Specialist outreach service for on-table repair of iatrogenic bile duct injuries – a new kind of ‘travelling surgeon’

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ABSTRACT

INTRODUCTION The objective of this study was to determine the outcome of on table repair of iatrogenic bile duct injuries (IBDIs) following laparoscopic cholecystectomy, by specialist hepatobiliary surgeons as an outreach service.

PATIENTS AND METHODS Prospectively collected data on IBDI managed as an outreach service, was analysed retrospectively. The Strasberg classification was used to define types of injury.

RESULTS There were 22 patients. Twenty (91%) had type E ‘classical’ excision injuries, two had types B and D. Two type E cases had co-existent vascular injury both with right hepatic artery injuries; one also had a co-existent portal vein injury. A Roux-en-Y hepaticojejunostomy was used to repair the IBDI in 21 (95%) patients. One type D injury had duct repair over a T-tube. No attempt was made to reconstruct the injured hepatic arteries, while the portal vein injury was primarily repaired. The median follow-up was 210 days (range, 47–1088 days). Two patients developed bile leak and cholangitis while another developed transient jaundice. There were no postoperative mortalities. All patients were followed up at our centre.

CONCLUSIONS Repair of IBDI as an outreach service by specialist surgeons is feasible and safe, with minimal disruption to the patient pathway. Prompt recognition and definitive management may help reduce complaints and medicolegal litigation.

KEYWORDS

Laparoscopic cholecystectomy – Strasberg classification – Bile leak – Cholangitis

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Laparoscopic cholecystectomy (LC) is one of the most commonly performed abdominal operations. Compared to open cholecystectomy, it has a significant reduction in surgical morbidity, a shorter hospital stay and a much faster postoperative return to normal activity.^{1–5} Although initially attributed to the learning curve, the incidence of iatrogenic bile duct injuries (IBDIs) has remained between 0.5–0.6%,^{4–6} approximately 17–20% of which are recognised intra-operatively.⁷ The long-term implications for the patient, surgeon and the healthcare system along with the rising cost of litigation continue to mitigate this otherwise excellent procedure.^{8,9}

The management outcome of IBDI when it occurs has been shown to be better when such injuries are managed at specialised hepatobiliary centres equipped with a multidisciplinary service.^{5,10,11} The availability of surgical expertise to repair small calibre bile ducts high within the porta hepatis, specialised radiological and endoscopic support are the main factors that contribute to the better outcome. In this setting, the long-term outcome of immediate repair of

IBDI has also been shown to be comparable with intermediate and late repair.^{5,12}

The advantages of immediate on-table repair of IBDI include a single anaesthetic and surgical procedure for the patient, and shorter hospital stay. When a specialist hepatobiliary surgeon provides the service of on-table repair as an outreach service, in addition to the added advantage of better surgical outcome, the need to transfer the patient to a tertiary centre is also abolished. As opposed to a delayed repair, an immediate on-table repair nullifies the need for prolonged external biliary drainage and the associated increased risk of sepsis. The disadvantages of such an outreach on-table repair of IBDI are these injuries often being complex, requiring high hepaticojejunostomy reconstructions for non-dilated, normal diameter ducts. Often, the extent of the ischaemic injury suffered by the bile duct is less apparent in the immediate repair setting.^{5,12} This could result in a higher incidence of anastomotic strictures requiring subsequent dilatation or surgical repair.^{5,12}

Figure 1 Strasberg classification of laparoscopic bile duct injury.

Limited information exists on the relationship between adverse events associated with LC and subsequent litigation.^{13,14} With a background knowledge that outcome of repairs of these injuries are better when done by specialised hepatobiliary surgeons,^{5,10,11} the impact of successful outreach on-table repair of IBDI following LC can only be positive.

At the Liver Unit, Queen Elizabeth Hospital, we have been providing an outreach service of on-table repair at the referring hospital where the IBDI has occurred. This study reviews the outcome of this service from January 2001 to April 2006.

Patients and Methods

Prospectively collected data on IBDIs following elective laparoscopic cholecystectomy managed with on-table repair by our team as an outreach service was analysed. The Strasberg classification was used for defining the types of injury (Fig. 1).

Outreach on-table repair was undertaken by the consultant surgeon on call for the unit on a given day along with a specialist registrar. A set of instruments which includes a Rochard's abdominal retractor and fine instruments to suture narrow calibre hepatic ducts is always available for use by the team leaving to a referring hospital at short notice. The majority of repairs of IBDI were done using a Roux-en-Y hepaticojejunostomy. All Roux-en-Y hepaticojejunostomies (using 5/0 PDS continuous or interrupted suture) were carried out following exploration of the damaged bile duct and demonstration of good bleed back from the cut bile duct edge as well as cholangiography whenever possible. Depending on the size of the bile duct, the anastomosis was aided by an anterior spatulation of the duct and the use of surgical loops. Following a warm saline lavage, the wound was closed with a wide-bore drain left in Morrison's pouch. One patient had a common bile duct repair over a T-tube for a type D injury. No attempt was made to reconstruct the injured right hepatic arteries, while the portal vein injury was primarily repaired. The 'in-hospital' postoperative management of the patients was by the

Table 1 Patient demographics and type of IBDI treated as an outreach on-table service

Repair by Queen Elizabeth Hospital team as outreach service (<i>n</i> = 22)	
Median age (years)	59 (range, 22–76)
Male:female ratio	7:15
Type of injury	
• B	1
• D	1
• E1	1
• E2	7
• E3	7
• E4	3
• E5	2

referring team who were in telephone contact with the liver unit team. Following discharge, the patients were followed up at the Liver Unit, Queen Elizabeth Hospital in Birmingham.

Results

There were 22 patients (3 from our own Trust, 19 elsewhere) managed as an outreach service. Demographics and type of injury using the Strasberg classification are given in Table 1. Seventeen of these were from hospitals within the West Midlands while five were in Wales. The median distance to the referring hospital was 25 miles (range, 2–115 miles), with the median duration to the location being 45 min (range, 16 min to 2.5 h). Following a telephone request by the referring surgeon, the on-call hepatobiliary surgeon was usually ready to leave for the referring hospital within a period of 15–30 min. The logistics of this service was aided by the familiarity the unit has in sending out multi-organ retrieval teams for procurement of transplant organs. The patient at the referring hospital remained under anaesthesia until arrival of the outreach team. On arrival at the referring centre, an on-table cholangiogram was done if not already available.

All injuries were recognised at the time of the surgery and had been converted to open procedures. Twenty (91%) of these cases had type E injuries, the remaining two being types B and D. Two type E injuries had co-existent vascular injury both with right hepatic artery injuries; one had a co-existent portal vein injury. Once the type and extent of the injury was ascertained, the majority of injuries were repaired using a Roux-en-Y hepaticojejunostomy. Twenty-

one (95%) of the IBDIs in this group had a Roux-en-Y hepaticojejunostomy biliary reconstruction. This included 20 with type E injuries and one type B injury. The patient with a type D injury underwent primary repair over a T-tube.

Postoperative morbidity included two bile leaks with cholangitis, and another patient developed transient jaundice. One patient who developed bile leak and cholangitis with a co-existent right hepatic artery injury required transfer to our centre. This patient later developed secondary haemorrhage from a false aneurysm of the right hepatic artery which was treated by embolisation. All other patients remained in the referring hospital for the duration of the postoperative recovery and, once discharged, were followed up at our centre. The median follow up was 210 days (range, 47–1088 days).

Three patients required percutaneous transhepatic cholangiography and dilatation for anastomotic strictures which occurred 6, 17 and 28 months post reconstruction. One of these patients had had a co-existent arterial injury. There were no 30-day mortalities in this group, although one 74-year-old patient died 6 months after surgery due to an unrelated cardiac cause.

Discussion

Laparoscopic approach has led to a significant improvement in overall morbidity, shorter hospital stay and earlier return to work following cholecystectomy. The higher rate of injuries with the laparoscopic method was initially attributed to the learning curve. These have, however, remained the same, a decade after the widespread acceptance of the procedure.^{9,15} It is important to recognise IBDI early and, although less common, recognition of injury at the time of the initial surgery is advantageous.⁷ The management outcome of IBDI, when it occurs, has been shown to be better when such injuries are managed at specialised hepatobiliary centres.^{5,10,11,16} The ability to provide this specialised service at a referring hospital as an outreach on-table repair of IBDI following LC has several potential advantages.

This study has shown that the new service offered by specialised hepatobiliary centres in the form of an outreach on-table procedure is both feasible and also has outcomes that are acceptable. This 'travelling hepatobiliary surgeon' provides a potential solution to the IBDI recognised on-table, which is advantageous to both the patient and the referring surgeon. For the patient, it offers the advantage of not requiring another anaesthetic for a second definitive procedure, it abolishes the need for transfer to a specialised centre in most instances, allays anxiety in the patient and results in a shorter hospital stay that does not involve prolonged bile drainage, fistula formation, sepsis and liver dysfunction.

For the referring surgeon, apart from the relief of having an additional colleague present, there is the advantage of shared definitive care for an acceptable and known complication following a routine procedure. The better outcome of repair done by a specialised hepatobiliary surgeon for IBDI following LC, has potential medicolegal advantages as well. With a better and rapid outcome at time of injury by a specialist team, there is a lower risk of litigation, which is in the interests of the referring hospital.

Immediate repair of complex bile duct injuries, however, has its own disadvantages. The bile ducts are usually of normal diameter being small (usually 3–8 mm) and thin walled. These are just the type of ducts hepatobiliary surgeons carrying out liver transplantation on a routine basis are familiar with. Access to the site of injury is achieved satisfactorily since the travelling team bring along a suitable abdominal wall retractor and instruments that are used for hepatobiliary surgery. Another disadvantage is the inability to judge the extent of ischaemic injury to the bile duct.¹² This is because ischaemic injury that results in stricturing of the bile duct manifests late (weeks, months or even years) following the injury. To reduce this, the proximal bile duct to be divided up to a level where good bleed back from the cut surface of the duct occurs. This frequently results in a high bile duct repair in the setting of normal, thin walled ducts,¹² and may explain why three patients developed late stricturing of the hepaticojejunostomy requiring radiological dilatation.

Conclusions

We have described safe, remote delivery of a specialised reconstruction service for a rare but recognised complication of laparoscopic gall bladder surgery, resulting in a definitive treatment with minimal disruption to the patient pathway, to the advantage of both patients as well as their referring surgeons.

Acknowledgement

Part of the data included in this paper has been previously presented at the Annual Meeting of the Association of Surgeons of Great Britain and Ireland, Glasgow, UK in April 2005.

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