en-Y hepatojejunostomy (RHYJ) for post cholecystectomy benign biliary stricture (BBS) or following cholecystic cyst excision. Detailed clinical evaluation and an upper GI endoscopy were carried out in all cases to assess the symptoms/evidence of peptic ulcer disease (PUD). RESULTS: In total 86 patients were recruited for the study. RYHJ was done for BBS in 55 patients and with CDC excision in 31 patients, 6 months to 9 years previously. The age range was 21–56 years in BBS and 5–72 years in CDC with 50 and 24 females, respectively. In all, 9 patients were found to have symptomatology suggestive of PUD including one patient who had similar symptoms prior to surgery. None of the patients had upper gastrointestinal bleed (UGI) in the postoperative period. UGI endoscopy did not show any evidence of PUD and was reported to be normal in all the patients. Seven of these 9 patients responded to therapy with proton pump inhibitors (PPI). On the basis of response to PPIs the incidence of peptic ulcer disease after RYHJ was 7.9% (7/86). CONCLUSIONS: Biliary diversion is a risk factor for development of PUD. However, the clinically important risk is small, 8.13% in our study, and can be easily managed with PPIs.

1081 DUPLICATION OF COMMON BILE DUCT: A REVIEW OF THE LITERATURE
Kazuki Yamashita, Yoko Hirabayashi, Masahito Ikeda, Masahiko Yamamura, Tadaaki Kubo, Hisumi Hasegawa, Hiroyuki Morimoto, Atsushi Urawaki, Yoshihiro Hira and Tsukasa Tsumoda, Kawasaki Medical School, Kurashiki, Japan

Among the various anomalies of the biliary system, a duplication of common bile duct (DCBD) is extremely rare. Only 24 cases have been recognized in the Western literature during approximately the last 500 years up to 1986. However, in Japan, a total of 48 cases have been reported since 1968, when the first case was reported. We recently encountered a case of DCBD associated with a choledochal cyst and pancreaticobiliary maljunction (PBM). A 60-year-old female patient presented to our hospital with severe upper abdominal pain. A diagnosis of common bile duct dilatation and PBM was made preoperatively. Operative choledocho-pancreateography via the common hepatic duct showed that the cylindrical dilatation of the common bile duct began from the site of the opening of the cystic duct, that dilatation continued into the pancreatic portion, and that the duct was eventually divided into two channels. Both channels opened individually into the second portion of the duodenum, and the diagnosis of DCBD with PBM was made. This case is reported herein, along with a review of the Japanese literature. Cancer and PBM were the two most serious concomitant conditions. Defining the accessory common bile duct (ACBD) as that channel of the aberrant common bile duct which did not open into the major duodenal papilla, it was found that the ACBD opened into the gastrointestinal tract between the upper lesser curvature and just above the major duodenal papilla, into the pancreatic duct and into other sites. In DCBD, the opening site of the ACBD was considered to have close implications for the type of concomitant cancer and concomitant PBM that would appear.

1082 PREOPERATIVE BILIARY DRAINAGE FOR PERIAMPUTAL CANCER: A COMPARISON BETWEEN ENDOSCOPIC DRAINAGE AND PERCUTANEOUS TRANSEPTIC DRAINAGE
Sun-Hee Kim, Min-Gew Choi, Dae-Wook Hwang, Ji-Hoon Kim*, Yoo-Seok Yoon, Jin-young Jang, Yong-Hyon Park, Department of Surgery and *Department of Pathology, Seoul National University Hospital, Seou, Republic of Korea

PURPOSE: A preoperative biliary drainage procedure (endoscopic nasoabiliary drainage, ENBD; endoscopic retrograde biliary drainage, ERBD or percutaneous transhepatic biliary drainage, PTBD) is not infrequently performed in periampullary cancer patients with obstructive jaundice. Among those different biliary drainage procedures, a safe and more informative procedure should be performed in the indicated cases. However, no comparative study has been done between two biliary drainage methods (endoscopic vs percutaneous). The aim of this study was to compare the clinical outcome of these two biliary drainage methods in periampullary cancer and to suggest the guidelines in selecting the appropriate preoperative biliary drainage. METHODS: Between January 1996 and June 2003, 34 patients underwent pancreaticoduodenectomy (Whipples' operation or pylorus-preserving pancreaticoduodenectomy) after ENBD/ERBD (group A) due to periampullary cancer. Preoperatively PTBD performed in 34 patients was matched with group A, according to age group, sex, diagnosis, and operation during the same period (group B). RESULTS: There was no difference in operative time, intraoperative and postoperative transfusion, total/postoperative length of stay, incidence of postoperative complication, TNM staging, and perineural/endovascular/ endoluminal invasion. However, the thickness of CBD wall (group A: group B: 1.78 ± 0.55 mm; 1.14 ± 0.37 mm, P < 0.001) and degree of inflammation of CBD wall (group A > group B, P < 0.031) have shown statistical significance. CONCLUSIONS: Although the significant difference of clinical outcome between two preoperative biliary drainage methods could not be identified in this study, the inflammation of operative field resulting from ENBD/ERBD is expected to cause surgical difficulties and ultimately affect the postoperative complications.

1083 CO-EXISTENCE OF TUBERCULOSIS WITH HEPATOPANCREATICOBILIARY MALIGNANCIES
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BACKGROUND: Co-existence of malignancy with tuberculosis is rare. Potential for misdiagnosis of cancer remains high in these cases due to sampling error showing only one of the pathologies. CASE 1: A young woman was operated on with a preoperative diagnosis of peripancreatic adenocarcinoma. At laparotomy, regional lymph nodes were grossly enlarged. Frozen section of these nodes revealed tuberculosis. Final pathology confirmed co-existence of tuberculosis with malignancy. The patient made an uneventful recovery. CASE 2: A 50-year-old woman with chronic pain in the right hypochondriac region was diagnosed to have carcinoma of the gallbladder. A radical cholecystectomy with segment IVb and V liver resection and regional lymphadenectomy was performed. Final histopathology report revealed adenocarcinoma of gallbladder with miliary tuberculosis of liver with reactive lymph nodes. She died 9 months later of pneumonia. CONCLUSION: In countries with high endemicity for tuberculosis, co-existence of malignancy and tuberculosis should be considered. Resection, which is the only chance for cure, should not be abandoned based on histopathology of tuberculosis if tumour is strongly suspected on clinical grounds and imaging.
1084 PSEUDOANEURYSM OF CYSTIC ARTERY AFTER LAPAROSCOPIC CHOLECYSTECTOMY - A CASE REPORT
Marcelo A Ribeiro Jr, Oswaldo L Molla Neto, William Abrão Saad Jr, Eleazar Chabi and William Abrão Saad, São Luiz Hospital and University of Sao Paulo, Sao Paulo, Brazil

BACKGROUND: Laparoscopic cholecystectomy is the treatment of choice for cholelithiasis. Literature shows that during the performance of such a procedure, there may be complications such as arterial lesions. The formation of a pseudoaneurysm of the cystic artery is a rare occurrence that has only five cases reported. Clinical manifestations of arterial lesions may be early or late, and the diagnosis can be made through radiological methods. CASE OUTLINE: We hereby report a case of pseudoaneurysm of cystic artery after laparoscopic cholecystectomy that presented a clinical picture of obstructive jaundice on the 50th post-surgery day. The diagnosis was verified by means of arteriography, as well as by CT and cholangiography, and the treatment was by laparotomy pseudoaneurysm surgical approach. DISCUSSION: Although this kind of surgical complication is rare, the surgeon must be aware of the occurrence, as they have a high index of suspicion to be able to make a differential diagnosis.

1085 CHRONIC GRANULOMATOUS CHOLECYSTITIS INVOLVING THE RIGHT HEPATIC ARTERY AND THE BILE DUCT OF HEPATIC HILUS: A CASE REPORT
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Patients with severe chronic cholecystitis, particularly xanthogranulomatous cholecystitis, often undergo excessive surgical resections because of difficulty in distinguishing their condition from gallbladder cancer or bile duct cancer. We experienced a patient with a severe granulomatous cholecystitis with unusual neurofibromatous involvement of the right hepatic artery and the bile duct of hepatic hilus, who underwent a simple bile duct resection. The 71-year-old woman was admitted with a chief complaint of jaundice and anaemia. Computerized tomography and ultrasonography revealed obstructive jaundice, a low density hilar hepatic mass and gallbladder stone. Magnetic resonance cholangiography revealed hilar bile duct stenosis. Endoscopic retrograde cholangiography demonstrated smooth hilar bile duct stenosis, obstruction of the cystic duct and bilio-cholecytic fistula. Intraductal ultrasound revealed intact mucosal layer and circular concentric homogeneous hyperechoic fibrous muscular layer of the narrowing bile duct. Cholangioscopic examination revealed neither tumor nor tumor vessel and cholangiocarcinotic biopsy detected no malignancy. Hepatic angiography revealed right hepatic arterial obstruction, which resulted in generating collateral feedings from the left hepatic artery to the right liver through the hepatic hilar plate. Tumor markers were all within normal range. Based on those findings, we highly suspected chronic severe cholecystitis involving the right hepatocystic artery and the bile duct of the hepatic hilus causing bilio-cholecytic fistula. Simple bile duct resection was programmed. Intraoperative extemporaneous biopsies did not reveal any malignancies either in the hepatic margin of the bile duct or gallbladder. The gross findings of the surgical specimen showed an ill-defined white hard mass, but microscopic examination demonstrated unusual findings of chronic granulomatous cholecystitis with neurofibromatosis without any xanthogranulomatous changes. Our case was unusual one because, in general, the single inflammatory process seldom injures thick arterial wall. The authors recommend the preoperative scrutiny of the bile duct system by cholangiography and cholangioscopy for bile duct strictures which present difficulty to determine whether it is benign or not.

1086 A CASE OF XANTHOGRAVULOMATOUS CHOLECYSTITIS
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Xanthogranulomatous cholecystitis (XGC) is an uncommon inflammatory disease of the gallbladder, and XGC is sometimes confused with a malignant lesion. We recently experienced an XGC patient who had been diagnosed preoperatively as an advanced gallbladder carcinoma. A 55-year-old male with gallbladder tumor was admitted for examination and treatment. On his abdominal ultrasound, we could not see the border of gallbladder wall and 26 mm × 23 mm low echoic mass in the liver. On CT scan, we found a 30 mm mass in his liver via the gallbladder wall and was enhanced around the tumor. Tumor increased 23 mm to 30 mm for 1.5 months. We found encausement of cystic artery and minor tumor stain on angiography. In his laboratory data, tumor marker was within the normal range. We performed extended radical cholecystectomy injecting blue dye into cystic artery and diagnosed pathologically gallbladder mass as XGC intraoperatively. We should comprehensively diagnose XGC.

1087 USEFULNESS OF SELF-EXPANDABLE METALLIC STENTS FOR MALIGNANT HILAR STRICURE
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Since January 2001, we have transhepatically placed biliary metallic stents in 50 patients with inoperable malignant hilar obstruction, 12 of whom suffered from pancreatic cancer, 16 from carcinoma of the common bile duct, 4 from carcinoma of the hilar bile duct, 9 from cancer of the gallbladder, 8 from metastatic carcinoma of the stomach and the colon, one from malignant lymphoma. In particular, we evaluated the usefulness of metallic stent in 8 patients with malignant hilar stricture, 4 from carcinoma of the hilar bile duct, 3 from carcinoma of the gallbladder invasion to hilar bile duct, one from malignant lymphoma. Insertion and deployment of metallic stents into both the right and left hepatic ducts were successful in 5 of the 8 patients, 3 patients were inserted into the left hepatic duct. The patients were followed up for 30-336 days (mean 185). After stents were placed, all patients could take their diet orally and take a bath, among them 7 patients (87.5%) were discharged. In one patients stent occlusion due to sludge formation occurred 121 days after treatment, but we transhepatically inserted multiple stents in bilateral hepatic duct for this patient. After that this patient lived for 9 months without complications. Metallic stents are useful and safe and reliable for irreversible malignant hilar stricture.

1088 MRI AND MRCP FINDINGS IN PRIMARY SCLEROSING CHOLANGITIS (PSC)
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Primary sclerosing cholangitis (PSC) is a disease of unknown etiology, characterized by inflammation, fibrosis, progressive stricturing and obliteration of bile ducts. Magnetic resonance cholangiopancreatography (MRCP) is an excellent non-invasive technique for evaluating intra- and extrahepatic bile ducts. Before the use of MRCP, the diagnosis of PSC was made mainly by invasive procedures such as endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous transhepatic cholangiography (PTC). MRCP allows high resolution imaging of the bile ducts in various planes by using heavily T2-weighted sequences. This technique relies on inherent T2 signal of biliary fluid. When MRCP is combined with gadolinium chelate contrast enhancement MRI, this further allows evaluation of liver parenchyma and complications of PSC such as cholangiocarcinoma. Cholangiocarcinoma occurs as a complication in 10-15% of patients with PSC. MRI and MRCP together, provide more information than conventional cholangiography in evaluation of the disease extent and staging. The objectives of this presentation are as follows. 1. To detail the technique for comprehensive evaluation with MRI and MRCP. 2. To illustrate the classic MRI/MRCP findings in PSC. To illustrate the role of 3D imaging in evaluation and staging of cholangi-carcinoma and complications of PSC.

1089 HEPATOPANCREATICODUODENECTOMY WITH COMBINED RESECTION AND RECONSTRUCTION OF THE PORTAL VEIN FOR ADVANCED GALLBLADDER CARCINOMA
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Although diagnostic modalities for hepatobiliary diseases have recently been advanced, gallbladder cancer is still encountered at the advanced stage. We present surgical techniques of hepatopancreaticoduodenectomy (HPD) with combined resection and reconstruction of the portal vein for advanced gallbladder transverse for locally advanced gallbladder carcinoma. The patient is a 61-year-old gentleman with the chief complaint of fever. Preoperative images revealed a huge gallbladder tumor, 9.3 cm in diameter, involving the liver, extrahepatic bile duct and duodenum. After amelioration of the serum total bilirubin level by percutaneous transhepatic biliary drainage, percutaneous transhepatic portal embolization (PTPE) of the right portal
vein was performed. The calculated ratio of the right lobe volume to the total liver by CT volumetry decreased, 62% before PTPE to 55% 10 days after PTPE. The operation was performed 13 days after PTPE. First, right hemicolecetomy was performed because of firm attachment of the gallbladder tumor to the transverse colon. Then, stomach was cut 2 cm proximal to the pyloric ring. After skeletonization resection of the hepatoduodenal ligament, right hepatic artery and gastroduodenal artery were ligated and divided. Portal bifurcation was found to be involved by the huge mass. Pancreas was divided at the level of the portal vein and the head of the pancreas was detached from the portal system and superior mesenteric artery. Following extended right hepatic lobectomy, the left medial, left lateral superior and left lateral inferior segmental bile ducts were individually divided. Finally, the portal bifurcation was resected and end-to-end anastomosis between the portal trunk and left portal vein was made. Modified Child method reconstruction and ileocolostomy were performed. The operating time was 12 h and 23 minutes and blood loss was 2525 mL. The patient was discharged 33 days after operation without any complications. He suffered from local recurrence 6 months after surgery and underwent chemoradiation therapy. He has enjoyed a year following surgery and is still doing well.

1090 ROBOTIC ASSISTED CHOLEDOCO-JEJUNOSTOMY IN PIGS
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AIM: To evaluate robotic assisted (da Vinci) laparoscopic reconstruction of the common bile duct (CBD) by a surgeon inexperienced in robotic surgery. MATERIALS AND METHODS: Ten pigs of 75 kg were used for the experiments. Three of these were used to initialize and adjust the procedure. Five pigs endured a planned postoperative survival of 1 week and afterwards a laparotomy and cholangiography were performed. The gallbladder was removed, the CBD displayed and transected. Proximal jejunum was divided by stapling techniques. The CBD then anastomosized end-to-side to the jejunum by interrupted sutures. Jejunal continuity was restored by way of Roux-en-Y anastomosis. Blood samples were drawn prior to the first operation and before the laparotomy 1 week later. RESULTS: Seven pigs were planned to survive. Two pigs died due to bleu, they both had a competent anastomosis. Five pigs survived. Standard liver parameters were unaffected by surgery and cholangiography showed no signs of extrahepatic stenosis or intrahepatic dilatation. There was a steep decline in operating time for a surgeon inexperienced in robotic-assisted surgery. CONCLUSION: Laparoscopic reconstruction of the CBD by way of a choledocho-jejunostomy, utilizing robotic assistance, seems to be a safe procedure and easy to learn for an inexperienced surgeon.

1091 THE EXPERIENCE OF 17 CASES OF HEPATECTOMY AND PANCREATO-DUODENECTOMY (HPD), AND HEPATECTOMY, LIGATION AND PANCREATODUODENECTOMY (HPLD)
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BACKGROUND: HPD or HLD for advanced biliary tract cancer is controversial. We summarized 17 cases done at our institute from January 1987 through November 2003. PATIENTS: Ten male and seven female patients whose diagnoses were gallbladder cancer (GBCa) in 6 cases, hilar bile duct cancer (HBdCa) in 5 cases, bile duct cancer (BdCa) in 5 cases and cholangiocellular carcinoma (CCCa) in 1 case were analysed. The type of hepatectomy was extended left lobectomy in 7 cases, extended right lobectomy in 2 cases and partial resection in 8 cases. The type of pancreatotomy was PD in 12 cases and PpPD in 5 cases. RESULTS: The average age was 63.7 years old (48–73). The final staging was as follows; GBCa: stage III: 1 case, IVa: 5 cases, HBdCa/BdCa: stage II: 6 cases, III: 3 cases, CCCa: stage IVa: 1 case. Histology revealed curability of in all six GCCa cases because of &gt;em1, hml, hml. As to 10 HBdCa/BdCa cases, the histology revealed em0, hml, bmo in 2 cases, em1 in 6 cases, em2 in 1 case, hml2 in 1 case, and m0 in 5 cases, n1 in 4 cases, n2 in 2 cases. The final curabilities were curA in 1 case, curB in 7 cases and curC in 2 cases. The one case of CCCa was finalized in curB because of n1. The operation time was 15.9 ± 2.1h. Blood loss was 2968 ± 992 ml. The nine cases had complications such as intra-abdominal abscess in 7 cases, after bleeding in 2 cases. One case died from hepatic failure. Average hospitalization was 121.5 ± 60 days. Observation period was 18.8 months on average (2–86). All GBCa and CCCa patients died within 14 months. As to 10 HBdCa/ BdCa cases, 7 patients died 86, 48, 28, 26, 12, 2, 2 months postoperatively, and the other 3 patients were alive 20, 13, and 4 months after the operation, respectively. CONCLUSION: As a treatment of advanced biliary tract cancer, HPD or HLD is still difficult to achieve long-term survival. Since there is no evidence-based adjuvant chemotherapy at present, the indication for these operations would need consideration.

1092 APPROPRIATE AGE FOR BILIARY TRACT SURGERY FOR PATIENTS WITH PANCREATICOBILIARY MALFUNCTION: CHILDHOOD VS ADULTHOOD
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BACKGROUND: We performed excision of dilated choledochos with pancreaticobiliary maljunction (PBM), which is a high-risk factor for biliary tract carcinogenesis, because of a continuous reflux of pancreatic juice into a biliary tract. The aim of this study was to clarify the appropriate age to undergo bile duct excision in the patients with pancreaticobiliary maljunction (PBM) to prevent the development of biliary tract carcinoma. METHOD: The subjects studied were 144 patients including 81 patients in the pediatric group (<15 years old) and 63 patients in the adult group (>15 years old) with PBM who had dilated choledochos and underwent surgical excision of extrahepatic bile ducts or choledochoctestotomy. We investigated the risk of biliary tract carcinogenesis, according to age of patients and types of dilation. RESULTS: No carcinoma cases could be found in a pediatric group preoperatively and in the follow-up period up to a maximum of 21 years. The youngest case was 21 years old who developed bile duct carcinoma 3 years after surgery for congenital choledochal dilation (choledochal cyst). CONCLUSION: To prevent biliary tract carcinogenesis, dilated choledochos should be excised in childhood for PBM patients before its development to precancerous stage.

1093 COMPARATIVE ANALYSIS OF BILE DUCT INJURIES SUSTAINED AT OPEN AND LAPAROSCOPIC CHOLECYSTECTOMY
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BACKGROUND: There has been an increase in the number of bile duct injuries at laparoscopic cholecystectomy (LC). There is a suggestion that these may be more severe than open injuries. This series compares patient groups in a similar time frame who have sustained injuries at open or laparoscopic cholecystectomy. PATIENTS AND METHODS: Between 1997 and 2003, there were 42 patients with bile duct injuries referred to our unit and the data were prospectively maintained. 24 had sustained the injury at open cholecystectomy (OC) and 18 at LC. In the LC group, 13 patients presented with a leak, 2 were discovered at the time of LC and 3 had strictures. In the OC group, 12 patients presented with a stricture and the remainder with a leak. In the LC group, there were 7 patients with a Bismuth type 3 injury, 6 patients with a type 4 injury (33%), 2 patients with a type 2 injury and one with a type 5 injury. In the OC group, 20 patients had a Bismuth type 3 injury, 3 patients had a type 2 injury and one had a type 4 (5%) injury. In the LC group, 9 patients underwent laparotomy before referral, for septum or for attempted repair. In the OC group, 8 patients underwent operations, all for repair, which failed. Roux-en-Y hepaticojejunostomy was done in all patients, by the Hepp Couinaud approach. In the LC group, 4 patients needed 2 anastomoses at the hilum to left and right ducts, one patient required a right hepatic resection and one required repair to an anomalous right hepatic duct. In the OC group, only one patient required 2 anastomoses separately at the hilum. There were 2 deaths, both in the LC group, one in a patient with Bismuth type 4 injury with a second repair, due to ARDS and one due to liver failure due to delayed CCa. The type of repair and the development of cirrhosis. RESULTS: The medium-term results in the LC group include 3 patients who have developed problems (14%): two patients with type 4 injuries have needed percutaneous dilatation or reoperation and one patient with a type 3 injury. One of the OC group, whose liver had severe intrahepatic stricthing and no further treatment offered. One patient who had a delayed repair died 3 years later with
secondary biliary cirrhosis, with a patent anastomosis. The other patient with a type 4 injury has had one dilatation and is well. CONCLUSION: Bile duct injuries after LC are more complex, of a higher Bismuth grade (p < 0.005) and associated with more septic complications than those after OC. The overall results of repair are likely to be worse with LC as they depend on the Bismuth grade of injury.

1094 USEFULNESS OF THREE-DIMENSIONAL COMPUTED TOMOGRAPHY FOR PREOPERATIVE MANAGEMENT OF HILAR CHOLANGIOCARCINOMA
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BACKGROUND: It is difficult to assume a transaction line of the hilar bile duct preoperatively by intraoperative markers like a bifurcation of the portal vein. PURPOSE: To clarify the usefulness of superimposed three-dimensional computed tomography (3D-CT) of the bile duct and the portal vein for the preoperative simulation of bile duct transaction. SUBJECTS AND METHODS: Two patients with hilar cholangiocarcinoma were examined. MDCT cholangiography and dynamic enhanced MDCT were performed preoperatively, and a 3D image which superimposed the bile duct on the portal vein was made from these data using the workstation (HepaVision, MeVis, Bremen, Germany). After an area of cancer invasion diagnosed by cholangiography was projected on this 3D bile duct image, an appropriate transaction line of the bile duct for the curative resection was simulated. Bifurcation of the portal vein was used as a marker of the transaction line of the bile ducts, and the bile duct which was exposed to the cut surface was also identified. They were compared with the intraoperative findings. RESULTS: Case 1: Tumor mainly located in the upper to hilar hepatic duct. It invaded to the root of the bile duct of the median segment (B4) and to the secondary branches of the right hepatic duct. Since the patient had a severe chronic obstructive pulmonary disease, extended hilar bile duct resection was selected. By the 3D-CT simulation, transaction line of the right hepatic duct was determined as a right edge of the bifurcation of the anterior and posterior portal branch, and that of the left hepatic duct was determined as a right edge of the umbilical portion. Case 2: Tumor mainly located in right to hilar hepatic duct. It invaded to the root of B4 and to the third branch of the right hepatic duct. Extended right hepatectomy + caudate lobectomy was performed. By the 3D-CT simulation, a transaction line of the bile duct was determined as a right edge of the umbilical portion. In both cases, intraoperative findings of transected bile ducts were same as those of preoperative simulation by the 3D-CT, and curative resection was obtained. CONCLUSION: 3D-CT was useful for deciding the appropriate transaction line of the bile duct by using blood vessels such as the bifurcation of the portal vein as markers preoperatively.

1095 MANAGEMENT OF BILE LEAK FOLLOWING LAPAROSCOPIC CHOLECYSTECTOMY
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BACKGROUND: Bile leak is a well-documented complication of laparoscopic cholecystectomy. Recognition and treatment of this event varies. We have standardised the management of such bile leaks and an algorithm is presented. METHODS: Twenty-five patients with bile leaks following laparoscopic cholecystectomy between 1991 and 2003 were reviewed in two groups, before (pre-1998) and after standardising the management. RESULTS: There were no bile leaks due to CBD damage. Nine cases occurred pre-1998. Of these, 4 patients underwent open surgery to control cystic stump bile leak and 1 patient had re-laparoscopy with washout and sutting of an accessory duct. Four patients were managed conservatively. Mean duration of hospital stay was 11.5 days (range 5–30). There was one mortality. Following establishment of our HPB unit in 1998, 16 patients were referred with a bile leak and managed according to a protocol involving establishment of drainage, insertion of endoscopic stent and laparoscopic lavage in cases with peritonitis. Seven patients underwent ultrasound, 4 who did not have a percutaneous drain had drain insertion. Thirteen patients had postoperative ERCP, with stent insertion in 12. Five patients had re-laparoscopy to oversew a leak (n = 2) or washout with drain insertion (n = 3). There was no mortality and none required open surgery. Mean hospital stay was 9.89 days (range 5–11). DISCUSSION: Early referral of bile leaks and management on a specialised unit using ERCP and percutaneous drainage produces a good outcome for most patients, minimising morbidity and maintaining patient satisfaction with a minimal access approach.

1096 SURGICAL TREATMENT OF HEPATICOCHOLEDOCHUS BILIARY STRICTURES
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AIM: Postoperative bile duct excision injury after cholecystectomy occurs in 0.1–2.2% of cases, which leads to formation of biliary strictures (BS). Thus, we encountered damage to the bile duct after open cholecystectomy (OC) and endoscopic retrograde cholangiopancreatography in 0.1% events, at laparoscopic operation in 0.3% events and after stomach resection in 0.2%. Surgical treatment of such complications is one of the most difficult problems, and has not yet been solved completely. Our purpose was to study the results of reparative surgery in different types of biliary strictures. METHODS: We present the data from our experience of surgical treatment performed on 164 patients with biliary strictures, operated in the period from 1980 to 2003. Patients were divided into BS types according to Bismuth classification: type I – 5 (3%) patients, type II – 18 (11.5%) patients, type III 89 (54.3%), type IV – 49 (29.9%), and type V – 15 (9.3%). Patients with types I and II underwent choledocho-duodenostomy, depending on the level and localization of stricture. RESULTS: For the period from 1980 to 2003, 41 (25%) patients with types III, IV and V underwent reconstructive operation – hepatojejunostomy on the small intestine out-of-work loop on Roux using transhepatic biliary catheters (TBC). From 1999 to 2003, for the treatment of III, IV and V scar stricture types we used reconstructive operations developed in our center – hepatojejunostomy without transhepatic biliary catheters on the small intestine out-of-work loop on Roux, because presence of TBC may be the source of infections. It should be noted that the main condition for realization of such a strategy was a careful mobilization of lobe bile ducts, localization and extent of scar stricture. So, in type V, if conditions for hepatojejunostomy were not favorable, anastomosis was formed with transhepatic TBC. CONCLUSION: Thereby, we consider that in all BS types the execution of reconstructive bile drainage operations is more rational to perform strictly depending on indications. Types I and II and choledocho-duodenostomy is the most applicable, whether in BS types III, IV and V hepaticojejunostomy on Roux without transhepatic biliary catheters should be performed. Surgical interventions with the use of TBC remain operations of choice in type V, both for preventive maintenance of complications, and for ‘make-up’ purpose.

1097 IS SURVEILLANCE FOLLOWING REPAIR OF BILE DUCT INJURY WARRANTED?
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Introduction and Aim: The incidence of major bile duct injuries remains at 0.4–0.6% of all laparoscopic cholecystectomies. Repair of bile duct injuries (BDI) can be successful in up to 90% of cases, complications, however, can be associated with significant morbidity and mortality. The aim of this study was to determine whether regular surveillance of BDI patients enables interventions to be performed before complications become clinically apparent. METHODS: Patients following definitive BDI management were entered into a prospective surveillance study undertaken by a single surgeon (JMHB). Only BDIs secondary to cholecystectomy were included. Patients were seen every 3 months for the first 2 years and then 6-monthly. At each visit blood was drawn for liver function tests. A rise in the alkaline phosphatase (AP) led to investigation. If an intervention was carried out the patient was returned to 3-monthly surveillance. Approval from the Cleveland Clinic Foundation Institutional Review Board was obtained. RESULTS: Eighteen consecutive patients were studied (13 female, 5 male). Median age was 42 (IQR 33–57). All patients underwent laparoscopic cholecystectomy, 10 patients had undergone an intervention prior to referral (4 repaired at the initial surgery, 6 delayed repair). There were 2 E2, 10 E3 and 6 E4 injuries (Strasberg classification). Median time from injury to referral was 29 days (IQR 6–167). Definitive treatment included 9 primary and 4 re-do hepaticojejunostomies, 4 stents/balloon dilatation and 1 abscess drainage. The median follow-up period was 44
months (IQR 26–49). In 4 patients there was an elevation of the AP which prompted investigation and subsequent stricture dilatation. In one patient an episode of cholangitis due to stricture formation occurred with a normal AP. 2 patients had persistently elevated AP throughout the study period. The patients both had E4 injuries and investigation demonstrated sectorial duct blockage. CONCLUSIONS: This study confirms that successful repair of complex BDI can be achieved in expert hands. Regular surveillance of the alkaline phosphatase can identify stenoses before they become clinically apparent.

1098  INTARGETIVE CONTINUOUS EXTERNAL BILIARY DRAINAGE DURING PANCREATICOoduodenectomy

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In pancreatoduodenectomy, the common bile duct is usually divided at an early phase of this operation. After this division, abrupt and prolonged complete closure of the proximal common duct stump during the operation may cause liver damage and result in postoperative liver dysfunction and other complications. In this study, we performed intraoperative continuous external bile drainage (IBD) in consecutive 43 patients and compared postoperative morbidity including liver dysfunction and patient outcomes with the control group (n = 41). No complications associated with IBD catheter insertion were observed in this series. The drainage group showed significantly decreased transaminase levels within 7 days after operation. Postoperative liver dysfunction was detected in 7 patients in this series, 6 in the control group and 1 in the drainage group (p = 0.04). However, there were no significant differences between these two groups in terms of postoperative morbidity other than liver dysfunction, relaparotomy and in-hospital mortality rates. This study demonstrated that prolonged intraoperative complete closure of the common bile duct contributed to postoperative liver dysfunction in a majority of the cases, and IBD, which is easy and safe to perform, could reduce intraoperative liver damage and prevent postoperative liver dysfunction.

1099  RESULTS OF HEPATOCOEJEJUNOSTOMY IN A SPECIALIST UNIT FROM A DEVELOPING COUNTRY

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BACKGROUND: Surgeons in developing countries do not commonly perform bilio-enteric anastomoses at the hepatic duct confluence. Patients with bile strictures are often treated with repeated stenting or ended with no treatment. With the evolution of hepatopancreatoibiliary (HPB) units, complex biliary reconstructions are now being performed in increasing numbers but data on results, especially follow-up, are scarce. The aim of this study was to analyse the results of hepatocoejejunostomy (bilio-enteric anastomosis at the common hepatic duct or above) in a new specialist HPB unit in a developing country. PATIENTS AND METHODS: An analysis of a prospectively maintained database of 84 patients (M = 37, F = 47, mean age = 36 years; range 6–72) who underwent hepatocoejejunostomy over a 6-year period was performed. Indications included post cholecystectomy injuries in 39 patients (open = 24, laparoscopic = 15), choledochal cysts in 27, choledochocarcinoma in 9 and others in 9. Most of the patients underwent bilio-enteric anastomosis around the confluence. Five patients had an anastomosis to the left duct only and 3 separate anastomoses to the right and left ducts. Fifteen patients (60%) had previous surgery on the biliary tree. RESULTS: There were 2 immediate postoperative deaths, one due to pulmonary embolism and another due to chest sepsis and ARDS. Major postoperative complications occurred in 9 patients including bile leaks in 5, intra-abdominal abscess in 1, GI bleed in 1, hemoperitoneum in 1 and postoperative fat necrosis in 1. Two patients needed exploratory laparotomy (one biliary, one hemoperitoneum). The follow-up period ranged from 2 to 84 months (mean 36). Eight patients have been lost to follow-up. Five of 9 patients with choledochocarcinoma died in the study period (mean survival 30 months). One patient with choledochocarcinoma had a primary liver and died of disease progression 15 months postoperatively. In total, 7 patients are alive and well, with a median follow-up of 36 months postoperatively. CONCLUSIONS: At our center, the results of hepatocoejejunostomy were comparable to published data from developed countries. The study demonstrates that hepatocoejejunostomy can be performed with acceptable results in a developing country.

1100  PERCUTANEOUS MANAGEMENT OF BENIGN BILE DUCT PATHOLOGY BY SURGEONS: EXPERIENCE IN A HEPATO-PANCREATO-BILIARY SECTION

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BACKGROUND: Biliary percutaneous procedures (BPP) are useful in the management of complex and acute biliary pathology. OBJECTIVE: To communicate our experience with percutaneous biliary procedures carried out by surgeons in a specific Hepato-Pancreato-Biliary Section. METHODS: Retrospective evaluation in 84 patients with benign biliary diseases, treated with BPP in the period January 1989–January 2002. RESULTS: Diagnostics: common bile duct stones 21 patients, strictures after common bile duct injury (SCBD) 29 patients, and other benign bile duct strictures (OBDDS) 34 patients. Indications: acute cholangitis 45, pruritus 11, high surgical risk 10, contraindicated or failed endoscopic access 9, before liver transplantation 12 and other causes 3. Procedures (n = 141): percutaneous drainage 96, stricture dilatation 27, percutaneous stone treatment 12, stents 5 and biopsy 1. Effectiveness: cholangitis 94.8%, stones 100%, anastomotic stricture dilatation (by SCBD) 45.5% and by OBDDS 90%. Complications: total 32 (38.1%). Mortality: 3 (3.6%). CONCLUSIONS: 1. Percutaneous drainage was an effective method for bile duct decompression in acute cholangitis, it allows an elective and definitive treatment of the pathology. 2. BPP solved strictures in patients with a high surgical risk and in those with complex diseases. 3. The results of biliary percutaneous dilatation were related to the etiology.

1101  BILE DUCT INJURIES ASSOCIATED WITH LAPAROSCOPIC CHOLECYSTECTOMY: A DECADE OF EXPERIENCE

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BACKGROUND: Biliary tract injuries (BTI) represent the most serious and potentially life-threatening complication of laparoscopic cholecystectomy (LC). The aim of this study to review and evaluate reasons, clinical features, diagnostic procedures, timing, methods and results of BTI treatment. METHODS: Data were collected prospectively on 41 patients treated at our center with major bile duct injuries after LC managed between January 1, 1993, and January 1, 2003. 5660 patients underwent LC in our center during the study period. Course of operation, diagnostic procedures, type of BTI, complications and average hospital stay were analysed. The type of BTI was classified according to Strasberg classification. RESULTS: In 25 patients the BTI occurred during LC at our center, whereas the remaining 16 patients were referred after injury at an outside hospital. The frequency of BTIs during LC was 0.44% (25 cases of 5660 LC). The causes of BTI at our center were: misidentification of bile ducts because of acute or chronic inflammation with dense scarring in 17 cases (68%), careless coagulation near bile duct in 3 (12%) cases, incorrect tension of gallbladder during LC in presence of short cystic duct in 3 (12%) cases and Mirizzi syndrome in 2 (8%) cases. BTIs were recognized at the time of LC in 17 patients. The conversion to open surgery was performed in 15 cases, lateral bile duct injury (typeD1) was sutured laparoscopically in 2 cases. The signs of BTI in the postoperative period were: biliary leak and peritonitis, jaundice or acute cholangitis. We performed ultrasound examination, fistulogram (in cases when drainage tube was left), endoscopic retrograde cholangiography and percutaneous transhepatic cholangiography in 1 case to confirm BTI and detect the exact site of biliary leak or obstruction. The BTI was not occurred in stricture in 15 cases (n = 25; C-1; D-10; E1-5; E2-2; E3-1) were sutured with or without biliary drainage in 19 cases (76%). In patients referred after injury at an outside hospital (n = 16; C-1; D-2; E1-4; E2-6; E4-3) Roux-en-Y hepaticojejunostomy was performed in 6 cases (28.5%) and end-to-end ductal anastomosis in 4 cases (25%). In 8 patients reoperation was performed. There was no postoperative mortality. CONCLUSIONS: Early recognition of the BTI is
very important because they can be managed successfully by laparoscopic or combined surgical and radiologic techniques. Circumferential (E-type) and so late BTI recognizing lead to reconstructive bile duct operations

1102 PRE-MORBID STATUS DOES NOT AFFECT LENGTH OF STAY AFTER OPEN CHOLECYSTECTOMY FOLLOWING CONVERSION
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AIM: To determine if preoperative factors contribute to the length of stay after conversion surgery of laparoscopic to open cholecystectomy. METHODS: A retrospective study of 24 patients who had a conversion from a laparoscopic to open cholecystectomy between April 2001 and October 2003 were analysed. The morbidity was assessed by the average length of stay and postoperative complications sustained. RESULTS: There was an equal distribution of males and females. The mean age of the patients was 54, ranging between 22 and 82 years of age. The mean length of index hospitalization was 12.3 days, ranging between 5 and 25 days. The mean length of stay corresponding to the ASA status was as follows: ASA 1 (12.3 days); ASA 2 (11.8 days); ASA 3 (9 days); ASA 4 (6 days). 4 patients required postoperative intensive care monitoring. 2 of these patients had an ASA score of 1, one had a score of 2 and another had a score of 3. Two patients had an intra-operative iatrogenic complication of bowel perforation and 3 patients had postoperative remnant stones in the biliary tree. These complications were technical in nature and had no correlation with the preoperative status of the patient. Endoscopic retrograde cholangiopancreatography (ERCP) was performed upon the same admission of the surgery in 4 patients and it had to be repeated in one patient. Thus this group had a longer than average length of stay of 17.8 days. Three patients had elective ERCP performed prior to their current admission for surgery, and their mean length of stay was found to be 11.7 days. Only 7 (29%) of the patients had an intra-operative cholangiogram.
CONCLUSION: The morbidity associated with conversion surgery in cholecystectomy was largely attributed to the surgical technique itself. The pre-morbid status, as defined by the ASA scoring, in this study, did not correlate with a correspondingly longer period of postoperative recovery.

1103 FROZEN SECTION AND PERMANENT DIAGNOSES OF THE BILE DUCT MARGIN IN GALLBLADDER AND BILE DUCT CANCER
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BACKGROUND: Frozen section diagnosis and permanent diagnosis of bile duct margin may predict local recurrence after surgical resection of gallbladder or bile duct carcinoma. METHODS: A total of 20 patients underwent frozen section diagnosis of bile duct margin for resection of gallbladder and bile duct carcinoma. RESULTS: The permanent diagnosis was identical in 15 patients but changed in 5 (from positive to negative in 3 and from negative to positive in 2). The reasons for these changes were overdiagnosis (mucosal lesions in 2 and mesenchymal components in another) and new recognition of malignant cells on permanent section in the other 2. In 7 patients with a positive bile duct margin by permanent histology, mucosal spread was evident in 2 and involvement of the subepithelial layer was present in the other 5. No local recurrence occurred in the 2 patients with epithelial spread and 4 of the 3 with subepithelial infiltration. CONCLUSIONS: Frozen section and permanent diagnoses of the bile duct margin in gallbladder and bile duct carcinoma may be inconsistent in 25% of patients due to overdiagnosis of frozen section or new recognition of cancer cells by permanent histology. In situ carcinoma does not always produce local recurrence, while cancer cells in the subepithelial layer strongly predict occurrence of local recurrence.

1104 THE USEFULNESS OF BOVINE PERICARDIUM IN THE REPAIR OF FULL THICKNESS BILE DUCT DEFECTS: AN EXPERIMENTAL STUDY IN PIGS
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BACKGROUND: Previous prosthetic materials for the repair of the common bile duct were associated with failure. The use of bovine pericardium as a substitute for main arteries and cardiac valves showed encouraging results. The aim of this study was to evaluate the usefulness of bovine pericardium in the repair of full thickness common bile duct (CBD) defects in a porcine model. MATERIALS AND METHODS: Fourteen animals were divided into two groups according to the type of the CBD defect created: group I (n = 7) 50% of the circumference at the anterolateral aspect and group II (n = 7) 2 cm length whole circumference defect. A cholecystectomy was performed routinely. The repair was done with a patch in group I and a tube graft in group II through a midline laparotomy using continuous 6/0 Prolene suture. Blood counts and liver function tests were obtained preoperatively, at day 1 and each week for 6 weeks. The animals were monitored for signs of infection and jaundice. No drains were used. Upon sacrifice a cholangiogram was done, the CBD was inspected for the extent of stenosis, or proximal dilatation of extrahepatic bile ducts and the specimen including the common bile duct and a liver biopsy were histopathologically examined. RESULTS: One animal in group II died on postoperative day 7 due to mesenteric infarction. No biliary leak was observed. 3 more animals died during the fifth postoperative week due to severe jaundice associated with ascites. Macroscopically, no bile leaks developed and marked inflammatory and fibrotic response was noticed in all animals. The prosthesis was not evident. This was more intense in group II. The degree of stenosis at the site of the repair was more severe in group II and accordingly, the extent of proximal bile duct dilatation. The liver function tests showed a marked progressive obstructive pattern which was significantly more severe in group II with p <0.001. Cholangiograms showed stenosis of the CBD in group I and total or near obstruction in group II. Histopathology in all animals revealed intense inflammatory and fibrotic response with total resorption of the prosthesis. A restoration of the diameter of the CBD could be seen in group I, the stenosis was due to perifocal inflammation. CONCLUSIONS: Repair of full thickness CBD defects using bovine pericardium showed some encouraging results in smaller defects but as a prosthesis it was disappointing. Based on this experimental model, the use of bovine pericardium cannot be recommended as a bile duct replacement. It might be useful in repairing smaller defects if local inflammation leading to stenosis can be controlled.

1105 INVESTIGATION OF LAPAROSCOPIC CHOLECYSTECTOMY FOR ACUTE EMPHYSEMATOUS CHOLECYSTITIS
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Acute emphysematous cholecystitis is a relatively rare disease caused by gas-producing bacteria and it reveales specific gas in the gallbladder lumen and wall and imaging examinations. We experienced 3 cases of acute emphysematous cholecystitis. In all cases, a percutaneous transhepatic gallbladder drainage (PTGBD) under US guidance was performed immediately. After the general condition of the patients improved, we performed laparoscopic cholecystectomy. There were only 9 patients with emphysematous cholecystitis who were treated by laparoscopic cholecystectomy in the Japanese literature in Japan. In our cases, the gallbladder showed remarkable wall thickening and there was severe adherence to the peripheral tissues, but the detailed intraoperative cholangiographies could be shown with the drainage tube, so we could perform laparoscopic cholecystectomy without bile duct injury. We compared PTGBD and LC useful procedures for treating acute emphysematous cholecystitis.

1106 SURGICAL ORIENTATION FOR Pancreaticobiliary Maljunction of Normal Cholecodochus
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BACKGROUND: A continuous reflux of pancreatic juice into a biliary tract predisposes pancreaticobiliary maljunction (PBM) to a high risk factor for biliary tract carcinogenesis. However, we have controversial opinions for prophylactic excision of choledochus, if it does not dilate. PATIENTS: The subjects studied were 73 patients with PBM who had been treated in our Department of Surgery in Chiba University Hospital from 1974 to 2002. We had 45 cases with cystic dilatation, 18 cases with diffuse dilatation (spindle type) and 10 cases with no dilatation. We assessed the frequency of gallbladder carcinomas and bile duct carcinoma and the length of bile duct dilatation. RESULTS AND CONCLUSION: Gallbladder carcinomas were as follows: 3 cases among 45 cystic dilatation, 6 cases among 18
diffuse dilatation and 8 cases among 10 no dilatation. 3 cases of bile duct carcinomas were exclusively identified in the type of cystic dilatation. Gallbladder carries an extremely high risk for carcinogenesis in the no dilatation type. For patients with pancreaticobiliary maljunction with normal choledochus (no dilatation), prophylactic cholecystectomy should be recommended; however, prophylactic excision of bile ducts should not be performed because of long-term complications including intrahepatic stones after hepaticeo-jejunostomy.

1107 THE USE OF ULTRASONICALLY ACTIVATED DEVICES IN COMPLICATED LAPAROSCOPIC CHOLECYSTECTOMY

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OBJECTIVE: Recent development of ultrasonically activated devices (USAD) has greatly contributed to the laparoscopic field. We tested, in experimental studies, 3 types of 5-mm USAD and reported the clinical features and applications, especially for complicated laparoscopic cholecystectomy. METHODS: In an anesthetized pig model, the burst pressures of the harvested arteries (BP), grasping force (GF), the temperature change on the active blade with thermography (TC), and cavitation effect were recorded and compared in order to evaluate the features of the Harmonic scalpel 2 (HS2; Ethicon Endo-Surgery), UltraShears (US; Tyco Healthcare Japan), and SonoSurg (SS; OLYMPUS Co. Ltd). RESULTS: 1) Experimental study. HS2 and SS were superior in BP, and SS and US were superior in GF. In all devices, TC increased gradually and reached to 90–150 A6. The stabilized cavitation effect was observed both in HS2 and SS. 2) Clinical application. With use of the HS2, dissection around Calot’s triangle and liver bed could be carried out using the cavitation effect because of a stabilized cavitation from the active blade. Compared with HS1, the coagulation and cutting quality of the HS2 appeared satisfactory because HS2 has a newly developed built-in microchip in the handlepiece. With use of the US, dissection of dense adhesions around the gallbladder is feasible and effective because it generates excellent cutting function and GF from the wedged shape blade. However, care must be taken when manipulating the active blade above a deep site in order to avoid tissue injury by cavitation. With use of the SS, pick-up dissection could be done easily when Calot’s triangle or thickened gallbladder wall was manipulated. CONCLUSIONS: Understanding the features of these devices should lead us to perform complicated laparoscopic cholecystectomy safely whenever precise dissection is needed.

1108 POST SURGICAL BILIARY INJURIES: WHEN AND WHAT TO DO

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INTRODUCTION: Bile duct injuries and their sequelae present a formidable challenge, with varying management protocols as well as long-term results. While one cannot but re-emphasise the basic fundamentals of safe dissection in the hepatocystic triangle, optimal treatment and excellent long-term outcome should be the goal inspite of fragmentation of opinion as regards the efficacy of various treatment modalities for these injuries. PATIENTS AND METHODS: Records of 42 patients with bile duct injuries treated in a single referral unit over a 5.5-year period (Feb. 1998 to June 2003) were analysed. All 42 cases were following open (n = 19) or laparoscopic (n = 23) cholecystectomy. The information regarding the time of detection of biliary injury and its presentation was carefully ascertained as also the level of injury after a study of the cholangiographic anatomy. RESULTS: Majority of the patients (n = 31) underwent a Roux-en-Y hepaticeo-jejunostomy. Postoperative morbidity was due to wound infection (4 patients), anastomotic leak (3) and cholangitis, hematoma and pancreatitis (1 each), all of which were treated conservatively. There was no mortality in our series. Following treatment 39 patients remained asymptomatic with normal biochemical parameters, while 3 patients required repeat intervention for anastomotic stenosis and recurrent attacks of cholangitis. All patients are on a regular follow-up with a median follow-up of 32 months. An attempt was also made to derive an algorithm to offer the best possible solution to a difficult problem. CONCLUSIONS: As in most bile diseases, the management of bile duct injuries is a team effort between an interventional radiologist, therapeutic endoscopist and an experienced surgeon. Reconstruction surgery, a hepaticeo-jejunostomy is the gold standard. However, debate persists about the results, complications, cost-benefit ratio and remostasis risk of endotheraphy vis-à-vis surgery.

1109 FACTORS CONTRIBUTING TO THE CONVERSION OF LAPAROSCOPIC CHOLECYSTECTOMY PERFORMED IN A GENERAL SURGICAL UNIT

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AIM: To identify the causes of conversion of laparoscopic to open cholecystectomy in our general surgical unit. METHODS: A retrospective review of 24 patients who had a conversion from a laparoscopic to open cholecystectomy between April 2001 and October 2003. RESULTS: The surgery was performed by general surgeons in the department, ranging in seniority from senior consultant, consultant and registrar. A total of 17 (70%) cases had cholecystectomy performed within 14 days of onset of the symptoms. The rest (30%) were admitted for an elective surgery. The main cause for conversion was found to be secondary to an ill-defined Calot’s triangle (54.2%); dense adhesions were found in 22.8% of patients; 2 patients had excessive bleeding from a cut cystic artery; 2 patients had iatrogenic colon perforation during the laparoscopy; 1 case of a suspected gallbladder cancer and 1 case of impacted calculi in the Hartmann’s pouch rendering a difficult laparoscopic dissection. 76.9% of the patients who had a difficult anatomy of the Calot’s triangle had emergency surgery compared with the remaining 23.1% who had interval cholecystectomy. Adhesions requiring conversion was again, noted to be predominantly (80%) in the group undergoing emergency surgery. However, the 2 cases that had colonic perforation were found to be patients who were admitted for an elective procedure. The patients with interval cholecystectomy had an average operative time of 162 minutes while the rest had a shorter average operative time of 138 minutes. This was despite the fact that more patients in the emergency group had intra-operative cholangiogram. CONCLUSION: The results show that difficulty in identifying Calot’s triangle remains the primary cause for conversion to open cholecystectomy. They also show that emergency cholecystectomy had a higher incidence of conversion compared with the patients who underwent interval cholecystectomy.

1110 RESULT ANALYSIS IN A SERIES OF 144 BILIARY TREE RECONSTRUCTIONS

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INTRODUCTION: In this study we report the experience of a referral center for hepatobiliary surgery and liver transplantation on biliary tract surgical reconstruction. A series of 144 biliary tract reconstructions were performed in a heterogeneous group of patients that underwent a surgery procedure for liver transplant (68), for tumor of the biliary tree (35), iatrogenic lesions of the biliary tree (13), and for benign pathologies of the biliary tree (3). METHODS: We reviewed the medical records of all patients undergoing biliary tract reconstructions at our facility, between July 1999 and May 2003, with particular attention to surgical technique, operative mortality, postoperative complications and postoperative liver function tests (fts) with respect to biliary function. The series included 82 males and 37 females with a mean age of 54 years (range 15–76 years). The mean follow-up time was 19.4 months (range 1.0–44.7). 144 biliary tree reconstructions were carried out in 119 patients. Biliary tract reconstructions were divided in five different types: 92 hepaticeojejunostomy, 40 duct-to-duct anastomoses, seven porto-enterostomies, four duct-jejunostomy, and one hepticocholedochostomy. As regards these procedures, a descriptive analysis concerning surgical technique, perioperative mortality, postoperative complications, and evaluation of postoperative liver function tests was carried out. RESULTS: Among the patients who underwent hepaticeojejunostomy we observed one death, one dehiscence, and two anastomotical stenoses. Amid the duct-to-duct anastomoses we found two strictures, in the group of patients that underwent a duct-jejunostomy a death occurred, another death occurred in the patient group that underwent a porto-enterostomy. None of the surgically treated patients suffered complications like cholangitis, jaundice, or liver failure. CONCLUSIONS: Based on our experience, our goal is to inform the hepatobiliary and general surgeons who confront these complex biliary tract reconstruction problems of the principles adopted by us during liver transplantation and extended to hepato-biliary surgery. We believe that this information supports the belief that complex malignant or benign biliary diseases should be managed by centers with significant hepatobiliary experience.
1111 LAPAROSCOPIC CHOLECYSTECTOMY WITH VERESS NEEDLE DECOMPRESSION FOR ACUTE CHOLECYSTITIS
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BACKGROUND AND PURPOSE: Laparoscopic cholecystectomy is cost-effective and safe in elective surgery, and is also feasible in emergent operation for acute cholecystitis because the techniques in laparoscopic cholecystectomy for acute cholecystitis were improved by some methods. In this study, we used a veress needle decompression method to facilitate laparoscopic cholecystectomy in acute cholecystitis. MATERIALS AND METHODS: Between April 1998 and Nov. 2003, 65 patients with acute cholecystitis underwent laparoscopic cholecystectomy emergently. Veress needle decompression method was used through subcostal area to facilitate operation in every patient. RESULTS: Conversion of laparoscopic to open cholecystectomy was performed in 10 patients (conversion rate: 15.6%). Inability to identify triangle of Calot occurred in four patients. Severe dense adhesion was noted in four patients. Another two patients were due to iatrogenic duodenal perforation. Postoperative morbidity happened in five cases: (GB fossa abscess, port-site infection, intra-duodenal perforation and cystic stump leak, right pleural effusion, and intra-abdominal abscess). No mortality occurred. CONCLUSION: Lower conversion rate after veress needle decompression in laparoscopic cholecystectomy for acute cholecystitis was feasible.

1112 INTRAOPERATIVE CHOLANGIOSCOPY IN THE MANAGEMENT OF BILIARY ADENOMAS
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Obstructive jaundice due to biliary adenomas is a rare clinical entity. There are a lot of diagnostic difficulties and the therapeutic options, endoscopic or surgical, have to be discussed. Based on two cases of patients with recurrent obstructive jaundice due to biliary adenomas we describe the role of intraoperative cholangioscopy in the decision-making for the operation. Intraoperative cholangioscopy, a former routine procedure for the intraoperative exploration of the bile duct in cholelithiasis, can be very helpful in this rare disease, where the surgical planning could be between a bile duct resection with hepaticojejunostomy and Roux-en-Y anastomosis until a Whipple operation and a liver resection. This approach may offer a better chance of curative, but not too aggressive operation, when the preoperative imaging diagnostics and the intraoperative frozen section are often inadequate.

1113 RECONSTRUCTION OF THE COMMON BILE DUCT BY A VASCULAR GRAFT. AN EXPERIMENTAL STUDY ON PIGS
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INTRODUCTION: Reconstructive surgery is often needed in case of strictures, iatrogenic lesions or tumours of the extrabiliary biliary tree. The splenic flexure of Oddi provides a barrier against reflux of pancreatic juice and bacteria from the intestine into the biliary tree. Biliary-enteric drainage causing reflux of bile may lead to cholangitis, a factor that is considered to have a possible influence on the development of cholangiocarcinoma. The aim of this study was to investigate whether reconstruction of the common bile duct (CBD) could be done using a vascular prosthetic graft and thereby providing drainage through an intact sphincter of Oddi. MATERIALS AND METHODS: Eight pigs were included in the study. The gallbladder was dissected and the cystic duct was ligated and divided. The CBD was displayed and transected. The CBD was reconstructed by a standard wallled 4-mm vascular graft by way of 12 interrupted 4.0 Biosyn sutures. The ends of the vascular graft were inserted into the CBD and sutures were placed. Finally fibrin glue was applied to the anastomotic line. Blood samples for determination of liver parameters were drawn prior to primary surgery and before explorative laparotomy on day 8. At laparotomy pigs were evaluated for possible cholasos and a cholangiography was performed. RESULTS: All pigs, except one, where without signs of gall leakage. One pig had an encapsulated biloma. Another animal had to be operated on day 6, laparotomy showed a perforated ulceration of the ventricle but no signs of biliary leakage. Cholangiography were in all cases without signs of leakage or anastomotic stenoses. Liver parameters were unaffected by surgery. CONCLUSION: Reconstruction of the CBD by way of a vascular graft seems to be a safe procedure to accomplish biliary drainage through an intact sphincter of Oddi.

1114 SURGICAL MANAGEMENT OF BILE DUCT INJURY FOLLOWING CHOLECYSTECTOMY
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OBJECTIVE: Bile duct injury (BDI) is the most complicated complication of cholecystectomy. We analysed the clinical presentation, diagnostic and therapeutic management and outcome of 13 patients presenting with iatrogenic bile duct injuries following cholecystectomy. MATERIALS AND METHODS: Between 1992 and 2003 we treated 13 patients with bile duct injuries (BDIs) following cholecystectomy. Operative notes and charts of each patient were reviewed systematically. A follow-up examination of each patient was performed after a median of 21 months (range 1–71). RESULTS: 10 patients presented with obstructive jaundice. One patient was referred to the hospital with biliary-cutaneous fistula. In two of all patients, BDIs were identified at the time of operations. 12 patients had major BDIs. They were treated with Roux-en-Y hepaticejunostomy with at least 2 cm of the diameter. One patient had minor BDI. The procedure (LC) was converted to laparotomy. At time of conversion, primary suture repair with T-tube drainage of the injured bile duct was performed. There was no postoperative mortality. Postoperative complications were found in 4 patients (30.7%). In two patients (15.4%), postoperative bleeding occurred. One patient (7.7%) presented with subhepatic collection. Surgical site infection (SSI) was found in two patients (15.4%). At the end of the study, during a median follow-up period of 21 months, neither clinical nor biochemical evidence of cholangitis has been found in all patients. CONCLUSION: Major BDIs are associated with high morbidity and prolonged hospitalization. Early detection and referral to an experienced center are crucial in the management of these patients.

1115 ROUX-EN-Y SYNDROME AFTER A HEPATICOJEJUNOSTOMY
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INTRODUCTION: Several reports mention delayed gastric emptying as a frequent complication of Roux-en-Y gastrojejunostomy, especially if realized with antrectomy, vagotomy, or both. We present a case of severe gastric stasis after a Roux-en-Y hepaticejunostomy as treatment for an iatrogenic bile duct injury. CASE REPORT: A 64-year-old woman presented with nausea, vomiting and abdominal pain 8 days after a Roux-en-Y hepaticejunostomy performed as treatment for a common bile duct iatrogenic stricture. Neither gastroduodenal resection nor vagotomy was realized. Intestinal sounds as well as defecation were present; and radiologic studies showed a severely distended stomach (Figure). The treatment was conservative: nasogastric drainage, prokinetics, and feeding through a jejunostomy. The patient was discharged 5 days later and returned 1 month later for follow-up presenting no further complaints. DISCUSSION: Roux-en-Y syndrome, manifested as nausea, vomiting and abdominal pain, is secondary to a functional inability of the Roux limb that produces gastric retention; generally under the basis of a vagotomy and Billroth I or II operations. It occurs in between 10 and 50% of the patients undergoing these procedures. The treatment consists in prokinetics, but
surgery is needed in refractory cases. We introduce a case in which a Roux-en-Y hepaticojunostomy was complicated with gastric retention, even when none of the common causal factors were present. It was treated as Roux-en-Y syndrome with prokinetics and the outcome was uneventful.

**1116 SHOULD CHOLECYSTECTOMY ONLY BE PERFORMED BY EXPERIENCED UPPER GI SURGEONS?**
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BACKGROUND: One in 300 cholecystectomies continues to result in serious biliary injury. Cholecystectomy is by far the most common elective major abdominal operation, and the needs of service provision tend to dictate that it can be performed under the care of any consultant surgeon within general surgery. However, iatrogenic bile duct injury is a life-threatening disaster. The aim of this study was to assess the ratio of injuries caused by specialist consultant upper GI surgeons compared to those caused by surgeons of other specialties and grades. METHODS: Case note review of a single-centre experience of 26 major iatrogenic biliary injury repairs with an additional 13 medicolegal case note reviews (all cases Strasberg grade E). The grade of the most senior surgeon documented to be present at surgery was noted (Table). Only 4% of injuries occurred when a consultant upper GI surgeon was present, 69% of injuries occurred despite the presence of a consultant surgeon who was not a specialist in upper GI surgery, while 27% of injuries happened while a consultant was not present. These data would support the argument for cholecystectomy to be performed only under the direct supervision of a specialist upper GI surgeon.

**1117 BILIARY TRACT OBSTRUCTION DUE TO HEPATO-BILIARY SARCOMOIDOSIS**
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Biliary tract obstruction due to sarcoïdosis is very rare and the differential diagnosis in patients without a positive history is almost unfeasible. We report a case of a 31-year-old woman admitted to our hospital with a new episode of cholangitis, 7 years after the suspicion of primary sclerosing cholangitis through percutaneous liver biopsy and after a course of 14 endoscopic retrograde cholangiographies with dilatations of the biliary track. Endoscopic retrograde cholangioscopy and positron emission tomography in combination with abdominal computed tomography raised the suspicion of a biliary tumor and decision to carry out surgery was taken. At operation, extremely enlarged lymph nodes were identified at the liver hilum, no malignancy was found. Histology revealed the presence of sarcoïd, non-caseating epitheloid granulomas. Although the patient was only treated surgically as she refused the recommended immunosuppressive therapy, no relapse has been observed until now, 20 months after the operation, demonstrating the efficacy of surgical therapy for sarcoïd granulomas in this case.

**1118 POST PELLET INJURY BILIOUS DISSECTION THROUGH SUBEROAL LAYER OF THE GALLBLADDER WALL LEADING TO GANGRENE OF THE GALL BLADDER – A CASE REPORT**
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We report a case of a 30-year-old male who presented with multiple, homicidal, airgun pellet injuries. There was presence of peritonitis with evidence of free gas under the dome of the right hemi-diaphragm. Ultrasonography was suggestive of a grossly dilated gallbladder with presence of free fluid in the pelvis necessitating an exploratory laparotomy. Multiple jejunal perforations localized to a segment were identified. A grossly dilated, dark green ( bile-tinged) gallbladder was seen at surgery with presence of black patches at the neck. It was suggestive of bilious dissection through the suberosal layer of the gallbladder wall leading to early onset gangrene. The patient was managed with cholecystectomy with resection anastomosis of the involved jejunal segment. We suggest an index of suspicion, and that this diagnosis is kept in mind for penetrating missile wounds with trajectory through the gallbladder to prevent complications related to a frankly gangrenous or perforated cholecystitis.

**1119 SURGICAL MANAGEMENT OF BENIGN LOBAR AND SEGMENTAL HEPATIC DUCT (BISMUTH TYPE IV–V) STRUCTURES**
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BACKGROUND: Patients with benign lobar and segmental hepatic duct (HD) structures comprise the most severe group and require special surgical engineering. MATERIALS AND METHODS: We operated on 55 such patients (1988–2002). There were 35 lobar and 20 segmental hepatic duct structures. Cholangitis manifested in 55 pts, jaundice in 26, biliary cirrhosis in 9. External biliary fistula was identified in 25 patients, hepatic abscesses in 4. For approach to HD the portal plate excision and 4th segment partial resection was carried out in 21 patients. Precise bile-digestive anastomosis was performed in 14 lobar and 9 segmental HD structures. Reconstruction of the biliary confluence ceiling was performed in 17 patients. Separate anastomoses on the left and right ducts have been placed in 6 patients. In 32 patients scar tissue completely excision was regarded as impossible. In these cases we used bile-digestive anastomosis with exchangeable transhepatic drainage (ETD). RESULTS: Postoperative mortality was observed in 3 (5.4%) patients: cholangiogenic abscess, 2 patients; anastomosis insufficiency, 1 patient. Temporary biliary fistula occurred in 11 and biloma in 2 patients (treated by ultrasound-guided punctures). The long-term results (from 1 to 12 years) were investigated in 46 (83.3%) patients. 3 (6.5%) patients developed restenosis within 3 years after reconstruction. All of these patients were successfully reoperated. The main cause of restrictions was inadequate release of HD from scar damage and unreasonable refusal of ETD application. CONCLUSION: For release of intact HD portal plate excision and 4th segment resection is necessary in 60% of patients with Bismuth III–V type structures. When complete excision of the scar tissue is impossible it is necessary to perform anastomosis with ETD.

**1120 ADJUVANT PHOTODYNAMIC THERAPY FOR TREATMENT OF BILE DUCT CARCINOMA**
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PURPOSE: There is no information regarding the survival benefits of radiotherapy and chemotherapy in patients with bile duct carcinoma. Photodynamic therapy (PDT) before biliary stent is a new palliative option in patients with non-resectable bile duct carcinomas. In the present study, we examined the clinical usefulness of adjuvant PDT treatment in resectable and non-resectable bile duct carcinomas. PATIENTS AND METHODS: Between May 2001 and October 2003, PDT was applied in 8 patients with extra- or intra-hepatic bile duct carcinomas. Five patients had extrahepatic bile duct carcinomas, 2 had intrahepatic cholangiocarcinoma and one had an ampullar carcinoma. In 5 patients undergoing surgical resection including hemihepatectomy and pancreatico-cystoduodenectomy, cancer cells were positively detected at the stump of the hepatic duct. Two patients had tumor recurrence and occlusion of the remnant bile duct after hemihepatectomy for intrahepatic cholangiocarcinoma. One patient with hilar cholangiocarcinoma underwent biliary stent because of severe invasion of the intrahepatic bile duct. After 48 h prior to PDT, 2 mg/kg body weight of porfimer sodium (Photofrin®) was injected intravenously and the patient stayed in a dark room for 4 weeks. Via transhepatic or transinterstial access, pulse laser (630 nm wavelength, 4 mJ/pulse, 40 Hz for 10 min, 102 J/cm²) was applied through an endoscope by the eximer dye laser to the anastomatic site of hepatojejunostomy or occluded tumor lesion. The bile duct was examined by endoscopy and intraductal
ultrasonography at day 1, 7 and 28 post-PDT. RESULTS: Marked destruction of the tumor and ductal epithelium were observed at day 1 post-PDT. Fibrosis and thickening of the hepatic duct were seen at day 7. After PDT, one patient developed mild dermatitis, but no severe morbidity or mortality was noted in any patient. In 5 patients who underwent PDT for hepatic duct stump, none showed tumor recurrence at 32, 15, 6 and 6 months, although one patient died at 2 months of unrelated causes. In 3 patients with occlusion by tumor growth, resolution of bile duct stenosis was noted at day 7 post-PDT and, allowing biliary stent. None of the patients had re-tumor occlusion at 24, 18 and 6 months. Conclusions. Adjuvant PDT therapy is a safe and useful option for better survival benefit in patients with resectable and non-resectable bile duct carcinomas.

1121 CHOICE OF BILIARY STENT IN PATIENTS WITH INOPERABLE MALIGNANT BILIARY OBSTRUCTION
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BACKGROUND: Biliary endoprosthesis is commonly considered in patients with malignant biliary obstruction (MBO) as they have advanced disease upon diagnosis. Plastic stent is often the choice at first instance before patients can be transferred to a specialized hepatobiliary center. In case of stent failure and inoperable disease, the choice will be replacing either another plastic stent or metal stent. The aim of this study was to assess the patency of plastic stents in our patients with inoperable MBO, and to compare the outcome of plastic versus metal stents as salvage after first stent failure. PATIENTS AND METHODS: Between June 2000 and September 2003, 46 patients with inoperable MBO were managed with plastic endoprosthesis as the initial palliation in the Department of Surgery, Kwong Wah Hospital. All patients were evaluated every 8 weeks after intervention. Stent was considered occluded if there were symptoms and signs of biliary obstruction or biliary duct dilatation on imaging. The choice of second stent was not randomized, but depended on individual's considerations. Patient survival was estimated according to the Kaplan–Meier method and log rank test for group comparison. RESULTS: There were 30 men and 16 women with a median age of 73. The reasons for inoperability were distant metastasis in 16, locally advanced disease in 10 and medical contraindications in 20 patients. 74% (34/46) of MBO belonged to Bismuth I or II type. At the time of analysis, 37 died with a median survival of 3.7 months, one patient was lost to follow-up and 8 patients were still alive. 13 patients (28.3%) had stent blockage and the median duration of stent patency was 3.7 months in this group. The median survival was significantly longer in the group with stent failure than that without stent failure (7.4 months versus 2.2 months, p = 0.02). Among those with stent failure, 6 underwent revision with self-expandable metal stent; 5 died and one is still alive without recurrent jaundice. The remaining 7 had a second plastic stent but 2 suffered from recurrent cholangitis before their death. The second stent failure rate was 28.6% (2/7) for plastic stent but 0% (0/6) for metal stent. CONCLUSION: In our experience, MBO can be successfully palliated with plastic endoprosthesis in 72% of cases without the need for revision during lifetime. Metal stent may be the choice of second endoprosthesis after first stent failure as this group of patients usually has a longer survival.

1122 GALLBLADDER CARCINOMA IN YOUNG PATIENTS – FACTORS AFFECTING THE OUTCOME
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Gallbladder cancer (GBC) is one of the biliary malignancies with poor prognosis. There is not much literature available about its prognosis in young patients. The present study has been done with the aim of finding out the prognosis of the disease in young patients and the factors associated with it, at a tertiary referral center in North India, where the incidence of GBC is very high. A total of 741 patients with GBC were admitted between June 1989 and Dec. 2000 in the Department of Surgical Gastroenterology. 159 of these patients underwent surgical resections – either simple cholecystectomy (n = 112) or extended cholecystectomy (n = 47). 42 patients were excluded from the study. Records of the remaining 117 patients were analysed retrospectively from a computer-based prospectively maintained database. Follow-up varied from 1 to 114 months (median 16.2 months). The patients were divided into two groups – G1 (young patients, aged ≤40 years); G2 (older patients aged >40 years). The demographics of these patients are given in Table. The various factors analysed to see their effects on survival were sex, duration of symptoms, type of surgery (extended versus simple cholecystectomy), type of resection (R0 versus R1). T and N stage, vascular and neural invasion, presence or absence of stones and adjuvant therapy. p value ≤0.05 was considered statistically significant. Young patients (G1) had poorer survival as compared with older patients (G2), as shown in Table. Among the various factors analysed to see their effect on survival, none of the factors were found to be statistically significant except that the association of stone was high in G2 as compared with G1 (p = 0.05). There were more node-positive patients in G1 than G2 (60% vs 49%); however, this was not statistically significant. Young patients with GBC have poor prognosis in comparison with older patients irrespective of type and extent of surgery and adjuvant treatment. A further large study is needed to confirm this finding.

1123 PANCREATODUODENECTOMY AS A RADICAL TREATMENT OF CARCINOMA OF PAPILLA OF VATER
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BACKGROUND: Adenocarcinoma is the most common malignant tumor of the papilla of Vater, but in general it is still rare, that is why these tumors are very difficult to study. To evaluate early postoperative outcome as well as long-term results we have documented and investigated prospectively 21 consecutive patients with adenocarcinoma of the papilla of Vater who had been operated on at the Department of Surgery, Kaunas Medical University Hospital. PATIENTS AND METHODS: We have evaluated preoperative clinical data, pathology reports, tumor stage, postoperative morbidity, mortality and long-term follow-up results. Survival analysis was done by the method of Kalman–Meier. Differences in survival between patient subsets were compared by log rank test. Between January 1, 1999 and May 30, 2003, 21 patients with adenocarcinoma of papilla of Vater were operated on. The mean age of all studied patients was 65.3 years. All 21 patients underwent major resection for malignant disease – Whipple procedure (2 patients, 9.5%) or pylorus-preserving pancreatoduodenectomy (20 patients, 90.5%). The lymph node dissection in all cases was performed in pursuance of D2. RESULTS: Postoperative mortality after pancreatoduodenectomy was 4.8%. Overall morbidity was 28.6%. Pancreato-pancreaticobiliary morbidity (pancreatic fistula, peripancreatic sepsis) was 14.3%. Repeated surgery was required in 9.5% of patients due to intra-abdominal hemorrhage. We observed a surprisingly low rate of delayed gastric emptying postoperatively (4.8%). Overall 3-year survival among the patients with carcinoma of papilla of Vater was 89%. 3-year survival was 102% among the patients with stage I and II tumor and 67% with stage III and IV tumor (p = 0.046). We tested survival according to T classification, grouping T1 and T2 cases as one group and T3–T4 as the other. 3-year survival in the T1,2 group was 100%, whereas in T3,4 cases survival was 88% (p = 0.047). Grouping the patients according to N value to N positive and negative showed a significant difference (p = 0.024). Patients who had tumors with high or moderate differentiation of cells (G1 and G2) survived better than patients with poor cell differentiation (G3), though significant difference was not achieved (p = 0.132). Establishing gender differences our data show that overall 3-year survival was higher in women, who underwent radical pancreatoduodenectomy for ampullary cancer than in patients with
1124 PRESENCE OF CCK-A, B RECEPTORS AND THE EFFECT OF GASTRIN AND CHOLECYSTOKININ ON THE GROWTH OF PANCREATO-BILIARY CANCER CELL LINES
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PURPOSE: Gastrin and cholecystokinin (CCK) have been reported to play a role in the development and growth stimulation of some gastrointestinal cancers. However, it is not generally accepted in biliary and pancreatic cancer due to the shortage of established cancer cell lines. We investigated the effects of gastrin and CCK on the growth of pancreatic and biliary tract cancer cell lines. METHODS: Eleven pancreatic/biliary cancer cell lines mainly established at the Cancer Research Institute of Seoul National University College of Medicine were used in this study. Colorimetric and direct cell counting methods were used to screen and confirm the hormonal trophic effect and its inhibitory effect by specific hormonal receptor blockers (L-365,260 for gastrin and L-364,718 for CCK). Reverse transcription-polymerase chain reaction (RT-PCR) and slot blot hybridization were used to examine the expression of hormonal receptors in those cell lines. RESULTS: Of the six biliary tract and five pancreatic cancer cell lines, SNU-38 showed a growth stimulated effect by gastrin-17, as did SNU-478 by both gastrin-17 and CCK-8. And the trophic effect of these two hormones was completely blocked by specific antagonists (L-365,260 for gastrin and L-364,718 for CCK). Other cell lines did not respond to gastrin or CCK. In RT-PCR, the presence of CCK-A receptor and CCK-B/ gastrin receptor mRNA was detected in all biliary cancer and pancreatic cancer cell lines. In slot blot hybridization, compared to the cell lines which did not respond to hormones, the cell lines which responded to hormones showed high expression of receptor mRNA. CONCLUSION: This study suggests that gastrin and CCK exert a trophic action on some of the biliary tract cancers by their specific receptors. However, further studies to investigate the functional and structural variation among receptors according to their subtypes and mutation/polymorphism are requisite before the clinical usage of adjunctive hormonal or antithrombotic therapy can be recommended.

1125 RELATIONSHIP BETWEEN COX-2 EXPRESSION AND CLINICOPATHOLOGIC DATA OF GALLBLADDER CANCER
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BACKGROUND: Gallbladder carcinoma has been associated with a dismal overall prognosis. Tumorigenesis of gallbladder carcinoma is complex and not completely understood. An association of gallbladder carcinoma with cholecystitis or an anomalous arrangement of pancreatico- biliary duct suggests progression of carcinoma. COX-2 is a rate-limiting enzyme of PG synthesis and related to chronic inflammation. Several reports suggest the close relationship between COX-2 and gallbladder cancer. METHODS: We reviewed the clinical records of 62 patients with gallbladder cancer who had undergone operation from January, 1990 to December, 1999 at Hanyang University Hospital. COX-2 expression in gallbladder cancer was evaluated with immunohistochemical staining and expression intensity was graded as 0-2. RESULTS: There were 62 patients, whose mean age was 52.5 years. The ages ranged from 25 to 84 years. There were 27 male patients and 35 female patients. Generally, COX-2 expression was found in chronic inflammation areas and its level increased in dysplastic areas and mucosal tumor. Stromal tumor showed a relatively weaker COX-2 expression level. COX-2 expression is related to depth of tumor invasion, lymph node metastasis, stage (TNM, Nevin) in a negative way. CONCLUSION: Early stage of gallbladder cancer shows relatively increased levels of COX-2. Its increased level means that COX-2 can modulate the early stage of gallbladder cancer carcinogenesis. COX-2 inhibitor, a cancer chemopreventive agent in colon cancer, can be regarded as the same one in gallbladder cancer.

1126 ASSESSMENT OF RESECTABILITY IN GALL BLADDER CANCER: THE POTENTIAL ROLE OF SERUM CA 19-9 ESTIMATION
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BACKGROUND: Carcinoma of the gallbladder is a disease common to Northern India. An inherently aggressive tumor, it usually presents in advanced stages and carries a dismal prognosis. Radical surgery is the only established treatment option. Preoperative assessment of resectability therefore assumes crucial importance. AIM: The aim of the study was to evaluate the role of CA 19-9 estimation in the assessment of resectability in gallbladder cancer. CA 19-9 is used as a tumor marker and in the prognostication of various hepatobiliary-pancreatic malignancies. PA- TIENTS AND METHODS: Retrospective analysis of 85 patients with gallbladder carcinoma at Tata Memorial Hospital (July 2001–2003). All patients with histologically proven gallbladder carcinoma were evaluated by computed tomography (CT) for assessment of resectability. Serum CA 19-9 estimation was done in all patients. A correlation between radiological features, CA 19-9 levels and status of resectability in these patients was done. RESULTS: The median CA 19-9 value was 207 U/ml for the 85 patients evaluated. Out of a total of 85 cases, 25 were resected and they had a median value of 13 U/ml. 60 cases were unresectable and they had a median CA 19-9 value of 600.5 U/ml. The difference in CA 19-9 values between the two groups was significant (p < 0.02). Patients with operable disease on CT scan imaging had a CA 19-9 level of 12.2 U/ml. Patients with borderline operability on CT scan imaging had a median CA 19-9 value of 433 U/ml, while those deemed inoperable on CT scan had a median value of 988 U/ml. CONCLUSIONS: CA 19-9 levels in gallbladder cancer correlate with tumor burden. This has a possible definitive role in preoperative assessment of resectability in selected patients in conjunction with imaging modality.

1127 HETEROGENEITY OF INTRAHEPATIC CHOLANGIOCARCINOMA ACCORDING TO THE TIME OF RECURRENCE AFTER SURGICAL RESECTION
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PURPOSE: To evaluate the results of surgical resection for intrahepatic cholangiocarcinoma (ICC) in view of the time of recurrence. METHODS: Between December 1984 and August 2003, 69 patients with ICC, except intraaductal growth type of ICC, were surgically treated in our institution. Among the 69 patients, surgical resection with macroscopically curative objectives was possible in 54 patients. These 54 patients were retrospectively reviewed as regards outcomes, the time of recurrence, recurrence pattern, survival after the first recurrence, and prognostic factors. RESULTS: The overall survival rates were 57% at 1 year, 31% at 3 years, and 17% at 5 years. Recurrence occurred in 35 patients. The most common site of recurrence was the remaining liver, followed by lymph nodes, peritoneum, lung and bile duct. With respect to the time of recurrence, 21 of 35 patients with recurrence had recurrent tumor within a year after surgical resection, and 18 of these 21 patients died within the next year. The difference in survival rates between these 21 patients and 15 patients undergoing palliative resection was not significant. In contrast, survival of 14 patients whose recurrent tumor appeared beyond a year after surgery was significantly favorable as compared with the patients whose recurrence occurred within a year after surgical resection, and these patients survived for a significantly longer period even after the recurrence. There were no significant differences in several prognostic factors, such as gender, hepatitis viral infection, gross appearance, location of tumor, size of principal tumor, intrahepatic metastasis, liver capsule invasion, histological tumor differentiation, microscopic vessel invasion, perineural invasion, lymph node involvement, and presence of cancer cells in the resection margin, between patients with and without recurrence within a year after surgical resection. CONCLUSIONS: These results suggest that ICCs contain two different types of tumor, such as tumors with rapid growth and with relatively slow growth. Although biological characteristics of these tumors were not clarified at present, discrimination of these types of tumor may provide information for therapeutic strategies.
1128 EXPRESSION OF CYCLOOXYGENASE-2 AND ITS CLINICAL SIGNIFICANCE IN BILARY TRACT CANCER
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PURPOSE: Although chronic inflammatory conditions are closely related with carcinogenesis epidemiologically in biliary tract cancers, the biological mechanism is still not well known. We investigated whether cyclooxygenase-2 (COX-2) is involved in the carcinogenesis of biliary tract cancers.
METHODS: 10 fresh frozen tissues and 22 paraffin blocks from patients with biliary tract cancer and 4 cholecystitis samples were used in this study. Combining RT-PCR and immunohistochemistry, Western blot, we quantified and compared the COX-2 protein expression levels of epithelial cells according to their histopathological backgrounds. RESULTS: In RT-PCR, all samples from cancer and non-cancerous lesions including 4 cholecystitis showed expression of COX-2 mRNA. In Western blot, we could find higher expression of COX-2 in cancer lesions compared with that in non-cancerous lesions except for one patient. Immunohistochemical staining also showed similar results to those obtained by Western blot. However, we could not find any relationship between the intensity of expression of COX-2 and clinicopathological features. CONCLUSION: These data suggest that COX-2 expression might regulate carcinogenesis of the biliary tract in inflammatory regions and tumor progression. Further study using COX-2 selective inhibitors is needed to confirm these results.

1129 PROGNOSIS OF PATIENTS WITH THE GALLBLADDER CARCINOMA UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY AS AN INITIAL OPERATION
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Laparoscopic cholecystectomy (LC) has become a standard procedure for treatment of benign gallbladder diseases. There has been a small proportion of gallbladder cancers (GBC) which were incidentally found in the LC specimen, and LC also has been tried in some patients with suspected GBC. This study intended to analyse the prognosis of patients with GBC undergoing LC and the outcome of extended re-operation. From January 1995 to August 2001, the outcomes of 59 GBC patients who underwent LC initially were analysed. 100 GBC patients who underwent laparotomy resection without LC were chosen as a control group. Carbon dioxide infiltration method was used for LC. The depths of cancer invasion in 59 GBC patients were as follows: pTis in 2 (3.4%), pT1a in 4 (6.8%), pT1b in 14 (23.7%), pT2 in 28 (47.5%), and pT3 in 11 (18.6%). Re-operation was carried out on average 14 days after LC in 25 (42%) patients. There was no recurrence in patients with pTis and pT1a GBC, but there were two recurrent cases in pT1b GBC (each case with and without re-operation). The survival rate of patients with pT2 GBC who underwent re-operation after LC was better than that of pT2 patients who underwent one-stage laparotomy resection, but this difference was not demonstrated in patients with pT3 GBC. We think that LC does not deteriorate the prognosis of patients with incidentally detected GBC if appropriate re-operation is carried out according to the cancer staging. However, there is some possibility of tumor cell spillage during LC, so laparotomy should be preferred to LC for patients with suspected GBC in preoperative assessment.

1130 CANCER OF THE GALLBLADDER: AN 8-YEAR RETROSPECTIVE ANALYSIS OF SURGERY WITH RADICAL INTENT
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AIMS: Primary carcinoma of the gallbladder (GC) is a progressive lethal disease with an incidence of 2%. The survival of patients with GC depends strictly on depth of tumor invasion. We evaluated the results of our surgical series according to the pTNM classification and the stage groupings designated by the American Joint Committee on Cancer in 1992.
METHODS: A retrospective analysis of 8 years’ experience was performed. Of the 77 patients with GC observed at our institution between 1994 and 2002, a ‘curative’ operation was carried out in 31 patients (40.2%). The most common presenting symptom was pain (78.6%) in the 16 patients with stage I-II and jaundice (41.7%) in the 15 patients with stage III-IV. Of 31 patients, 12 underwent cholecystectomy and 19 had an extended operation (9 cases of cholecystectomy and liver segmentectomy IV or IV-V; 2 cases of Whipple procedure; 1 case of Whipple procedure and liver segmentectomy IV; 4 cases of cholecystectomy and bile duct resection; 3 cases of other extended procedure). RESULTS: Survival time according to Kaplan-Meier is 81.8% after 1 year, 63.6% after 2 years, and 18.1% after 5 years for the stage I-II patients; 27.2%, 0, and 0 for the Stage III-IV patients, respectively. CONCLUSIONS: The stage I-II patients represent a minority of cases of GC: they have a localized disease and surgical treatment provides the opportunity of a good survival. The stage III-IV patients are not curable: the survival rates demonstrated that surgery is only a good palliation. Extended operations for advanced stages are associated with a poor prognosis.

1131 EXTRAHEPATIC BILE DUCT RESECTION IN COMBINATION WITH LIVER RESECTION FOR HILAR CHOLANGIOCARCINOMA. A REPORT OF 42 CASES
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Hilar cholangiocarcinoma (HC) is a rare tumor and surgery offers the only chance for cure. From September 1986 to December 2003, 42 patients, 20 males and 22 females, underwent a combined EHBDR and LR for HC. The aim of the study was to analyse patient survival, morbidity and mortality and to look for predictive factors. 1-, 3-, and 5-year actuarial patient survival was respectively 72%, 37%, and 22%. Median survival was 19 months. Hospital mortality, all due to septic complications, was 12%. Morbidity was observed in 32 (76%) patients. Infections were the most dominant complication. Patients (n = 11) with AJCC stage I or II tumors had a superior survival compared with patients (n = 31) with stage III or IV tumors (p = 0.023). Patients with tumor-free lymph nodes (n = 26) showed a better survival compared with patients with tumor-positive lymph nodes (n = 16, p = 0.004). Over 20% of patients with hilar cholangiocarcinoma can survive >5 years after a combined EHBDR and LR at the cost of 12% peri-operative mortality and a 76% morbidity. Results might improve by prevention of infectious complications, better selection of patients in order to avoid vascular reconstructions and to predict a negative nodal state.

1132 INTRADUCTAL PAPILLARY MUCINOUS NEOPLASM OF THE BILIARY TRACT
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Intraductal papillary mucinous neoplasm of the biliary tract may be considered as an uncommon type of an intraductal-growing tumor of the bile duct characterized by saccular and segmental dilatation of intraductal duct and excessive mucin secretion. Radiologically and histologically, they resemble intraductal papillary mucinous tumor of the pancreas; however, their clinical features are not well known. In this study, 13 patients (four men, eight women; mean age 59) in a single institution in Korea between May 1995 and November 2003 were examined. Nine patients had clinical manifestation of biliary pain and cholangitis. 2 patients had a palpable mass on the right upper quadrant and 1 patient had cardiac arrest due to ruptured bile duct dilatation to the pericardial cavity. Serum CA 19-9 level (median 14 U/ml) increased in only 2 patients. Intraductal saccular and segmental dilatations with excessive mucin secretion and intraductal papillary growth pattern were presented in all cases. Ductal dilatations were mainly present at the left liver in 9 patients and the right liver in 3 patients. In 5 patients, grossly visual tumors were detected radiologically. Pathologic findings were categorized as 3 types of lesion, one adenoma, 2 borderline malignancies and 9 invasive carcinomas. In 2 cases, intraductal mucin accumulation and tumor extension to the diaphragm and peritoneal cavity were observed, where curative resection could not be performed. Six patients had a history of previous operation for biliary stone. Intraductal duct stone was found intraduceptively in 1 patient. An exact survival analysis could not be estimated because a large proportion of data was censored. The mean follow-up duration was 17.7 months (1–33 months) without any cancer-related deaths. Intraductal papillary mucinous neoplasm of the biliary tract, a relatively new and rare entity, may be presented in various clinical and pathological statuses, from a simple adenoma to invasive carcinoma with intraductal metastasis. Further study to delineate
the characteristics of this disease and consensus meetings to clarify the nomenclature, intraaducal papillary mucinous neoplasm of the biliary tract, are needed.

1133  HEPATOPANCREATODUODENECTOMY (HPD) FOR LOCALLY ADVANCED GALLBLADDER (GB) CANCER
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HPD is a high-risk operation with near 10% rate of mortality. The main indication remains locally advanced GC bancers. The aim of this study was to report the short and long-term results of HPD in a tertiary specialized centre. From Nov. 2001 to Sept. 2003, 7 patients (5 F/2 M) were treated by HPD. Two patients (1 endocrine pancreas head cancer with diffuse liver metastases and a GB in situ cancer on cholangitis) were eliminated from the survival analysis but included in the morbit-morbidity analysis. Five patients had T3 or T4 N+ GB carcinoma. Mean age was 52 ± 7 years (36-60). A pancreatobiliary maljunction was found in 2/5 (42%) patients. Two patients had jaundice at the time of management, one had previous cholecystectomy. In preparation for HPD including a right lobectomy (S4 to S8), they both had (i) a laparoscopy which aimed to eliminate peritoneal carcinomatosis and superficial left liver metastases, (ii) a biliary drainage (i.e. 1 endoscopic internal and one percutaneous external) and (iii) a portal vein embolization. Among the 5 patients with infiltrating GC cancers, 4 (80%) had R0 resection. All of the operated patients had proximal lymph node involvement (negative aortocaval lymph nodes). Mean operative time was 480 min (345-722) and median intraoperative bleeding was 800 ml (150-1700). All of the patients (n = 7) had one or multiple postoperative complications: infections (71%), pancreatic leak (58%), pulmonary (58%) and ascites (43%). None of the patients experienced postoperative liver failure. There were no deaths. ICU and in-hospital mean stays were 10 days (7-18) and 42 days (20-87). Three patients had postoperative chemoradiation. All of the patients are still alive (from 13 to 25 months follow-up), 5 including the 2 patients who had PD and right lobectomies are still alive without macroscopic sign of recurrence (one presented an elevation of CA 19-9). These results in selected patients with locally advanced GC cancers without distal lymph node involvement are encouraging. In preparation for HPD for jaundice patients, we recommend performing preoperative laparoscopy followed by biliary drainage and portal vein embolization.

1134  THE CLINICAL VALUE OF P53, C-ERBB-2 AND Ki-67 EXPRESSION IN GALLBLADDER CARCINOMA
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AIM: To study the expression and prognostic importance of p53, c-erbB-2 and Ki-67 protein in gallbladder carcinoma. We investigated immunohistochemically the expression of p53, c-erbB-2 and Ki-67 protein in gallbladder carcinoma, and we evaluated the correlation between clinicopathologic features and p53, c-erbB-2 and Ki-67 protein expression in gallbladder carcinoma. METHODS: From January 1994 to December 2002, 62 cases of gallbladder carcinoma were enrolled in this study and their clinicopathologic findings were analysed. We performed p53, c-erbB-2, and Ki-67 immunohistochemical staining on formalin-fixed, paraffin-embedded histological sections with an antibody. RESULTS: The rate of overexpression of p53, c-erbB-2, and Ki-67 protein in gallbladder carcinoma was 46.8%, 66.1%, and 45.2%, respectively. The 5-year patient survival rate significantly correlated only with tumor stage. In p53, c-erbB-2 and Ki-67 positive gallbladder carcinoma patients survived less than negative patients, but no statistical significance was found. There was significance with histologic differentiation in p53-positive gallbladder carcinoma patients (p = 0.012) and with tumor stage in c-erbB-2 positive gallbladder carcinoma patients (p = 0.045). Progressively increasing incidence of p53, c-erbB-2 and Ki-67 protein overexpression was observed in gallbladder carcinoma patients. p53 tumor suppressor gene has a correlation with histologic differentiation and c-erbB-2 has a correlation with tumor stage. Although this study found no correlation between the molecular markers and survival, further study will be needed to evaluate the significance of p53, c-erbB-2 and Ki-67 proteins as prognostic factors.

1135  HEPATOCELLULAR CARCINOMA EMBOLUS TO THE DISTAL COMMON BILE DUCT
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Obstruction of the common bile duct (CBD) by direct extension of the tumor is occasionally found in patients with hepatic neoplasm, but bile duct tumor embolus caused by intrahepatic transplantation of free floating tumor is a rare complication of hepatocellular carcinoma. Recently we observed a patient where a fragment of a tumor from the primary hepatocellular carcinoma (HCC) obstructed the distal CBD. A 46-year-old man was admitted to our hospital for distal CBD mass, measuring 1.2 × 1.5 cm, found by biliary computed tomography (CT) scan, 4 months prior to his admission, he had right hemihepatectomy for HCC accompanied by direct intrahepatic bile duct invasion without obstructive jaundice. On admission, there were no abnormal physical findings on laboratory examinations. An endoscopic retrograde cholangiopancreatography and papilotomiy were performed, which showed an irregularly shaped filling defect in the distal CBD. Endoscopic nasobiliary drainage (ENBD) was carried out for biliary decompression. Partially extracted soft tissue from the distal CBD by ERCP revealed HCC. We performed pylorus-preserving pancreaticoduodenectomy, and found a 1-cm sized remaining tumor attached to the mucosa of the intrapancreatic portion of the bile duct without any invasive growth into the submucosa. The tumor may have been an intrahepatic transplantation from the HCC in the right lobe through the bile duct. When an obstructive mass is found in the distal CBD, tumor emboli or metastatic lesion should be distinguished. Pancreaticoduodenectomy can be adopted as a curative treatment modality for this lesion.

1136  RESULT OF POSTOPERATIVE HIGH DOSE INTRALUMINAL BRACHYTHERAPY AFTER PALLIATIVE RESECTION FOR HILAR BILE DUCT CANCER
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AIM: The aim of this study was to assess the value of high dose intraluminal brachytherapy (HD-ILBT) after palliative resection for hilar bile duct cancer by analysing long-term complications and survival. PATIENTS: Between 1992 and 2002, 74 patients underwent some treatment for hilar bile duct cancer. Of the 26 patients who underwent resection, 13 patients had no additional HD-ILBT, 13 patients had additional HD-ILBT because of palliative resection. None of the patients received adjuvant chemotherapy. HD-ILBT delivered 6 Gy at a 1 cm depth, and was repeated weekly for 4 weeks with the VarisourceTM 200 remote afterloading unit. RESULTS: None of the patients had early or late complications with HD-ILBT such as abdominal pain, cholangitis or bile leakage after jejunostomy. In complete resection without HD-ILBT, survival rates at 1, 3 and 5 years were 92%, 53% and 31%, respectively. In palliative resection with additional HD-ILBT, survival rates at 1, 3 and 5 years were 100%, 46% and 23%, respectively. There was no significant difference between complete resection and palliative resection with HD-ILBT. CONCLUSION: HD-ILBT improved the long-term survival of the patients with hilar bile duct cancer after palliative resection with no severe complications.

1137  PROPOSAL FOR A NEW CLINICO-BIOCHEMICAL-RADIOLOGICAL STAGING SYSTEM FOR GALLBLADDER CANCER
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BACKGROUND: Gallbladder cancer is one of the commonest GI cancers in Northern India. It carries a dismal prognosis and most of the patients present with an advanced stage of the disease. The current staging systems for gallbladder cancer include the TNM and Nevin staging systems. These are both postoperative staging systems based on the pathology of the resected specimens. AIM: To propose a new clinico-biochemical-radiological staging system (Tata Memorial Hospital Staging System for Gall bladder cancer) in order to preoperatively predict the prognosis and help in formulating treatment options. METHODS: In addition to the radiological features, the presence/absence of jaundice and the serum CA 19-9 tumour marker levels are included in an objective manner to predict advanced
1138 BILIARY CYSTADENOMA AND BILIARY CYSTADENOCARCINOMA

II Young Park, Jin Hyun Lee, Sang Kwan Lee, Hyung Min Jin, Dong Gu Kim, Kee Hwan Kim and Young Kyung You, Catholic University of Korea, Bucheon-city, Kyunggi-do, Republic of Korea

BACKGROUND: A biliary cystadenoma (BCA) and cystadenocarcinoma (BCAC) are rare intraperitoneal cystic neoplasms. The clinical features are not marked and various treatments have been suggested. We reviewed their clinical characteristics including symptoms, pathologic features, treatment and related tumor markers. METHODS: Between July 2001 and December 2002, we have experienced one case of BCA and four cases of BCAC and their clinical characteristics were reviewed retrospectively.

RESULTS: Mean age of the BCA and the BCAC was 54 years. Median follow-up period was 20 months. Most common symptoms were vague abdominal pain and palpable mass. A BCA and two cases of BCAC occupied the right lobe of the liver and the others were noted at the left lobe. Serum CEA and alpha-fetoprotein were not elevated preoperatively in all cases. In BCA, serum CA125 was elevated preoperatively, then decreased after heptectomy. In two cases of BCAC, serum CA 19-9 was elevated, then decreased after heptectomy. All patients had undergone heptectomy suggesting pathologically complete resection and still have no recurrence. CONCLUSION: Biliary cystadenoma and cystadenocarcinoma are rare hepatic neoplasms. The relationships of serum tumor markers are not clear. Malignant transformation of a BCA to a BCAC is documented. Complete resection of BCA and BCAC seems to be crucial for reduction of recurrence and offers a chance for long-term survival.

1139 PRE-CANCEROUS LESION OF THE GALLBLADDER ASSOCIATED WITH OCCULT PANCREATOBILIARY REFLEX

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BACKGROUND: Recently we reported pancreatobiliary reflux in normal pancreaticobiliary junction (occult pancreatobiliary reflex) and associated gallbladder carcinoma. CASE REPORT: In September 2002, a 69-year-old woman visited our outpatient clinic with upper abdominal pain. Ultrasoundography revealed thickened common bile duct wall. Endoscopic retrograde cholangiopancreatography (ERCP) revealed a normal pancreaticobiliary junction. Biliary amylase and lipase levels in the normal bile duct sampled during ERCP were 30,600 U/L and 105,791 U/L, respectively. The amylase level in gallbladder bile sampled during cholecystectomy was 22,240 U/L. Histopathologic diagnosis was dysplasia of the gallbladder. CONCLUSION: Pancreatobiliary reflux, similar to that seen in patients with pancreaticobiliary maljunction, occurred in a patient with a normal pancreaticobiliary junction and induced pre-cancerous lesion of the gallbladder. The role of such reflux in relation to biliary cancer constituted a matter of great concern.

1140 PRIMARY CANCER OF THE CYSTIC DUCT: A CASE REPORT

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Primary carcinoma of the cystic duct is less frequent and preoperative diagnosis is difficult in most cases. The aim of this report is to present a case and review the literature. A 70-year-old woman entered with jaundice. Laboratory data showed elevation of serum bilirubin, ductal enzymes (aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase) and tumor markers (carcinoembryonic antigens). Computed tomography showed dilated intrapancreatic bile duct. Immediately preoperative transhepatic biliary drainage was performed and cholangiography revealed the common hepatic duct was obstructed at a diverging point of the duct. With the diagnosis of common hepatic duct cancer, right hepatectomy was performed after percutaneous transhepatic portal vein embolization. Pathologically the common hepatic duct was obstructed by a sentinel lymph node of gallbladder. Although cancer cells invaded into both gall bladder and common hepatic duct, the center of the tumor was located in the cystic duct. As a result, we concluded that the origin of this cancer was the cystic duct. Postoperative course was uneventful and the patient was discharged on the 24th postoperative day.

1141 A CASE OF GALBLADDER CANCER ASSOCIATED WITH PANCREATOBILIARY MALJUNCTION

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The patient was a 60-year-old woman who consulted a local doctor because of discomfort in the right hypochondriac region. Abdominal ultrasonography (US) showed a gallbladder abnormality, and she was referred to Kurume University Hospital, where it was further studied and surgery. Abdominal US revealed a sessile tumor with an irregular surface in the fundus of the gallbladder. The internal echo of the tumor was non-homogeneous, and the structure of the gallbladder wall was partly torn. The common bile duct and the left intrahepatic bile duct were dilated. Abdominal computed tomography showed an elevated lesion with the same degree of imaging effect as that of the liver on the peritoneal side of the fundus of the gallbladder. The structure of the gallbladder was preserved, and the gallbladder was well demarcated from the surrounding tissue. No hepatic or lymph node metastases were noted. Endoscopic retrograde cholangiopancreatography visualized the pancreaticobiliary maljunction where the pancreatic duct joined the biliary duct, entering an approximately 2-cm long common channel. Dilatation of the common bile duct and intrahepatic bile ducts was observed and diagnosed as type IV-A according to the Todani classification. Abdominal angiography in the arterial phase showed dilatation of the cystic artery and hyperplasia of vessels but no apparent encasement. In the venous phase, a deep-staining tumor was observed. From the above findings, we made a diagnosis of gallbladder cancer complicating pancreaticobiliary maljunction, and performed an operation. Since intraoperative US showed that the outermost layer of the gallbladder was in part ill-demarcated, we diagnosed the depth of penetration as suberosa (ss), and performed cholecystectomy and bile duct resection and hepatic resection (S4a and S5), and lymph node dissection. The resected specimen grossly showed a papillomatous lesion with a cauliflower-like surface. The histopathologic diagnosis was papillary adenocarcinoma, depth ss, stage II. Tumor cells proliferated in a papillomatous pattern and were mostly confined to the muscular coat but partly infiltrated into the subserosal coat. In the diagnosis of pancreaticobiliary maljunction, it is crucial to consider complicating gallbladder cancer.

1142 BILIARY STENOSIS AND METALLIC STENT: A MEDICO-SURGICAL MULTIDISCIPLINARY DECISION IS ALWAYS NECESSARY

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We present here a case report of a 65-year-old woman admitted for the diagnosis of angiocholitis due to the obstruction of a biliary metallic stent (MS) unfurled from the low part of principal bile duct (PBD) until the high part of the left bile duct (Rex recessus) (bridging the the biliary confluence). After several attempts at endoscopic relief of obstruction, because PM obstruction was responsible for recurrent angiocholitis and liver parenchyma atrophy, combined with the absence of morphological signs of tumoral inoperability, a surgical procedure was decided upon. To perform an ‘en bloc’ resection which included the left liver that had suffered from the mechanical consequences of obstructed inextirpable MS and the PBD where the biliary neoplastic stenosis was located, a left hepatectomy combined with a Whipple procedure was performed. Histological analysis of specimen has revealed a cholangiocarcinoma of the PBD (pT2N0). In the postoperative course, the medical management of external pancreatic fistula and a post-hepatectomy fluid collection has necessitated a hospitalization of 2 months. Biliary MS is one of the best palliative treatments for malignant biliary stenosis but its indication always necessitates a medico-surgical multidisciplinary decision.
1143 OCCULT PANCREATOBILIARY REFLEX AND GALLBLadder CARCINOMA.
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BACKGROUND: The aim of this study was to investigate pancreatobiliary reflex in individuals with a normal pancreatobiliary junction. METHODS: A total of 108 patients with a normal pancreatobiliary reflex who had gallbladder wall thickness as shown by ultrasonography or computed tomography underwent secretin injection magnetic resonance cholangiopancreatography. Based on the changes in the diameter of the biliary system after secretin injection, patients were categorized into the intensified group (n = 19) or the non-intensified group (n = 89). RESULTS: The mean (±SD) biliary amylase level in the bile duct was 24,674 (±59,779) IU/L in the intensified group, which was significantly higher than that in the non-intensified group 210 (±418) IU/L (p < 0.0001). There were two patients with carcinoma of the gallbladder in the intensified group and their biliary amylase level in the bile duct was 90,763 (±52,528) IU/L. CONCLUSION: Pancreatobiliary reflex similar to that seen in patients with pancreatobiliary maljunction can occur in persons with a normal pancreatobiliary junction and this may be associated with carcinoma of gallbladder. Secretin injection magnetic resonance cholangiopancreatography proved useful to identify such persons.

1144 PANCREATIC SECRETORY TRYPsin INHIBITOR IN INTRAHEPATIC CHOLANGIOMA: IMPLICATION FOR EARLY RECURRENCE AFTER SURGICAL RESection.
Akihiko Tomouchi, Masayuki Ohtsuka, Hiroshi Ito, Fumio Kimura, Satoshi Ambiru, Hiroshi Shimitu, Akira Togawa, Hiroyuki Yoshidome, Atsushi Kato and Masami Miyazaki, Department of General Surgery, Graduate School of Medicine, Chiba University, Chiba, Japan.

PURPOSE: The extremely unfavorable prognosis of intrahepatic cholangiocarcinoma (ICC) after surgical resection is mainly attributed to a high rate of recurrence. In particular, the survival of patients with early recurrence, which occurs within a year after surgical resection, is significantly poorer after surgery, and even after recurrence, as compared with that of patients whose recurrence occurred beyond a year after surgery. Factors influencing early recurrence of ICC, however, remain unclear. The purpose of this study was to explore factors that were associated with the development of early recurrence after surgical resection in ICC, based on gene expression profiles. METHODS: We separated ICC patients into subgroups and screened differentially expressed genes associated with early recurrence, using 4 samples each, by means of DNA microarray analysis. Subsequently, the expression of picked up genes was assessed by quantitative real-time reverse transcription-polymerase chain reaction (RT-PCR) in ICC samples including 9 additional independent samples. RESULTS: A total of 16 genes were picked up as candidate genes associated with early recurrence by DNA microarray analysis and the expression of 6 of these 16 genes was assessed by quantitative real-time RT-PCR. Among the 6 genes, high level expression of the pancreatic secretory trypsin inhibitor (PSTI) gene was significantly associated with early recurrence of ICC following surgical resection. According to the expression level of the PSTI gene, patients were classified as high- or low-risk with respect to early recurrence. No conventional clinicopathological factors were significantly related to risk. At the protein level, PSTI was immunohistochemically detected in the cytoplasm of cancer cells, although staining intensity was variable among specimens. In the normal hepatic tissue, immunostaining of PSTI was located to the large but not small intrahepatic bile ducts. CONCLUSIONS: We identified differential expression of the PSTI gene in ICC samples from patients having different clinical courses based on the time of recurrence. Since high PSTI expression was significantly associated with early recurrence of ICC after surgical resection, measurement of PSTI expression might be used to identify patients with increased risk of early recurrence, providing information for therapeutic strategies.

1145 ANGIOPoIETINS AND VASCULAR ENDOTHELIAL GROWTH FACTOR EXRESSION DURING SINUSOIdAL REGENERATION AFTER PARTIAL HEPATECTomy IN rATS.
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BACKGROUND/AIMS: Liver regeneration is a highly complex and organized process, but extensive studies have revealed regulatory mechanisms of hepatocyte proliferation. The regenerative process in the liver may be also remodeled to maintain blood flow to newly replicating hepatocytes, as a consequence of hepatocyte proliferation. However, regulatory mechanisms of sinusoidal regeneration and remodeling remain poorly understood. MATERIALS AND METHODS: We investigated the expression of angiopoietin (Ang)-1, Ang-2, Tie-2, and vascular endothelial growth factor (VEGF) by quantitative reverse-transcription polymerase chain reaction in regenerating rat liver tissue, and also isolated liver cells by in situ collagenase perfusion and counterflow elutriation, in order to identify potential cellular sources of these angiogenic factors. Proliferation and apoptosis of sinusoidal endothelial cells (SECs) were also evaluated by proliferating cell nuclear antigen (PCNA) staining and TUNEL assay, respectively, to determine the putative roles of VEGF and angiopoietins during sinusoidal regeneration. RESULTS: Expression of VEGF mRNA increased with a peak at 72 h after hepatectomy, decreasing thereafter. Ang-1 mRNA was present at detectable levels before hepatectomy and increased slowly 96 h after hepatectomy. Meanwhile, Ang-2 mRNA was not detected before hepatectomy, but increased remarkably after 120 h. In isolated cells, VEGF mRNA expression was limited to hepatocytes, but Ang-2 mRNA was found in sinusoidal cells, mainly in hepatic stellate cells. The PCNA labeling index of SECs increased slowly, reaching a peak at 72 h, whereas apoptotic SECs were detected between 120 and 168 h. CONCLUSIONS: VEGF secreted by hepatocytes may play a key role in SEC proliferation. Viewed from the standpoint of Ang-1 function in angiogenesis, increased expression of Ang-1 might be related to maturation of sinusoids. Thereafter, elevated Ang-2 in the absence of VEGF induction might be associated with the apoptotic changes in superfluous SECs for cessation of the regenerative process. In conclusion, angiopoietins released from non-parenchymal cells, together with VEGF, may greatly contribute to regulation of sinusoidal regeneration after hepatectomy.

1146 EX SITU LIVER DIVISION: LABORATORY EXPERIENCE WITH NEW TECHNOLOGY.
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In situ splitting has been described in adult-pediatric recipients and is generally felt to produce better results than ex vivo splitting but it has limitations of time and expertise and has not been applied to two adult recipients. Ex situ division offers an alternative for centers that lack the resources but may result in increased post-perfusion bleeding. Recently newer technologies have emerged to divide the liver parenchyma, but have not been used in ex situ conditions. These methods are demonstrated in this video presentation demonstrating the feasibility of achieving suitable hemostasis in splitting fresh calf liver. The video shows the division of an adult liver, weighing approximately 2 kilograms. Two techniques of division along the major axis were employed. The first technique involves water-jet technology for parenchymal dissection. The Erbe Helix Hydro-Jet® uses a thin laminar saline jet to cut through soft tissue, while preserving vascular and ductal structures. The jet pressure can be adjusted for specific parenchymal selectivity, and in this setting was used at 510 psi. This demonstrates the fine detail of the vascular skeleton that is visualized. Use of bipolar coagulation is demonstrated in the back table ice bath. Caution of small vessels was achieved through use of the standard bipolar forceps, in this case the Erbe Vio generator was used. Large vessels could be ligated or clipped. Upon completion, the portal veins were perfused under pressure to determine the hemostatic integrity of the split surface. Hepatic vein outflow could be observed with slight leakage of the cut surface. The second technique utilized Tissue-Link Bipolar Sealer. This floating ball device is attached to a Valley Lab Force FX generator using a special adaptor. The technique combined clamp crush dissection techniques with hemostatic sealing of the cut surface. The auxiliary inferior hepatic vein, middle hepatic vein and segments eight and five drainage veins were easily identified and preserved. The hilar structures were divided in the standard
1147 BILE DUCT INJURY
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OBJECTIVE: To study the presentation and management of postoperative bile duct injury after open and laparoscopic cholecystectomy (LC) in a gastrointestinal surgery centre. DESIGN: Retrospective study of patients from 1 April 2001 to 31 October 2003. METHODS: 12 patients were admitted during this period from post cholecystectomy biliary leak and bile leak; 5 patients presented after LC and 7 patients after open cholecystectomy. RESULTS: All patients were managed percutaneously — endoscopically — surgically. CONCLUSION: Early diagnosis and judicious management.

1148 LIVING DONOR LIVING TRANSPANTATION VS CADVERIC LIVER TRANSPLANTATION FOR THE TREATMENT OF HEPATOCELLULAR CARCINOMA: LONG-TERM RESULTS
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PURPOSE: To compare the long-term results of living donor living transplantation (LDLT) to cadaveric liver transplantation (OLT) for hepatocellular carcinoma (HCC). METHODS: Between 4/97 and 2/02, patients with known HCC treated with liver transplantation (LDLT or OLT) were analysed. Patients with incidental HCC were excluded. Recipient demographics, pre-transplant labs and tumor characteristics were analysed. RESULTS: 108 patients were included in the analysis, 36 LDLT (33.3%) and 72 OLT (66.7%). The median follow-up for LDLT was 933 days and for OLT 1023 days. There were no differences in recipient demographics, labs or tumor characteristics between the two groups other than a significantly shorter waiting time for LDLT. 51 (42.2%) patients died, 15 (13.8%) LDLT and 36 (33.3%) OLT. 19 died of recurrent HCC, 6 (5.5%) in the LDLT and 13 (12%) in the OLT group; 12 died perioperatively (between 60 days of postoperative); and 20 died free of disease. There were 29 (26.8%) patients with recurrence, 10 (9.2%) LDLT and 19 (17.6%) OLT, 10 of these are still alive with recurrence. The freedom from recurrence for the LDLT was 82.2% at 1 year and 63.9% at 2 years, and for OLT was 89.1%, 81.1% and 62.7% (p = 0.03). CONCLUSION: There were no differences in survival and freedom from recurrence in a comparison of LDLT vs OLT in this cohort with a follow-up of 3 years. The time on the waiting list was longer in the OLT patients. Shortening of this period can lead to decreased need for treatment and decreased drop-out from the waiting list.

1149 ANTIOXIDANT VITAMIN AND GDCL3 ATTENUATE LIPID PEROXIDATION AND HEPATIC PARENCHYMAL INJURY INDUCED BY HEPATIC ISCHEMIA/REPERFUSION
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INTRODUCTION: Activated Kupffer cells are considered to be the predominant cell mediating reperfusion injury after severe hepatic ischemia. Activation of Kupffer cells is a key factor in increased oxidative stress and triggers an intense oxidative stress along with enhanced ROS production overwhelming the endogenous antioxidant system and initiating lipid peroxidation. The aim of our study was to evaluate the combined effect of GdCl3 and α-tocopherol in suppressing lipid peroxidation after hepatic reperfusion injury. METHODS: One hundred male Wistar rats, 200-250 g, were divided into 10 groups. Group A, sham operation – vehicle; B, ischemia/reperfusion (I/R) – vehicle; C, UR - GdCl3, 10 mg/kg; D, UR - α-tocopherol 30 mg/kg; and E, UR GdCl3, 10 mg/kg, plus α-tocopherol 30 mg/kg. Pretreatment with GdCl3 and α-tocopherol was given at 48 and 24 h before operation, while an additional dose of α-tocopherol was administered before the induction of ischemia. MDA, serum α-tocopherol, AST, ALT, and light histology examinations were measured at the end of reperfusion. The remaining animals were divided into five groups SRS, SRS, SRS, SRS, and SRS respectively as described previously, and served for survival rate determination and no blood or tissue samples were taken from them. Total hepatic ischemia was induced for 60 min by cross-clamping the hepatic artery, portal vein, and bile duct. RESULTS: Mean MDA values (nmol/g wet weight) were 1.117, 1.476, 1.126, 0.983 and 0.978 in groups A, B, C, D and E respectively. Mean serum α-tocopherol levels were 10.4, 1.9, 3.5, 11.4 and 12 in groups A, B, C, D and E, respectively. Mean serum AST values (IU/L) were 110, 2199, 1599, 1229, 1185, and mean serum ALT 81, 1995, 1553, 1104, 1045 in groups A, B, C, D and E, respectively. Light histology examination revealed increased congestion and vacuolization in the I/R group compared with the sham operation group. Administration of GdCl3 and α-tocopherol resulted in minimal congestion and vacuolization. Survival rate was 100% (10/10), 0% (0/10), 50% (5/10), 60% (6/10) and 60% (6/10) in SRS, SRS, SRS, SRS and SRS groups respectively, CONCLUSIONS: Administration of GdCl3 and α-tocopherol is likely to protect liver from lipid peroxidation through their combined effect of suppressing Kupffer cell activation and significant antioxidant properties.

1150 LYMPH NODE DISSECTION IN GALLBLADDER CARCINOMA
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AIM: Lymph node spread is the most common pattern of progression in gallbladder carcinoma and is an important prognostic factor. The purpose of this study was to determine the prevalence of lymph node metastasis in patients with resected advanced gallbladder carcinoma and to evaluate the curative effects of radical surgery for patients with lymph node metastasis. METHODS: 69 patients who had undergone extended surgery with curative intent for gallbladder carcinoma were included in this study from January 1997 to December 2002. Patients in pT1 - 0%, pT2 - 11 (15.9%), pT3 - 19 (27.5%), and pT4 - 39 (56.5%) were found. Overall lymph node metastasis was found in 66.7%; it was 54.7% in pT2 tumours and 78.2% in pT3/T4 tumours. Surgical procedures performed were radical cholecystectomy with wedge resection of liver in 37 patients, segment IV–V resection and radical cholecystectomy in 26, hepatopancreaticoduodenectomy in 4 and right hepatectomy in 2 patients. RESULTS: 45 of the 69 patients with pT2-4 tumours had lymph node metastasis. Perihilar perihilar lymph node was the most common metastatic lymph node followed by cistic node. The frequency of metastasis in retroportal, posterosuperior pancreaticoduodenal and interaortocaval lymph nodes was 16.9% in all cases. PT3-4 tumours had more lymph node involvement and poor prognosis. CONCLUSION: The frequency of lymph node involvement is strongly influenced by the depth of invasion and grade of primary tumour and it is an important prognostic factor in gallbladder carcinoma. Patients with pT3-4 tumours with regional lymph node spread should be considered for curative resection.
1151  THE OUTCOME OF SURGERY FOR 84 CASES OF BILARY ATRESIA: A SINGLE INSTITUTIONAL EXPERIENCE
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AIM: Retrospective evaluation of the outcome for 84 cases of biliary atresia who underwent surgical treatment. PATIENTS AND METHODS: Between June 1995 and June 2003, 84 cases of biliary atresia were operated, 40 were females and 44 were males with mean age at surgery 83.25 days (range 43–155 days). Hepatoportojejunostomy was done for type I (5 cases), hepatic portocholecystostomy was performed for type II (11 cases). For type III, the Kasai operation was done in 42 cases, interposition jejunual loop with an intravenous anti-reflux valve in 16 cases, and hepatic portojejunostomy with valve in 10 cases. RESULTS: The mean age for type I was 111 days (range 80–155 days), all are still alive, two for 6.5 years, two for 4 years and one for 2.7 years. Type II was observed in 11 cases with mean age 79.66 days (range 45–102 days), two of them were identical twins. The procedure failed in two patients and was converted to portoenterostomy, six of them are alive, two for 3 years, two for 2 years and one for 1 year. The remaining 68 cases were type III with mean age of 83.41 days (range 43–149 days). Eleven patients underwent the operation below the age of 60 days, 46 cases were aged 61–90 days and 27 cases were above the age of 91 days. The overall survivors are 38 cases (45.24%), 14 of them are clinically jaundice-free, hospital mortality was 28 cases and 18 were lost to follow-up. Three cases from the survivors received LRLT, one jaundice-free case because of hematemesis. 5.5 years after the Kasai operation and two due to recurrent attacks of cholangitis and liver failure. CONCLUSIONS: Close-term care, follow-up and elevation of the medical awareness of the family are essential to achieve good results, especially in centers where liver transplantation has not yet started.

1152  SPONTANEOUS RUPTURE OF THE NON-MALIGNANT LIVER: UK PERSPECTIVE
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BACKGROUND: Spontaneous rupture of the liver is a rare but potentially fatal condition. Most series from the Far East have shown hepatocellular carcinoma as the most common lesion to rupture. Liver cell adenoma (LCA) is the most common benign lesion to present with rupture and bleeding. Hence, resection is considered in a suspected LCA and lesions like focal nodular hyperplasia (FNH) and haemangioma that are rarely known to rupture are not recommended for resection. The aim of this study was to review the pathology and management of benign liver lesions presenting with rupture with particular reference to the role of delayed surgery. METHODS: Data were collected from a prospective database. Patients with rupture of malignant lesions were excluded from the study. RESULTS: The study included 17 females and 2 males. Nine patients were operated on during the same admission. The remainder (10) were managed conservatively; of these 6 patients had delayed surgical resection. The surgical treatment included ligation of right hepatic artery (1), partial hepatectomy (3), hemi-hepatectomy (7), hemi-hepatectomy with non-anatomical resection (1), extended hemi-hepatectomy (2) and total hepatectomy (1). Two patients who bled following esclama died after emergency resection. Surgical resection was facilitated following resolution of subcapsular haematoma in elective resection. Histological examination of the 15 lesions showed liver cell adenoma (LCA) (9), focal nodular hyperplasia (FNH) (3), peliosis hepatis (1), and pregnancy-related intrahepatic haemorrhage/infarction (2). All 3 cases of FNH were atypical variants and they lacked the presence of central scar. Of these 2 were multi-focal lesions with telangiectatic features, the other showed mixed features of FNH and LCA. CONCLUSION: LCA is the most common benign lesion to present with spontaneous rupture; however, atypical variants of FNH too can rarely rupture and present with bleeding. There is a role for conservative management in a haemodynamically stable patient.

1153  PATIENT CONCERNS AND PSYCHO-MORBIDITY FOLLOWING IATROGENIC BILE DUCT INJURY
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AIM: Studies of the patient’s perspective and psycho-morbidity after surgical repair of iatrogenic bile duct injury are very limited. The aim of this study was to determine the relationship between patient concerns and levels of psycho-morbidity in patients who have undergone seemingly successful surgical repair. METHODS: 18 (5 male, 13 female) of 24 patients who had undergone a surgical repair of a post-cholecystectomy Strasberg grade E injury agreed to participate. These patients completed the Hospital Anxiety and Depression Scale (HADS) and the Concerns Checklist. RESULTS: Using a score of 11 on the HADS, there were 3 probable cases of reactive depression, 8 cases of reactive anxiety. Patients reported a mean of 5 (0–11) concerns. The strong association between the number of concerns and psychological distress was not dependent on the severity of the injury or type of repair. Rather, concerns related to the disabling effects of recurrent cholangitis, in addition to unresolved issues (delay in diagnosis, anger) which were linked with depressive mood in 6 patients. 3 were receiving psychiatric treatment. ‘How are you feeling physically?’ (pain, fatigue) was linked with both anxiety and depressive changes in mood in 13 patients. Uncertainty about the future was associated with anxiety in 10. Strategies that reduced concerns reflected in low scores for psycho-morbidity; these included speedy referral and the assurance of ready access to the specialist HPB team, plus a self-start protocol for access, analgesia and antibiotics at the onset of symptoms of cholangitis. CONCLUSIONS: This exploratory study shows a clear link between the number of patient concerns following bile duct repair and psychological distress. These factors will play an important role in future medicolegal assessment of causation and quantum. We believe that we have identified appropriate support strategies for these patients, which have important implications in future HPB service provision.

1154  LAPAROSCOPIC DEROOFING OF SIMPLE LIVER CYST IN COMBINATION WITH ETHANOL SCLEROTHERAPY EMPLOYING SAND BALLOON CATHETER SYSTEM
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BACKGROUND: Liver cysts are not uncommon, with a prevalence of up to 7%. Laparoscopic surgery is feasible for treatment of simple liver cyst due to its reduced invasiveness. Laparoscopic fenestration or deroofing is the choice of treatment and to reduce the frequency of recrudescences, it is recommended to destroy the epithelium in the residual cystic cavity by ethanol, argon laser coagulator, or electric cautery. We report cases of giant solitary liver cyst treated successfully applying the SAND balloon catheter system, which was originally developed for the treatment of ovarian cysts. METHOD: Between January 1996 and December 2003, 5 patients underwent laparoscopic deroofing using the SAND balloon system together. The mean size of the cysts was 14 cm. After inserting the SAND balloon catheter, the inner and outer balloon between the cyst wall was inflated, the cystic fluid was aspirated as much as possible, and ethanol solution was injected into the cystic cavity to act on the entire inner surface of the cyst. The cystic cavity was washed with physiologic saline, and the cystic fluid containing ethanol was replaced with physiologic saline 100 mL. After this procedure, wide exeresis of the cystic wall was performed. CONCLUSION: The cyst sclerosis with alcohol found to be effective, but with sclerotherapy alone, the rate of recurrence was very high. Here we report cases of giant solitary cyst treated successfully by laparoscopic deroofing in combination with ethanol sclerotherapy of the cyst wall, adopting the SAND balloon catheter system.
1155 PROPHYLACTIC OPERATIONS IN PORTAL HYPERTENSION DUE TO EXTRAPеченAL VENOUS OBSTRUCTION IN A DEVELOPING COUNTRY: LESSONS LEARNT OVER 26 YEARS
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BACKGROUND: Although the mortality from the first episode of variceal bleeding in patients with cirrhosis may reach 70%, prophylactic portosystemic shunt have been advocated as they increase long-term mortality due to progressive post-shunt liver failure. However, in patients with extrahepatic portal venous obstruction (ECHO), because of the good liver function, variceal bleeding rather than liver failure is the common cause of death. In developing countries shortage of tertiary health care facilities and blood banks leads to a further increase in mortality due to variceal bleeding. Therefore we studied the efficacy of prophylactic operations to prevent variceal bleeding in patients with portal hypertension due to ECHO.

METHODS: Between 1976 and 2002, we prospectively enrolled patients with EHO, who had no history of variceal bleeding, for prophylactic surgery. These patients were included if they had high risk esophago-gastric varices (grade III-IV, gastric fundal varices), growth retardation, symptomatic biliary obstruction due to biliary calculi or portal hypertensive biliopathy, bleeding ulcers due to hypersplenism and came from remote areas with poor access to tertiary health care facilities. Following surgery these patients were prospectively followed up with regard to occurrence of variceal bleeding, encephalopathy, pedal edema, jaundice and ascites.

RESULTS: A total of 74 patients (48 males) was prospectively enrolled. The mean age of the patients was 17 years (range 6-55 years). Overall 61 (82.4%) patients underwent proximal lienorenal shunts and 13 underwent splenectomy and devascularization (splenic vein not available). The operative mortality was 1.4%. No patient developed overwhelming post splenectomy sepsis. Hypersplenism present in 49 (66%) patients was reversed in all. 56 patients (76.7%) were followed up for a mean period of 58 months (range 6-228 months). The late complications included one death 6 months after discharge, 2 patients developed membranoproliferative glomerulonephritis and one had variceal bleeding. No patient developed post shunt encephalopathy. Of the patients followed up, 93% were free of symptoms. CONCLUSIONS: Prophylactic operations are safe with good long-term results in patients with EHO. In developing countries, such patients with high-risk esophago-gastric varices and/or hypersplenism, with poor access to medical facilities, should be offered prophylactic lienorenal shunt surgery.

1156 SURGICAL RECONSTRUCTION OF IATROGENIC INJURIES OF THE PROXIMAL COMMON BILE DUCT
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Between January 1994 and June 2003 a series of 45 patients were operated on at our hospital for iatrogenic biliary injuries. Injuries, according to the Strasberg classification, were type E2 in 22 patients, type E3 in 17 patients and type E4 in 6 patients. Thirty patients (66.67%) had undergone open cholecystectomy and laparoscopic cholecystectomy was the primary procedure in 15 (33.33%) patients. Previous repair had been attempted in 12 (26.67%) patients. A total of 46 hepatojunostomies was performed. Postoperative death occurred in 2 patients (4.44%). Outcome was graded as excellent, good or poor depending on clinical symptoms, liver function tests, and the need for reintervention due to anastomotic stenosis. The mean follow-up was 2.5 ± 0.2 years with the longest follow-up 8 years. Following our first repair, 38 of the 43 patients (88.37%) had excellent results, 1 (2.33%) had good results, and 4 (9.30%) had poor results. An early repair was performed in 12 patients (26.66%) out of 45. Except for one patient who died in the postoperative period the results in the other 11 were very satisfactory. We conclude that surgical reconstruction offers excellent or good results for the vast majority of patients with iatrogenic lesions of the proximal common bile duct. Moreover, early repair in carefully selected patients gives equally satisfactory results. This observation requires further confirmation in controlled clinical studies.

1157 LONG-TERM RESULTS AFTER CURATIVE RESECTION FOR CARCINOMA OF THE GALLBLADDER ACCORDING TO THE TNM STAGE
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BACKGROUND: Gallbladder carcinoma (GC) is a tumor of the biliary tract with a poor prognosis. Early GC is frequently asymptomatic and most patients are diagnosed with advanced stage disease. For Tis and T1 gallbladder cancer, simple excision of the tumor (CT) is considered an adequate therapy requiring no further surgery. Wedge resection (W-R) of the gallbladder bed with lymphonodal dissection has been reported to improve survival from pathologic stages IB, IIA and IIB. Although extensive surgical treatment for advanced GC (stage III and IV) has been reported, recently its efficacy and long-term results have been disappointing. The aim of the present study was to evaluate retrospectively the long-term results of different surgical treatments.

METHODS: 118 patients with GC were observed – 74 females (63%) and 44 males (37%), with overall age of 63 years (range 38-91). Gallbladder stones were present in 98 patients (83%) and incidental finding of the neoplasia during CT occurred in 25 (21%) (21 traditional CT and 4 laparoscopic). On the basis of the clinical staging, 20 patients (17%) have not been treated because of the tumor extension. 98 (83%) of the patients underwent surgery: in 35 the surgery was radical (36%) and palliative in 63 (64%). RESULTS: pTNM stage of the 35 radical resections was: 3 in IA, 10 in IB, 3 in IIA, 6 in IIB, 11 in III and 2 in IV. In long-term follow-up 22 patients (63%) died, 21 due to tumor recurrence (mean survival 11 months, range 2–35) and 1 (Ia-pT1b) of natural causes 4 years postoperatively. The average survival rate of the 13 living patients (37%) was 54 months (range 8–225): 1 Ia (pT1a) who underwent CT is alive at 26 months postoperatively; 3 IB (pT1b/RI) are alive with BR 103 months (range 1–19 years); 2 IIA (W-R) are alive at 116 months (range 15 months to 18 years). Of the 60 stage III patients, 5 of 11 who underwent radical resection (3 right hepatectomies, 1 mesohepatectomy and 1 trisegmentectomy) are alive with an average survival of 313 months (range 8–154). In patients undergoing curative resection, 5-year survival was 15%: 30% in IB patients, 33% in IIA and 18% in III. The average survival rate in palliative treatment and non-operated patients was 3.5 months (range 1–6). CONCLUSION: Simple CT seems to be sufficient in T1a patients but inadequate in T1b (stage IA), in which is indicated a more aggressive surgical treatment similar to those for stages IB and IIA. Depth of tumor infiltration is an important prognostic factor and the presence of lymph node metastasis (stages III and IV) should not be a contraindication to aggressive surgery because it may offer a long-term survival or a good palliation.

1158 HEPATIC RESECTION IS THE OPTIMAL TREATMENT FOR MULTILocular OR MULTIPLE LIVER ABSCESSES
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OBJECTIVE: The aim of this study was to define the role of hepatic resection in the treatment of pyogenic liver abscesses. DESIGN: Retrospective cohort study. SETTING: Tertiary care, academic hospital. METHODS: 86 patients were diagnosed with pyogenic liver abscesses from 1997 to 2002. The patients were divided into 4 study groups. Group A was patients with small (<3 cm) abscesses treated with antibiotics alone (n = 6). Group B was patients treated with US- or CT-guided drainage (n = 54). This group was further subdivided into patients with solitary abscesses (group B1) and those with multiple abscesses (group B2). Group C (n = 20) was patients who underwent liver resection (wedge or segmental), either for complexity of abscess(es) or presence of another intra-abdominal process or failure of percutaneous treatment. RESULTS: Recurrence rate in group A was 0%. There was one death. Recurrence rate in group B1 was 19% and all were successfully treated with a second drainage. Two patients died. Recurrence rate in group B2 was 66%, half of which were successfully treated with repeated drainages while the others were treated with an operation. Two patients expired. The recurrence rate in group C was 0%. Two patients in this group expired. CONCLUSIONS: Recommendations for treatment of patients with hepatic abscesses are as follows. Simple <3 cm abscesses can be treated with appropriate antibiotic therapy. Larger, unilocular abscesses can be first managed with percutaneous drainage. Failure or recurrence following percutaneous drainage
should be treated operatively. Chronic, large, complex or multilobar liver abscesses should be managed definitively by hepatic resection of the abscess. This study demonstrates no recurrences of hepatic abscesses when liver resection is employed as the treatment of choice for complex liver abscesses.

1159 LIVER TRANSPLANTATION FOR POLYCYSTIC LIVER DISEASE. RESULTS OF A FRENCH MULTICENTRIC 30 CASE-SERIES

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BACKGROUND: Polycystic liver disease (PLD) may progress to debilitating symptoms by massive hepatomegaly. For diffuse hepatic cystic disease liver transplantation (LT) may represent the chance of definitive treatment. Incidence of LT for PLD is <1%. We review the multicentric experience of 10 French institutions. METHODS: Since December 1991, 36 patients (30 females) underwent orthotopic LT for PLD. The median age was 50 years and the median time after diagnosis of PLD was 17 years (range 6–33). 32 patients (89%) had concomitant polycystic kidney disease (PKD), 17 (53%) were on haemodialysis at the time of LT, 6 had already received a kidney graft. All patients had massive hepatomegaly, 66% had abdominal pain, 50% ascites. Three had concomitant viral hepatitis. No one developed Reye’s, variceal bleeding or liver failure. Before LT, 28% of patients had received conservative surgery for PLD. RESULTS: 22 patients (20 with PKD) received a synchronous combined liver and kidney transplantation and 14 received an isolated LT. Median surgery duration was 7.1 h (3.7–14.9). Blood transfusion was necessary for 33 patients with a median requirement of 8 units. Native liver weight varied from 1.8 to 17 kg (median 6.5 kg). Median hospital stay was 30 days. Complications occurred in 23 patients and included hepatic artery thrombosis (n = 3) and biliary disease (4). 12 relaparotomies were performed within the first postoperative month for complications. Three patients died respectively at 1 month (2) and 39 months (1). Immunosuppression consisted of cyclosporine (36%) or tacrolimus (64%) and prednisolone (95%). All patients had a total relief of symptoms within the first month. With a median follow-up of 38 months, no patients need a liver retransplantation. Three patients (all with PKD) developed renal failure requiring haemodialysis (one had received a kidney graft before LT). No patient with combined liver-kidney grafts had renal failure. CONCLUSION: Liver transplantation is a reasonably safe option for treated PLD and provides excellent symptomatic relief. In cases with renal impairment, combined liver and kidney transplantsations procure optimal kidney graft survival.

1160 HEPATITIS C AND BILE DUCTS: A RISK FACTOR FOR BILARY COMPLICATIONS POST LIVER TRANSPLANTATION?

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BACKGROUND: Biliary strictures or leaks occur in 10–30% of all liver transplant (OLT) recipients. Hepatitis C virus (HCV) has been isolated from biliary epithelium as well as hepatocytes, and whether HCV infection predisposes patients to biliary complications post-OLT is not known. OBJECTIVES: Primary: to assess the association between hepatitis C viral infection and the development of biliary strictures or leaks (complications) post-transplant. Secondary: to evaluate conventional risk factors for biliary complications in our liver transplant center. METHODS: All liver transplant recipients between 1990 and 2002 at our institution were eligible for this retrospective cohort study. Information was obtained on 325 transplant recipients and analysed using logistic regression techniques. The main outcome variable was development of a biliary complication, either a stricture or a leak. Study variables examined were age, year of surgery, cold ischemia time (CIT), gender, presence of hepatic artery thrombosis (HAT), CMV infection, and disease indication for transplantation (HBV, HCV, alcohol, cholestatic liver disease, tumor, retransplantation). RESULTS: Biliary complications occurred in 104 (32.0%) of all liver transplant recipients. Patients with a history of CMV infection had a 1.86 x higher risk of developing a biliary complication than those without infection. CIT was included in the model to control for its confounding effect, and regardless of CMV status, patients who received organs with the maximum CIT had an odds 1.93 x higher of developing a biliary complication than those with the minimum CIT. The risk of developing a biliary complication was 3.3% for each hour of CIT prior to organ transplantation. Gender, age, date of transplantation, HAT and disease indication for surgery, and specifically HCV infection, were not significant factors. CONCLUSIONS: Patients transplanted for HCV infection are not more at risk of developing a biliary complication than other disease indications. However, post-operative CMV infection and/or prolonged CIT were the greatest risk factors for biliary complications.

1161 LAPAROSCOPIC TREATMENT FOR HEPATOCELULAR CARCINOMA

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BACKGROUND: Recent developments in minimally invasive surgery have made the two types of surgical approach, including endoscopic microwave or radiofrequency thermal ablation (E-TA) and laparoscopic liver resection (L-Hr) for hepatocellular carcinoma (HCC). To clarify the usefulness of each treatment for HCC, the techniques and results of a clinical series were reported. PATIENTS: E-TA has been performed for tumor superficially located in both the upper and lower segment in 29 cases with HCC. Conversely, for a tumor in the lower segment or left lateral segment, L-Hr has been performed in 28 patients with HCC. Operative methods were left lateral segmentectomy (9 cases), S6 subsegmentectomy (1) and partial hepatectomy (19). RESULTS: In the cases of L-Hr, there were notable differences in blood loss and operating time compared with open hepatectomy (O-Hr), although the E-TA group showed a significantly shorter operating time and less blood loss. As an evaluation of less invasive surgery, we utilized an E-PASS scoring system (Estimation of Physiologic Ability and Surgical Stress). Although there was no difference in preoperative risk, a significant difference was seen in the surgical stress and comprehensive risk scores comparing (O-Hr) with both L-Hr and E-TA. In the postoperative course, values were significantly better with oral intake, ambulation and hospital stay for both L-Hr and E-TA, compared with O-Hr. Postoperative complication rates were not significantly different in the 3 groups. In E-TA, two cases suffered needle tract seeding. Concerning the survival rate and disease-free survival rate, there were no significant differences in the 3 groups. Conclusion: Laparoscopic treatment for HCC is technically feasible with acceptable morbidity and mortality rates. The laparoscopic approach in selected patients with HCC is considered to be the treatment of choice.

1162 IS THE VASCULAR ENDOTHELIAL GROWTH FACTOR MESSENGER RNA EXPRESSION IN RESected HEPATOCelULAR CARCINOMA AN INDICATOR OF THE BIOLOGICAL BEHAVIOR OF REcurrence?

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AIM: To evaluate the correlation between vascular endothelial growth factor messenger RNA (VEGF mRNA) in resected primary hepatocellular carcinoma (HCC) tissues and the behavior of postoperative recurrence. METHODS: Using a reverse-transcription polymerase chain reaction (RT-PCR)-based assay, VEGF mRNA was determined prospectively in HCC tissues of 50 consecutive patients undergoing curative resection for HCC. Sixteen patients developing recurrence during the follow-up entered this study. The correlation between them and clinical features of recurrence was studied. RESULTS: Among the isoforms of VEGF mRNA, by multivariate analysis, a higher level of VEGF165 in HCC tissue correlated with a significant risk of HCC recurrence (p = 0.038) and VEGF121 did not. As to the clinical manifestation of recurrence, recurrence HCC numbers over 2, recurrent extent over 2 liver segments, and recurrence-related death were significantly correlated with those with a higher level of VEGF mRNA in primary tumors (p = 0.0346, 0.043, and 0.0328 respectively). However, presence of extrahepatic metastasis was not (p = 0.05). CONCLUSION: The expression of VEGF mRNA, especially isoform VEGF165, in HCC tissues, may be a significant indicator of the invasiveness of postoperative recurrence.
1163 RADIOACTIVE RESIN MICROSPHERES AS PROPHYLACTIC TREATMENT FOR INTRAHEPATIC LIVER METASTASIS MODEL IN RATS: DOES IT IMPROVE SURVIVAL RATES?
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BACKGROUND: Radiotherapy has been used in the treatment of many malignancies. However, there has been little success in controlling established liver metastases. In cases of liver metastases from colon cancer, prophylactic therapy after tumoral resection appears appropriate to prevent the development of metastatic foci. Therefore, we have developed an experimental model of intrahepatic metastasis and studied the effectiveness of radionuclide-labelled microspheres. AIM: The purpose of this study was to verify the uptake of 3p-labelled resin microspheres (LRM) in rats. METHODS: Donryu rats weighing 120–140 g were used. Asctis hepatica AH60C cells were inoculated intraperitoneally. Animals were divided in 5 groups: group A received no treatment (positive control, n = 35), group B received LRM 4 days before inoculation (n = 42), group C received LRM at the time of tumor inoculation (n = 38), group D received LRM 4 days after tumor inoculation (n = 12), and group E received only LRM (n = 11). At day 4 and day 48 after the injection, 4 intraperitoneally injected animals were radiographed to study the organ distribution of microspheres. Animals were followed up. Survival time was studied until 60 days. Necropsy was performed after death. RESULTS: The distribution of the microspheres within the liver using the portal vein method was homogeneous. Percent distribution of radioactivity in tissue 4 days after injection showed 81.6% in the liver, 0.11% in the leg, 0.02% in the lung, 0.01% in the spleen, and 0.04% in the kidney. These levels were maintained in the animals at day 48 days after the injection of microspheres. Therefore, it showed the highest uptake in liver when compared with other organs. Survival rates after 60 days were 2.9%, 40%, 23.8%, 0%, and 0% in groups 1, 2, 3, 4, and 5, respectively. CONCLUSIONS: This study suggests that radioactive resin microspheres treatment was shown to be effective as prophylactic treatment of intrahepatic metastases.

1164 MURINE HEPATOCELLULAR CARCINOMA CELL LINES CONSTITUTIVELY PRODUCE GM-CSF IN VITRO AND INVOKE COMPLETE IMMUNE REPRESSION IN VIVO FOLLOWING IMPLANTATION INTO THE LIVERS OF SYNGENEIC MICE
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INTRODUCTION: We have developed a practical murine model for intrahepatic tumorgenesis of hepatocellular carcinoma (HCC). The purpose of this study is to describe results with a murine model for HCC based on intrahepatic inoculation. METHODS: GM-CSF production of all HCC cell lines currently available from ATCC was assessed by RT-PCR and ELISA. Varying cell doses (1 × 10^4 to 10^6) were implanted into the livers of normal female C57BL/6 mice. Tumorigenesis was assessed at 21 days following implantation by laparotomy, enumeration of hepatic nodules, and histopathological analysis. Some tumor-bearing mice were also characterized with micro-CT and volumetric analysis. Tumor cells were also implanted into immunosuppressed female C57BL/6 mice, treated with 200 mg/kg intraperitoneal cyclophosphamide prior to tumor challenge. RESULTS: All murine HCC cell lines constitutively produce high levels of GM-CSF, as assessed by RT-PCR and ELISA. The Hepa 1–6 cell line was selected among these and implanted into the livers of normal female C57BL/6 mice. Among normal mice, 28/82 (34%) developed tumors within 21 days following implantation of 1 × 10^6 Hepa 1–6 cells. Grossly evident areas of inflammatory response developed at the site of inoculation in 90% of animals that failed to develop tumor. Histologic analysis of these areas revealed dense lymphocytic infiltrates and features consistent with a complete immune response to tumor challenge. Contrary to normal mice, 26/32 (81%) of immunosuppressed mice developed tumors following intrahepatic inoculation with Hepa 1–6. CONCLUSIONS: Hepa 1–6 is an immunogenic HCC cell line. Intrahepatic implantation of 1 × 10^8 Hepa 1–6 cells into normal female C57BL/6 mice results in sporadic tumorigenesis due to the vigorous host immune response to tumor cells. The sporadic nature of Hepa 1–6 tumorigenesis is not observed in immunosuppressed murine hosts, most of which develop hepatic tumors. The immunogenicity of Hepa 1–6 may, in part, be a result of GM-CSF secretion, which is produced at high levels by Hepa 1–6 as well as all other available murine HCC cell lines.

1165 PREDICTORS OF LONG-TERM DISEASE-FREE SURVIVAL AFTER RESECTION OF HEPATOCELLULAR CARCINOMA: TWO DECADES OF EXPERIENCE AT CHANG GUNG MEMORIAL HOSPITAL
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BACKGROUND: Hepatocellular carcinoma (HCC) is a common disease in Taiwan. A high incidence of recurrence after hepatectomy is the most important cause of unsatisfactory results after resection of HCC. This study aims to determine the clinicopathologic factors for predicting survival longer than 5 years without recurrence in HCC patients treated with hepatectomy. METHODS: The clinical features of 46 cases of surgically resected HCC that survived longer than 5 years without recurrence (group A) were reviewed. Also, comparison was made with the clinical features and factors influencing the outcome of 1046 cases of resected HCC who survived <3 years both with, and without recurrence, and for >5 years with recurrence (group B). RESULTS: Of 1092 cases of surgically resected HCC, 46 (4.5%) survived longer than 5 years without recurrence. Univariate analysis revealed that absence of vascular invasion, satellite lesions, low histological grading of HCC, lower rate of underlying liver cirrhosis, wider resection margins, and an uneventful postoperative course were frequent in group A patients compared with group B patients. Moreover, multivariate stepwise logistic regression analysis identified an absence of satellite lesions and an uneventful postoperative course as the two main independently significant predictors of HCC patients undergoing hepatectomy with long-term disease-free survival. The 1-, 3-, 5-, and 10-year survival rates of group A patients were 100%, 100%, 100%, and 84%, while those of group B patients were 73.5%, 47.9%, 29.0%, and 21.2%, respectively. CONCLUSIONS: Absence of satellite lesions and uneventful postoperative courses are the two main independent predictors for long-term disease-free survival in HCC patients undergoing hepatic resection.

1166 CLINICAL FEATURES IN PATIENTS WITH MASS-FORMING TYPE CHOLANGIOCELLULAR CARCINOMA ASSOCIATED WITH HEPATITIS VIRAL INFECTION RESEMBLING HEPATOCELLULAR CARCINOMA
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BACKGROUND:AIMS: Clinicopathological features and outcome after surgery in patients with mass-forming type cholangiocellular carcinoma (m-CCC) caused by hepatitis viral infection have not been clarified. METHODOLOGY: From 1980 through 2002, 71 consecutive patients with m-CCC who had undergone hepatectomy were studied retrospectively. The etiology of chronic hepatitis or cirrhosis was hepatitis C virus (HCV) in 24 patients (34%), hepatitis B virus (HBV) in 10 patients (14%), and HCV/HBV co-infection in 1 patient (1%), while 36 patients were negative for both HBV and HCV. We attempted to clarify whether there might be a difference in the clinicopathological features in relation to the hepatitis viral infection in patients with m-CCC. RESULTS: The chi-square test revealed significant differences in clinicopathological features in relation to the hepatitis viral infection: tumor size, lymph node metastasis, serum level of AFP, hypervascular tumor on angiography, expression of periodic acid-Schiff and alcin blue stain, the number of cases of cholangiocellular carcinoma, and the number of cases with concomitant hepatocellular carcinoma. The 5-year survival rate was significantly greater in patients with viral infection (39%) than in patients without viral infection (16%, p = 0.03). CONCLUSIONS: Although pathological findings were typical m-CCC, biological characteristics of m-CCC with hepatitis viral infection resembled the characteristics of hepatocellular carcinoma.
1167 DO THE CHANGES OF GAP JUNCTION GENE CONNEXIN 32 AND CONNEXIN 43 MESSNER RNA IN RESECTED HEPATOCELLULAR CARCINOMA CORRELATE WITH INVASIVENESS OF POSTOPERATIVE RECURRENCE?
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AIM: To investigate the correlation between the expression of connexin (Cx) 26, 32 and 43 messenger RNA (mRNA) in hepatocellular carcinoma (HCC) tissues and the clinical features of recurrence. METHODS: Using a reverse-transcription polymerase chain reaction (RT-PCR)-based assay, Cx26, Cx32 and Cx43 mRNA was determined prospectively in the liver tissues in HCC tissue in 25 consecutive patients receiving curative resections. Follow-up clinical study of 10 patients developing recurrence was correlated with these mRNA changes. RESULTS: Comparing the liver tissue of control patients and non-cancerous liver tissue of HCC patients, Cx26 mRNA and Cx32 mRNA decreased significantly in HCC tissues (p < 0.01, p < 0.01, respectively). By multivariate analysis, a lower level of Cx26 mRNA and Cx32 mRNA correlated significantly with a risk of HCC recurrence (p = 0.033, p = 0.033, respectively). Cx43 mRNA increased in HCC tissues but does not correlate with postoperative recurrence. As to the manifestation of recurrence in 10 patients during the follow-up, we found the correlation between clinical invasiveness factors (recurrence, recurrence HCC numbers over 2, recurrent extent over 2 liver segments, presence of extrahepatic recurrence and mortality) and those with decreased changes of Cx32 and Cx26 mRNA in primary HCC were statistically significant (p = 0.0023, 0.0333, 0.0523, 0.0088, respectively). CONCLUSION: The decrease in expression of Cx26 mRNA and Cx32 mRNA in primary HCC tissues correlated significantly with biological behaviors of postoperative recurrence of HCC.

1168 USE OF POSTOPERATIVE CEA TO PREDICT SURVIVAL AFTER LAPAROSCOPIC RADIOFREQUENCY THERMAL ABLATION OF COLORECTAL HEPATIC METASTASES
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PURPOSE: We previously analysed the preoperative prognostic factors responsible for survival at the time of radiofrequency thermal ablation (RFA) of colorectal liver metastases. Little is known, however, about how an assessment of the patient’s initial response to RFA – as determined by serum carcinoembryogenic antigen (CEA) and imaging studies – can be used to predict survival. METHODS: 106 consecutive patients with colorectal liver metastases undergoing laparoscopic RFA were prospectively evaluated. Serum CEA values and tri-phasic liver CT scans obtained preoperatively and at 3 months were compared. Three groups of patients were identified based on the post-ablation change in CEA levels: 0% to 35% drop (n = 25), 35% to 100% drop (n = 57) or increase (n = 24). The patients were further divided on the basis of their disease progression at 3-month follow-up CT scans: patients with new hepatic or extrahepatic recurrence, local hepatic recurrence or stable disease. Survival in each group was compared using Kaplan-Meier survival curves and the log rank test. RESULTS: The change in the post-ablation CEA level was the most significant determinant of long-term survival, with a median survival of 34 months, >48 months and 16 months in the 0% to 35% drop, 35% to 100% drop and increase in CEA groups, respectively (p = 0.004). The limited number of patients showing disease progression by CT scan within 3 months after RFA precluded statistical conclusions to be drawn in the latter subgroup analyses. CONCLUSIONS: The post-ablation drop in serum CEA relates to the efficacy of tumor debulking and is a more sensitive predictor of survival in patients undergoing RFA of colorectal liver metastases than the imaging studies. Although preoperative factors are traditionally used to predict survival after cancer therapy, an understanding of the postoperative factors affecting survival makes it possible to redefine the patient’s prognosis and institute additional therapy in high-risk patients.

1169 IN VIVO BIOLUMINESCENCE AND MRI IMAGING OF COLORECTAL CANCER METASTASES IN ORTHOTOPIC MURINE MODELS
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AIM: To utilize in vivo imaging methods to monitor progression of tumors in a murine model of colorectal cancer metastases using bioluminescence and MRI technologies. RATIONALE: The ability to follow the growth of tumors without sacrificing the animal in a preclinical model is valuable in understanding and dissecting the steps of tumor progression and the molecular level. In addition, monitoring the progression and regression of both primary and metastatic tumors is of great value in models evaluating new therapeutic agents. Advances in treatment of minimal residual disease states have been limited by inadequate animal models in which a small number of tumor cells can be detected and the patterns of growth, metastasis, and regression with treatment can be studied over time. BACKGROUND AND SIGNIFICANCE: Colorectal cancer is the third most common cancer in the USA. Most patients who die from this disease will succumb with metastases to the liver. Improved survival from colorectal cancer can be attributed to early detection and better adjuvant therapy. Further advances must address the burden of metastatic disease. Preclinical models of colorectal cancer have an important place in understanding the molecular mechanisms of this disease as well as devising treatment strategies. METHODS AND RESULTS: We have adapted the murine splenic and cecal injection models of colorectal metastases. These orthotopic models are used to recapitulate the early and late stages of metastasis. In the splenic injection model, wild-type (WT) C57BL/6 mice underwent splenic injection of 1 x 10^5 syngeneic MC38 colon cancer cells stably transfected with a luciferase reporter construct. This technique reproducibly resulted in liver metastases in the injected mice. After injection with luciferin, animals were sequentially imaged using an IVIS camera at 5-, 10-, and 12-day time points. In addition, mice were imaged on days 7 and 14 using a 7 Tesla micro MRI. Bioluminescence showed a nearly 5-fold increase in signal from 5 to 12 days. MRI showed better localization of tumor within the liver. CONCLUSIONS: To our knowledge this is the first example of bioluminescence imaging of metastatic tumors in an orthotopic model. While MRI provides better spatial resolution of tumors, bioluminescence provides serial images whose signal can be quantified. These imaging modalities are complementary. Bioluminescence and MRI offer the opportunity to follow the progression and potentially the regression of tumors over time in an orthotopic model. These techniques also provide the practical benefit of cost reduction as a result of decreasing the numbers of animals required for a given study.

1170 EXPRESSION OF OXIDATIVE STRESS MARKERS IN NON-CANCEROUS LIVER TISSUE CORRELATED WITH INTRAHEPATIC RECURRENCE-FREE SURVIVAL AFTER HEPATECTOMY FOR HEPATOCELULAR CARCINOMA
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BACKGROUND: Hepatocellular carcinoma (HCC) is one of the most frequent malignant tumors, and its incidence is increasing throughout the world. Long-term survival after surgical resection of HCC remains unsatisfactory due to the high incidence of tumor recurrence, especially in the remnant liver. It is very important to explore the risk factors for HCC recurrence. Hepatic status has a large influence on intrahepatic recurrence, as does the nature of the HCC. The aim of this study was to evaluate underlying hepatic status with hepatitis C viral infection in intrahepatic recurrence of HCC after hepatectomy by means of oxidative stress markers for DNA damage. METHODS: Liver tissue samples were obtained from 40 HCC patients with hepatitis C virus and 16 patients with normal liver as controls, who underwent hepatic resection. 8-Hydroxydeoxyguanosine (8-OHdG), an oxidative stress marker for DNA base, was detected immunohistochemically using anti-8-OHdG antibody, and expressed as 8-OHdG labelling index (LI). mRNA expression of human 8-oxodeoxyguanosine DNA glycosylase (hOGG1), the DNA base excision enzyme for 8-OHdG, was measured by quantitative PCR. Univariate and multivariate analyses were performed on 8-OHdG and hOGG1mRNA expression, and several clinicopathological factors affecting intrahepatic recurrence-free survival after hepatectomy for HCC. RESULTS: Both 8-OHdG LI and
hOGG1 mRNA expression in non-cancerous liver were significantly higher in the HCC patients with hepatitis C virus than in normal liver as control. Univariate analysis identified three variables as factors contributing to intrahepatic recurrence: presence of microscopic venous invasion and microscopic surgical free margin 0 mm. The high h-OHH2L1 (≥ 30.103 group) and lower hOGG1 (p < 0.05). The low hOGG1 mRNA expression (≥ 1.8) group (p < 0.05). Multivariate analysis identified high h-OHH2L1 and microscopic surgical free margin 0 mm as significant risk factors for intrahepatic recurrence. CONCLUSION: Expression of h-OHH2 and hOGG1 in non-cancerous liver tissue could be a useful indicator for predicting intrahepatic recurrence-free time.

1171 ADVERSE EFFECTS OF RADIOFREQUENCY ABLATION OF LIVER TUMOURS IN THE NETHERLANDS
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INTRODUCTION: Radiofrequency ablation (RFA) is a promising treatment in selected cases of unresectable liver metastases (LM) and hepatocellular carcinomas (HCC). The ability of RFA to accomplish local disease control in the treatment of malignant tumors has been shown in a large number of patients. The purpose of this study is to report on adverse effects in the initial experiences with RFA in 8 medical centers in the Netherlands. PATIENTS AND METHODS: From 1999 through 2003, 128 patients were treated with RFA, were prospectively registered. Patients were not suitable for hepatic resection because of carcinosis, bilobar disease, vascular proximity, previous hepatocemias or extrahepatic disease. Medical records were reviewed for demographics, RFA procedure and follow-up data. Complications were divided into major and minor categories as described by clinical examination or imaging. RESULTS: 123 RFA treatment procedures in 108 patients were performed. A total of 233 liver tumors (216 CRC and 15 HCCs) were treated with an average of 1.28 RFA applications per tumor. RFA was performed percutaneously (28 treatments, 23%) and after laparotomy (95 treatments, 77%). RFA was combined with partial hepatectomy in 12 treatment procedures (34%). Two patients died within 30 days after RFA in combination with partial hepatectomy (mortality rate 1.8%). Major complications occurred equally (8%) in percutaneous and open RFA and included bile duct injury (n = 6), abdominal hemorrhage (2) requiring relaparotomy or transfusion, liver failure (2), fistula (2) and multi-organ failure (1). Simultaneous partial hepatectomy was associated with increased major complication rate (19% vs 5%, p < 0.05). CONCLUSION: RFA is most often well tolerated. Initial complication rates in the Netherlands following radiofrequency ablation are higher than previously reported and predominantly related to concomitant resection.

1172 LIVER ENZYME RELEASE AND ACUTE PHASE REACTION AFTER LOCAL ABLATION IN THE RAT LIVER
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INTRODUCTION: Cytoablution (CA), radiofrequency ablation (RFA) and interstitial laser coagulation (ILC) are local therapies for unresectable liver tumours. The aim of this study was to assess the systemic effects of local therapies in a rat model for partial liver ablation. MATERIAL AND METHODS: 48 rats were treated with CA (n = 12), RFA (12), ILC (12) or sham operation (12). Plasma samples were collected before and 1, 3, 6 and 24 h after ablation for determination of liver enzymes (AST) and acute phase cytokines (IL-6 and IL-10). Animals were treated 6 or 24 h after therapy. Livers were removed for macroscopic examination. To ascertain necrosis, frozen sections of ablated liver were assessed for activity of NaN34, a marker of mitochondrial viability. RESULTS: H&E sections of ablated liver showed a total loss of architecture, shredded sinusoids and stasis of erythrocytes. NaN34 staining of the centre of the lesion invariably showed complete necrosis. ASAT values (median values in U/1 ± SEM) were elevated (p < 0.05) 1, 3, 6 and 24 h after CA (404 ± 37, 902 ± 144, 1582 ± 335, 1278 ± 972, respectively), ILC (123 ± 45, 594 ± 83, 1313 ± 281, 1436 ± 149, respectively) and CA (2098 ± 372, 2594 ± 349, 2605 ± 176, 11548 ± 2489, respectively) compared to sham surgery (173 ± 32, 191 ± 35, 271 ± 50, 235 ± 80, respectively). Although equal volumes were ablated, AST levels were higher 1, 3 and 6 h after CA (p < 0.05). IL-6 (pg/ml) was also increased (p < 0.05) 1, 3 and 6 h after CA (1948 ± 97, 4163 ± 898, 3848 ± 833, respectively) compared to RFA (480 ± 108, 880 ± 163, 725 ± 136, respectively), ILC (442 ± 284, 1460 ± 375, 1332 ± 310, respectively) and sham surgery (507 ± 124, 318 ± 208, 119 ± 43, respectively). IL-10 was increased 6 h after CA compared to rats undergoing RFA, ILC or sham surgery (p < 0.05). CONCLUSION: Complete parenchymal necrosis is achieved after RFA, ILC and CA. No difference in enzyme leakage or acute phase response could be observed between RFA and IL-C. Freezing (CA) resulted in increased leakage of liver enzymes into the systemic circulation and in an increased acute phase response directly after treatment as compared to heating (RFA and ILC). These results corroborate the clinical findings of increased complications after CA, such as ARDS and SIRS (cryslock).

1173 COMPARATIVE STUDY OF STAGING SYSTEMS FOR HEPATOCELLULAR CARCINOMA AFTER SURGICAL TREATMENT
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PURPOSE: To select the appropriate treatment for patients with hepatocellular carcinoma (HCC), establishment of a combined staging system based on tumor progression and liver function is necessary. The TNM stage and Okuda's criteria; the Cancer of the Liver Italian Group (CLIP) integrated staging (JIS) scoring system have been proposed for staging and all adequately reflect patient survival. However, α-feto-protein (AFP) level in the 4 categories of JIS clip score does not reflect tumor invasiveness. Accordingly, we proposed the modified CLIP score. In the present study, we compared the usefulness of various staging systems for HCC and compared the results in patients who underwent hepatectomy and local ablations. PATIENTS AND METHODS: The disease-free and overall patient survival rates were compared between TNM staging of UICC and Japan, JIS score (Japan TNM plus Child classification), CLIP score (tumor morphology, AFP, portal thrombus and Child classification) and modified CLIP score (scoring of AFP was replaced by that of protein induced by vitamin K absence or antagonist [PIVKA-II]). Between 1990 and 2003, 210 patients who underwent hepatic resection and 52 patients who underwent local ablation therapies were analysed. For multivariate analysis, we also analysed non-associated factors with these staging systems. RESULTS: A high serum PIVKA-II level (≥ 400 μA/mul) was associated with enhanced survival compared with that of AFP. The survival discriminating ability of Japan TNM staging was significantly better than that of the UICC TNM staging. The majority of patients undergoing hepatectomy were classified as Child A. There were no differences in survival rates between Japan TNM and JIS score. The survival discriminating ability between scores 1 and 2 of the modified CLIP score was significantly better than CLIP. Multivariate analysis using Cox's hazard model and AIC analysis showed that modified CLIP and JIS score were better staging systems in predicting survival of HCC patients. There were no significant differences in patient survival between hepatectomy and ablation therapies at each stage. CONCLUSIONS: JIS and modified CLIP are useful staging systems for predicting prognosis of HCC patients. At present, apart from liver transplantation, HCC patients should be treated by various modalities to prolong survival.

1174 SECOND PRIMARY NEOPLASMS IN PATIENTS WITH HEPATOCCELLULAR CARCINOMA
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PURPOSE: There is a paucity of literature on second primary neoplasms in patients with hepatocellular carcinoma (HCC). We attempted to characterize this cohort of patients to define the incidence, risk factors, and overall survival, to potentially determine if there are identifiable clues to shared underlying genetic aberrations. METHODS: This is a retrospective analysis from an established prospective database of patients with
HCC. Patients were seen between 1991 and 2003 at a university-affiliated, community-based tertiary referral center. Demographic data, risk factors, characteristics of secondary neoplasm and overall survival were recorded. RESULTS: Of 272 patients with HCC, 20 patients (7.4%) were identified with a secondary neoplasm. Two patients had two other primary tumors, for a total of 22 second primary neoplasms. In this group, mean age was 60 years and the male:female ratio was 2.3:1. Frequency of risk factors included: hepatitis B (20%), hepatitis C (30%), smoking (40%), diabetes (30%), cirrhosis (65%), family history of HCC (10%). Second primaries included 7 genitourinary (prostate = 2, bladder = 2, testicular = 1, renal = 1, ovarian = 1), 6 gastrointestinal (colon = 5, gastric = 1), 2 skin, 2 lung, 2 breast, 2 hematologic, and 1 desmoid. Five patients had HCC first, while 15 had the other primary first. Mean survival after diagnosis of HCC was 66.7 days, with 1-year survival of 75%, and 2-year survival of 30%. CONCLUSION: The incidence of second primary tumors in HCC is relatively common, with a strong clustering of genitourinary and other gastrointestinal malignancies, suggesting possible common underlying genetic etiologies. Molecular biologic analyses of this cohort may contribute further to our understanding of cancer biology and may aid in identifying a cohort of patients who are at higher risk for the development of metachronous cancers.

1175 HEPATITIS STATUS, CHILD-PUGH CLASSIFICATION, AND SERUM AFP LEVELS PREDICT SURVIVAL IN PATIENTS TREATED WITH TRANSARTERIAL EMBOLIZATION FOR UNRESECTABLE HEPATOCELLULAR CARCINOMA
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INTRODUCTION: Hepatocellular carcinoma (HCC) represents one of the most prevalent and deadly cancers worldwide. Surgical resection and orthotopic liver transplantation represent the only known curative procedures for this disease. Unfortunately, most patients are not surgical candidates and transarterial embolization (TAE) has been used to treat patients with unresectable HCC. The purpose of this study was to identify factors that predict survival in patients treated with TAE at a Western medical center. METHODS: Review of a prospective database identified 307 patients treated for HCC at University Hospital (Newark, NJ) between 1/98 and 12/03. Of these patients, 109 patients underwent TAE. Eleven of these patients were subsequently treated surgically and excluded from this study. Of the remaining 98 patients, demographic data and laboratory values were analysed to predict survival by univariate and multivariate analysis. RESULTS: Of the 98 patients studied (74 male, 24 female), the median age was 65 (26-87) and median survival was 12.5 months. Several factors including hepatitis status, Child-Pugh classification (A or B), serum AFP levels ≤500 ng/dl, bilirubin <2.0 mg/dl, prothrombin time <16s, platelet count 3.5 g/ml and multiple treatments were all found to predict a significant improvement in survival by univariate analysis. No significant difference in survival was found between patients treated with TAE vs. transarterial chemoembolization. Using multivariate analysis, AFP levels (p = 0.03), Child-Pugh classification (p = 0.02) and hepatitis status (p = 0.03) were found to be independent predictors of survival. CONCLUSION: HCC patients with CHC and hepatitis status were all shown to be independent predictors of survival in patients treated with TAE for unresectable HCC. These factors may help to better select patients with unresectable HCC who might benefit from TAE. In addition, further studies addressing the effects of hepatitis on HCC progression and patient survival are also warranted.

1176 GENE EXPRESSION OF DDIHYDROPYRIMIDINE DEHYDROGENASE (DPD) AND THYMIDYLATE SYNTHASE (TS) IN HEPATOCELLULAR CARCINOMA
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BACKGROUND/PURPOSE: Dihydropyrimidine dehydrogenase (DPD) and thymidylate synthase (TS) are key enzymes for predicting the efficacy of 5-FU in the treatment of malignant tumors. However, 5-FU is not commonly used for chemotherapeutic treatment of hepatocellular carcinoma (HCC) in practice. The aim of this study was to determine the activities of both DPD and TS in HCCs and non-cancerous liver tissues adjacent to HCCs (N-HCCs) and to assess the correlation between the activities of these enzymes and clinicopathological factors. METHODS: This study material comprised 40 pairs of HCCs and N-HCCs (liver cirrhosis 29, chronic hepatitis 9, normal liver 2). DPD and TS gene expression were quantified by TaqMan reverse transcription-PCR assay using beta-actin as an internal standard and expressed as TS: beta-actin and DPD:beta-actin mRNA ratio. As for clinicopathological factors, including sex, ICGR15, positive rate of HCV, clinical stage and pathological findings were examined. The cut-off level was set at the mean levels of TS and DPD expression. Early recurrence within 6 months after operation was investigated. RESULTS: The level of DPD expression was higher in N-HCCs than that in HCCs (2.81 +/- 6.24 x 10^-7 vs 3.39 +/- 5.01 x 10^-7, p = 0.02), while the level of TS expression tended to be high in HCCs (not significant). The levels of TS expression were significantly higher in both HCCs and N-HCCs in stage 4 (n = 5) than those in stage 1 (n = 5) (1.53 +/- 0.64 x 10^-7 vs 10.59 +/- 8.17 x 10^-3, p = 0.04, 0.85 +/- 0.13 x 10^-7 vs 5.46 +/- 2.81 x 10^-7, p = 0.03). As for pathologic factors, HCCs with vascular invasion revealed a significantly higher TS expression (n = 21) than those without vascular invasion (n = 18) (6.82 +/- 6.95 x 10^-7 vs 2.49 +/- 0.33 x 10^-7, p = 0.03). No significant relation was found between DPD expression and clinicopathological factors. The cut-off levels of TS and DPD expression in HCCs were 4.32 x 10^-7 and 2.81 x 10^-7, respectively. Postoperative recurrence rates within 6 months were significantly higher in patients with high TS expression (13.1 +/- 5.53 x 10^-3, n = 4/6, 67%) than in patients with low TS expression (1.80 +/- 1.09 x 10^-3, n = 6/28, 21%; p = 0.03). DPD expression had no impact on the early recurrence rate of HCCs. CONCLUSION: These results suggest that TS gene expression may be an important factor for predictive early recurrence of HCCs.

1177 IMMUNOHISTOCHEMICAL STUDY OF EXPRESSION OF MUC-1 IN HEPATOCELLULAR CARCINOMA
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AIM: Mixed hepatocellular and cholangiocellular carcinoma (mixed HCC) have both nature of hepatocellular carcinoma (HCC) and cholangiocellular carcinoma (CCC), and have a tendency to distant and intrahepatic metastasis rapidly. However, a few HCCs except mixed HCC advanced in the manner of CCC or mixed HCC, and we presume that these HCCs have the potential manner of CCC. We clarified correlation with clinicopathologic factors of HCC and expression of surface antigen and cytokeratin filament of cholangiocellular carcinoma. PATIENTS AND METHODS: Except the patients who were diagnosed as HCC microscopically, 143 patients with primary HCC who underwent hepatic resection during 1997-2002 were enrolled. Backgrounds of patients for consideration were gender, age, hepatic virus infection. We obtained surgical specimens, and macro- and microscopically evaluated diameter of tumor, grade of differentiation, presence of intrahepatic metastasis (IM), and infiltrations to portal vein (vp (+)), hepatic vein (hv (+)) and bile duct (bd (+)). Additionally, we evaluated distant metastasis (DM) intraoperatively or radiologically. Using surgical specimens, immunohistochemical examination of mucin core protein (MUC-1), cytokeratin (CK) 7 and CK 19 were performed. Results were correlated with gender, age, viral results, tumor size, grade of differentiation, vascular/bile duct invasion, DM, and presence of epithelial markers/cell surface antigen statistically. RESULTS: Mean age of patients consisting of 112 men and 31 women was 63 years. Of 143, 95 patients had HCV antibody and 24 patients had HBs surface antigen. Mean tumor diameter was 3.9 cm. Histopathologically, HCCs consisted of 11 well, 82 moderately and 50 poorly differentiated HCC. Of 143 HCCs, 33 HCCs had IM, 55 vp (+), 5 hv (+), 5 bd (+), and 12 DM. Immunohistochemically, 77% (109) were positive for MUC-1, 72 (50%) were CK 7, and 11 (8%) were CK 19. Positivity of MUC-1 significantly correlated with poor differentiation (p < 0.05), (b +) (p < 0.05), and positivity of CK 19. CONCLUSION: Half of the HCCs demonstrated expression of MUC-1 and CK 19. In the present study, and MUC-1, especially, correlated with poor differentiation and b (+). This suggests that poor differentiation of HCC leads it to reacquire phenotype of bile duct, and that some membrane-binding glycoprotein such as MUC-1 makes intercellular adhesion easy. MUC-1 might play an important role in adhesion or infiltration in the process of metastasis of HCC.
1178 EXPERIENCE WITH REPEAT SELECTIVE INTERNAL RADIATION THERAPY (SIRT) WITH SIR SPHERES FOR NON-RESECTABLE LIVER TUMORS

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INTRODUCTION: SIRT is a relatively new modality for treating non-resectable liver tumors that utilizes high doses of β radiation delivered by hepatic arterial injection of Yttrium-90 microspheres. Response rates of 80–90% are reported following a single treatment for suitable tumors. To date there are very few data available regarding the safety and efficacy of repeat treatment. The Wakefield Clinic has a large experience (over 170 cases) with this treatment and has given one or more repeat treatments in 18 patients (5 F, 13 M) aged between 31 and 69 years. All initial and subsequent treatments were generally administered to the whole liver. METHODS: Repeat treatment was only undertaken where a good response had been obtained from the initial treatment. The following types of liver tumors were treated: colorectal cancer (14), HCC (1), renal carcinoma (1), carcinoid tumor (1), melanoma (1). The interval between treatments was 5–57 months (median 11). The repeat treatment was via a port in 10 patients and a femoral catheter in 8, whereas the initial delivery of SIRT had been via a port in 16 patients and via a femoral catheter in 2 patients. Doses given on the second occasion were as follows: 3 GBq (1), 2.2 GBq (1), 2.0 GBq (15) and 1.2 GBq (1), which were similar to those delivered on the first occasion. RESULTS: One patient developed probable radiation hepatitis following repeat treatment and developed deteriorating liver function despite a very good tumour response and another developed acute hepatic necrosis which resulted in death 5 days after the SIRT. Tumor response was based on serial CT scanning and/or tumor marker data. A very good response was seen in 8 patients (44%), stable disease in 8 (44%), no response in 1 (5%) and one patient died before a response could be assessed. Survival following the second dose ranged from 5 days to 88 weeks (median 36 weeks). CONCLUSION: While the response rate for repeat SIRT is lower than after initial treatment a good response is still to be expected in approximately 50% of those who responded well on the first occasion. The risks of hepatic damage appear greater following repeat treatment.

1179 THE CLINICAL VALUE OF LIVER TUMOR STAGING SYSTEMS

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OBJECTIVE: The staging of primary liver tumors is used to select treatment and to assess prognosis which is based on pre- and postoperative factors. The question arises why there are so many different staging systems and what their clinical value is. METHODS: We have reviewed the medical literature to identify and compare liver tumor staging systems. For comparison we have used the Certainty Factor (C factor) as suggested by the UICC. The C factor is defined as follows: C1 clinical assessment, C2 imaging studies, C3 biopsy, C4 resection, C5 autopsy. The concept is that the higher the C factor rating is the greater is the accuracy and reliability of the staging. RESULTS: 19 liver tumor staging systems that were published between 1954 and 2003 were identified. Ten staging systems were capable of selecting treatment without assessing a definitive prognosis based on pathological criteria such as the Milan criteria. Two systems cannot be used to select therapy but provide prognostic information only, e.g. Edmondson and Steiner. A total of seven systems allowed both assistance in decision making for therapy based on clinical criteria and the assessment of a prognosis after surgery. An example is Vauthier, CONCLUSION: The ideal liver tumor staging system should be capable of assisting with both therapy selection and formulating a prognosis. The question is why currently liver tumor staging systems are favored despite their inability to adequately assess prognosis. It would be desirable to use a uniform staging system in order to compare the results of different studies.

1180 HEPATIC RESECTION FOR METASTATIC TUMORS FROM GASTRIC CANCER

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AIMS: To identify prognostic determinants for hepatic metastases from gastric cancer and to evaluate the actual targets of surgical therapy.

METHODS: Between 1985 and 2001, 11 patients (all men, a median age of 59.5 years) underwent 13 hepatectomies for radical treatments and were enrolled. Follow-up ranged from 6 to 62 months. Macroscopically, number, size, lobar distribution, and surgical margin of the metastases were studied. The microscopic features evaluated were histological differentiation and the presence of vascular and lymphatic invasion of gastric cancer, fibrous pseudocapsule and peritumoral lymphocytes of metastases. RESULTS: Six patients died of recurrence (3 hepatic metastases, 2 lymph node, 1 bone marrow), and 3 patients are still alive with recurrence. The overall survival was 100% at 1 year, 64% at 3 years, and 17% at 5 years. Univariate analysis revealed venous involvement of the primary tumor (in patients with venous invasion, 5-year survival of 0% vs 22% in patients without, p = 0.0026) and lymphocyte aggregation around the metastases (in patients with aggregation 22% vs 0% in patients without, p = 0.029) to be significant prognostic factors for survival. However, multivariate analysis indicated them to have no significant impact on survival. There were 3 survivors > 4 years, and all had lymphocytes aggregation. CONCLUSION: Liver resection for metastases from primary gastric cancer may contribute to better survival in selected patients. Those without venous invasion of the primary gastric lesion may be a good indication for liver resection. Peritumoral lymphatic aggregation of the liver deposits may be a good predictive factor.

1181 MRI CHARACTERIZATION OF FOCAL HEPATIC LESIONS INDETTERMINATE ON CT

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PURPOSE: To evaluate the diagnostic yield of contrast-enhanced MRI in characterization of focal hepatic lesions that are indeterminate on CT. SUBJECTS AND METHODS: In a retrospective investigation, 124 indeterminate focal hepatic lesions in 96 patients were identified on CT examinations over 5 years from 1997 to 2001. All patients had MRI examination of the liver performed within 8 weeks of CT examination. CT and MR images were reviewed independently by two separate groups of radiologists. The value of MRI in characterizing these lesions was assessed. Diagnoses were confirmed based on histology, or clinical follow-up. RESULTS: MRI accurately characterized 73 lesions (58%) of the lesions that were indeterminate on CT. MRI could not definitely characterize 41 lesions (33%). MRI also detected lesions that were not seen by CT in 24 patients. Ten lesions seen on CT were not visualized on MRI, and follow-up imaging confirmed that these lesions could not be identified, suggesting that these were pseudo lesions. CONCLUSION: MRI is valuable for detection and characterization of indeterminate focal hepatic lesions detected on CT.

1182 FOCAL HEPATIC LESIONS DIFFERENTIAL ENHANCEMENT PATTERN APPROACH WITH 3D GRADIENT ECHO POST CONTRAST MR IMAGING

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Detection and characterization of focal hepatic lesions continues to be a radiologic challenge despite the progressive advances in liver imaging. MRI is playing an ever-growing role in the evaluation of a wide range of benign and malignant focal hepatic lesions. Recent introduction of 3D GRE sequence such as volumetric interpolated breath hold examination (VIBE) has dramatically improved MR imaging by providing dynamic enhanced thin slice images with fat saturation and high signal to noise ratio. Various patterns of contrast enhancement such as non-enhancement, arterial phase enhancement, delayed enhancement, peripheral washout, ring enhancement, nodule within nodule, true central scar and pseudo-central scar and pseudocapsule can be helpful in the diagnosis of various benign and malignant focal hepatic lesions. In this exhibit, special emphasis will be placed on the impact of 3D GRE sequence in the diagnosis of these lesions with comprehensive use of the enhancement patterns in the differential diagnosis of various hepatic lesions. Learning objectives: To discuss the value of post contrast 3D GRE sequence in the diagnosis of focal hepatic lesions. To illustrate various enhancement patterns leading to accurate non-invasive diagnosis of these lesions.
1183 CENTRAL HEPATECTOMY CAN BE PERFORMED SAFELY
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BACKGROUND: The management of tumors within the central hepatic region can be a challenge. Central hepatectomy is a viable option for centrally located tumors. Herein we report the outcomes of patients with central and conventional means. METHODS: The records of 68 patients with central hepatic lesions were reviewed. Patients were categorized into those who underwent central hepatectomy (group 1) or conventional hepatic resection (group 2). The clinicopathological characteristics, operative morbidity/mortality, and survival were analysed among the two groups.
RESULTS: Central hepatectomy was performed in 33 patients, whereas 35 patients underwent conventional hepatic resection. The mean patient age in group 1 and group 2 was 55.7 years (range 34–82) and 69.4 years (range 40–81), respectively (p < 0.001). The mean tumor size in group 1 and group 2 was 7.7 cm (range 2–21 cm) and 5.2 cm (2.7–18 cm), respectively (p < 0.001). Resections were performed in both groups primarily for metastatic colorectal cancer (48% vs 45.7%), hepatocellular carcinoma (15% vs 17.1%), and cholangiocarcinoma (25% vs 11.4%). The most common resection performed in group 1 was central hepatectomy (55%), followed by right trisegmentectomy (27%), right hepatectomy (15%) and left trisegmentectomy (3%). The most common resections performed in group 2 were bisegmentectomy/segmentectomy (65.7%), left/right hepatectomy (25.7%), right trisegmentectomy (5.7%), and non-anatomical excisions (5.7%). The operative morbidity in group 1 and group 2 was 18.2% and 22.8%, respectively. The mortality in group 1 and group 2 was 3.3% vs 2.9%, respectively. These findings were not statistically significant. Additionally, the length of stay was 11 days in group 1 and 10.4 days in group 2, which was also not statistically significant. The overall survival in both groups were comparable (32 vs 30 months, p = 0.6, log rank test).
CONCLUSION: Central hepatectomy, despite its complexity, is a safe and effective operative procedure for the treatment of such lesions. The early and late outcomes for resected patients were the same as those who underwent conventional major hepatectomy.

1184 IMPACT OF DIAGNOSTIC LAPAROSCOPY UPON THE MANAGEMENT OF HEPATOCellular CARCINOMA
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BACKGROUND: Hepatic resection offers the best chance of survival for patients with hepatocellular carcinoma (HCC). However, this is only possible in a small number of these patients because of liver cirrhosis and advanced stage of the disease. Diagnostic laparoscopy was introduced for accurate assessment of patients with HCC with very promising results. This study was designed to evaluate the role of diagnostic laparoscopy (performed immediately before a planned laparotomy) in the assessment of patients with potentially resectable HCC. PATIENTS AND METHODS: Out of 114 patients who were submitted to this study, only 101 patients were subjected to diagnostic laparoscopy (73 males and 28 females). According to Child-Pugh classification, 72 patients were of class A, 5 patients were of class B, and 24 patients were noncirrhotics with negative viral markers for hepatitis B and C. Laparotomy was not performed when definite evidence of unresectable tumor was established by diagnostic laparoscopy. If unresectability decision was not clear, open exploration was performed. When resectability was confirmed by diagnostic laparoscopy, laparotomy aiming for hepatic resection was carried out. RESULTS: Laparoscopic assessment showed definite features of unresectable disease in 23 patients, while the remaining 78 patients showed features of resectability and underwent laparotomy. Out of those 78 patients, 69 underwent hepatic resection and 9 were not found to be candidates for resection during laparotomy. Diagnostic laparoscopy avoided unnecessary laparotomies in 13 out of 32 patients with unresectable HCC. The median duration for the laparoscopic procedure was 25 minutes (range 15–45). The complications that occurred during the diagnostic laparoscopy included trocar site infection (n = 5), surgical emphysema (3), perforated small intestine (2), and bleeding (1). CONCLUSION: Diagnostic laparoscopy is a valuable method for assessment of resectability in patients with HCC.

1185 RUPTURED HEPATOCYTOPLASMIC CARCINOMAS
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INTRODUCTION: The spontaneous rupture of a hepatocellular carcinoma is a serious and often lethal (in 10% of cases) complication. The mechanism is not clear but it is suggested that rupture is usually preceded by a rapid expansion of the tumour secondary to bleeding from within its substance. PATIENTS AND METHODS: Over the last 20 years we have treated 24 patients with this condition: 18 men and 6 women, aged between 39 and 83 years (average age 65 years). RESULTS: The hepatocellular carcinoma developed in livers affected by alcoholic cirrhosis (14) or hepatitis (6). Four patients had no pre-existing liver disease. Lesions were located in the left lobe (n = 2), in the right lobe (n = 13) or were bilateral (n = 4). Nine patients were operated on in emergency for a hemoperitoneum demonstrated by ultrasound. Of these, 4 had a ligation of the hepatic artery, 2 were treated by packing hemostasis, and 3 by complete resection of the lesion. All the patients were transfused. In 50% of cases, the diagnosis of hepatocellular carcinoma was known at the time of surgery. Eleven patients had a CT scan, angiography and hepatic artery embolisation before surgery. In 5 cases, a chemo-embolisation was performed.
Overall, only 2 patients were followed >3 years (68 and 72 months). Survival at 3 years was 34% (n = 8). Mortality at 30 days was 13% (n = 3). Patients with embolisation before surgery had a better survival than those operated immediately. So did those with a liver free of pre-existing conditions. DISCUSSION: The evolution of a ruptured hepatocellular carcinoma is determined by concomitant hepatic diseases, by the delay between the haemorrhage and diagnosis, by the extent of the haemorrhage and by the choice of treatment. A two-stage procedure (chemo-embolisation followed by excision) is the procedure of choice. Emergency hepatectomy should be reserved for patients with an easily resectable lesion and who are hemodynamically stable. In any case, an eventual surgical excision offers the best chance of long-term survival in operable patients.

1186 NEOADJUVANT CHEMOTHERAPY FOR RESECTABLE COLORECTAL CANCER LIVER METASTASES: IMPACT ON LIVER RESECTION
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Curative liver resection remains the best treatment option for colorectal liver metastases (CRCLM). Overall survival still is limited due to high recurrence rates. Adjuvant chemotherapy was ineffective in reducing recurrence, therefore neoadjuvant treatment was explored. During recent 2 years 56 patients were treated with 3 cycles of neoadjuvant chemotherapy prior to liver resection for CRCLM. Chemotherapy consisted of oxaliplatin/5-FU/LV or oxaliplatin/Xeloda over a 3-month period. Primary end-points of these early results were radiological and tumor marker (CEA, CA 19-9) response, extent of liver resection and perioperative morbidity/mortality. Response rates: 1 complete response, 34 partial responses, 14 stable disease, 7 progression leading to an ORR of 61% and a progression of 12%. None of the progressed patients was operable after CTX. Tumor marker response correlated with radiologic response, 15% of the patients obtained a normalization of their tumor marker. The extent of the liver resection could be substantially reduced in responding patients. The perioperative mortality was 0% and the morbidity was 4% (1 bile leak, 1 biloma). At the time of this analysis 48% of the patients are alive without recurrence, 34% have recurrence and 18% died with tumor. Oxaliplatin-based chemotherapy demonstrates a high response rate given preoperatively without increasing the perioperative morbidity. This response led to a reduction of the extent of the intended liver resection. Survival outcome measurements appear promising.

1187 INTRAEPIC HEPATOCYTOPLASMIC CARCINOMA: POSSIBLE BENEFIT OF A MULTIDISCIPLINARY APPROACH
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Tumor resection leads to the best patient survival in intrahepatic
cholangiocarcinoma (ihhCC). The aim of this study was to investigate prognostic factors in resected patients treated in a multidisciplinary manner. This is a clinical observational series of 31 resected patients with ihhCC treated at a single institution from 1994 to 2002. Univariate and multivariate analyses of clinical and pathologic factors in relation to patient survival and tumor recurrence were performed. Possible benefit of chemotherapy although not given randomly was investigated separately. The median follow-up time was 37.3 months. Out of 31 resected patients a tumor-free resection (R0) was achieved in 26; 2 patients died postoperatively. Chemotherapy was administered to 19 patients. Overall survival was significantly better in patients with R0 resection (33.6 vs 18.1 months, p = 0.017), negative lymph nodes (34.1 vs 11.9 months, p = 0.001), a solitary tumor (p = 0.005) and a width of resection margin >3 mm. Recurrence-free survival was prolonged in patients with negative lymph nodes (9.9 vs 5.3 months, p = 0.007), early UICC stages (23.7 vs 7.9 months, p = 0.017), solitary tumor (13.0 vs 7.9 months, p = 0.023) and a tumor <5 cm in diameter (8.9 vs 7.3 months, p = 0.051). In UICC stages II and III, patients with pR0 resection showed a significantly better overall survival. In a multivariate analysis chemotherapy and lymphatic node involvement significantly influenced survival in UICC stages III and IV. In selected, resected patients with ihCC chemotherapy may improve survival. However, a prospective, randomized trial is necessary to fully evaluate the role of adjuvant therapy.

Utility of Dynamic Computed Tomography in Diagnosis of Small Hepatocellular Carcinoma: Comparison with Computed Tomography During Angiography

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AIM: Computed tomography during angiography (angio CT) is usually performed for final imaging diagnosis of small hepatocellular carcinoma (HCC) because of its specificity and detectability. However, angio CT is expensive and requires time and an experienced radiologist. We studied the specificity of and detectability of dynamic CT of small HCC, and compared the utility of dynamic CT with that of angio CT. MATERIALS AND METHODS: We obtained 97 small HCCs (<3 cm in diameter) surgically or by needle biopsy. Preoperatively, we explained the HCCs on dynamic CT (early and late phase), and 93 (23.7 vs 7.23 months, p = 0.044). In a multivariate analysis chemotherapy and lymphatic node involvement significantly influenced survival in UICC stages III and IV. In selected, resected patients with ihCC chemotherapy may improve survival. However, a prospective, randomized trial is necessary to fully evaluate the role of adjuvant therapy.

1188

Multimodal Approach for More than Three Liver Metastases from Colorectal Cancer

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BACKGROUND: Patients with more than 3 liver metastases (LM) from colorectal cancer classically have a poor prognosis and surgical approaches are rare. Multimodal approach could improve prognosis. The aim of this study was to assess the results of multimodal therapy in patients with more than 3 LM from colorectal cancer. PATIENTS AND METHODS: Medical charts of 33 patients were retrospectively reviewed. Multimodal therapy included neoadjuvant and adjuvant chemotherapy, portal vein embolization, surgical resection and radiofrequency thermoablation (RT). RESULTS: Mean age was 62 years (30-70). Mean number of LM treated was 6 (4-12). 30 patients (90.9%) received neoadjuvant chemotherapy with significant response (>50%) on tumoral size in 16 cases (48.8%). Surgical procedures were 23 major and 5 minor liver resections. No-anatomic resection and R1 were performed respectively on 46 and 50 metastases. Operative mortality and morbidity were respectively 3% (n = 1) and 45% (n = 15). Median overall survival was 39 months. Actuarial overall 3-year survival was 33.4%. 23 patients (70%) developed recurrences in a median time of 18 months. Actuarial 3-year disease-free survival (DFS) was 9.8%. DFS was significantly different when resection margin was ≥5 mm (83%) or ≤2 mm (11.5%). Recurrence rate was correlated with postoperative morbidity. CONCLUSIONS: Multimodal therapy in patients with more than 3 liver metastases (LM) from colorectal cancer allows prolonged survival. However, DFS remains extremely poor in our experience.

1191

Current Difficulties with the Most Widely Used Staging Systems for Hepatocellular Carcinoma

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Hepatocellular carcinoma (HCC) one of the commonest cancers and was the fourth leading cause of cancer death in 1998. There has been an increase in the incidence of HCC in both Europe and North America with the highest incidence in hepatis endemic areas. However, to date there has not been a reliable prognostic scoring system. Since 1943 when the TNM (Tumour, Lymph Node and Distant Metastasis) was developed, there have been many staging/prognostic systems developed. The first step included looking at the tumor factor only, e.g. TNM, Liver Cancer Study Group of Japan (LCSGJ) and AJCC. However, in 1985 Okuda et al noticed that the liver status is an important contributing factor and introduced it in their prognostic scoring system, which was known later as the Okuda Staging System. Following that, multiple systems like the CLIPP, and JS and other scoring systems have been developed. All of these systems looked at both tumor and liver status, with each demonstrating an excellent prediction of prognosis. However, an important factor as demonstrated is the liver status/carcinoma, this was different in each study and was mainly limited to the ethnic group or population where the study was done. It has been shown that the natural history of HCC is different from North
America to China and/or Japan, with each having their main cause of liver cirrhosis. Latter in 1999, the French and the Barcelona scoring systems were published. Both of these systems looked into another unnoticed important factor that was not alluded to before, the PPS (Patient Performance Score) or the patient status. This was the third important factor that has been demonstrated to play a major part in the prognosis of patients with HCC, as an asymptomatic incidental finding has a better prognosis than patients with multiple co-morbid factors. However, each of these scoring systems had other problems (mainly the cause of liver cirrhosis). We propose a multi-centre database for HCC governed by the IHPBA, to develop an international prognostic scoring system as a common language between all physicians worldwide. This system will lead to a better estimation of the prognosis of HCC, better determination of treatment strategies and a more effective means of description. This database will look into variable ethnic groups, multiple causes of liver cirrhosis and different patient statuses from all over the globe.

1192 NOSOCOMIAL INFECTION AND MICROBIOLOGY IN PATIENTS WITH HEPATIC-PANCREATIC-BILIARY CANCER
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BACKGROUND: Nosocomial infections (NI) constitute an important problem in public health care. NI are an important cause of hospital morbidity and mortality, causing important social and economic costs. It is well known that there are differences between microorganisms at different hospitals or in different areas in the same hospital. AIM: To know the NI and microorganisms of NI occurring during 1 year in hepato-pancreatico-biliary neoplastic patients. MATERIALS AND METHODS: The patients included in the study were those entered or transferred, programmed or urgent, from other units to the hepato-pancreatico-biliary (HPB) surgery unit during 1 year. Infection was considered according to the CDC approaches. We counted daily during 1 year: dates of entrance, discharge, surgical intervention, ASA, intrinsic and extrinsic risk factors, nosocomial infections, microbiology, reoperations. HPB neoplastic patients were selected. RESULTS: 468 patients were analysed for a period of 1 year. The mean age was 59.78 years and 12.45% were >80 years old. Surgery in 53.68% was clean-contaminated. There were 112 NI in 69 patients, which supposed a rate of accumulated infection of 23.93%. The most frequent NI was surgical infection (SI) (45.54%) and inside the same ones the surgical of organ or space (45.10%). Overall, bivariant analysis was statistically significant (p < 0.002) between NI and HBPC cancer. There were 44 HPB neoplasias: 12 hepatic, 26 pancreatic and 6 biliary neoplasias. 39.14% of surgical infections, 31.25% of bacteremias, 23.53% of pneumonias and 15.38% of urinary tract infections were in those patients (9.42% of overall). 41 microbiological isolations were obtained. The most frequently isolated microorganism was MRSA (methillin-resistant Staphylococcus aureus; 24.40%), after Escherichia coli (12.19%) and Acinetobacter baumannii (7.31%). 56.1% of the SI was caused by gram-positive cocci. Sensitive/ resistant cephalosporins (see Table below). CONCLUSION: The rate of incidence of infections in HPB neoplastic patients is elevated in comparison with other HPB surgical patients. It is appreciated high rates of MRSA without an outbreak of this microorganism. This could rebound in the current empirical antibiotic policy of the unit, although the appropriate prevention was a statistically significant protective factor.

1193 RUPTURED HEPATOCELLULAR CARCINOMA – A MAINLY CONSERVATIVE MANAGEMENT HAS IMPROVED SURVIVAL
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BACKGROUND: Hepatocellular carcinoma (HCC) presents itself as spontaneous rupture in 3–14.5% of cases as reported in different series from around the world. The exact mechanism of tumor rupture is unknown, however, the mechanisms implicated are outflow venous occlusion by tumor thrombus leading to increased intratumoral pressure, tumor necrosis, subcapsular tumor location, portal hypertension and coagulopathy. There has been a shift in management of patients presenting with ruptured HCC from mainly a surgical approach to a more conservative approach with improved results. METHODS: A retrospective analysis of data of all patients admitted between April 1999 and April 2002 to our unit with diagnosis of ruptured HCC during the study period. 24/37 (64.8%) patients had known HCC at presentation and 13/37 (35.1%) patients had unknown HCC at presentation and this was the first presentation for their HCC. All patients had underlying cirrhosis because of hepatitis B (29), hepatitis B + C (1), hepatitis B + alcohol (5) and alcohol (5). 94.5% patients had pain as their present symptom, 70% had abdominal distension, 64% had anemia on presentation and 51% patients presented with shock. 31 (83.7%) patients were managed conservatively and only 6 (16.2%) patients were subjected to a laparotomy of which only 2 had a liver resection and the rest had a haemostatic procedure only. 23 (62%) patients required blood transfusion as a part of their management. 10/31 (32.5%) patients had embolisation of their bleeding vessels, of which 9 were selective and 1 was non-selective. The non-selective embolisation lea to liver failure, however, the patient recovered. Of the 9 selective embolisations, 2 patients had liver failure as a complication resulting in the death of one. Of the conservatively managed 31 patients 4 patients went on to surgery later for definitive management of their HCC, with 2 receiving curative resections and 2 only palliative resections. The overall inpatient mortality in this group of patients was 16.2% with no mortality in the operative group. CONCLUSION: With a lower in-hospital mortality and a survival of 83.7% achieved in this group of patients as compared with 49% as reported previously from our unit, there seems to be a better prognosis. This has been achieved by a more conservative approach of management as reported previously from our unit.

1194 EFFECTS OF RADIOFREQUENCY ABLATION (RFA) ON LONG-TERM SURVIVAL IN PATIENTS WITH UNRESECTABLE LIVER TUMOURS
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AIM: To study the effects of radiofrequency ablation (RFA) on long-term survival in patients with unresectable liver tumour. METHODS: A prospective study was carried out in which 62 patients with unresectable liver tumours were treated with RFA as well as systemic or regional chemotherapy if indicated. Patients were followed up in a dedicated ‘RFA clinic’. Surgical resection was carried out if RFA failed to downstage the disease. RESULTS: 64 patients underwent RFA. Median follow up was 18 months (4–54 months). There were 42 men and 20 women. Median age was 65 years (range 40–94). 35 patients had colorectal liver metastasis (CRM) (n = 35, 55%). 22 had hepatocellular cancer (HCC). There were 132 tumours treated by 102 ‘ablation episodes’. The median size of the tumours ablated was 3 cm (range 1–5 cm, mean 3.12 cm). There were 10 lesions >5 cm in size. 67 ablations were ultrasound (US)-guided, 27 were open, 7 were laparoscopic and 1 procedure was carried out under CT guidance. Using US, 1–3 lesions (mean 1.01) were treated at one sitting, while at laparotomy 1–9 (mean 2.03) lesions were treated at one time (p = 0.001). With respect to size, US treated lesions of 1–5 cm (mean 3 cm) and open ablation treated tumours of 3–8 cm, with a mean of 5 cm (p = 0.001). 64% of patients were alive at mean follow-up of 20.1 months. There was no survival difference between primary liver tumours and colorectal liver metastasis (CRM). There was no survival difference between patients

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treated with single or multiple ablations. 86% of HCC and 72% of CRM had other form of therapy. With a mean follow-up of 20.1 months (range 4–54 months), 25 had stable disease (no evidence of disease progression in 6 months on CT or MRI, 19 had progressive disease and 20 were dead at the time of last follow-up. Ten (15.6%) patients had complication. Two patients died as a result of procedure related to RFA. CONCLUSION: RFA of liver tumours is a safe and effective treatment in selected groups of patients. RFA should be combined with other treatment modalities like systemic chemotherapy and transarterial chemo-embolisation (TACE) to increase its effectiveness. The aim of the treatment should be complete ablation of the tumour either by single or serial ablations, as the long-term survival will not differ if the complete ablation is achieved. To allow RFA to be used to its full potential randomised controlled trials are urgently needed.

1195 LAPAROSCOPIC LARGE VOLUME MICROWAVE TISSUE ABLATION (MTA) OF LIVER TUMOURS
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BACKGROUND: Tissue ablation is becoming an established modality for the treatment of solid tumours, particularly in the liver. Greater acceptance of these techniques will be achieved when safe and effective ablations can be performed rapidly in a minimally invasive setting. METHODS: A novel MTA applicator has been developed which is capable of producing large volume ablations. Three patients underwent laparoscopic MTA for the treatment of a hepatic adenoma (n = 1), haemangiomata (n = 1) and metastasis from parathyroid carcinoma (n = 1). Cross-sectional imaging was used to identify these lesions pre-operatively, and their size and location were confirmed using intra-operative ultrasound (IOUS). A 5-mm MTA applicator, adapted for use laparoscopically, was positioned centrally within the tumour under IOUS guidance and ablated until a margin of clearance was achieved. Treatment was monitored with real-time IOUS imaging. Treatment efficacy, tumour recurrence, complications and survival were recorded. RESULTS: The mean age of patients was 42 years (range 30–53). Each patient had one tumour, which was ablated (mean tumour size 3.8 cm, range 3.8–4.9 cm). MTA treatment time ranged from 60 s to 180 s (mean 130 s) and was carried out with a single insertion of the probe. No further MTA treatment was required in any of the patients. Mean follow-up time was 7 months (range 3–12). Postoperative imaging revealed complete tumour destruction with no evidence of recurrence, and all 3 patients remain asymptomatic and disease-free. There were no immediate or long-term complications arising from the MTA treatment. Mean hospital stay was 36 h (range 24–48). CONCLUSIONS: Large volume MTA represents significant advancement in the treatment of benign and malignant liver tumours. Results from these patients suggest that the use of this novel microwave equipment laparoscopically combines the benefits of a minimally invasive approach without compromising the efficacy of the ablation.

1196 SURGICAL WOUND RECURRENCE OF HEPATOCELLULAR CARCINOMA
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Intrahepatic recurrence after surgical resection of hepatocellular carcinoma (HCC) occurs commonly. However, recurrence at the surgical wound is rare, with only 2 cases reported previously. In this report, we describe a case of surgical wound recurrence after resection of HCC. The patient is a 59-year-old Chinese man with hepatitis B and a long history of alcohol consumption. Segmental resection of a HCC at segment VII/VIII was performed through an extended right subcostal incision. During resection, the tumour was found to be abutting the middle hepatic vein and it was dissected off the middle hepatic vein at this point so as to ensure adequate remnant liver function. On follow-up imaging 15 months post-resection, he was found to have multifocal intrahepatic recurrence. In addition there was a mass within the right rectus abdominis muscle at the previous surgical wound. Wide excision of the abdominal wall tumor was performed and the resultant defect was repaired with a prolene mesh. Postoperative recovery was uneventful. Histology confirmed a 5 × 3 × 2.5 cm HCC at the abdominal wall with clear resection margin. The intrahepatic tumor recurrence was subsequently treated with transarterial chemo-embolisation. The patient remains alive 9 months after resection of the surgical wound recurrence. This is the first wound recurrence after about 260 HCC resections in our unit. As surgical wound recurrence after HCC resection is rare, it is not possible to define the risk factors. In our patient, exposure of the tumor where it was dissected off the middle hepatic vein had likely contributed to the surgical wound recurrence. As its occurrence is unpredictable, we should monitor all patients during follow-up for its development, especially in the first 2 years after resection of the primary tumor, when most wound recurrence is expected to occur. Management usually entails local excision with mesh repair if the resultant defect is large.

1197 THE CURATIVE RESECTIONS FOR KLATSKIN TUMORS
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AIM/BACKGROUND: To justify an aggressive surgical approach in the management of Klatskin tumors (hilary cholangiocarcinomas). METHODS: In a series of 166 patients with Klatskin tumors curative resections were performed in 81 (48.8%) patients. 85 (51.2%) underwent palliative procedures, including percutaneous and operative biliary drainage, percutaneous and endoscopic stent placement and limited non-curative bile duct resection. The contraindications for curative surgical therapy were as follows: poor general condition, tumor dissemination, bilateral vascular and segmental bile duct invasion. A percutaneous biliary drainage was an obligatory preconditioning for the curative resections. 46 patients with Bismuth type I and II tumors underwent common bile duct, hepatic duct and biliary confluence curative resections with hepatic lymph node dissection. 7 right and 25 left hepatectomies were performed in patients with Bismuth type IIIA and Bismuth type IIIB tumors, respectively. Hepatectomies extended to the first segment in 5 cases. RESULTS: Operative mortality was 12.3% for curative and 32.9% for palliative procedures. In the group of curatively treated patients, 5 of 46 died after bile duct resections and 5 of 35 after bile duct resections accompanied by hepatectomies. 1-3- and 5-year survival rates after curative procedures were 92.4%, 50.2% and 15.0%, respectively. Median survival time after palliative procedures was only 7.7 months. CONCLUSION: A comparative analysis of the curative and the palliative procedures demonstrates the necessity of an aggressive approach for Klatskin tumor therapy.

1198 HEPATOCELLULAR CARCINOMA IN NON-CIRRHOTIC LIVER: PROGNOSTIC FACTORS AFTER CURATIVE RESECTION
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The aim of this study was to investigate the prognostic factors for hepatocellular carcinoma (HCC) in patients without cirrhosis who underwent curative hepatectomy. We reviewed 49 patients (median age 67 ± 2 years) with non-cirrhotic liver between 1996 and 2001. Data were collected prospectively. We determined their surgical mortality and the disease-free and overall cumulative survival rates. Postoperative histology confirmed no cirrhosis in all cases but F2 or F3 fibrosis in 38.8% of the cases. Surgical procedure consisted of major hepatectomy (three segments or more) in 59% of the cases. 15 patients (30.6%) received adjuvant intra-arterial lipiodol-iodine-131 (Lipiodil®). Peroperative mortality was 6%. Biliary complications were 8%. The 1-, 3- and 5-year disease-free and overall cumulative survival rates were 76%, 50%, 35% and 80%, 60%, 42%, respectively. By univariate analysis, recurrent tumor recurrence, multiple tumor nodules, macroscopic vein invasion affected the survival and increased recurrence. By Cox regression, only multiple tumors and tumor size >6 cm were independent prognostic factors. Neither adjuvant Lipiodil® nor fibrosis influenced survival and recurrence. Curative resection for HCCs in non-cirrhotic liver leads to a high survival rate for single tumor, for tumors <8 cm and tumors without vascular invasion.

1199 LIVER RESECTION FOR COLORECTAL METASTASES IN A SMALL VOLUME HOSPITAL IN WESTERN NORWAY
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BACKGROUND: Colorectal liver metastases are the commonest indication for liver resection in our country and this is concentrated to a few regional hospitals. The number of hepatic resections is small compared with larger units abroad. It has been indicated that large volume units may achieve superior results compared with smaller units. Still, surgery has been offered to all our patients whenever the possibility of radical resection was
present. Our aim was to present the results from a non-referral, small volume, but dedicated unit when done by a single surgeon. METHODS: 30 patients (15 men) were resected by the first author during a 5-year period from 1997 to 2003, median age 64 years (range 29–78). The colorectal tumors were Dukes stage A (n = 1), B (n = 10) or C (n = 19) and 22 (73%) were located in the rectum or the sigmoid colon. Two patients had synchronous colorectal and hepatic surgery. Hepatic surgery followed the primary, colorectal operation within 1 year in 19 other patients (70%). 6 patients (17%) were only explored because of undetected, peritoneal metastases (n = 5) or unresectable nodes in the hepatoduodenal ligament (n = 1). RESULTS: A J-shaped incision was used. Sequential Pringle's manoeuvre was used in 26 patients (87%). Resections were right hemihepatectomy or equivalent in 9 patients (30%). Mean blood loss was estimated as 2115 ml (range 200–7220 ml) and 4 (30%) were transfused a mean 930 ml (range 250–2100). The average number of metastases was 3 (range 1–7) and the disease was bilateral in 14 patients (47%). The resection margin was clear in all instances. A 77-year-old man (3%) died of MOF after right hemihepatectomy. Morbidity was encountered in 8 other patients (27%) of whom 1 had a suspected bile leak. 4 patients have later been treated for a different malignancy. First metastases in 19 patients were detected in the liver (n = 10), liver and lung (n = 4), lung (n = 1) or multiple or other sites (n = 4) of which one included the liver. 6 patients (20%) had had resections for recurrences, one of these is also awaiting lung surgery. Follow-up has been median 35 months (range 6–74) in 18 surviving patients (NE = 11). The 3- and 5-year survival rate was calculated as 72% and 44%, respectively. CONCLUSION: Although our unit has treated a small number of patients compared with specialized units elsewhere, the survival rate was comparable. However, 50% have cured liver disease. Maybe adjuvant treatment as well as the impact of different liver resections, wedge or segmentectomy versus hemihepatectomy, should be addressed in a larger, prospective setting.

1201 PREOPERATIVE SYSTEMIC CHEMOTHERAPY DOES NOT ALTER POSTOPERATIVE OUTCOME AFTER LIVER RESECTION FOR COLORECTAL METASTASES

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BACKGROUND: Most patients who underwent liver resection (LR) for colorectal metastases (CM) received previous chemotherapy (CT). The aim of this retrospective study was to assess postoperative mortality, morbidity, liver function and pathologic examination of resected specimen in patients who underwent LR for CM after chemotherapy in a 6-year mono-institutional experience. PATIENTS AND METHODS: Medical charts of 210 patients who underwent LR for CM between January 1996 and December 2001 were retrospectively reviewed. We excluded patients who received a combined treatment (radiofrequency thermal ablation and liver surgery), or underwent concurrent colorectal surgery. Group I included 25 patients who received adjuvant chemotherapy 12 months before LR, or never received chemotherapy. Group II included 15 patients who received chemotherapy 3 months before LR. RESULTS: Postoperative mortality was respectively 1% in group I and 6.6% (1/15) in group II. Surgical postoperative morbidity (abscesses and biliary fistula) was similar in the two groups (16% vs 13%). Pulmonary complications were similar in the two groups (32% vs 33%). The mean length of stay in the hospital was similar in the two groups (19 vs 14). Changes of liver function test on days 1, 3, 5, 7, 8 were similar in the two groups. Inflammation, steatosis, fibrosis, necrosis and cholestasis rates in resected specimen were similar in the two groups. CONCLUSIONS: Systemic CT received preoperatively by patients who undergo LR for CM appears to have a limited impact on postoperative mortality and morbidity. Pathologic changes induced by preoperative CT are limited and do not alter postoperative liver function significantly.

1202 INTRAHEPATIC CHOLANGIOCARCINOMA MIMICKING HAEMANGIOMA ON CT SCAN: A NOTE FOR CAUTION

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INTRODUCTION: Haemangioma is the commonest benign lesion of liver. With increasing use of ultrasound (USG) and CT scan for patients with non-specific abdominal symptoms, more and more liver haemangio-mata are diagnosed as incidental findings. Such lesions are usually regarded as benign and no further action is taken. A safer policy is to monitor the lesion with repeated scans. Here we report two cases of ‘typical liver haemangioma’ on CT scan which eventually turned out to be cholangiocarcinoma. CASE 1: A 68-year-old lady was found to have a 3-cm hypechoic lesion in the right lobe on USG during a routine body check. On CT scan, the lesion showed peripheral nodular enhancement on early arterial phase and complete fill-in upon 5 minutes delay. It was described as a typical haemangioma. All blood tests including liver function, tumor markers and hepatitis serology were normal. Serial USG and CT scans were done to follow up the lesion. The lesion was noted to increase progressively to 7 cm over a 3-year period. Although it was still suggestive of haemangioma, operation was offered as malignancy could not be excluded. A solid tumor was found on laparotomy and trisegmentectomy was performed. The patient recovered uneventfully. Pathology revealed cholangiocarcinoma. CASE 2: A 67-year-old man presented with left loin pain. An 8-mm left renal stone was found on USG. Incidentally a 4-cm left lobe liver ‘haemangioma’ was noted. The lesion had peripheral nodular enhancement with centripetal filling up of contrast in delay film on CT scan. These features were suggestive of a typical haemangioma. All blood tests were again normal. As the lesion progressively increased in size to 8 cm on USG within 1.5 years, CT scan was done. It revealed that the lesion had replaced the whole left liver with satellite lesions on the right side. USG-guided biopsy of the left liver lesion confirmed cholangiocarcinoma. The patient was treated conservatively in view of the advanced disease. DISCUSSION: Cholangiocarcinoma can mimic haemangioma on USG and CT scan. One review showed that thin contrast enhancement was present in 60% of intrahepatic cholangiocarcinoma, which can be interpreted as the characteristic feature of haemangioma, especially if there is no associated intrahepatic duct dilatation or liver capsule retraction. Thus one must be aware of the limitations of USG and CT in diagnosing liver haemangioma. The policy of serial scanning is not without pitfalls. We recommend follow-up scan every 3 months for at least 1 or 2 years in order to exclude some slow-growing malignant tumors. In case of doubt, other imaging modalities like red cell scans, magnetic resonance imaging or biopsy of the lesion should be considered.
1203 EXPERIMENTAL STUDY TO COMPARE THE EFFECTS OF RADIOFREQUENCY ABLATION ON CIRRHOTIC AND NORMAL HUMAN LIVER PARENCHYMA USING VITAL STAINS AND HISTOLOGY IN AN IN-VIVO MODEL
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AIM: To determine the infarct size and histological changes in cirrhotic and normal human liver parenchyma after radiofrequency ablation (RFA).
METHODS: RFA was carried out on the normal liver parenchyma for 10 minutes in resected specimen after liver resection for primary or secondary tumour. With identical settings on RFA generator ablation was carried out for 10 minutes on explant cirrhotic livers. Ablations were done when the liver specimen was resected out from the body, using a two-bowl technique. Ablated liver specimen was stained with 2,3,5-triphenyl tetrazolium chloride (TTC) and lesions were photographed. Size of the necrotic zone was calculated using callipers and planimetry. Light microscopic studies of the ablated lesions were carried out after staining with haematoxylin and eosin. RESULTS: The lesions created in the cirrhotic liver were bigger in size than the lesions in normal liver. On histological examination there was evidence of necrosis in the ablated area without any evidence of non-ablated liver cells within the perimeter of macroscopic necrotic zone. There was sharp demarcation between necrotic liver tissue and non-necrotic liver parenchyma. Staining with TTC demonstrated an area of white to grey tissue suggestive of infarction surrounded by a narrow circumferential zone of tissue which stained pink and which merged into brightly red stained tissue of non-necrotic liver parenchyma. CONCLUSION: Radiofrequency ablation produces significantly larger lesions in non-perfused cirrhotic liver compared with normal non-perfused liver parenchyma. Vital stain like TTC helps in demonstrating necrotic area so that exact size of ablated area can be calculated for experimental studies. There is a zone of tissue surrounding necrotic ablated tissue 'marginal zone' which is not completely necrotic but is distinct from viable liver tissue. This zone may represent an area of thermally injured hepatocytes. Further study of marginal zone using cell viability markers and looking for apoptosis and HSP70 expression is awaited

1204 LONG-TERM SURVIVORS AFTER SURGERY FOR INTRAHEPATIC CHOLANGIOCARCINOMA
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BACKGROUND: The background of long-term survivors after surgery for intrahepatic cholangiocarcinoma (ICC) have not been confirmed in a large series at a single institution. METHODS: We reviewed the surgical outcomes in ICC patients and investigated the backgrounds of long-term survivors. RESULTS: From 1980 to 1998, 100 patients with ICC underwent surgical resection at our institution. Of these, 42 patients underwent curative surgery and 41 patients had lymph node metastasis, and 21 patients were well 5 years after surgery. All of these underwent curative surgery and only one had lymph node metastasis. Seven of the 21 patients had recurrence; however, the time of recurrence was later than 3 years after surgery. Recurrences in three patients were intrahepatic growth type ICC and two of them underwent re-hepatectomy. CONCLUSION: Long-term survivors were curative surgical patients without lymph node metastasis and some of them had undergone surgery for recurrence.

1205 A CASE OF TRUE 'CARCINOSARCOMA' OF THE LIVER - NOVEL HISTOLOGICAL AND IMMUNOHISTOCHEMICAL FEATURES OF A HEPATOCELLULAR CARCINOMA WITH OSTEOSARCOMATOUS COMPONENT
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We herein describe a rare case of true carcinosarcoma with the components of hepatocellular carcinoma, osteosarcoma and spindle cell sarcoma, and also its interesting features of histology and immunohistochemical staining. Abdominal ultrasound examination, performed for liver dysfunction, revealed a heterogeneous lesion with thin halo in the liver of a 54-year-old man with alcoholic cirrhosis. The plasma alpha-fetoprotein and PIVKA-II levels were elevated and hepatitis B antigen and antibodies, and hepatitis C antibody were all negative. The lesion was enhanced heterogeneously with contrast in the arterial phase of the abdominal computed tomography examination. The patient underwent anterior sector resection of the liver. He was discharged at 45 postoperative days after a single intra-arterial chemotherapy through the proper hepatic artery and is well without any signs of recurrence 1 year after the operation. Histologically, the tumor was hepatocellular carcinoma with the mixture of moderately and poorly differentiated components in the main portion. There were also spindle cell-type sarcomatous component in the poorly differentiated parts and osteosarcomatous component with the osteoid matrix in the area where the moderately differentiated hepatocellular carcinoma cells intermingled with undifferentiated to sarcomatous cells. Decreasing vascularity was observed in the spindle cell-type sarcomatous area, but not in the osteosarcomatous area. Immunohistochemically, anti-s-100 protein staining showed positivity only on the cells surrounding or embedded in the osteoid matrix. Anti-cytokeratin staining with a rabbit polyclonal antibody showed positivity only on the hepatocellular carcinoma cells, which was intermingled with the osteosarcomatous cells, not on the other hepatocellular carcinoma cells. There are several attractive hypotheses in this present case. The HCC cells intermingled in the area might have worked on the differential changes, such as, through releasing paracrine substances. It could also be possible that the special circumstances of the area, the coexistence of different cell populations and/or the increasing change of blood flow compared with the area of only spindle cells caused the differential changes.

1206 OUTCOME OF SURGICAL TREATMENT FOR HEPATOCELLULAR CARCINOMA ORIGINATING IN THE CAUDATE LOBE
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BACKGROUND: The prognosis of hepatocellular carcinoma originating in or mainly involving the caudate lobe (caudate HCC) is generally poor. We reviewed the clinicopathologic findings of patients who underwent liver resection of caudate HCC and correlated the outcome with the surgical method. METHODS: We reviewed 418 patients who underwent liver resection for HCC. The patients were divided into two groups. One group consisted of 16 patients who underwent liver resection for caudate HCC. The other group included 402 patients with HCC in a site other than the caudate lobe. We compared the following clinicopathologic features: age, gender, vital hepatitis status, Child-Pugh's classification, stage of HCC (UKCC), grade of differentiation, size, solitary versus multiple disease, microscopic portal infiltration, operative method, time of operation, intraoperative blood loss, postoperative complications, operative death, and outcome of surgical treatment. RESULTS: Anatomic resection of Couinaud segment I or IX (a partial caudate lobectomy), conforming to portal anatomy, was performed in 14 patients with caudate HCC, and segmentectomies of segments I and IX (a total caudate lobectomy) were performed in 2 patients with caudate HCC. The age of the patients, gender, hepatitis status, Child-Pugh's classification, stage of HCC, grade of differentiation, tumor size, solitary versus multiple disease, portal infiltration, operative method, time of operation, intraoperative blood loss were similar in the caudate HCC group and HCC in other sites group. The incidence of postoperative complications was similar in the two groups, with no operative deaths in the caudate HCC group. Tumor-free survival and cumulative survival were similar in the two groups. However, among patients with caudate HCC, tumor-free and cumulative survival were lower in patients with than without microscopic portal venous involvement (p < 0.01), and among patients with microscopic portal infiltration of HCC, tumor-free and cumulative survival were lower in the caudate HCC group and HCC in other sites group (p < 0.01 and p < 0.05). CONCLUSION: Partial caudate lobectomy along the portal system is an appropriate procedure for caudate HCC, especially in patients with injured liver function or a small HCC. Patients with caudate HCC having microscopic portal venous involvement would require additional adjuvant therapy because of early recurrence.
1207 SURGICAL TREATMENT FOR HEPATOCELLULAR CARCINOMA WITH TUMOR INVOLVING THE INFERIOR VENA CAVA
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PURPOSE: The significance of hepatic resection for hepatocellular carcinoma (HCC) with tumor invasion to inferior vena cava (IVC) is clarified. MATERIALS AND METHODS: We operated on 3 patients with HCC who had a tumor extending to the IVC (1 with thrombus into IVC, 2 with direct invasion). In these patients, the hepatic resections (2 right hemihepatectomy, 1 extended left hemihepatectomy) and IVC excision (2 with patch repair, 1 primary repair) were successful performed. RESULTS: Total vascular occlusion without venous bypass was performed for IVC repair (with artificial venous patch) and times of IVC clamping were 25 and 28 minutes. The blood loss was 1500 and 3000 ml, respectively. During follow-up, one patient died of liver and brain metastasis 8 months later and the others are still alive (one of them survived more than 3 years after operation). CONCLUSION: The procedure of major hepatectomy and excision of the IVC lesion for HCC with tumor involving the IVC is acceptable treatment as it is safe. It is considered that better prognosis can be achieved when the lesion can be removed en bloc.

1208 SPECTRUM OF LIVER SOLS IN 100 CONSECUTIVE PATIENTS AT A TERTIARY REFERRAL CENTRE
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INTRODUCTION: The spectrum of liver tumours seen in our country is varied. The type of tumours seen by a particular centre depends upon the level of expertise in the treatment of these tumours as well as the referral pattern and may not necessarily reflect the true incidence of the type of tumours prevalent in that region or country. The aim of this study is to retrospectively analyse the spectrum of the liver tumours seen by a single specialized surgical unit over a period of 3 years. PATIENTS AND RESULTS: Most of the liver SOLs seen at our centre were malignant lesions (~68%), whereas benign lesions were few (~24%) and 50% of these were hemangiomas with very few amoebic abscesses or hydatids. Of these malignant lesions, primary tumours viz., HCC, cholangiocarcinomas, hepatoblastomas, primary neuroendocrine tumours, etc. constituted about 70% of the malignant tumours, whereas metastatic lesions were ~30%. Most of the metastases were from the gallbladder and carcinoids, with very few colorectal metastases. Major liver resections were performed mainly for malignant lesions and were in the form of either bi- or tri-segmentectomies. Only 7 patients with benign lesions who were symptomatic underwent resectional surgery of the liver. The overall morbidity of the resectional surgery was ~12% and took the form of localized biliary leaks, early liver cell failure, wound infection and pulmonary complications, all of which were managed conservatively. There were 2 postoperative deaths, giving us a mortality of ~5% comparable to world standards. CONCLUSION: We observed that most of the benign lesions are now dealt with by either medical gastroenterologists or by surgeons in general hospitals, which explains less numbers of benign cases being referred. Also, without doubt, it is the referral pattern that decides the spectrum of SOLs seen by a specialty unit and it is the awareness/willingness among the medical gastroenterologists for surgical management of liver tumours that limits their curative resection in large numbers in our country.

1209 RADIOFREQUENCY ABLATION IN LIVER TUMOURS: OUR EXPERIENCE
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BACKGROUND AND AIMS: To demonstrate our experience in the treatment of focal liver lesions by using radiofrequency ablation (RFA) with cool-tip electrode as a valid alternative option for patients suffering from liver tumours, who are not eligible for liver surgery. MATERIALS AND METHODS: From July 1999 to October 2003, 30 patients, 16 males and 14 females, age range 63–83 years (median 70.5), who were suffering from hepatocellular carcinoma (HCC, n = 15), cholangiocarcinoma (CC; n = 1), colorectal cancer focal liver lesions (CRC, n = 11), and breast cancer (BC, n = 3), underwent RFA. Percutaneous, laparoscopic or laparotomy approach was chosen where required. General anaesthetic was used for all patients. The average diameter of the lesions was 22–35 mm, except for one patient who suffered from a large HCC of 7 cm of diameter in the right lobe. This case required four RFA treatments, with a good result. We treated 57 lesions in total. All HCC patients were Child-Pugh B with acceptable blood coagulation test and liver function. No more than three focal liver lesions of 30 mm of diameter each, were treated per operation. RESULTS: Our results were as follows (after one treatment only and 12–18 months follow-up): necrosis rate in HCC, 93.5%; necrosis rate for CRC liver lesions, 82%; necrosis rate for BC liver lesions, 100%. No serious complications were noticed in our patients immediately after the treatment. One patient, died 2 weeks later after bowel perforation and sepsis, caused by the heat (percutaneous approach). Only 3.5% of recurrence after treatments has been observed (3 lesions). CONCLUSION: Based on the above experience, we deem RFA a valid repeatable procedure for focal liver lesion treatment, in patients who are not eligible for surgery, at low cost, with short hospital stay and satisfactory results.

1210 METHODS OF INTERVENTIONAL RADIOLOGY IN HEPATOBLASTIC CANCER COMPPLICATED BY OBSTRUCTIVE JAUNDICE
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AIM: To increase effectiveness of interventional radiological treatment in patients with hepatoblastic cancer complicated by obstructive jaundice. MATERIALS AND METHODS: Within the period of 1990–2002, percutaneous transhepatic biliary drainage (PTBD) was performed in 97 patients with primary and secondary hepatoblastic malignancies complicated by obstructive jaundice. For puncture of biliary ducts, fluoroscopic control (n = 21) or real-time ultrasound (US) (n = 68) were used. After successful PTBD patients received symptomatic treatment (n = 66), hepatic artery infusion or chemoembolization (10), radiotherapy and/or systemic chemotherapy (7), palliative (6) and radical surgery (2). RESULTS: Technical success rate of the procedure PTBD was 97%: 99.5% with US guidance versus 89.5% with fluoroscopic guidance. Complications and mortality rates were 11% and 1% after PTBD, respectively. Mean survival (M ± SD) was 3.6 ± 3.7 months for symptomatic therapy versus 9.2 ± 3.5 months for transcatheter therapy. CONCLUSION: PTBD under US guidance has significant advantage over the fluoroscopic technique in cases of malignant obstructive jaundice. Regional chemotherapy after successful PTBD (serum bilirubin <50 µmol/ L) is safe and effective palliative treatment for patients with primary and secondary liver malignancies complicated by obstructive jaundice. Hepatic artery infusion and chemoembolization make it possible to achieve the two- to three-fold increase of survival.

1211 INCREASED SURVIVAL IN PATIENTS WITH UNRESECTABLE COLORECTAL CARCINOMA LIVER METASTASES FOLLOWING SELECTIVE ARTERIAL BLOOD EMBOLIZATION
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INTRODUCTION: Patients with colorectal liver metastases now can benefit from a 40% 5-year survival following colonic and hepatic resection. However, patients with unresectable disease have a median survival of 6 months without therapy; new chemotherapeutic regimens have increased survival to 9 months in this category of patients. Chemoembolization therapy certainly is advantageous in hepatocellular carcinoma patients but failed to show clear benefits in patients with colorectal metastases. We report here the outcome of eight patients with unresectable colorectal liver metastases following selective bland hepatic artery embolization. METHOD: This is a retrospective review of all the patients who presented at our institution to the service of hepatobiliary surgery between January 2003 and December 2003, with colorectal hepatic metastases and unresectable disease and treated with selective hepatic artery bland embolization. RESULTS: Eight patients, all men, with unresectable colorectal liver metastases, with a mean age of 61, were treated in interventional radiology with selective hepatic artery embolization between January and December 2003. 3 patients were embolized only once, 3 were embolized 3 times and 2 patients had 4 embolizations. Of these, 3 are still alive. The mean survival is 11 ± 4 months (ranging from 7 to 22) from the time of colorectal liver metastases diagnosis and 23 ± 7 months (ranging from 11 to 34) from the
time of colorectal cancer diagnosis. All patients died in the hands of a palliative care service. No major complications were reported immediately afterembolization. CONCLUSION: We believe that hepatic artery selective bland embolization is a safe and efficacious recommendation for patients with unresectable hepatic metastases of colorectal origin. We think that this short study is encouraging and certainly suggests that patients with unresectable disease have a survival benefit with selective hepatic artery bland embolization.

1212 A NEW HEPATIC ARTERY INFUSION MODEL IN YUCATAN MINIPIGS

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BACKGROUND: Historically, the treatment of hepatic malignancies, both primary and metastatic, has been difficult. The role of hepatic artery infusion (HAI) has been controversial, and its use often has been empiric without the benefit of pharmacologic and toxicologic data because a suitable animal model that incorporates prolonged HAI has not been available. AIM: The goal of this study is to develop an HAI model using animals whose liver is anatomically, physiologically, and biochemically nearly identical to humans and to employ this model to evaluate hepatic toxicity for site-directed, high dose chemotherapy. In addition, the model can aid in determining the timing of a particular supplemental modality (ablative, resection, or chemotherapy) based on the recovery of liver function. METHODS: Minipigs with the Yucatan minipig model, a cytochrome P450 enzyme family with remarkable similarities to the human and microscopic and gross anatomy that also resembles the human liver (Anzenbacher 1998, Swindle 2000). A hepatic artery catheter was placed via the gastroduodenal artery (GDA) in eight pigs. Continuous infusion of the catheter was maintained for 1-4 weeks. Liver biopsies were done at the time of laparotomy for catheter placement and subsequently laparoscopi-
cally at various intervals. The liver was evaluated morphologically using light and transmission electron microscopy (TEM) and physiologically by measuring P450 activity. Serum liver function studies were performed at the time of liver biopsies. RESULTS: We were able to maintain an HAI catheter in the GDA for extended infusion periods to simulate human chemotherapy treatment protocols. Infusion of saline via HAI established baseline controls of TEM, light microscopy histology, and P450 activity levels. CONCLUSION: Our HAI animal model allows for evaluation of hepatic toxicity of various cytotoxic agents at the cellular, subcellular, and biochemical level. In addition, this model can be used to study multi-modality treatment, such as resection, ablation, or neoadjuvant chemotherapy, of hepatic malignancies, and how the temporal relation of these treatments affects hepatic function.

1213 HEPATIC ARTERIAL INFUSION CHEMOTHERAPY IN COLORECTAL LIVER METASTASES: EFFECT OF ARTERIAL ANATOMY ON IMPLANTABLE RESERVOIR PLACEMENT

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PURPOSE: To assess anatomic variants of the hepatic artery and to discuss the role of these variants for implantable reservoir placement and effectiveness of hepatic artery infusion. MATERIALS AND METHODS: Hepatic arteriograms of 1439 patients (1985-2002) were analysed according to Hauet (1994) classification. RESULTS: Six types of arterial anatomy were identified. Type 1, typical: The common hepatic artery (CHA) arose from the celiac artery, divided on the gastroduodenal artery (GDA) and the proper hepatic artery (PHA) with the left (LHA) and right (RHA) hepatic arteries = 67.6%. Type 2, left common trunk (LCT) or accessory LHA from the left gastric artery (LGA) = 16%. Type 3, right common trunk (RCT) or accessory RHA from the superior mesenteric artery (SMA) = 3.2%. Type 4, left common trunk (LCT) or accessory LHA from the SMA = 3.8%. Type 5, CHA from SMA = 1.5%. Type 6, other variants = 8.2%. CONCLUSION: Typical arterial anatomy of the liver occurs in about two-thirds of patients while different variants are present in the remaining one-third. Ablative hepatic arterial anatomy is associated with high rates of misperfusion, thrombosis of both the hepatic artery and infusion system if compared with typical anatomy. Knowledge of these variants is important for abdominal surgeons and interventional radiologists.

1214 LONG-TERM RESULTS OF TREATMENT OF HEPATOCELLULAR CARCINOMA IN A LOW INCIDENCE CENTER

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BACKGROUND: Hepatocellular carcinoma (HCC) has a high incidence worldwide—especially in Southeast Asia. In the western parts of the world HCC is much less frequent although it is the primary liver cancer with highest incidence. Most reports evaluating curative and palliative treatment modalities originates from Asia. However, it is far from clear that the experience achieved in such a center can be adopted effectively by others. HCC also in low frequency areas constitutes a clinical dilemma. Therefore, we wanted to report our experience with HCC from a referral center in a country with an expected yearly HCC incidence of only approximately 40 per million inhabitants. PATIENTS AND METHODS: 63 patients with microscopy-proven HCC were treated at our institution between January 1994 and June 2003; 24 were treated surgically and 38 by intra-arteral chemoembolisation (50 mg epirubicin (Adriamycin®, Pharmacia, Stockholm, Sweden) in lipidol (Hexabrix®, Guerbet, Aulnay-sous-Bois Cedex, France)). Patients unfit for major surgery or with unresectable tumors due to size of tumor or concomitant liver cirrhosis, without portal thrombosis and extrahepatic growth were selected for this treatment. All patients were followed according to a standardised protocol reviewed retrospectively. RESULTS: The median age of the surgically treated patients was 66 years (range 24-79; 38% women). 1 patient had more than one resection (a left hemihepatectomy at the primary operation followed 2 and 3 years later by non-anatomical resections). In total, 10 (42%) had less resections (7 right and 3 left hemipatectomies) while 13 had more limited resections (4 bisegmental, 7 one segment or non-anatomical resections). 1 patient had surgical exploration of the liver and intraoperative radiofrequency ablation of one single abnormal lesion. 1 patient died postoperatively due to liver insufficiency. The observed 3- and 5-year survival was 50% (9/18) and 55% (6/11), respectively. This survival rate is, thus, of the same magnitude as that found following resections for colorectal liver metastases. 39 patients with a median age of 70 years (range 51-86; 44% women) had intra-arterial chemoembolisation every 6th week during the first 6 months. If successful the treatment was continued with prolonged intervals. The median number of treatments per patient was 5 (range 1-15). There were no major complications. The observed 3- and 5-year survival rates were 19% (4/21) and 17% (3/18), respectively. CONCLUSION: Surgery, and for the inoperable patients chemoembolisation, are good treatment alternatives for patients with HCC.

1215 MIXED HEPATOCELLULAR CARCINOMA AND CHOLANGIOCARCINOMA IN A BREAST NEUROENDOCRINE CANCER PATIENT: A CASE REPORT

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Combined hepatocellular carcinoma and cholangiocellular carcinoma (H-CCC) is a rare tumor that accounts for 1.0-6.3% of primary liver cancers. The definition and classification of H-CCC remain unclear. In 1949, Allen and Lisa reported five cases of H-CCC-CCC and classified them by reference to (1) separate nodules of hepatocellular and bile duct carcinoma, (2) contiguity with mingling, and (3) intimate association due to origin from the same focus. In the classification by the World Health Organization (WHO), hCCC-CCC is defined as an area tumor with an intimate and unequivocal admixture of both hepatocellular carcinoma and cholangiocarcinoma cells. The histogenesis of H-CCC-CCC remains unclear. Kojito et al reported three hypotheses for the histogenesis of H-CCC-CCC: (1) double cancer; (2) development of either HCC or CCC first, with subsequent transformation of one of the other; and (3) development of cancer arises an intermediate between hepatocytes and bile-duct epithelial cells, and subsequent complete or incomplete differentiation into the two component. We present the first Korean case of H-CCC-CCC. A 61-year-old woman was admitted to our hospital because of breast cancer. Computed tomography showed a large mass in Cusinard segment 2 and 3 in the liver. CT-guided biopsy resulted in a diagnosis of cholangiocarcinoma. We did left lobectomy in cancer and modified radical mastectomy in right breast tumor. Histopathological diagnosis was mixed.
hepatocellular carcinoma and cholangiocellular carcinoma in liver specimen, neuroendocrine carcinoma of breast right. We have reported a rare form of combined carcinoma of the liver combined right neuroendocrine carcinoma.

**1216 RUPTURED PRIMARY NEUROENDOCRINE TUMOR OF LIVER IN A TEENAGER: A FATAL CASE REPORT**

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INTRODUCTION: Primary neuroendocrine carcinoma of the liver is exceedingly rare. We herein present a case of ruptured primary neuroendocrine tumour of liver in a teenager whose father died of hepatocellular carcinoma (HCC) 4 years ago. CASE REPORT: A 15-year-old boy presented with sudden severe abdominal pain and hypovolemic shock. Before that, he had gradual abdominal distension and right upper quadrant pain for 1 month. Physical examination revealed hepatomegaly with a tender and distended abdomen. Urgent CT scan showed two huge space-occupying lesions and multiple satellites lesions in both lobes of the liver with isoenportenoneum. Selective embolisation and operative haemostasis were attempted. The patient, however, developed coagulopathy, abdominal compartment syndrome, renal and respiratory failure. The patient died 4 days after presentation. Post-mortem revealed a rupture of IMA, and IVC. There were multiple lesions in the liver. Histological examination showed poorly differentiated carcinoma cells forming sheets and trabecula which exhibit marked nuclear hyperchromasia, pleomorphism and scanty indistinct cytoplasm. Staining for epithelial markers and neuroendocrine markers was positive. No alternative primary source was detected. This case is considered to be the first documented ruptured primary hepatic neuroendocrine tumour.

Discussion: Given the positive family history and the fact that ruptured HCC is a more common disease entity, the patient is initially managed as a case of ruptured HCC. The tumor pathology was only revealed at post-mortem examination. Neuroendocrine tumours commonly occur in gastrointestinal tract, pancreas and lung. Despite the fact that it is the most frequent site for metastasis, liver is rarely the primary site for neuroendocrine cancer in the English literature, there were only 47 reported cases of primary neuroendocrine tumour of liver, and most of them were classified as carcinoids. Most of the reported neuroendocrine carcinomas of liver were autopsy cases or cases who died soon after presentation. The majority of patients lived less than 4 years and there was no predilection. None of these patients presented with rupture. The present case is peculiar in that it occurs in a teenager and presents with rupture.

**1217 HEPATIC ARTERIAL INFUSION CHEMOTHERAPY FOR NON-RESECTABLE COLORECTAL LIVER METASTASES**

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BACKGROUND: Non-resectable multiple hepatic metastases are associated with poor prognosis for patients with colorectal cancer. Left untreated, such hepatic metastasis is fatal with a life expectancy usually measured in months. We tried to assess the efficacy of hepatic arterial 5-FU infusion chemotherapy (HAI) for patients with colorectal carcinoma who have undergone resection of primary tumor and have unresectable synchronous liver metastases. DESIGN: A retrospective single arm study.

SETTING: Academic medical center. METHODS: 20 patients who underwent resection of primary colorectal cancer and completed HAI (10 g of 5-FU or more) for non-resectable hepatic secondaries were studied. Eligible candidates who could not receive HAI because of failure in catheter-placement were analysed as a control group. Data were collected from the patient's medical record. The study end-points were response rate, time to progression and overall survival. RESULTS: The median follow-up period was 17 months. The tumor response was observed in 58.1% of patients receiving intra-arterial 5-FU treatment. The median time to disease progression was 12 months. The median survival time was 16 months (vs 7 months in control group). There were three actual 3-year survivors. The most common adverse effect was epigastralgia due to misperfusion. CONCLUSIONS: Although HAI for non-resectable colorectal liver metastases requires further investigation, it is an effective regional therapy and may contribute to the survival benefit of a small subset of the patients.

**1218 PRIMARY HEPATIC CARCINOID TUMOR OF THE LIVER**

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Primary hepatic carcinoid tumors (PHCTs) are extremely rare, and fewer than 50 cases have been reported in the English language literature. We report two cases of PHCT. Case 1. A 22-year-old male presented with with long-standing gastritis, upper GI dyspepsia and elevated S-gastrin levels. MRI revealed a large vascular SOL in the liver; the scan did not reveal any other lesion elsewhere in the abdomen. After an extended right hepatectomy his symptoms were completely alleviated and his S-gastrin levels returned to normal. He remains disease-free at a follow-up of 18 months. Case 2. A 45-year-old male presented with upper abdominal discomfort. CT scan revealed a large SOL in the liver and a FNA revealed a malignant carcinoid; he subsequently underwent a right hemi-hepatectomy. He did not exhibit any features suggestive of carcinoid syndrome. At follow-up at 8 months the patient is alive with presence of peritoneal dissemination. PHCTs usually have a good prognosis with a 68% 10 year survival after primary resection which should be the treatment of choice.

**1219 SUCCESSFUL LAPAROSCOPIC MICROWAVE TISSUE ABLATION OF A LARGE HEPATIC METASTASIS FROM PARATHYROID CARCINOMA**

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BACKGROUND: Hepatic metastases from a parathyroid carcinoma are rare. Excessive parathyroid hormone (PTH) production from the hepatic metastases may induce hypercalcaemia with potentially serious consequences. This presents a challenging therapeutic problem, as it is difficult to detect, treat and carries a poor prognosis. METHODS: A 43-year-old woman underwent surgical resection of a primary parathyroid carcinoma. The subsequent PTH and calcium levels failed to normalise and remained elevated despite extensive medical therapy. A gadolinium-enhanced MRI scan revealed a solitary lesion 4.5 cm in diameter in segment IV of the liver. This was confirmed as a functioning lesion following an iso- tope scan, and selective venous sampling from the hepatic veins revealed high levels of PTH. A novel microwave tissue ablation system pioneered at our institution was used to ablate the tumour laparoscopically. Using laparoscopic ultrasound, a 5-mm diameter laparoscopic microwave applicator was positioned centrally within the tumour, and treatment was monitored in real-time. Tumour destruction was considered complete when a 1-cm margin of ablation was achieved around the lesion. Microwave energy was applied for a total of 180 s, producing an ablation of 6.5 cm in diameter. Postoperatively, the efficacy of ablation was assessed using a combination of cross-sectional imaging, PTH and calcium levels. RESULTS: Following the parathyroid surgery, the adjusted calcium levels remained high at around 4.60 mmol/l (normal 2.10–2.60 mmol/l) and the PTH level was elevated at 105 pmol/l (normal 1.30–7.60 pmol/l). One day postoperatively the adjusted calcium level had fallen to 2.72 mmol/l and the PTH level to 7.01 pmol/l. At 7 days the serum calcium had fallen to 1.83 mmol/l, and the patient required oral calcium supplementation. The PTH levels had normalised to 5.10 pmol/l and the patient became asymptomatic. Subsequent MRI scans confirmed complete tumour destruction with no residual tumour or recurrence. CONCLUSIONS: The effective use of a novel laparoscopic microwave ablation system in the treatment of this rare metastatic disorder is described. Such ablative treatments may palliate and prolong life for a number of years by relieving the symptoms of hypercalcaemia and improving metabolic disturbances. This ablation equipment may be useful in the treatment of other symptomatic solid organ tumours.

**1220 MANAGEMENT OF HEPATIC METASTASES FROM COLORECTAL CANCER: MULTI-INSTITUTIONAL EXPERIENCE**

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PURPOSE: The purpose of this study was to assess the experience with the management of hepatic metastases from colorectal cancer in the two major cancer hospitals in our state. METHODS: We studied a total of 188 patients with hepatic metastases from colorectal cancer managed by
surgical methods at one of our two hospitals between 1983 and 2003. A combination of treatments including hepatic resection, hepatic arterial infusion chemotherapy, and ablative techniques (cryoablation and/or radiofrequency ablation) were used in a manner individualized to each patient based on extent of disease, underlying hepatic function, and other factors. RESULTS: 159 patients (68.6%) were treated by hepatic resection alone; 13 patients (6.9%) were treated with hepatic resection and hepatic arterial infusion chemotherapy; 19 patients (10.1%) were treated with ablative techniques (cryoablation or radiofrequency ablation), with or without hepatic arterial infusion chemotherapy; 1 patient (0.5%) was treated with ablative techniques and hepatic resection; and 26 patients (13.8%) were treated with hepatic arterial infusion chemotherapy alone. CONCLUSIONS: Hepatic metastases from colorectal cancer remain a common and compelling clinical problem. The standard of care is hepatic resection in appropriate candidates, offering up to 30% 5-year survival. Our experience shows that the majority of surgically managed patients can be treated with resection. For patients in whom hepatic resection is not a feasible option, multiple other treatment options exist and can be combined to obtain the best control of disease and long-term outcome.

1221 GROWTH OF HEPATIC ANGIOMYOLIPOMA INDICATING MALIGNANT POTENTIAL
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We encountered hepatic angiomyolipoma and resected it successfully. During the wait for the surgery, the size of the tumor increased rapidly. The pathological examination confirmed angiomyolipoma of the liver. The tumor cells were stained for HMB-45, which is a specific marker for angiomyolipoma. Furthermore, mitotic cells were observed in 8 cells of 10 high-power fields (HPP) and 30% of the cells positive for Ki-67 that supported the mitotic counts. We carefully measured the tumor size by using a computer and calculated the tumor doubling time. We estimated that the tumor development occurred more than 8 years earlier. Hepatic angiomylipoma has been considered a benign tumor; however, this case was completely exceptional. We should be aware of the presence of malignant hepatic angiomyolipoma, for which surgical treatment should be considered.

1222 SIMULTANEOUS RIGHT ADRENALECTOMY DURING RIGHT HEPATECTOMY FOR THE TREATMENT OF HEPATOCELLULAR CARCINOMA
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PURPOSE: We know that the adrenal gland is a common site of extrahepatic metastasis, occurring in 4–10% of hepatocellular carcinoma (HCC) cases at autopsy. However, diagnosis is less commonly made clinically. The efficacy of adrenalectomy for treatment of invasion from hepatocellular carcinoma synchronous with hepatic resection remains unclear. MATERIALS AND METHODS: We retrospectively analysed our patients treated for adrenal metastasis of HCC after successful hepatic resection, we also reviewed the efficacy of simultaneous right adrenalectomy during right hepatectomy for HCCs near the right adrenal gland. RESULTS: Two patients had right adrenal gland metastasis after hepatectomy for HCCs, 9 months and 11 months respectively. One patient received radiation therapy and survived for 12 months, the other was still alive 13 months after right adrenalectomy. Since 2002, we routinely performed right adrenalectomy during liver resection for 8 HCCs; these tumors were found to be adherent to the inferior surface of the liver (adrenonephric fusion). One of them proved adrenal capsule invasion by pathologic finding. CONCLUSION: In bloc right hepatectomy with right adrenalectomy for HCC would be a safe procedure and prevent the incidence of adrenal metastasis, when tumors are adherent to the adrenonephric fusion. We also believe that adrenalectomy could be the best choice when adrenal metastasis occurs after successful HCC resection.

1223 TWO-STAGE HEPATIC RESECTION BY DISRUPTION OF THE RIGHT PORTAL FLOW THROUGH PLACEMENT OF A BALLOONING CATHETER IN THE RIGHT PORTAL VEIN
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Major hepatectomy combined with a portal vein embolization (PVE) allowed for a curative resection for patients with an insufficient volume of future remnant liver. However, some cases showed a deterioration of liver function after a PVE with a morbidity rate of 4–6%. The authors experienced one case of initially non-resectable colon cancer liver metastases. He was curatively and safely treated with a two-stage hepatic resection by disruption of the right portal flow through placement of a balloonning catheter in the right portal vein. The 54-year-old man was diagnosed with sigmoid colon cancer combined with multiple bilobar liver metastases. Four small metastatic lesions in the left lobe were detected and five large sized lesions in the right lobe (mean size 3.8 cm) were detected in a preoperative CT scan. The authors removed the sigmoid colon cancer through a laparoscopy-assisted anterior resection. All the left hepatic metastatic lesions (9 small superficial lesions, mean size 0.8 cm) were removed by an open non-anatomical wedge resection 12 days later after the first operation. A balloonning catheter was placed in the right portal vein through the branch of the inferior mesenteric vein at that time. He showed no abnormal liver function after the procedure. The percentage of the future remnant liver volume compared to the whole liver volume excluding the metastatic lesions was <30% on the 2nd day after the last operation, increasing to 37% 2 weeks later. A right lobectomy was performed. The patient recovered well and we applied adjuvant hepatic arterial infusion of IL-2-based immuno-chemotherapy. At present, the patient lives normally without any findings of tumor recurrence.

1224 TWO CASES OF ICTERIC HEPATOCELLULAR CARCINOMA
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Hepatocellular carcinoma (HCC) with obstructive jaundice caused by bile duct tumor thrombi (BDT) is uncommon. The appropriate treatment has not yet been established. The authors experienced two cases of icteric type HCC. In the first case, the 55-year-old man was admitted with obstructive jaundice (17.5 mg/dl on admission) with no other symptoms. A preoperative ERCP (endoscopic retrograde cholangiopancreatography) and CT (computed tomography) showed the BDT extending from the main mass in the left lobe to the common hepatic duct. The serum total bilirubin concentration was 4.7 mg/dl one day before the operation. ICG-R15 was 36% one week before the operation. The serum AFP (alpha-fetoprotein) concentration was 4872 ng/ml. The serum albumin concentration and prothrombin time were normal. A left lobectomy, extrahepatic bile duct resection, and Roux-en-Y hepatojejunostomy were performed with stenting each bile duct orifice. Histologically, the BDT partially invaded in the epithelium of the extrahepatic bile duct confluence portion. The second case was a 32-year-old woman, who was admitted with abdominal discomfort without jaundice. The preoperative imaging studies showed almost the same findings as the first case. However, the laboratory findings were normal. The authors performed almost the same operation as was used in the first case. The BDT did not invade the confluence portion of the extrahepatic bile duct. At present, both patients live well without any finding of tumor recurrence. Many reports insist that the BDT rarely invades the confluence portion of bile duct. So, the BDT extraction without extrahepatic bile duct resection was a sufficient procedure for HCC with the BDT. However, this strategy was inadequate in the first case.

1225 EXTRAHEPATIC GROWING LIVER CELL ADENOMA: A CASE REPORT
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INTRODUCTION: Liver cell adenoma appears in the normal liver, and it is difficult to distinguish adenoma from malignant tumor. A case of resection for extrahepatic growing liver cell adenoma is reported. CASE REPORT: A 43-year-old woman was admitted for right hypochondral discomfort in spring 2003, and in June 2003, she pointed out liver dysfunction in a medical examination. Virus marker of hepatitis was negative, and she had not used the oral contraceptive pill. Abdominal ultrasonography showed an extrahepatic growing tumor from segment six (S6), and it grew below. Tumor size was 13.8 cm, and almost uniform density. Abdominal CT showed that the tumor tissue density was almost the same as normal liver, and a boundary line was not clear. Enhanced CT showed that the phase of artery was enhanced a little, but the phase of vein was enhanced longer. Abdominal MRI showed low density a little in T1 emphasized, and high density in T2 emphasized. Celiac angiographies
showed the tumor was enhanced by A6 artery. Then preoperative diagnosis was liver cell adenoma, laparoscopic examination was performed. Tumor grew outside the liver (S6) with capsule. There were no intestinal or perforation adherences. Intraoperative laparoscopic ultrasonography showed the boundary between tumor and normal liver, then we resected the tumor with a 1-cm surgical margin. Pathology in operation was no malignancy and diagnosed liver cell adenoma. CONCLUSION: From abdominal CT, ultrasonography, and MRI, we suspected that the tumor was liver cell adenoma. But tumor growing outside the liver was rare, it was difficult to make a diagnosis at preoperative. Laparoscopic approach for this case was effective as minimally invasive treatment.

1226 ASSOCIATION BETWEEN TUMOUR SIZE AND HAEMOSTATIC FACTORS – A PROSPECTIVE ANALYSIS IN HEPATOCELLULAR CARCINOMA

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Introduction: Portal vein thrombosis (PVT) is well established as a poor prognostic factor in hepatocellular carcinoma (HCC), with tumor thrombus being a much more common occurrence in HCC than in other liver tumors such as colorectal secondary. Meanwhile, platelet and haemostatic factors have been implicated in tumor spread. Aggregation of platelets is thought to provide an adhesive medium to which disseminated tumor cells adhere and propagate, while thrombomodulin has been shown to inhibit intrathelial spread of HCC. In this study, we evaluate any association between haemostatic factors and the propagation of HCC. METHOD: Data from 2493 HCC patients were reviewed retrospectively with emphasis on the presence of PVT, tumor size, alpha-fetoprotein (AFP) level and haemostatic factors (platelet count and prothrombin time). RESULTS: A total of 1611 patients have complete data to be analysed. Tumor size was found to have significant association with prothrombin time (p = 0.05), as well as with AFP and platelet count (p = 0.01). On the other hand, only tumor size and AFP have significant association with the presence of PVT, while the haemostatic factors do not. CONCLUSION: Surprisingly, the haemostatic factors are found to be associated with tumor size but not the presence of PVT. The association between tumor size and the haemostatic factors (platelet count and prothrombin time) seem to suggest an existing role for thrombosis in the intrathelial development of HCC. Further studies are required to define such a role, but, if it exists, this may be a possible point for intervention in the fight against HCC. On the other hand, AFP was found to be associated with both the tumor size and the presence of PVT. Its value as a tumor marker should perhaps be reviewed in a more positive light.

1227 MANAGEMENT OF RARE BENIGN LIVER TUMORS

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AIM/BACKGROUND: The vast majority of benign liver tumors are hemangiomas, so other benign liver tumors appear challenging for diagnosis and management. A 17-year experience in management of rare benign liver tumors is analysed. METHODS: 55 patients with rare benign tumors have been observed in the AV Vishnevski Institute of Surgery since 1986. They constitute a 14% share of overall number of patients with benign liver tumor, admitted to the Institute during the above-mentioned period. A conventional work-up included ultrasound, spiral computer tomography and CEA, CA 19-9 and alpha-fetoprotein analysis. Isolated cases required celico- and endo-scopic examination. 45 patients were selectively operated, and 10 patients were refused surgery due to small (<5 cm) size of tumor and evident benign nature. 10 patients underwent hepatectomies and extended hepatectomies; segmentectomies and wedge liver resections were performed in 35 patients. RESULTS: Liver tumors had the following morphology: focal nodular hyperplasia (FNH) in 31, hepatocellular adenoma (HCA) in 15, adiloma in 3, benign glomic tumor in 1, embroyonal mesenchymal tumor in 1, fibroma in 1, fibromyoma in 1, hamartoma in 1 and leiomyoma in 1 patient. No tumor, but FNH and adiloma, had specific preoperative imaging signs. Preoperative work-up allowed refusal of surgical procedure in 8 patients with FNH, measuring up to 5 cm in diameter, and 2 patients with adiloma, measuring up to 2 cm in diameter. No evidence of tumor enlargement or complications was revealed in these patients during the observation period. Mortality rate was 0%. One patient with HCA died after extended right hepatectomy due to liver failure. Postoperative complications, including fluid collection at the liver raw surface and pleural effusion, were revealed in 10 (22.2%) patients. Pathologist reported intratumoral hemorrhage in 3 cases (2 FNH, 1 HCA) and neoplastic transformation of HCA in 3 cases. CONCLUSION: Within the group of rare benign liver tumor, only FNH and adiloma may be diagnosed preoperatively. Small FNH and adiloma do not require surgery. All liver tumors of unknown nature are to be excised with frozen section morphology. When neoplastic transformation has been revealed, a wider resection is to be performed.

1228 A RESELECTED CASE OF PRIMARY HEPATIC MALIGNANT LYMPHOMA

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Liver primary malignant lymphoma is a rare disorder. Its incidence is reported to be about 0.4% of extranodal lymphoma, and the follicular type is considered to account for about 5% of all primary malignant lymphomas. We encountered a case of liver primary malignant lymphoma which exhibited a favorable prognosis following removal of the tumor, a description of which is reported here. The case was an 81-year-old male who, although he was indicated as having chronic hepatitis as a result of being HCV antibody-positive in 1996, did not undergo any particular treatment. He had a prior history of a myocardial infarction in April 1999. During the course of a regular examination in March 2001, a 2.5-cm tumor was observed in the lateral segment of the liver. Although cholangiocellular carcinoma was suspected on the basis of imaging findings, there were no elevations of tumor markers. Needle biopsy revealed desmoplastic changes (focalized components), suggesting a strong possibility of cholangiocellular carcinoma. MRI and angiography revealed dye to be concentrated in the tumor, resulting in a diagnosis of hepatocellular carcinoma in addition consideration of the patient’s C. As a result, the patient underwent extrahepatic excision in April 2001. The final pathological diagnosis was liver primary malignant lymphoma classified as peripheral B cell neoplasma, follicular lymphoma, cyclorigic grade 1 according to the WHO classification. Although chemotherapy was not performed following surgery, the patient has not been observed to relapse despite 2 years and 6 months having elapsed since surgery.

1229 RADIOFREQUENCY ABLATION THERAPY FOR HEPATOMAS WITHIN 2 CM

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PURPOSE: The safety and efficacy of radiofrequency ablation therapy (RFA) for hepatomas has become recognized by surgeons. However, local recurrence and intrahepatic metastasis in short time after RFA are problems now. We examined the recurrence of hepatomas (first and single nodule) within 2 cm after RFA. METHODS: We performed RFA for 11 hepatoma patients. Their HCC were within 2 cm, and were first time and single nodule. An electrode cannula was introduced into the tumor under ultrasound guidance, which was then ablated at 40–90 W under ultrasound imaging monitoring, using an RFA device at a frequency of 460 kHz. The efficacy of this RFA therapy was evaluated by intraoperative enhanced ultrasound, peroperative and follow-up CT scans. RESULTS: Patients were aged 48–68 years. One patient had HBV and 11 patients had HCV. 7 patients were Child-Pugh A, 2 patients were B and 2 patients were C. Serum AFP levels of patients were 3.9–226.9 ng/mL. Approach to RFA was percutaneous in 2 patients, under laparotomy in 5 patients, under laparoscopy in 2 patients and under thoracotomy in 1 patient. 3 patients had local recurrence after 2, 3 and 10 months, respectively. CONCLUSIONS: We should perform RFA therapy carefully for HCC patients and need chemotherapy for HCC patients after RFA.

1230 RADIOFREQUENCY ABLATION OF LIVER TUMORS: AN EARLY EXPERIENCE

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Radiofrequency ablation (RFA) is a technique of thermal coagulation of tissue using radiofrequency (RF) energy. The technique of RF ablation can be applied for management of primary and secondary liver tumors. In our
experience of 13 cases over 12 months, 8 were hepatocellular cancers, 4 were metastatic colorectal cancers and 1 was a metastatic deposit from an ovarian cancer. The mean size of the lesion ablated was 5 cm. The average hospital stay was 4 days. The success of ablation was evaluated by follow-up CT scan and tumour marker study. In colorectal metastases successful ablation in all 4 cases as revealed by a zone of ablation larger than the original lesion and a return to normality of elevated S-CEA levels was achieved. In the HCC group, the lesions were larger than the metastatic lesions and a complete ablation was achieved in 5/8 cases. There was no procedure-related mortality in our series. Our only morbidity was a patient who was explored for hemoperitoneum following percutaneous ablation. At follow-up evaluation only one patient had died due to an upper GI bleed secondary to extensive cirrhosis. In the other patients there was no progression of disease at a median follow-up of 4 months. RFA is promising technique to deal with lesions not amenable for surgical resections. Although a long-term follow-up is required to evaluate future outcome of this technique, our early data are promising. RFA can be performed with reasonable safety in unresectable colorectal metastases and HCCs. The success rate is higher in smaller lesions without underlying cirrhosis of the liver.

1231 HEPATOCELLULAR CARCINOMA WITH LAMELLAR FIBROSIS AND ONCOCYTIC CELLS: SMALL FIBROCELLULAR-LIKE CARCINOMA IN A JAPANESE HB-POSITIVE PATIENT
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Lamellar fibrosis in hepatocellular carcinoma (HCC) is often referred to as a distinctive feature of fibrolamellar (FL-HCC), which is considered an uncommon malignancy with a lower rate of recurrence and improved survival compared to conventional HCC. However, the molecular mechanisms underlying lamellar fibrosis in FL-HCC remain largely unknown. In this study, we report a case of a 41-year-old male who was diagnosed with a solitary HCC in the right lobe of the liver. The patient underwent a right hepatectomy, and the resected liver tissue was sent for histopathological examination. The resected liver tissue was sent for histopathological examination. The resected liver tissue was sent for histopathological examination.

1233 PRIMARY CARCINOID TUMOR OF LIVER – A RARITY
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Primary hepatic carcinoid tumors (PHCTs) are extremely rare, and fewer than 50 cases have been reported in the English-language literature. Resection is the treatment of choice for PHCT and resection for PHCT can be performed in most patients and offers long-term survival. We present a case of primary hepatic carcinoid in a 40-year-old female, who was incidentally diagnosed on a routine ultrasonographic examination to have a space-occupying lesion of liver. Preoperative diagnosis of huge hemangiomata of the right lobe was made after CT scan. Upon exploration it was found to be a mass involving right lobe of liver. There was no mass lesion in the rest of the viscera and no lymph nodes were enlarged. Trisegmentectomy was performed and the patient stood the procedure well. Final histopathological examination and immunohistochemistry revealed it to be a carcinoid. Thorough search for any primary lesion was made but none was found. The patient has been put on cisplatin and 5 fluorouracil and is well after 6 months of follow-up. Clinical details of patient, operative procedure, histopathological details along with review of literature will be presented in the poster.

1234 ANATOMICAL VARIATION OF THE RIGHT PORTAL VEIN: INTRA-OPERATIVE REVISION OF THE PLANNED SURGICAL LIVER RESECTION
Parul J Shukla, Mandar S Naidkarni, Suprata Atya, Hemant Telkar and Shalvesh V Shrikhande, Tata Memorial Hospital, Mumbai and Jupiter Scan Centre, Mumbai, India

We would like to report a case of a 65-year-old male patient with a hepatocellular carcinoma (HCC). After routine work-up, the patient was diagnosed to have a solitary HCC in the right lobe of the liver. The plan was to undertake a right hepatectomy. However, upon exploration, the tumour was found to be in the left lobe of the liver. The patient underwent a left hepatectomy, and the resected liver tissue was sent for histopathological examination. The resected liver tissue was sent for histopathological examination. The resected liver tissue was sent for histopathological examination.

1235 LAPAROSCOPIC-ASSISTED RIGHT LOBECTOMY OF LIVER WITH MODIFIED HANGING OVER TECHNIQUE
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The recent development of innovative laparoscopic instruments and surgical skills have made totally laparoscopic liver resection possible. However, we are doing laparoscopic assisted liver resection because we still afraid of gas embolism during parenchymal resection. We have 11 cases of successful laparoscopic-assisted liver resection. Among them we would like to show you laparoscopic-assisted light lobectomy using modified hanging over technique. The patient was a 58-year-old female with right intrahepatic duct stone.

1236 LAPAROSCOPIC RESECTION OF FOCAL NODULAR HYPERPLASIA OF THE LIVER
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A 36-year-old woman presented with vague upper abdominal pain. She was healthy and took birth control pills for 20 consecutive years. An ultrasound revealed a mass in the left lobe of the liver. A dynamic helical CT scan demonstrated an enhancing mass (4 cm x 5 cm) extending laterally off segment III of the liver. The lesion had the typical appearance of an FNH. The patient underwent a laparoscopic liver resection of the mass without problems. In addition, at operation she was found to have a second mass on the surface of segment V of the liver that was also resected. She left the hospital on postoperative day 1. Pathology demonstrated an FNH and
hamartoma of the liver. This video illustrates the principles of laparoscopic liver resection from the 'laparoscopic segments' and demonstrates how to properly employ a number of new technologies such aslinear endocutters, harmonic scalpel, argon beam, and Tissue Link linear radiofrequency.

1237 EFFICACY OF A SPATULA-SHAPED MICROWAVE ELECTRODE FOR TRANSSECTION OF THE LIVER PARENCHYMA DURING LAPAROSCOPIC HEPATECTOMY
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BACKGROUND: Using a spatula-shaped microwave electrode and conventional needle electrode, we performed hand-assisted laparoscopic hepatectomy for hepatocellular carcinoma at segment 6 with liver cirrhosis. We will introduce a video of our procedure. The patient was 52 years old. He had a 6-cm hepatocellular carcinoma and gallstones. He has been infected with hepatitis B virus. PROCEDURE: We placed a camera port at the umbilicus using the open technique. Pneumoperitoneum was established at 8 mmHg. The laparoscope was inserted. After exploring the peritoneal cavity, a 7-cm incision was made on the right rectus abdominis muscle and then the GelPort device was placed. First we performed laparoscopic cholecystectomy. Then we checked the area of the tumor using laparoscopic ultrasonography and determined the transaction line and drew a cutting line using electrosurgery. Then we coagulated the cutting line using a conventional 10-mm needle. After that we lifted the abdominal wall, and we transected the liver using a spatula-shaped microwave electrode. Major vessels were clipped. We removed the specimen through the GelPort device, then inserted a drain to finish the procedure. CONCLUSION: Like the USA, we believe that the use of this electrode allows us to expose vessels in detail and ligate them with confidence.

1238 SIMULTANEOUS RESECTION OF CARCINOID PRIMARY TUMOR AND LIVER METASTASES
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Carcinoid tumors are difficult to identify before surgery and the standard tests cannot perform the diagnosis. A 34-year-old female patient was referred to our hospital with history of abdominal colic pain and bronchial spasms episodes. The US showed multiple hyperechoic bilateral lesions, the videodenscopy of the upper digestive tract and videocolonoscopy were normal. Tumor markers, chest X-ray and biochemical tests were normal too. The multi-slice CT showed multiple liver lesions without evidence of primary tumor, and the last test required was 5 HLA, which showed and increased level. The patient was operated on and a small lesion of carcinoid tumor located in the jejunum was resected with lymph node dissection; and we performed a right extended hepatectomy with a metastasectomy on segment 3. Postoperative course was uneventful and 2 years later the patients is free of tumoral recurrence and symptoms. We conclude that the surgeon must be familiar with the clinical behaviour of carcinoid tumors and perform the appropriate surgical procedure. The goal is to resect the primary tumor and the liver metastases simultaneously.

1239 DOES BIOPSY OF COLORECTAL LIVER METASTASES MATTER?
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PURPOSE: Biopsy or instrumentation of potentially resectable colorectal liver metastases is still practised commonly, despite anecdotal reports of malignant dissemination from such procedures. However, no evidence exists on the long-term impact of biopsy on survival after liver resection for colorectal metastases. METHOD: Prospective data from 598 consecutive liver resections in patients with colorectal liver metastases since November 1986 were analysed. RESULTS: Biopsy of the liver metastases had been attempted in 90 cases (15%) prior to referral. At subsequent laparotomy for liver resection, needle track dissemination consistent with previous tumour violation was seen in 17 patients (19%), though resection was undertaken in each case. Biopsied and non-biopsied groups were comparable in terms of patient characteristics and features of both primary and metastatic tumour stage and distribution. The only difference between groups was a higher incidence of synchronous tumours in the biopsied group. Per-operative death and postoperative complications did not differ between biopsied and non-biopsied patients. 5-year survival (standard error in brackets) for biopsied patients was 21% (5.2). This compared to 38% (3.0) for patients not biopsied and operated on with curative intent (p = 0.004). Patients with operative appearances of needle track seeding, confirmed histologically, had a survival of only 8.1% (7.7) at 5 years (p = 0.021). CONCLUSION: The practice of pre-operative biopsy of colorectal liver metastases is usually unnecessary, may result in needle track deposits and has an adverse effect on long-term survival after surgery.

1240 RISK FACTORS FOR INTRACTABLE PLEURAL EFFUSION AFTER LIVER RESECTION
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BACKGROUND: Although intractable pleural effusion is a well-known complication of liver resection, risk factors for this condition have not been established. METHODS: Records of 254 patients who underwent liver resection for hepatocellular carcinoma between January 1994 and December 2002 were reviewed. Postoperative pleural effusion that required thoracentesis or continuous drainage with or without pleurodesis was defined as intractable. Variables evaluated as risk factors included demographic factors, presence of cirrhosis, routine preoperative laboratory data, serum concentration of type IV collagen 75 domain (75 collagen), Child-Pugh class, preoperative interventions, including transcatheter arterial embolization (TAE), operative procedure, intraoperative blood loss, histology of non-cirrhotic background parenchyma, and postoperative complications. RESULTS: Postoperative intractable pleural effusion developed in 15 (5.9%) patients. Serum concentration of 75 collagen, preoperative TAE, and liver resection that included segments 7 and/or 8 were independent risk factors on multivariate analysis. In patients with high concentration of 75 collagen (≥8.0 ng/mL), the incidence of the complication was significantly lower in patients who had not undergone TAE than in those who had undergone TAE. CONCLUSION: An increase in serum 75 collagen concentration (≥8.0 ng/mL) and preoperative TAE are independent and preoperative risk factors for the development of intractable pleural effusion after liver resection for HCC. Preoperative TAE should be avoided when possible in patients whose serum 75 collagen concentration is ≥8.0 ng/mL.

1241 CLINICAL FACTORS PREDICTIVE OF LIVER REGENERATION AFTER HUMAN HEPATECTOMY
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INTRODUCTION: This study was carried out to identify factors predictive of liver regeneration after human hepatectomy by prospective analyses of preoperative variables and evaluation of liver regeneration using computed tomography (CT) volumetry. PATIENTS AND METHODS: From 1992 to 2003, 75 cases of right (n = 26) and left hepatic lobectomy (n = 49) were performed in our institute. Pre-operative variables, such as age, liver disease, laboratory data, and indocyanine green 15 minutes retention ratio (ICG15R), were recorded. Pre and 2-week postoperative liver size were assessed by CT volumetry in each case. The remnant liver was estimated from specimen's weight. The liver regeneration was evaluated by the 2-week postoperative liver size, which was expressed as a percentage of the pre-operative value. The 2-week postoperative liver size was compared with the 15% value. RESULTS: The liver sizes immediately and 2 weeks after hepatic lobectomy were 37.4 ± 3.1% and 63.0 ± 2.9% of preoperative value. Any factors predictive of liver regeneration after right hepatic lobectomy could not be detected. The mean liver size at 2 weeks after left hepatic lobectomy was 84.6 ± 2.7% of preoperative value, while that immediately after the operation was 70.9 ± 2.2%. When the cases were divided into good and poor liver regeneration groups, patient’s age (52.0 vs 62.6 years), virus hepatitis (17.1 vs 42.9%), number of platelets (261 vs 176 × 10¹¹), and ICG15R (5.3 vs 11.5%) were significantly associated with liver regeneration after left hepatic lobectomy. Logistic regression revealed that ICG15R (odds ratio
1242 POSTOPERATIVE PORTAL VEIN THROMBOSIS IN PATIENTS WITH HEPATOPLESMONICANCION SCHISTOSOMIASIS: RELATIONSHIP WITH INTRAOPERATIVE PORTAL PRESSURE AND FLOW. A PROSPECTIVE STUDY

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AIMS: Portal vein thrombosis is a frequent postoperative complication after esophagegastic devascularization with splenectomy. The aim of this study was to analyse biochemical, hematochemical, coagulation blood tests and portal vein hemodynamics in patients with and without portal vein thrombosis after surgical treatment of hepatoplebic manonic schistosomiasis portal hypertension in order to clarify the pathophysiology of this significant postoperative complication. METHODS: 40 patients with hepatoplesmic schistosomiasis and indication for surgical treatment were prospectively studied. All patients underwent routine pre- and postoperative biochemical, hematochemical, coagulation blood tests and intraoperative portal hemodynamic evaluation (portal pressure and portal flow) before and after esophagegastic devascularization and splenectomy using a 4F-thrombolysis catheter introduced inside the portal vein. RESULTS: Portal vein thrombosis, diagnosed by routine postoperative Doppler ultrasound was found in 22 patients (56%). It was partial in 19 and total in 3. In patients with portal thrombosis, we observed a reduction in portal flow of 971 ± 592 ml/min (42 ± 16%) at the end of the surgery, while this reduction was of 720 ± 644 ml/min (33 ± 30%) in those with postoperative perversive portal vein (p = 0.249). The decrease in portal pressure was the same in both groups: 7.2 ± 3.0 mmHg (23 ± 10%) and 7.6 ± 3.8 mmHg (27 ± 14%) with and without thrombosis respectively (p = 0.759). There was also no significant difference between patients with and without portal vein thrombosis regarding pre- and postoperative hemoglobin level, platelet levels, coagulation tests, portal vein diameter and spleen weight. CONCLUSIONS: Esophagegastic devascularization and splenectomy reduce portal pressure as well as portal flow. Portal vein thrombosis occurs in 55% of patients submitted to this surgical procedure but this complication does not show any correlation with the decrease in portal flow, biochemical, hematochemical, coagulation blood tests, portal vein diameter or spleen weight.

1243 CHEMOTHERAPY PRIOR TO LIVER RESECTION FOR COLORECTAL METASTASES DOES NOT ADVERSELY AFFECT PERIOPERATIVE OUTCOMES

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BACKGROUND: The effects of systemic adjuvant or palliative chemo- therapy on morbidity following subsequent hepatic resection for metastases are not well defined. METHODS: 96 resections for colorectal metastases were performed from 7/01 to 7/03 (93% ≥ 2 segments). Preoperative demographics, perioperative features, and postoperative outcomes were prospectively followed. Type of chemotherapy, and the temporal relationship of chemotherapy to the liver resection were analysed. RESULTS: 53 (55%) non-randomized patients received a mean of 5.7 cycles/6.1 months of systemic chemotherapy prior to hepatic resection, with a median interval of 12 months from end of therapy to resection (range 1–75 months). 35 received 5-FU (5FU/1 alone, 9 had Imita in addition to 5FU/L (CPT-11), and 9 were not specified. Preoperative age, sex, comorbidities, ASA score, biochemical and liver enzyme profiles, tumor number, and extent and technique of hepatic resection were equivalent between the chemotherapy and non-chemotherapy cohorts. Mean tumor size was smaller (4.5 vs 5.8 cm) and synchronous metastases were half as common (25% vs 49%) in the chemotherapy group. Operative time was equivalent (270 min). Median estimated blood loss and transfusion requirements were lower in the chemotherapy than the non-chemotherapy group. Postoperative liver enzyme peaks were greater in the chemotherapy group (AST = 402 vs 302 U/L, p = 0.09 and ALT = 433 vs 312 U/L, p = 0.1). However, peak changes in INR and Bilirubin did not differ. Complications were more prevalent (51% vs 40%), and the only death was in the non-chemotherapy group. Steatosis was present in 28% of the non-chemotherapy and 57% of the chemotherapy resection specimens (p = 0.005) and was marked (>30%) in 7% and 10% respectively. Further analysis of the chemotherapy group based on the interval between completion of chemotherapy and the hepatic resection (<6 months, 7–12 months, 1–2 years, and >2 years) reveals a trend towards worse outcomes in most categories for those in the >2 year cohort. When compared to 5FU/L alone, the CPT-11 group had more steatosis (67% vs 51%) but smaller tumors (2.7 vs 4.0 cm), less blood loss (800 vs 950 ml, p = 0.01), fewer complications (33% vs 43%) and shorter LOS (6.5 vs 7.5 d). CONCLUSION: Despite variations in biochemical function following hepatic resection, short-term clinical outcomes are not affected by the administration of chemotherapy prior to hepatic resection. Furthermore, there is no detrimental effect of close timing prior to resection, and there is no appreciable difference between Irinotecan-containing regimes and the more traditional 5-FU-based therapies.

1244 STEROID ADMINISTRATION BEFORE LIVER RESECTION INCLUDING TEMPORARY INFLOW OCCLUSION DOES NOT INFLUENCE POSTOPERATIVE HEPATOCYTE REGENERATION

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INTRODUCTION: If temporary inflow occlusion is required during liver resection, the postoperative course might be complicated by ischemia-reperfusion (IR) injury. Steroids have been shown to protect against hepatic IR injury; however, due to their anti-proliferative character concerns exist on their use on liver regeneration after resection. Using an experimental rat model, we investigated the effects of methylprednisolone (MP) on hepatocyte proliferation after partial hepatectomy with temporary inflow occlusion. MATERIALS AND METHODS: Prior to partial (70%) hepatectomy, one group of animals received MP (30 mg/kg BW), while the second group served as non-treated controls. During surgery, total vascular inflow occlusion was performed by cross-clamping the hepatoduodenal ligament (30 minutes). The degree of IR injury was indicated by the post-ischemic rise of AST, ALT, and GLDH at 6 h after surgery. Immunohistochemistry tools were used to determine the mitotic index, Ki-67 expression, while Western blot analysis (cyclin D1) characterized the proliferative activity on days 1, 4, 7, and 10 after resection. Additionally, the body weight, the weight of the proliferating liver, and as a measure of liver function, bilirubin secretion and albumin synthesis were analysed. RESULTS: The post-ischemic enzyme release at 6 h following surgery was significantly decreased in the MP group. Expression of cyclin D1, the percentage of Ki-67-positive cells, and the mitotic cell index were similar in both groups at all time points. Similar results were found for bilirubin and albumin production, suggesting a similar weight of proliferating liver, indicating that steroid treatment given to reduce IR injury does not interfere with postoperative hepatocyte proliferation. DISCUSSION: Although steroid administration in rats significantly reduced IR-associated tissue injury, it has no apparent effects on hepatic regeneration after partial hepatectomy. Thus, steroids should be recommended if a temporary inflow occlusion is required during liver resection, in order to reduce complications caused by severe ischemia-related organ dysfunction.

1245 INTERMITTENT HEPATIC VEIN-TOTAL VASCULAR EXCLUSION DURING LIVER RESECTION: ANATOMIC AND CLINICAL STUDIES

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Bleeding from hepatic veins remains a problem during liver surgery. Perceived difficulties in the dissection and isolation of these retrohepatic venous structures have limited the widespread use of hepatic vein control during liver resection. The purpose of this study is to delineate the anatomy of the hepatic veins, and to apply this knowledge to a series of patients
undergoing liver resection with intermittent hepatic vein-total vascular exclusion (IH-IVTE). A detailed study of the hepatic venous anatomy in 20 cadavers was undertaken. Dissection and casting of the hepatic veins was performed. Anatomical data were also recorded during 30 hepatectomies. We found that division of the hepatocaval ligament was necessary to isolate the right hepatic vein. This ligament was closely associated with a caudate vein 69% of the time. The trunk of the middle-left hepatic veins could be isolated through a window above the caudate lobe. With the benefit of improved anatomic knowledge, we evaluated a series of 45 consecutive major liver resections in which hepatic veins were isolated and the technique of IH-IVTE was applied. The portal triad and the hepatic veins were occluded intermittently (20 minutes with 5 minutes of perfusion) with Rommel tourniquets. Inferior vena cava flow was maintained. Mean total warm ischemic time was 65 ± 24.5 minutes, with one patient extending out over 2 hours. Mean peak ALT was 452 ± 420 IU/L and mean estimated blood loss was 864 ± 514 mL. Calculated blood loss was 1553 ± 636 mL. 18% of patients required blood transfusions in the perioperative period. Complications were identified in 16 patients (35.5%) with one grade 3 complication and the rest grade 1-2. The average length of hospital stay was 10.5 ± 3.4 days. There was no in-hospital or 60-day mortality. Detailed anatomic knowledge of the hepatocaval ligament and the hepatic veins allows for safe extraparenchymal control of the hepatic veins during major hepatic surgery. Control of the hepatic veins in conjunction with control of the porta hepatitis has the potential advantages of TVE while avoiding the complications associated with IVC clamping.

1246 N-ACETYLCYSTEINE MODULATES BILE COMPOSITION FOLLOWING LIVER ISCHEMIA-REPERFUSION INJURY IN EXPERIMENTAL MURINE FATTY LIVER
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BACKGROUND: Steatosis is associated with increased mortality in hepatic resections and risk of dysfunction following transplantation. N-Acetylcysteine (NAC) detoxifies free radicals produced during ischemia-reperfusion (I/R) injury. In this study we investigated the changes in bile composition produced by NAC administration during warm I/R in steatotic livers. METHODS: Moderate steatosis was induced in 12 New Zealand white rabbits by feeding with a high cholesterol diet (2%). Under general anaesthesia laparotomy was performed and lobar ischemia induced by clamping the vascular pedicles of the median and left lobes of the liver for 60 min followed by 6 h of reperfusion. In the NAC group (n = 6) 150 mg/kg of NAC in 20ml of 5% dextrose was infused IV 15 minutes before reperfusion and maintained at 10 mg/kg/h in 5% dextrose during the 6-h reperfusion period, while in the control group (n = 6) equal volumes of 5% dextrose with same infusion protocol were carried out. The bile duct was cannulated, and collected at baseline, end of ischemia, and at 2.5, 5 and 6 h of reperfusion and analysed by proton magnetic resonance spectroscopy. RESULTS: Bile production was greater in the NAC group than in the control group (p < 0.05) on reperfusion. NAC administration resulted in increased levels of bile lactate (p = 0.03), acetate (p = 0.009) and pyruvate (p < 0.001) compared to controls on reperfusion and a significant decrease in hepatic biopterin levels (11.5 ± 4.9 vs 1.2 ± 0.4, p < 0.001) compared to controls on reperfusion. CONCLUSION: NAC administration increased bile production and improved the metabolite composition of bile following warm I/R in steatotic livers.

1247 SYSTEMIC HEMODYNAMICS AFTER SURGICAL TREATMENT OF PORTAL HYPERTENSION IN HEPATOPLESONIC MANSIC SCHISTOSOMIASIS
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Thirty-one patients with indication for surgical treatment of portal hypertension due to hepatoplenic manasic schistosomiasis were prospectively studied. Each patient was submitted to preoperative assessment with pulmonary artery catheterization. The preoperative results (expressed as mean ± SD) indicated that the patients presented an increased cardiac index (4.91 ± 1.16 L/min/m²) associated with a reduction in the systemic vascular resistance index (1424.35 ± 450.20 dynes.s.cm⁻⁵) Mean pulmonary artery pressure (17.36 ± 5.41 mmHg) and the pulmonary vascular resistance index (130.77 ± 66.22 dynes.s.cm⁻⁵) was decreased. 16 patients were submitted to esophagegastroduodenal ulceration with splenectomy (EGDS) and 15 patients to distal splenorenal shunt (WARREN). The systemic hemodynamic assessment was repeated 4 days after surgery in all patients. Four days after EGDS there was a significant drop in cardiac index (3.80 ± 0.42 L/min/m²) and a significant increase in systemic vascular resistance index (1914.81 ± 336.29 dynes.s.cm⁻⁵) toward normal levels. There were also a significant reduction in pulmonary artery pressure (12.68 ± 4.82 mmHg), right cardiac work index (0.80 ± 0.44 kg.m/m²) and right ventricle systolic work index (9.35 ± 4.92 g.m/m²) together no significant change in pulmonary vascular resistance index (142.25 ± 106.21 dynes.s.cm⁻³). Four days after WARREN there was a non-significant increase in cardiac index (5.25 ± 0.59 L/min/m²) and a non-significant decrease in systemic vascular resistance index (1351.6 ± 249.54 dynes.s.cm⁻⁵). There was also a non-significant increase in pulmonary artery pressure (18.46 ± 4.89 mmHg), right cardiac work index (13.11 ± 0.35 kg.m/m²) and right ventricle systolic work index (13.62 ± 3.59 g.m/m²) together a non-significant decrease in pulmonary vascular resistance index (126.25 ± 63.79 dynes.s.cm⁻³). We conclude that the hyperdynamic circulatory state present in hepatoplenic manasic schistosomiasis is normalized by esophagegastroduodenal ulceration and splenectomy while distal splenorenal shunt maintains this hyperdynamic circulation. Similarly patients with portal hypertension due to hepatoplenic manasic schistosomiasis presented elevated mean pulmonary artery pressure that is normalized by esophagegastroduodenal ulceration and splenectomy and maintained by distal splenorenal shunt.

1248 HYPOTHERMIC PERFUSION OF PORCINE LIVER UNDER TOTAL VASCULAR EXCLUSION: THE EFFECT OF COOLING AT DIFFERENT TEMPERATURES
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BACKGROUND: Total hepatic vascular exclusion (TVE) can be used to control excessive blood loss during liver resection. As TVE compromises temporary vascular inflow occlusion of the liver, a disadvantage of this technique is that it induces concomitant ischaemia and reperfusion (I/R) injury of the liver. Hypothermic in situ perfusion (HIP) of the liver during ischemia potentially reduces this type of injury. It is however unknown which degree of hypothermia offers optimal protection. The aim of this study was to investigate the influence of different temperatures of HP on liver I/R injury. To this end, the effect of TVE without HP was compared to TVE with HP at 28°C and TVE with HP at 20°C. METHODS: Total liver ischemia was induced in male pigs (40-50 kg) by TVE for 60 minutes and was followed by 24 h of reperfusion. During ischemia a portal-cavo-caval shunt was placed to prevent splanchic congestion. The portal vein was perfused with cold Ringer lactate solution (4°C) while monitoring core liver temperature. Perfusion flow was adjusted to maintain core liver temperature at the desired level. The pigs were divided into 3 groups: group 1 (TVE without HP, n = 9), group 2 (TVE with HP at 28°C, n = 6) and group 3 (TVE with HP at 20°C, n = 6). Liver damage parameters (AST, ALT and alkaline phosphatase (AP)) were assessed before TVE and 1, 6, 12 and 24 h after TVE. Bile production and indocyanine green (ICG) clearance were measured to assess liver function. RESULTS: In group 1, 3 pigs (33%) died shortly after TVE due to irreversible shock. In groups 2 and 3, HP required a perfusion rate of 85 ± 14 L/min (690 ± 130 ml/h) to maintain core liver temperature at 28°C and 20°C, leading to total perfusion volumes of 5.1 ± 0.5 and 17.3 ± 1.7 litres, respectively (mean ± SEM). AST (UL) values 24 h after TVE were 1172 ± 440, 223 ± 69 and 180 ± 22 in groups 1, 2 and 3, respectively (mean ± SEM). AST, ALT and AP showed significantly lower values in groups 2 and 3 compared to group 1, 12 and 24 h after TVE (p < 0.05, ALT and AP data not shown).

There were no significant differences in AST, ALT and AP between groups 2 and 3. ICG clearance (% at 15 minutes after bolus injection) 6 h after TVE increased from 77 ± 5 in group 1 to 89 ± 2 and 90 ± 2 in groups 2 and 3, respectively (p < 0.05). Bile production (ml/h) 24 h after TVE was increased from 21 ± 3.3 in group 1 to 32 ± 5.5 and 45 ± 7.3 in group 2 and 3 respectively (*p < 0.05 compared to group 1). Pre-ischemic values were 36 ± 2.1, 38 ± 3.0 and 39 ± 3.0, respectively. CONCLUSION: Hypothermic perfusion during TVE requires large volumes of perfusate to cool the liver to 28°C or 20°C. Maintaining core liver temperature at 28°C or 20°C equally reduces liver damage. Bile production is better preserved during TVE at 20°C compared to TVE at 28°C.
1249 A RANDOMISED DOUBLE-BLIND CONTROLLED CLINICAL TRIAL TO ASSESS THE EFFICACY OF PROPHYLACTIC N-ACETYLCYSTEINE ON LIVER INJURY DURING LIVER RESECTION

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INTRODUCTION: Liver parenchymal damage due to liver manipulation and IRI is a recognised complication of liver resection. During periods of ischaemia there is accumulation of toxic oxidative radicals, cytokines and adhesion molecules accompanied by depletion of the intracellular antioxidant glutathione. N-Acetylcysteine (NAC) is an antioxidant which replenishes hepatic glutathione. This study was undertaken to evaluate the effect of NAC administration during liver resection. METHODS: 43 patients were randomised to NAC administration or placebo control. The NAC group (NACG) received an IV infusion of 150 mg/kg loading dose, 50 mg/kg over 4 h and 50 mg/kg over 8 h. The placebo group (PG) received equivalent volumes of 5% dextrose. Blood samples for liver functions were taken at start of operation, following liver mobilisation, after parenchymal resection and for 9 days postoperatively. Needle liver biopsies were also taken prior to liver mobilisation and after parenchymal resection, stained for ICAM-1 by immunohistochemistry and assessed semiquantitatively by blinded pathologists. RESULTS: Of the 43 patients randomised, 12 were excluded from the trial as inoperable at laparotomy. Of the 31 patients, 15 received NAC. There were no differences in age, sex, case distribution, peri-operative serum lactate, blood loss or transfusion requirements between the groups. ALT was significantly less in the NACG (p = 0.011) after resection while ALP was significantly higher in the NACG (p = 0.042). ICAM-1 up-regulation following resection was found in 6/16 in the PG and 3/15 in the NACG (z = 0.916, p = 0.440). CONCLUSIONS: Preliminary analysis of these results has demonstrated that NAC reduces the hepatocellular injury following major liver surgery.

1250 ARTERIAL CHEMOEMBOLIZATION FOLLOWED BY PORTAL VEIN EMBOLIZATION BEFORE RIGHT HEPATECTOMY IN CIRRHOtic PATIENTS

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OBJECTIVE: In patients with chronic liver disease, the degree of hypertrophy of the future remnant liver after portal vein embolisation (PVE) is variable. It has been suggested that selective transcatheter arterial chemoembolization (TACE) before PVE could improve the rate of hypertrophy. The aim of this study was to report the tolerance and efficacy of TACE before PVE in preparation for right hepatectomy for HCC in patients with chronic liver disease. METHODS: From 1998, 17 cirrhotic patients (mean age 64.9 years range 44–74) with HCC underwent a right hepatectomy after TACE followed by PVE. The results in terms of biological tolerance, morbidity and the rate of induced hypertrophy of the FLR and percentage of future functional liver volume (%FFLR: FLR/total liver volume) are reported and compared to the results of a matched group of 17 patients who underwent right hepatectomy in the same period after PVE alone. RESULTS: The mean delay time between TACE and PVE was 4.7 weeks (range 3–8). PVE was successful in all cases without major complications and all patients were discharged after 2–7 days. Transient biological changes observed after PVE included mild increase of serum bilirubin level and mild decrease of PT%. and were similar in the two groups. Although the mean increase of FLR 4–6 weeks after treatment was similar in the two groups, 41 ± 33% vs 45 ± 31%, the %FFLR was significantly higher in the TACE group, 13 ± 4% vs 9 ± 5%, p< 0.01 due to atrophy of the right liver in the TACE group. Intraoperative difficulties and blood loss were not different in the two groups. The rate of severe postoperative liver failure (23% vs 17%) was similar in the two groups. CONCLUSIONS: Our results confirm that PVE preceded by TACE in patients with chronic liver disease was well tolerated and was efficient concerning the increase of the %FFLR. However, we failed to demonstrate a significant beneficial effect on postoperative risk after major resection.

1251 DOPPLER ASSESSMENT AFTER RIGHT HEPATECTOMY CONFIRMS THE NECESSITY TO POSITION THE LEFT REMNANT LIVER IN ANATOMIC POSITION

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BACKGROUND AND OBJECTIVE: After right hepatectomy or triseg- mentectomy, division of the falciform ligament allows the remnant liver to rotate into the right subphrenic space. This rotation might induce venous kinking and impair outflow with several stages of outflow syndrome. Thus, simply fixing the falciform ligament to the anterior abdominal wall has been recommended in several articles. However, there is no scientific basis to support this maneuver. We describe a simple technique using ultrasono- graphic (US) Doppler after liver resection in order to find the most appropriate remnant liver position. METHODS: Between August and December 2003, 25 right resections (15 right hepatectomy, 5 extended right hepatectomy and 5 trisegmentectomy) were performed. In all patients, falciform ligament was divided and in 20 (80%) of them, left triangle ligament was also divided. After the resection, US-Doppler was performed to assess the outflow in the left and/or middle hepatic vein in two different positions: spontaneous (immediately after liver resection) and anatomical. The outflow assessment was grade 0–5 according to its Doppler amplitude. RESULTS: Doppler amplitude was significantly higher in anatomical position (2.3 ± 0.9 (range 1.4–vs 0.6 ± 0.2 (range 0.5–1), p <0.001) and the mean increase after correcting the position was 353 ± 172%. There was no difference with or without left triangle ligament division or ALT hepatic vein resection. No signs of severe hepatic congestion were observed in both positions. CONCLUSION: Our data show that venous outflow after right hepatectomy or trisegmentectomy is always better in anatomical position. Thus, we recommend that the remnant liver is routinely fixed in anatomical position even without left triangle ligament division.

1252 INFERIOR SEGMENT PRESERVING HEPATIC RESECTION FOR TUMOURS ENCASING ALL THREE HEPATIC VEINS

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BACKGROUND: Involvement of the superior liver segments (2, 4A, 7 and 8) along with the three major hepatic veins and inferior vena cava (IVC) may render liver tumours unresectable by standard operative techniques. However, the use of innovative techniques may make such difficult resections a possibility. METHODS: We describe our experience in three such patients. In two patients a new technique that we have termed ‘reverse transverse hepatectomy’ was enabled by an ex vivo or ante situum approach, preserving segments 4B, 5 and 6. In the third patient the presence of two inferior hepatic veins made hepatic vein resection without reconstruction possible, preserving segments 5 and 6. Preoperative assessment, surgical details and complete follow-up are presented. RESULTS: Short-term survival was achieved in all three patients but recurrent tumour was present at the time of death after 30, 28 and 7 months. CONCLUSIONS: Application of these techniques may be useful for lesions that encase the origin of all three hepatic veins and involve the superior liver segments. Improved chemotherapeutic strategies may assist the long-term management of these difficult cases.

1253 RESULTS OF HEPATIC RESECTION IN A NEW SPECIALIST UNIT FROM A DEVELOPING COUNTRY

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BACKGROUND: Resectional surgery of the liver is a new field in developing countries where facilities and expertise for such procedures are limited and the cost is high. Although, more and more centers are now performing hepatectomies, substantial data on results are scarce. The aim of this study was to analyse the results of 54 hepatic resections performed over a 5-year period in a new specialist hepatopancreatoobiliary unit in a developing country. METHODS: An analysis of a prospectively maintained database of 54 patients (37 males, 17 females) with a mean age of 23 years (range 6 months to 74 years) was performed. Preoperative assessment
included liver function tests, viral serology and appropriate work-up for the lesion. Adequacy and status of remnant liver were assessed with CT volumetry and, if indicated, biopsy. All patients with hepatoblastoma received preoperative chemotherapy. Two patients underwent preoperative portal vein embolisation. Diagnostic laparoscopy was performed as the initial step in patients with malignancy. The resection was performed with intermittent porta clamping. Total vascular exclusion was used in 3 patients. The liver was divided with an ultrasonic dissector in a majority and by the Kelly/figger fracture technique in a few. Intraoperative ultrasound was used in most patients. The indications included hepatocellular carcinoma in 14, hepatoblastoma in 11, hilar cholangiocarcinoma in 5, haemangiomia in 3, trauma in 2, metastases in 7 (colorectal 5, others 2) and others in 12. The procedures performed were right hepatectomy in 23, right extended hepatectomy in 6, right lateral segmentectomy in 1, left hepatectomy in 8, left lateral segmentectomy in 4, segmental or subsegmental resections in 8 and non-anatomical resections in 4 patients. RESULTS: There was one postoperative death due to bleeding in a child with hepatoblastoma. Liver failure (encephalopathy, INR >2) was seen in 4 patients, but recovered with conservative management. Postoperative morbidity included bile leak or biloma in 12 (requiring stenting in 5 patients), re-bleeding in 2 and prolonged cholestasis in one. Four patients are lost to follow-up. The mean follow-up is 37 months (range 2–60). All nine patients with benign indications are well at last follow-up. In the malignancy group 7 patients have died due to recurrence. The mean survival for patients with hepatocellular carcinoma is 11 months, hepatoblastoma 16 months, cholangiocarcinoma 33 months and metastases 25 months. CONCLUSION: Hepatic resection can be performed in a specialist unit in a developing country with low postoperative mortality and morbidity comparable to the rest of the world. The survival for hepatocellular carcinoma is limited and the cost-effectiveness of the procedure for such indications needs to be evaluated.

1254 ADVANCED TRAINING IN MAJOR RESECTIONAL HBPE SURGERY
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INTRODUCTION: Recent changes in the structure of surgical training may have compromised opportunities for training in advanced specialist surgery. We analysed surgical training and outcome of patients undergoing major HPB surgery with regard to the grade of the surgeon performing the procedure. METHODS: Between 1 January 2001 and 30 June 2003, 10 surgical trainees rotated to a specialist HPB Unit. Patients undergoing liver resection or pancreatic-duodenumectomies were identified and outcomes were determined by review of prospectively collected data. RESULTS: Trainees performed 46 of 101 liver resections (46%) and 46 of 81 pancreatic-duodenumectomies (57%). Each trainee performed a median of 4.5 liver resections (range 0–12) and 3 pancreatic-duodenumectomies (range 1–9). All cases were supervised by a consultant. Outcomes for liver resections performed by trainees or consultants were similar with no significant difference in 30-day mortality (2% vs 0%), overall mortality (10% vs 3%), incidence of bile leak (4% vs 4%) and need for re-operation (4% vs 6%). Outcomes were also similar for pancreatic-duodenumectomy with no significant difference in 30-day mortality (2% vs 0%), overall mortality (26% vs 49%), incidence of pancreatic leak (2% vs 11%) and need for re-operation (2% vs 0%). CONCLUSIONS: In a specialist unit, there is no difference in early outcome between consultants and supervised trainees; supervised operating by trainees is safe and does not jeopardise patient care. Advanced training in HPB surgery can be achieved within the current structure of surgical training.

1255 HEPATIC RESECTION FOR MALIGNANT MELANOMA LIVER METASTASES: THE Basingstoke EXPERIENCE
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BACKGROUND: Patients with metastatic melanoma to the liver have a poor prognosis with a median survival of 6 months. Although long-term survival has been reported in selected patients, there is a paucity of information regarding the natural history of the disease following liver resection for melanoma metastases. METHODS: Five patients (2 male) with liver resection for melanoma metastases had been performed were identified from a prospective database of 953 hepatic resections performed between 1986 and 2003. RESULTS: Survival following liver resection was unpredictable. Two patients died early from extrahepatic tumour recurrence, while 3 patients demonstrated disease-free survival of 6, 8 and 12 years, respectively. CONCLUSION: Hepatic resection for melanoma metastatic disease in carefully selected cases can improve survival. Prognostic features to identify those patients with melanoma hepatic metastases who might benefit from liver resection are poorly understood. Improved staging and patient selection may improve the outcome of surgery in the future.

1256 INTRA-OPERATIVE LIVER INJURY IS NOT ONLY RELATED TO VASCULAR CLAMPING
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BACKGROUND/AIMS: Postoperative increase of serum transaminase levels is accepted as the most accurate marker of hepatocyte injury after hepatectomy. Vascular clamping is considered as the main factor of liver injury. However, several studies failed to establish a correlation between the postoperative serum transaminase levels and the type and duration of vascular clamping. Therefore, we prospectively evaluated sequential changes of serum transaminase levels during and after liver resection.
METHODS: Between June 2003 and September 2003, 40 patients, aged 53 ± 14 years, who underwent elective, exclusive hepatic resection on normal liver, were included in a prospective study. Major resection (>3 segments) was present in 33 (82%). Liver resection was performed in 20 patients under intermittent clamping for a mean duration of 37 minutes (range 15–64 min); the other 20 cases had no vascular occlusion. All patients underwent serial blood samples assessing transaminase levels (ALT) during surgical procedure, respectively before incision, before liver resection and before abdominal closure and postoperatively, respectively on days 1, 2, 5 and 7. RESULTS: The overall intraoperative measurement of ALT was respectively 31 ± 11 before incision, 134 ± 62 before transection and 222 ± 117 before abdominal closure. ALT serum levels before abdominal closure were not statistically different between the two groups with and without clamping (212 ± 101 vs 233 ± 133). Postoperative ALT serum levels were similar between the two groups, with and without clamping, on days 1, 2, 5 and 7; respectively 289 ± 99 vs 341 ± 246; 227 ± 111 vs 314 ± 254; 127 ± 62 vs 157 ± 130; 73 ± 43 vs 109 ± 94. CONCLUSIONS: Our results show that, during liver resection, serum transaminase levels start to increase early, before the parenchymal transection and that the peak on day 1 was not related to the presence of clamping. These results suggest that other factors of hepatocyte injury, such as manipulation or compression of the parenchyma, should be taken in account.

1257 IN-LINE RADIOFREQUENCY ABLATION: A NEW TECHNIQUE TO MINIMIZE BLOOD LOSS IN HEPATIC PARENCHYMAL TRANSSECTION
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Liver resection is now frequently used for primary and secondary liver tumours and others with approximately 20–50% 5-year survival depending on the type of malignancy. The median blood loss with liver resection is reported to be 450–1500 ml depending on the type of resection. Blood loss and transfusion increase the morbidity and mortality of liver resections and have been shown to be associated with an increased rate of tumour recurrence. We have developed a device using radiofrequency energy (ILRFA) which is 5 cm long and is made of six electrodes, which are independently deployable. We have used this device in ovine liver and demonstrated reduction in bleeding. In this study ILRFA was used in eight patients for liver resection. At surgery half the resection was performed with an ultrasonic dissector and for the other half the resection line was first ablated with ILRFA and then resected using an ultrasonic dissector. No Pringle maneuver was performed. The blood loss was measured as the sum of the blood aspirated with the suckers and the blood loss as calculated by weighing the sponges. The areas of each plane of resection were measured and blood loss presented as ml per cm². The average blood loss with ILRFA was 6.5 ± 1.3 and 20.4 ± 3.1 with ultrasonic dissector. No ILRFA significantly reduced blood loss (p = 0.004) in liver resection.
1258 PERIOPERATIVE OUTCOMES OF 153 LIVER RESECTION FOR LARGE INTERMITTENT VASCULAR INFLOW OCCLUSION WITH REDUCING BACK-FLOW HEMORRHAGE FROM THE HEPATIC VEIN
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Hepatic resection may cause intraperoperative bleeding followed by significant morbidity and mortality. The rate of complications is closely related to the amount of bleeding during hepatic resection. Hepatic vascular inflow occlusion (Pringle maneuver) during hepatic resection has been used to reduce blood loss. However, a substantial cause of blood loss during liver resection can result from injury of hepatic vein or inferior vena cava. Low central venous pressure facilitates control of bleeding from hepatic veins by reducing the pressure gradient that promotes bleeding through hepatic venous back-flow during parenchymal dissection. In order to protect bleeding from the hepatic cut surface, we tried intermittent Pringle maneuver and reducing portal pressure as low as possible. We designed this study to see the overall outcomes of 153 consecutive liver resections performed with this approach. The mean blood loss was 652.5 ml. 111 patients (72.5%) did not require perioperative blood transfusion during surgery and the immediate 12 h after surgery. The median amount of blood transfusion for the patients who needed transfusion was 2.33 U. There was no evidence of renal derangement that may be related to low blood flow into the kidney affected by keeping the central venous pressure as low as possible. There were minor complications in 21 patients (13.7%), and two in-hospital mortalities (1.3%) related to hepatic failure in cirrhotics. In conclusion, hepatic resection using intermittent Pringle maneuver with low CPV anesthesia can reduce bleeding from the cut surface of the hepatic parenchyma by protecting back-flow. This is a very effective modality to protect bleeding from the hepatic cut surface in additional to the hepatic inflow occlusion of portal vein and hepatic artery. And this study suggests that low central venous pressure and Pringle maneuver during liver resection is a very effective modality to protect bleeding from cut surface during liver resection and does not cause derangement of renal function.

1259 ROLE OF LIVER RESECTION FOR LARGE HEPATOCELULAR CARCINOMA >10 CM IN CIRRHOTIC PATIENTS
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Surgical resection remains the only curative option for hepatocellular carcinoma (HCC). However, liver resection for large HCC with size ≥10 cm is more difficult. Because of associated poor prognostic factors and high operative risks, surgical resection is controversial in cirrhotic patients. Moreover, liver transplantation is always considered. Among the cirrhotic patients with HCC who underwent liver resection between 1991 and 2002, the tumor sizes of 104 others were ≥10 cm (mean ± SD, 14.7 ± 3.8 (range 10–32) cm L-group). Compared with another 328 cirrhotic patients with HCC whose size was <5 cm (S-group), the L-group had significantly younger patients age, high positivity of HbsAg, lower incidence of positive of hepatic C antibody, better liver function (IGC R15 = 12.1 ± 5.5% compared with 17.8 ± 8.0% in S-group), longer operative time, higher incidence of vessel invasion, presence of daughter nodule and presence of tumor capsule. Most of the L-group patients were stage III (83 patients), while only 9 patients of S-group were stage III. L-group patients also had greater amount of operative blood loss, and higher incidence of blood transfusion. The operative morbidity and mortality in S- and L-groups were not different. Although the disease-free and actuarial survival rates favored the S-group, 5-year disease-free and actuarial survival rates in the L-group were 23.8% and 24.7% respectively. Patients in L-group who had well encapsulated lesions and without vascular invasion had a better prognosis. Therefore, liver resection in large HCC (≥10 cm) is still recommended.

1260 GLYCINE SUPPRESSES CYTOKINE EXPRESSION AND IMPROVES BILE FLOW IN A RABBIT MODEL OF LIVER WARM ISCHAEMIA-REPERFUSION INJURY
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BACKGROUND: Liver ischemia reperfusion injury (IRI) is a major complication of liver resection and transplantation. Cytokine release by activated Kupffer cells (KC) plays a central role in this inflammatory response. Glycine, a non-essential amino acid, may protect against liver IRI by inhibition of KC activity. MATERIALS AND METHODS: A rabbit model of hepatic lobar warm I/R was used. Under general anaesthesia, the sham group (n = 6) underwent laparotomy alone for 7 h. The control I/R group (n = 6) underwent 60 min of and median lobe inflow occlusion and 6 h of reperfusion. The glycine I/R group (n = 6) underwent a similar procedure after receiving a single dose of glycine 5 mg/kg intravenously. Systemic haemodynamics, bile flow, TGFβ and IL-8 were measured in serum samples at 1, 2, 4, and 6 h after ischemia by ELISA. RESULTS: Systemic haemodynamic parameters remained stable throughout the experiment and there was no difference between the groups. The glycine group demonstrated increased bile flow following IRI (145.0 ± 11.4 vs 108.3 ± 28.2 μL/min/g in controls, p < 0.05). A significant reduction in circulating TNFα was seen in the glycine group at 1 (187 ± 118 pg/ml vs 283 ± 99 pg/ml, p < 0.01), 2 (203 ± 111 pg/ml vs 267 ± 58 pg/ml, p < 0.01) and 4 h (198 ± 96 pg/ml vs 330 ± 116 pg/ml, p < 0.01), but not at 6 h following reperfusion (p > 0.05). IL-8 levels however were significantly less at 1, 2, 4 and 6 h in the glycine group (p < 0.05). CONCLUSIONS: Intravenous glycine administration improved bile flow and suppressed TNFα and IL-8 release induced by liver IRI and may provide a novel therapeutic modality.

1261 ROUTE NASOGASTRIC DECOMPRESSION AFTER ELECTIVE HEPATIC RESECTION IS NOT JUSTIFIED
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INTRODUCTION: The routine use of a nasogastric tube (NGT) after abdominal surgery can lead to severe complications and is still debated. The aim of this prospective randomized trial was to evaluate the need for systematic nasogastric decomposition in patients undergoing hepatic resections. METHODS: Between September 2002 and December 2003, 109 patients who underwent elective hepatic resection were randomly assigned to NGT + (n = 54) or NGT - (n = 55) after surgery. NGT was placed in all patients after induction of anesthesia and removed after extubation for the NGT - group or passage of flatus feces for the NGT + group. Length of ileus, nausea, vomiting, tolerance to NGT, need for NGT reinsertion, in-hospital stay and postoperative morbidity were prospectively evaluated. RESULTS: The two groups (NGT + vs NGT -) were similar concerning age and rate of major resection (72% vs 68%). There was no difference in the length of ileus (4.3 ± 1.4 days vs 4.6 ± 2.0 days), the rate of nausea (15% vs 24%) or vomiting (9% vs 15%) and in-hospital stay (34.0 ± 6.8 days vs 34.1 ± 10.7 days). In the NGT - group, 7 (12.7%) patients needed NGT reinsertion 4.3 ± 2.3 days after surgery for vomiting or abdominal distension and the mean duration of subsequent NG decompression was 3.6 ± 1.8 days. In the NGT + group, minor or severe discomfort was recorded in 37% and 13% of patients, respectively. In these latter, 43% have removed NGT themselves. Pulmonary complications were similar between the 2 groups (7.3% vs 5.5%, ns) and one patient in the NGT + group had sinusitis requiring percutaneous drainage. CONCLUSION: Results of this study show that avoidance of NGT after hepatic resections greatly contributes to patient comfort without any adverse effects on the return of bowel function, incidence of digestive symptoms or early postoperative complications.

1262 TREATMENT STRATEGY FOR <5 CM AND SINGLE HEPATOCELULAR CARCINOMA: COMPARISON OF PERCUTANEOUS ETHANOL INJECTION THERAPY AND SURGICAL RESECTION
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AIM: This study was conducted to clarify the efficacy of percutaneous ethanol injection (PEI) and surgical resection for the treatment of small...
hepatocellular carcinoma (HCC). PATIENTS AND METHODS: From January 1994 to December 2001, 40 patients who were treated by PEI (P group) and 32 patients who underwent hepatic resection (Hr group) for small HCC (< 5 cm and single lesion) during the same period were enrolled. Retrospectively, long-term patient and recurrence-free survival rates were compared between the two groups. Data were expressed as mean. Student’s t test and Kaplan-Meier methods were used for statistical analysis. A p value < 0.05 was considered statistically significant. RESULTS: There were no statistically significant differences in preoperative liver function, gender and age in both groups. Mean tumor size was 2.1 cm in the P group and 3.1 cm in the Hr group, respectively. Mean patient follow-up was 44.5 months for the P group and 31.3 months for the Hr group (p = 0.021). The Hr group had statistically better 1-, 3-, and 5-year overall survival rates than the P group (92.5%, 74.6%, 45.7% in the P group, 93.6%, 83.9%, 74.6% in the Hr group, respectively, p = 0.047). During the follow-up period, 23 of the 40 (57.5%) and 9 of the 32 (28%) patients developed tumor recurrence after PEI and surgery, respectively. Cumulative 1-, 3-, and 5-year recurrence-free survival rates in the P group were 68.4%, 46.9% and 26.2%, whereas those in the Hr group were 73.6%, 65.7% and 65.7%, respectively. The results for the Hr group were significantly better than those for the P group (p = 0.048). CONCLUSION: Our overall findings show that liver resection can achieve better overall and recurrence-free survival.

1263 RADICAL SURGERY FOR LIVER HYDATID DISEASE
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AIM/BACKGROUND: An increasing incidence of liver hydatid disease in Russia and states of the former USSR requires radical surgical approaches. Short-term and long-term results of radical hydatid liver disease surgery are presented in the paper. METHODS: 253 patients (161 (63.3%) female, 92 (36.7%) male, age range 16–78 years) have undergone surgery for liver hydatid disease in the AV Vishnevski Institute of Surgery since 1994. Single cysts were revealed in 181 patients and multiple in 72 patients. Localization of cysts in patients with unilocular lesion was as follows: right hemiliver – 124, left hemiliver – 39, central localization (segments 4–5) – 18 patients. A conventional work-up included ultrasound, spiral computer tomography, serology and gas chromatography of blood. All patients underwent open operative procedures. Standard procedures were presented by ‘mechanic’ percutaneous cystectomy or elimination of fibrous capsule by plasma scalpel after cystectomy. Right hepatectomy was performed in 6, left hepatectomy in 1, wedge liver resections in 14, total percutaneous in 106 and subtotal percutaneous in 88 patients. 38 patients with multiple lesions underwent combined procedures. RESULTS: Mortality rate was 0.79%. Within the 30-day period, the following complications were revealed: parapleptic fluid collection in 6 (2.37%), suppuration of remaining cavity or intra-abdominal abscesses in 4 (1.58%), bleeding in 2 (0.8%), biliary fistulas in 5 (2.0%), percutaneous infections in 4 (1.62%) and residual cysts during the observation period, ranging from 1 to 7 years, were identified in 2 patients. CONCLUSION: Radical surgical procedure, including fibrous capsule excision, is a treatment of choice for liver hydatid disease.

1264 LONG-TERM SURVIVAL MORE THAN 10 YEARS AFTER HEPATECTOMY FOR COLORECTAL METASTASIS
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BACKGROUND: 5-year survival after resection for colorectal liver metastases is between 30 and 40% according to series. However, some of these patients may have a residual tumoral disease potentially lethal several years later. In a group of resected patients for liver colorectal metastases before 1993 we have selected the survivors without recurrence 10 years and more after surgical resection for the last metastatic site. PATIENTS AND METHODS: From 1984 to 1993, 211 patients underwent a liver resection for colorectal metastases at a single institution. Of these, 34 patients (16%) survived without recurrence > 10 years after the last treatment of the tumoral disease: hepatectomy for 31 patients (91%), extrhepatic resection for the 3 others. The primary tumor was a well differentiated adenocarcinoma in all the patients except for one (97%). After colorectal resection, chemotherapy for 6 months was delivered in half of the patients. Liver metastases were synchronous in 16 patients (47%). The mean interval between colorectal surgery and occurrence of liver metastases was 14 months (0–72). Before hepatectomy, chemotherapy was delivered in 19 patients (56%). RESULTS: A reduction superior to 50% of the liver metastases size was obtained after preoperative chemotherapy. During the first hepatectomy the mean number of metastases was 1.6 (1–5). The mean histologic size was 32.1 mm (5–100). The type of resection was non-anatomic for 14 patients (41%). The metastases were well differentiated in 96% of patients, no patient had a lymph node invasion. The margins of resection were invaded in none of the patients. Three patients had a concomitant extrhepatic localization: a sole local peritoneal node, a pulmonary metastasis, a bone metastasis treated by radiotherapy. Post-operative chemotherapy was administered in 76% of the patients. After the first hepatectomy, 23 patients (68%) had no recurrence. A first recurrence occurred in 11 patients (32%), a second recurrence in 3 patients (9%) and a third recurrence in 2 patients (6%). COMMENTS: In this series of 211 patients who underwent a liver resection for colorectal metastases, all the long-term survivors more than 10 years had well differentiated metastases, non-invaded resection margins, no metastatic lymph nodes and a complete eradication of tumoral disease. A recurrence is not incompatible with an aim of cure if a complete resection of the new lesions is feasible. So one patient underwent 3 hepatectomies and one pulmonary resection and another had one hepatectomy and 3 pulmonary resections, without recurrence more than 10 years after the last resection.

1265 SIGNIFICANCE OF THE EFFECTIVE REMNANT LIVER VOLUME IN MAJOR HEPATECTOMIES
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INTRODUCTION: The maximum extent of hepatectomy compatible with a safe postoperative course is still unknown. The aim of this study was to identify the minimal amount of effective remnant liver volume (ERLV) in patients undergoing major hepatectomy. METHODS: 41 consecutive major hepatectomies (resection of three or more Couinaud segments) performed between July 1999 and November 2003 were included in this study, consisting of 29 right hepatectomies, 6 left hepatectomies and 6 extended right hepatectomies. No patient had cirrhosis or preoperative cholestasis; 5 cases had chronic viral hepatitis. Indications for surgery were 9 primary tumors, 18 secondary tumors and 14 benign lesions. Patients comprised 24 males and 17 females, mean age was 51.39 years. In all 41 liver resections a frozen section of the remnant liver was taken. Resectability was considered feasible below 50% macrovesicular steatosis and at < 3 Knodell modified fibrosis score. The total liver volume was calculated using the Linn formula and 15% of this volume was subtracted for an extended right hepatectomy, 60% for right hepatectomy and 40% for left hepatectomy. The ERLV was calculated by subtracting the percentage degree of macrovesicular steatosis or fibrosis from the total calculated liver volume. The ERLV was then correlated with: the amount of intraoperative blood transfusions, postoperative complications, operative time, the length of hospital stay and the mean value in the first 5 postoperative days of the total bilirubin, prothrombin activity (expressed as a percentage), and the transaminase levels. Comparisons between means and percentages were performed by ANOVA, a value of p < 0.05 was considered to be statistically significant. RESULTS: ERLV ranged from 208 ml to 801 ml. There was no correlation between the ERLV and the number of blood transfusions (p = 0.1), the peri-operative complication rate (p = 0.4), the operative time (P = 0.1) and the length of hospitalization (p = 0.9); the degree of elevation of the postoperative liver function tests did not correlate with the ERLV: total bilirubin (p = 0.1), prothrombin activity (p = 0.9), AST (p = 0.7), ALT (p = 0.4). CONCLUSION: Major hepatectomies can be safely performed if ERLV is at least 208 ml and intraoperative frozen section shows < 50% of macrovesicular steatosis and < 3 Knodell modified fibrosis score.