The current standard of care in the periprocedural management of the patient with obstructive jaundice

DL CLARKE, Y PILLAY, F ANDERSON, SR THOMSON

Department of General Surgery, Nelson R Mandela School of Medicine, University of KwaZulu Natal, Durban, South Africa

ABSTRACT

This review provides a literature-based guide to the optimal management of the patient with obstructive jaundice with emphasis placed on prevention of complications.

KEYWORDS

Obstructive jaundice – Management – Coagulation – Cholangitis – Renal failure – Biliary drainage – Jaundice

CORRESPONDENCE TO

SR Thomson, Department of Surgery, Nelson R. Mandela School of Medicine, University of KwaZulu Natal, Private Bag 7, Congella 4013, Durban, South Africa

T: +27 (0)31 2604257; F: +27 (0)31 2604389; E: thomson@ukzn.ac.za

In the modern era, patients with obstructive jaundice can expect to be operated on with a low mortality and their morbidity can be reduced by relatively simple clinical interventions.¹ This review provides a literature-based guide to the optimal management of the patient with obstructive jaundice with emphasis placed on prevention of complications.

Methodology

A search of the Pubmed database was performed using the keywords of: obstructive jaundice, complications, biliary drainage, renal failure, bactobilia, coagulation, coagulopathy and vitamin K. All studies and reviews that addressed the topic were analysed by the authors and classified according to their methodology as retrospective, prospective, descriptive or comparative. Tables were generated to summarise the relevant articles.

Results

Coagulation overview

Efficient coagulation is initiated by platelet adhesion and aggregation, which activates the coagulation cascade. The process consists of an extrinsic and intrinsic pathway of inactivate pro-enzymes, pro- and anticoagulants which, when activated, form thrombin. Vitamin K is an essential co-factor for the synthesis of the procoagulant fat-soluble factors II, VII, IX

and X, as well as the anticoagulant factors protein C, protein S and anti-thrombin III.

Vitamin K is present in green vegetables and is synthesised in the gut by luminal bacteria. Absorption is dependent on the presence of luminal bile salts and the daily requirement of vitamin K is about 1 µg/kg. The liver synthesises all the vitamin K-dependent procoagulant and anticoagulant factors. In obstructive jaundice, mal-absorption of vitamin K results in hypoprothrombinaemia and a fall in the concentration of the other vitamin K-dependent pro- and anticoagulation factors.

Laboratory assays are used to assess the state of the coagulation system. The prothrombin time expressed as the international normalised ratio (INR) and measures the vitamin K-dependent factors VII, X, prothrombin and fibrinogen levels as well as Factor V. This is the extrinsic and the common pathway. Prolongation of prothrombin time has been used to gauge the extent of vitamin K deficiency although a normal prothrombin time may mask a subclinical deficiency of vitamin K.² The activated partial thromboplastin time is used to monitor heparin therapy and measures the efficacy of Factors V, VIII, IX, X, XI and XII, prothrombin and fibrinogen and von Willebrand's factor.

Management of the coagulopathy associated with obstructive jaundice

Although the predominant defect in the hypocoagulable state associated with obstructive jaundice is the mal-

Table 1 Biliary intervention in obstructive jaundice in naive and post-intervention patients

Authors	Year	Naive source	Post intervention source	n	Culture positive	Mono- or polymicrobial predominant
Lewis <i>et al.</i> ⁵	1987	Cholecystectomy-biliary colic		100	11%	Monomicrobial
		Cholecystectomy-cholecystitis		92	44%	Monomicrobial
		Surgery cholangitis		22	95%	Polymicrobial
Nomura <i>et al.</i> ¹⁰	1999		Post PTC	128	77%	Polymicrobial
Nomura <i>et al.</i> ⁹	2000	Initial ERC for malignancy		84	75%	Monomicrobial
Rerknimitr <i>et al.</i> ¹¹	2002	Initial ERC for malignancy		69	55%	Monomicrobial
			Stent exchange	111	98%	Polymicrobial
Neve <i>et al.</i> ⁸	2003	Initial ERC for malignancy		65	26%	Monomicrobial
			Stent exchange	15	86%	NS
			PTC for failed ERC	1	100%	NS
		Operative		7	42%	NS

NS, Not stated; ERC, endoscopic retrograde cholangiography; PTC, percutaneous transhepatic cholangiography.

absorption of vitamin K, the pathogenesis is frequently multifactorial.² A combination of hepatocyte dysfunction and endotoxaemia may result in wide-spread microthrombosis and the triggering of the intrinsic cascade precipitating disseminated intravascular coagulation. Prevention is achieved by administering parenteral vitamin K which will correct the deficiency in those without chronic liver disease.²

Patients with evidence of chronic liver disease or a prolonged PTT or active haemorrhage require the administration of freeze-dried plasma to replace clotting factors.² Freeze-dried plasma supplies all missing coagulation factors including Factor V. The use of prothrombin complex concentrates in patients who continue to bleed despite freeze-dried plasma may precipitate a disseminated intravascular coagulopathy (DIC). The management of a DIC is complex and will require multicomponent therapy. Consultation and liaison with a good clinical haematologist is essential.

Cholangitis

The susceptibility to sepsis seen in obstructive jaundice is generally ascribed to a combination of gut failure with increased bacterial translocation and decreased Kupffer cell activity.^{5,4} In addition to these systemic deficits, it is apparent that there is a significant incidence of biliary colonisation in obstructive jaundice especially in the setting of choledocholithiasis.⁵⁻⁷ Although the incidence was previously thought to be much lower in malignant obstruction, between one-fourth to two-thirds of patients with malignant obstructive jaundice have been shown to have positive bile cultures at initial ERC.^{8,9} In the absence of

biliary intervention, the route of infection is thought to be translocation via the portal system. The most common organisms isolated are Gram-negative *Escherichia coli*, *Klebsiella* spp. and *Proteus* spp. and these infections tend to be monomicrobial.^{10,11} In patients who have had a previous biliary intervention, reported rates of colonisation approach 100%; significantly, these infections tend to be polymicrobial.⁸⁻¹¹ Table 1 summarises the findings of the studies which report on the incidence of bactobilia in patients with obstructive jaundice.

Antimicrobial therapy in the jaundiced patient

The choice of a prophylactic or therapeutic antimicrobial agent in the jaundiced patient must be based on the following principles. The antibiotic should be active against Gram-negative bacilli, and achieve both therapeutic systemic levels and good penetration of the biliary system. The choice of antibiotic must take into consideration whether the bacterial colonisation of the biliary tract is naive and most likely monomicrobial or whether previous intervention has resulted in complex polymicrobial colonisation that necessitates directed therapy. In the absence of a directed culture result, Ticarcillin clavulanate in combination with an aminoglycoside is traditionally used empirically.^{12,13} Quinolones, third generation cephalosporins, ureidopenicillins and carbapenams are generally effective monotherapy in the treatment of cholangitis and are excreted in the bile.¹³⁻¹⁵ In severely ill patients with septicaemia, combination therapy is preferable. If the patient does not respond to treatment directed against a Gram-negative septicaemia, thought should be given to covering Gram-positive Enterococci as

well as anaerobes, in particular *Bacteroides* spp. This is especially relevant in patients with in-dwelling biliary stents or previous bile duct-bowel anastomosis, in the elderly and in patients in a serious clinical condition.^{16,17} In the setting of cholangitis, it is essential that relief of the obstruction be seen as part of the treatment of the septic episode. In the absence of effective biliary drainage, it is unlikely that antibiotics alone will be effective. Once adequate drainage has been achieved, a short course of antibiotics is sufficient.¹⁸

Prophylactic antibiotics are used commonly in the jaundiced patient undergoing ERCP or PTC. In naïve patients, a second generation cephalosporin used either alone or in combination with an aminoglycoside is effective.¹⁹ Because of their broad and appropriate spectrum, the quinolones and imipenam are also widely used, particularly in those with prior interventions, though evidence of their superior efficacy is not overwhelming.^{14,15,18,19} Prophylactic antibiotics also reduce septic complications following biliary surgery in the jaundiced patient. Newer generation β -lactams have not proven to be of greater benefit than older agents such as cefuroxime or cefazolin. Failure to achieve biliary drainage is the most important factor in predicting post-procedural septicaemia.

The prevention of post-procedural renal failure

Renal failure secondary to obstructive jaundice may be a life-threatening complication. This risk is increased by contraction of intravascular volume when patients are starved for investigations. A number of therapeutic

interventions were advocated in the past to reduce the incidence of renal failure. These include the pre-operative administration of bile salts and the use of mannitol to ensure adequate diuresis.^{1,20} The pre-operative administration of bile salts is believed to reduce endotoxaemia, as enteric endotoxin absorption is facilitated by the absence of bile salts from the intestine. Three small comparative studies in the 1980s looked at the pre-operative administration of bile salts.^{21–25} The details of these studies are summarised in Table 2. They had small numbers and were underpowered; hence, the evidence of their efficacy is dubious. There is no convincing evidence to recommend their use in the setting under discussion.

The use of pharmacological diuresis was initially championed by Dawson.²⁴ His findings led to the wide-spread adoption of this practice. Table 3 summarises the studies that have examined this issue.^{25–27} The results are equivocal; there is evidence that mannitol may actually be harmful and force a diuresis in an inadequately volume-loaded patient. Parks *et al.*²⁶ showed the benefits of volume loading. They analysed renal function in 59 jaundiced patients undergoing biliary decompression by surgical, endoscopic or radiological means. They were volume loaded prior to intervention and had no pharmacological intervention. The overall incidence of post-procedural renal impairment was 10.2%. Two patients who developed renal failure died and four others had some impairment of renal function. Overnight intravenous fluid therapy to maintain an adequate intravascular volume is the single most important preventative measure to reduce the risk of postoperative renal dysfunction.²⁶

Table 2 Randomised studies of the renoprotective effect of lactulose and bile salts in jaundiced patients

Authors	Year	Patient groups	n	Renal failure	Other end-points	Conclusion
Dawson ²⁴	1965	Non jaundiced – biliary surgery	12	0	Fall in Cr clearance	Mannitol should be given
		Jaundiced – surgery	15	0	Fall in Cr clearance	
		Jaundiced – surgery + mannitol	7	0	Attenuated fall in Cr clearance	
Gubern <i>et al.</i> ²⁵	1988	VL	14	1	Cr clearance worse	Mannitol may be harmful
		VL + mannitol	17	2		
Parks <i>et al.</i> ²⁶	1994	VL + frusemide	10	0	2 (postoperative oliguria)	No benefit
		VL + frusemide + LDD	13	0	3 (postoperative oliguria)	
Wahbah <i>et al.</i> ²⁷	2000	VL	10	0	No difference	No benefit
		VL + LDD before surgery	10	0	No difference	No benefit
		VL + LDD + mannitol	10	0	No difference	No benefit
		VL + LDD + frusemide	10	0	Fall in Cr clearance	May be harmful

VL, Volume loading; LDD, low dose dopamine.

Table 3 Studies on the renoprotective effects of diuretic strategies in jaundiced patients

Authors	Year	Patient groups	n	Renal failure	Other end-points	Authors' conclusion
Evans <i>et al.</i> ²²	1982	No bile salts + VL	9	2		Benefit to DCA
		DCA + VL	9	0		
Pain <i>et al.</i> ²³	1985	Lactulose + VL	35	0	Diarrhoea 34%	Benefit to DCA
		DCA + VL	32	0		
		VL	35	1		
Cahill <i>et al.</i> ²¹	1987	No bile salts + mannitol	22	1	Fall Cr clearance	Benefit to DCA
		DCA + mannitol	12	0	Reduction in endotoxaemia Cr clearance maintained	
		CDCA + mannitol	12	1	Vomiting 10% Fall Cr clearance	

DCA, Deoxycholic acid; CDCA, chenodeoxycholic acid; VL, volume loading.

Jaundice as a risk factor

A number of authors have identified elevated bilirubin levels as independent predictors of mortality and morbidity following surgery in the setting of obstructive jaundice. However, the level of jaundice has not been shown to be an independent risk factor by all investigators.^{28,29} The concern that the level of jaundice in itself may be a risk factor for death has caused some centres to adopt strategies designed to lower the pre-operative bilirubin level. A variety of approaches to alleviate jaundice have evolved over the years

External biliary drainage

External drainage of the obstructed biliary system via a percutaneously placed catheter was the first technique to be employed widely. Three clinical trials using external drainage prior to surgery failed to show any benefit.^{30–32} The studies had poor stratification and randomisation regarding benign or malignant pathology or level of obstruction and had few patients undergoing major resectional surgery. External drainage universally lowered serum bilirubin levels. However, biliary colonisation occurred in about half of the patients and there were significant complications from the drainage with increased mortality in one study and increased hospital stay in another. These reports have led to the universal abandonment of external biliary drainage as a definitive strategy to improve outcome in the obstructive jaundice patient.

Internal drainage

A number of theories have been proposed to explain the lack of success associated with external biliary drainage.

External drainage does not restore biliary-enteric circulation and the enterohepatic bile salt cycle and this is believed to impact negatively on immune function. From the experimental data, it would appear that in simple models of biliary obstruction there are pathophysiological benefits to internal drainage. It has been shown in the rat bile duct ligation model that restoration of internal drainage significantly reduces mortality and improves nutritional status.³³ However, internal drainage results in almost universal colonisation of the biliary tract. In-dwelling endoprotheses promote the development of an adherent biofilm comprised of glycocalyx-enclosed microcolonies.³⁴

The clinical data

In practice, any theoretical benefit of internal drainage may be offset by procedure-related and infective biliary complications. The clinical evidence is largely retrospective, with poor case stratification in terms of the level of obstruction and the magnitude of the operative intent. The summary of these studies is shown in Table 4. Only two prospective studies have attempted to address this issue and one showed a benefit in the pre-operative drainage group.^{37,38} The randomised study of Lygidakis *et al.*³⁷ compared patients undergoing pancreaticoduodenectomy. Nineteen received an endoscopic stent and 19 no intervention prior to surgery. They showed that the pre-operative drainage group experienced less septic morbidity than the operation alone group. However, cholangitis was not an exclusion criterion and patients with active cholangitis were subjected to resectional surgery without drainage – a fact that could well account for the increased septic morbidity in the operation group.

Table 4 Studies on the effect of biliary drainage on surgical outcome

Author	Year	n	Drained (%)	Pancreatic resection (%)	Negative outcomes for drainage	Mortality (no drainage)	Mortality (drainage)	Significance
<i>Randomised external drainage</i>								
Hatfield <i>et al.</i> ³⁰	1982	57	51	9	Increase procedure-related complications	14%	15%	ND
McPherson <i>et al.</i> ³¹	1984	65	52	11	Increase catheter-related complications	19%	32%	SD
Pitt <i>et al.</i> ³²	1885	79	51	9	Longer hospital stay for drainage group	5%	8%	ND
<i>Randomised internal drainage</i>								
Lygidakis <i>et al.</i> ³⁷	1987	38	50	100	ND	10%	0%	ND
Lai <i>et al.</i> ³⁸	1994	87	43	26	ND	14%	15%	ND
<i>Retrospective internal drainage</i>								
Karsten <i>et al.</i> ³⁵	1996	241	76	81	High stent occlusion and cholangitis	1.50%	0%	ND
Heslin <i>et al.</i> ⁴⁰	1998	74	53	100	Increase infective complications	0	2.50%	ND
Povoski <i>et al.</i> ³⁹	1999	240	53	100	Increase infective complications	1.80%	7.90%	SD
Sohn <i>et al.</i> ⁴⁴	2000	567	72	100	Increase in wound infection	2.50%	1.70%	ND
Pisters <i>et al.</i> ⁴⁵	2001	300	61	100	Increase wound infection	1.10%	0.60%	ND

The Memorial Sloan Kettering Group has reported that pre-operative biliary drainage is associated with a 4-fold increase in septic morbidity in the postoperative period and a significantly increased mortality.^{39–42} However, there are large volume centres who have data to support the contention that pre-operative drainage is not necessarily a bad thing (Table 4).^{45–47} Sohn *et al.*⁴⁴ reviewed 567 patients who had been subjected to pancreaticoduodenectomy. There were no differences in intra-operative physiological behaviour and mortality rates between the two groups were similar. Pisters *et al.*^{45,46} analysed 300 consecutive patients who had undergone pancreaticoduodenectomy after neo-adjuvant chemoradiation. The pre-operative drainage group included 172 patients who were stented and 35 patients who had undergone a surgical bypass prior to referral.⁴⁵ Although wound sepsis was higher in the stented group, there was no difference in terms of overall complications or mortality which was 1%. They concluded that pre-operative biliary drainage is safe and does not increase risk in patients with obstructive jaundice and allows neo-adjuvant therapy to be administered. There are practical issues which favour pre-operative stenting and which have led to the technique being widely adopted. These include the symptomatic relief of pruritus and expected delays in definitive surgery, which in light of current trends to refer such patients to high volume centres of excellence may be significant. These delays are further exacerbated by the increasing use of neo-adjuvant multimodality treatment of pancreatic cancer. Recent meta-analyses show no difference in

risk of postoperative complications or mortality between patients undergoing pre-operative internal drainage and those who do not.^{48–50}

Conclusions

Coagulopathy sepsis and renal failure remain major problems in the patient with obstructive jaundice. Essential preventative strategies include reversal of coagulopathy by parenteral vitamin K and the replacement of clotting factors, adequate volume loading to ensure euvolaemia and appropriate antibiotic usage. Patients with established complications of cholangitis and renal failure require urgent decompression of their biliary tract. In patients with obstructive jaundice, risk stratification is important to make informed therapeutic decisions. Those with prohibitive comorbidities may only be suitable for non-operative palliation. For those patients who are candidates for curative resection, the issue of pre-operative drainage is controversial. Recommendations in the literature are flawed by institutional bias and retrospective analysis. External biliary drainage should only be used as a bridge to internal stenting. Internal drainage has experimental rational and logistical advantages. If there are anticipated delays in definitive surgery or neo-adjuvant regimens are used, internal biliary drainage protocols may be appropriate. However, close monitoring and timely re-intervention are required to minimise the risk of cholangitis or recurrent jaundice associated with this approach. For

those who fall outwith these indications, pre-operative biliary drainage is inappropriate prior to surgery outwith the setting of a randomised control trial.

Acknowledgement

The authors gratefully acknowledge the assistance of Mrs M Dinanath.

References

1. Pain JA, Cahill CJ, Bailey ME. Perioperative complications in obstructive jaundice: therapeutic considerations. *Br J Surg* 1985; **72**: 942–5.
2. Prentice CR. Acquired coagulation disorders. *Clin Haematol* 1985; **14**: 413–42.
3. Cakmakci M, Tirnaksiz B, Hayran M, Belek S, Gurbuz T, Sayek I. Effects of obstructive jaundice and external biliary diversion on bacterial translocation in rats. *Eur J Surg* 1996; **162**: 567–71.
4. Reynolds JV, Murchan P, Leonard N, Clarke P, Keane FB, Tanner WA. Gut barrier failure in experimental obstructive jaundice. *J Surg Res* 1996; **62**: 11–6.
5. Lewis RT, Goodall RG, Marien B, Park M, Lloyd-Smith W, Wiegand FM. Biliary bacteria, antibiotic use, and wound infection in surgery of the gallbladder and common bile duct. *Arch Surg* 1987; **122**: 44–7.
6. Csendes A, Burdiles P, Maluenda F, Diaz JC, Csendes P, Mitru N. Simultaneous bacteriologic assessment of bile from gallbladder and common bile duct in control subjects and patients with gallstones and common duct stones. *Arch Surg* 1996; **131**: 389–94.
7. Csendes A, Hurdiles P, Diaz JC, Maluenda F, Ferrario M, Compan A. Bacteriological studies of liver parenchyma in controls and in patients with gallstones or common bile duct stones with or without acute cholangitis. *Hepatogastroenterology* 1995; **42**: 821–6.
8. Neve R, Biswas S, Dhir V, Mohandas KM, Kelkar R, Shukla P *et al*. Bile cultures and sensitivity patterns in malignant obstructive jaundice. *Indian J Gastroenterol* 2003; **22**: 16–8.
9. Nomura T, Shirai Y, Hatakeyama K. Enterococcal bactibilia in patients with malignant biliary obstruction. *Dig Dis Sci* 2000; **45**: 2183–6.
10. Nomura T, Shirai Y, Hatakeyama K. Impact of bactibilia on the development of postoperative abdominal septic complications in patients with malignant biliary obstruction. *Int Surg* 1999; **84**: 204–8.
11. Rerknimitr R, Fogel EL, Kalayci C, Esber E, Lehman GA, Sherman S. Microbiology of bile in patients with cholangitis or cholestasis with and without plastic biliary endoprosthesis. *Gastrointest Endosc* 2002; **56**: 885–9.
12. American Society for Gastrointestinal Endoscopy (ASGE). Preparation of patients for gastrointestinal endoscopy. *Gastrointest Endosc* 1998; **48**: 691–4.
13. Westphal JF, Brogard JM. Biliary tract infections: a guide to drug treatment. *Drugs* 1999; **57**: 81–91.
14. Grant MD, Jones RC, Wilson SE, Bombeck CT, Flint LM, Jonasson O *et al*. Single dose cephalosporin prophylaxis in high-risk patients undergoing surgical treatment of the biliary tract. *Surg Gynecol Obstet* 1992; **174**: 347–54.
15. Mehal WZ, Culshaw KD, Tillotson GS, Chapman RW. Antibiotic prophylaxis for ERCP: a randomized clinical trial comparing ciprofloxacin and cefuroxime in 200 patients at high risk of cholangitis. *Eur J Gastroenterol Hepatol* 1995; **7**: 841–5.
16. Levine JG, Botet J, Kurtz RC. Microbiological analysis of sepsis complicating non-surgical biliary drainage in malignant obstruction. *Gastrointest Endosc* 1990; **36**: 364–8.
17. Leung JW, Ling TK, Chan RC, Cheung SW, Lai CW, Sung JJ *et al*. Antibiotics, biliary sepsis and bile duct stones. *Gastrointest Endosc* 1994; **40**: 716–21.
18. van Lent AU, Bartelsman JF, Tytgat GN, Speelman P, Prins JM. Duration of antibiotic therapy for cholangitis after successful endoscopic drainage of the biliary tract. *Gastrointest Endosc* 2002; **55**: 518–22.
19. Harris A, Chan AC, Torres-Viera C, Hammett R, Carr-Locke D. Meta-analysis of antibiotic prophylaxis in endoscopic retrograde cholangiopancreatography (ERCP). *Endoscopy* 1999; **31**: 718–24.
20. Wait RB, Kahng KU. Renal failure complicating obstructive jaundice. *Am J Surg* 1989; **157**: 256–63.
21. Cahill CJ, Pain JA, Bailey ME. Bile salts, endotoxin and renal function in obstructive jaundice. *Surg Gynecol Obstet* 1987; **165**: 519–22.
22. Evans HJ, Torrealba V, Hudd C, Knight M. The effect of preoperative bile salt administration on postoperative renal function in patients with obstructive jaundice. *Br J Surg* 1982; **69**: 706–8.
23. Pain JA, Cahill CJ, Gilbert JM, Johnson CD, Trapnell JE, Bailey ME. Prevention of postoperative renal dysfunction in patients with obstructive jaundice: a multicentre study of bile salts and lactulose. *Br J Surg* 1991; **78**: 467–9.
24. Dawson JL. Preoperative renal function in obstructive jaundice; the effect of mannitol. *BMJ* 1965; **1**: 82–6.
25. Gubern JM, Sancho JJ, Simo J, Sitges-Serra A. A randomized trial on the effect of mannitol on postoperative renal function in patients with obstructive jaundice. *Surgery* 1988; **103**: 39–44.
26. Parks RW, Diamond T, McCrory DC, Johnston GW, Rowlands BJ. Prospective study of postoperative renal function in obstructive jaundice and the effect of perioperative dopamine. *Br J Surg* 1994; **81**: 437–9.
27. Wahbah AM, el Hefny MO, Wafa EM, el Kharbotly W, el Enin AA, Zaglol A *et al*. Perioperative renal protection in patients with obstructive jaundice using drug combinations. *Hepatogastroenterology* 2000; **47**: 1691–4.
28. Greig JD, Krukowski ZH, Matheson NA. Surgical morbidity and mortality in one hundred and twenty-nine patients with obstructive jaundice. *Br J Surg* 1988; **75**: 216–9.
29. Bottger TC, Junginger T. Factors influencing morbidity and mortality after pancreaticoduodenectomy: critical analysis of 221 resections. *World J Surg* 1999; **23**: 164–71.
30. Hatfield AR, Tobias R, Terblanche J, Girdwood AH, Fataar S, Harries-Jones R *et al*. Preoperative external biliary drainage in obstructive jaundice. A prospective controlled clinical trial. *Lancet* 1982; **2**: 896–9.
31. McPherson GA, Benjamin IS, Hodgson HJ, Bowley NB, Allison DJ, Blumgart LH. Pre-operative percutaneous transhepatic biliary drainage: the results of a controlled trial. *Br J Surg* 1984; **71**: 371–5.
32. Pitt HA, Gomes AS, Lois JF, Mann LL, Deutsch LS, Longmire Jr WP. Does preoperative percutaneous biliary drainage reduce operative risk or increase hospital cost. *Ann Surg* 1985; **201**: 545–53.
33. Gouma DJ, Coelho JC, Schlegel JF, Li YF, Moody FG. The effect of preoperative internal and external biliary drainage on mortality of jaundiced rats. *Arch Surg* 1987; **122**: 731–4.
34. Sung JY, Leung JW, Shaffer EA, Lam K, Costerton JW. Bacterial biofilm, brown pigment stone and blockage of biliary stents. *J Gastroenterol Hepatol* 1993; **8**: 28–34.

35. Karsten TM, Allema JH, Reinders M, van Gulik TM, de Wit LT, Verbeek PC *et al*. Preoperative biliary drainage, colonisation of bile and postoperative complications in patients with tumours of the pancreatic head: a retrospective analysis of 241 consecutive patients. *Eur J Surg* 1996; **162**: 881–8.
36. Sung JY, Leung JW, Shaffer EA, Lam K, Olson ME, Costerton JW. Ascending infection of the biliary tract after surgical sphincterotomy and biliary stenting. *J Gastroenterol Hepatol* 1992; **7**: 240–5.
37. Lygidakis NJ, van der Heyde MN, Lubbers MJ. Evaluation of preoperative biliary drainage in the surgical management of pancreatic head carcinoma. *Acta Chir Scand* 1987; **153**: 665–8.
38. Lai EC, Mok FP, Fan ST, Lo CM, Chu KM, Liu CL, Wong J. Preoperative endoscopic drainage for malignant obstructive jaundice. *Br J Surg* 1994; **81**: 1195–8.
39. Povoski SP, Karpeh Jr MS, Conlon KC, Blumgart LH, Brennan MF. Association of preoperative biliary drainage with postoperative outcome following pancreaticoduodenectomy. *Ann Surg* 1999; **230**: 131–42.
40. Heslin MJ, Brooks AD, Hochwald SN, Harrison LE, Blumgart LH, Brennan MF. A preoperative biliary stent is associated with increased complications after pancreaticoduodenectomy. *Arch Surg* 1998; **133**: 149–54.
41. Hochwald SN, Burke EC, Jarnagin WR, Fong Y, Blumgart LH. Association of preoperative biliary stenting with increased postoperative infectious complications in proximal cholangiocarcinoma. *Arch Surg* 1999; **134**: 261–6.
42. Povoski SP, Karpeh Jr MS, Conlon KC, Blumgart LH, Brennan MF. Preoperative biliary drainage: impact on intraoperative bile cultures and infectious morbidity and mortality after pancreaticoduodenectomy. *J Gastrointest Surg* 1999; **3**: 496–505.
43. Isenberg G, Gouma DJ, Pisters PW. The on-going debate about perioperative biliary drainage in jaundiced patients undergoing pancreaticoduodenectomy. *Gastrointest Endosc* 2002; **56**: 310–5.
44. Sohn TA, Yeo CJ, Cameron JL, Pitt HA, Lillemoe KD. Do preoperative biliary stents increase postpancreaticoduodenectomy complications? *J Gastrointest Surg* 2000; **4**: 258–67.
45. Pisters PW, Hudec WA, Hess KR, Lee JE, Vauthey JN, Lahoti S *et al*. Effect of preoperative biliary decompression on pancreaticoduodenectomy-associated morbidity in 300 consecutive patients. *Ann Surg* 2001; **234**: 47–55.
46. Pisters PW, Hudec WA, Lee JE, Raijman I, Lahoti S, Janjan NA *et al*. Preoperative chemoradiation for patients with pancreatic cancer: toxicity of endobiliary stents. *J Clin Oncol* 2000; **18**: 860–7.
47. Sewnath ME, Birjmohun RS, Rauws EA, Huijbregtse K, Obertop H, Gouma DJ. The effect of preoperative biliary drainage on postoperative complications after pancreaticoduodenectomy. *J Am Coll Surg* 2001; **192**: 726–34.

VIDEO ASSISTED THYROID / PARATHYROID SURGERY WORKSHOP

GRIMSBY - UK

(12-13 Jan 2007 and 08-09 Jun 2007)

(6 monthly course – Jan & Jun of every year)
For Consultants and SPRs

WORKSHOP PROGRAMME

A two-day intensive course accredited for Continuing Medical Education (9 points) covering theory, developing experience, live theatre through video link and hands-on experience using animal tissue and fully equipped endoscopic stations

Booking

Julie Barnard, Course Coordinator
Nurse Practitioner, Ward B2
Diana, Princess of Wales Hospital
Scartho Road, Grimsby DN33 2BA, UK
Email: Julie.barnard@nlg.nhs.uk
Tel: +44 1472 875723
Fax: +44 1472 875434

Course Director

Ahmed Samy

MBBCH, LRCPS(Glas&Edin), MSC, MD, FRCS(Glas), FRCS(Edin), FACA(USA)
Consultant General and Vascular Surgeon
Hon. Professor of Surgery
Diana Princess of Wales Hospital, Grimsby, DN33 2BA

Invited Guest Speakers

- 1- Paolo Miccoli, Italy
- 2- John Lynn, UK
- 3- Anthony Young, UK
- 4- To be arranged

Course Fees - £550