Bile Duct Injuries in the Laparoscopic Era: The University Hospital of the West Indies Experience

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ABSTRACT

During the ten-year period July 1994 to June 2004, 20 patients were seen with iatrogenic bile duct injuries. The case notes of these patients were reviewed. Half of the patients were referred after initial surgery at other hospitals. At the University Hospital of the West Indies, bile duct injury rate was 0.8% and 1% for open and laparoscopic cholecystectomy respectively. Sixty per cent of patients' injuries resulted from open cholecystectomy and the majority of these were during emergency cholecystectomies for acute cholecystitis. A wide range of treatment modalities were employed for patients with minor bile duct injuries but Roux en Y hepaticojejunostomy was the treatment of choice for patients with transection of the common hepatic or bile duct. Follow-up was available in seven of nine patients who had major bile duct injury repair to a median of 36 months and all but one were asymptomatic and had normal liver function tests. There were two deaths because of septic complications.

Lesiones de la vía Biliar en la Era Laparoscópica: la Experiencia del HUWI

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RESUMEN

Durante el período de diez años que va de julio de 1994 a junio de 2004, fueron atendidos 20 pacientes con lesiones iatrogénicas de la vía biliar. Las notas tomadas en el caso de estos pacientes fueron sometidas a examen. La mitad de estos pacientes fueron referidos, tras haber recibido cirugía inicial en otros hospitales. En el Hospital Universitario de West Indies las tasas de lesiones del conducto biliar fueron de 0.8% y 1% para la colecistectomía abierta y laparoscópica respectivamente. El sesenta por ciento de las lesiones en los pacientes se produjo como resultado de colecistectomía abierta, y la mayor parte de estas fueron durante colecistectomías de emergencia a causa de una colecistitis aguda. Se empleo una amplia gama de modalidades de tratamiento para los pacientes con lesiones menores de la vía biliar, pero para los pacientes con transección del conducto biliar o conducto hepático común, la hepatoyeyunostomía en Y de Roux fue el tratamiento de elección. Siete de nueve pacientes sometidos a reparación quirúrgica de la lesión del conducto biliar principal tuvieron una mediana de seguimiento de 36 meses, y todos excepto uno resultaron asintomáticos y tuvieron pruebas normales del funcionamiento del hígado. Se produjeron dos muertes a causa de complicaciones sépticas.

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INTRODUCTION

Laparoscopic cholecystectomy was introduced at the University Hospital of the West Indies (UHWI) in 1993 and since then it has become the preferred approach for the management of patients with symptomatic cholelithiasis. It is well recognized that the introduction of laparoscopic cholecystectomy was associated with an increase in the incidence of bile duct injuries (1), and though the experience in the management of benign bile duct strictures (the majority of which were from iatrogenic bile duct injuries) has been reported from UHWI in the pre-laparoscopic era (2), this has not been done since the introduction of laparoscopic cholecystectomy. Thus this retrospective study was undertaken to determine the nature and surgical management of bile duct injuries seen at the UHWI since the introduction of laparoscopic cholecystectomy.

The importance of adequate management of bile duct injuries lies in the fact that suboptimal treatment can result in

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biliary peritonitis, sepsis and multi-organ failure, and death initially, or recurrent episodes of ascending cholangitis, secondary biliary cirrhosis and the consequences of portal hypertension later. Despite the quality of life scores in patients with adequate treatment of bile duct injuries (with exception of the psychological domain) being comparable to those in whom uncomplicated laparoscopy had been performed as well as in healthy controls (3), patients with bile duct injuries often have significant morbidity with prolonged hospitalization, increased financial burden and occasional mortality (4). For the surgeons involved, it is an important source of medical malpractice litigation (5). Thus the prevention of these injuries is the most important form of treatment possible.

SUBJECTS AND METHODS

The records of all the patients treated during the period July 1994 to June 2004 with injuries to the extrahepatic biliary tree were examined and data extracted using a pre-designed proforma. The patients were identified by a search of the Department of Surgery operative audit database using key words 'bile duct injury', 'hepaticojejunostomy', and 'T- tube insertion'. This was supplemented by a search of the prospective database of all the patients subjected to endoscopic retrograde cholangiopancreatography (ERCP) during this period. Data extracted included age, gender, type of procedure, level of staff operating, type of injury, timing and method of discovery of bile duct injury, type of treatment offered and outcome.

RESULTS

A total of 20 patients were identified during the 10-year period. Nineteen were female, age ranging from 22–71 years while the single male was 15 years old. Ten cases had their initial surgery at UHWI (four laparoscopic and six open cholecystectomy) while the other 10 patients were referred from other hospitals. Five of the ten referred patients had attempted repair *via* laparotomy prior to transfer. During the period under review there were 717 open and 350 laparoscopic cholecystectomies performed at the UHWI giving injury rate of 0.8% and 1% respectively (Table). These 20 cases comprised 12 cases from open cholecystectomy, five cases where laparoscopic cholecystectomy was completed without injury being suspected and three cases where bile duct injury was diagnosed at laparoscopic cholecystectomy and the procedure converted to laparotomy for completion of the cholecystectomy and treatment of the bile duct injury. Thirteen cases were from elective operations while seven, all open cholecystectomies, were emergencies. Half of all operations were performed by consultant staff and this includes all of those referred. Intra-operative cholangiogram was not used in any of the patients having laparoscopic cholecystectomy while it was used selectively in cases undergoing open cholecystectomy. There were no cases of bile duct injuries in patients with sickle cell disease.

Table: Distribution of cholecystectomy and bile duct injury seen during the period under review

	Open cholecystectomy	Laparoscopic cholecystectomy	Total
Cholecystectomy	717	350	1067
BDI	12	8	20
Elective	5	7	12
Emergency	7	1	8

BDI = Bile duct injuries

The most common type of injury encountered was transection of the common hepatic duct or the common bile duct in the vicinity of the cystic duct junction (Figs. 1, 2).

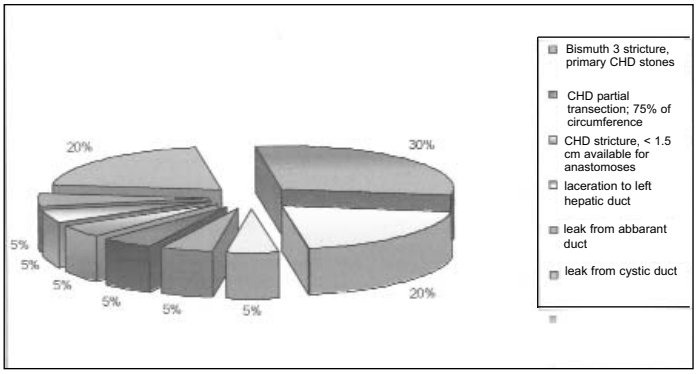

Fig. 1: Types of bile duct injuries encountered at UHWI.

Fig. 2: Endoscopic retrograde cholangiopancreatography of major bile duct injury from open cholecystectomy; incidentally, retained common bile duct stones are also present (circle).

This accounted for seven cases while two additional patients had Bismuth 3 strictures having had operative repair attempted at other hospitals and presented one month and 18 months post cholecystectomy. Leakage from the cystic duct stump was seen in four cases (Fig. 3). Linear tears in the common bile duct were seen in four cases while one patient suffered a laceration to the left hepatic duct. The site of injury in two cases was not identified as one patient died from sepsis before re-exploration and the other patient was

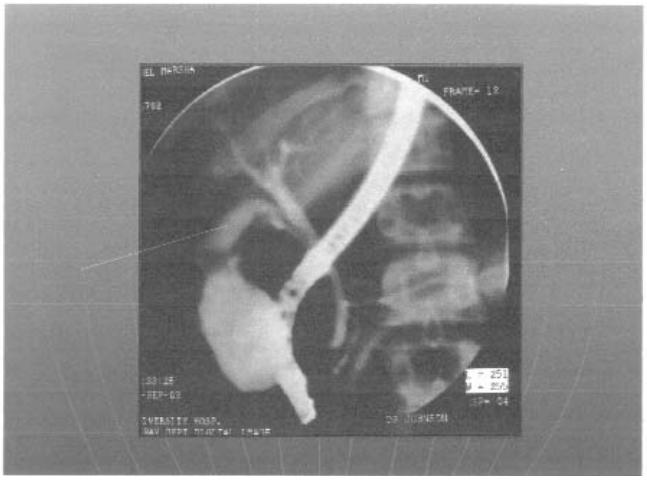

Fig. 3: Endoscopic retrograde cholangiopancreatography showing leaking from the cystic duct stump (arrow) after laparoscopic cholecystectomy. This patient was successfully managed with common bile duct stenting for six weeks. Repeat ERCP done at the time of stent removal was normal.

explored at laparotomy but an intra-operative and post-operative T-tube cholangiogram done did not show evidence of a bile leak even though there was approximately three litres of bile in the peritoneal cavity. She had a presumed diagnosis of leak from an aberrant bile duct.

Nine patients, because of major bile duct injuries required Roux-en Y hepaticojejunostomy. Three of these cases occurred during laparoscopic cholecystectomy (one at UHWI) and the other six at other hospitals during open cholecystectomy. Four of these patients had trans-anastomotic stents placed which were removed at a variable time. There was one death in this group from biliary peritonitis and in spite of re-laparotomy, she developed multiple organ failure. The other patients were treated by suturing of the laceration over a T-tube (four cases), ERCP and stenting (two cases), laparotomy and T-tube placement (two cases) and one patient was managed with ultrasound guided drains only while the final patient was managed with direct suturing to the left hepatic duct (Fig. 4).

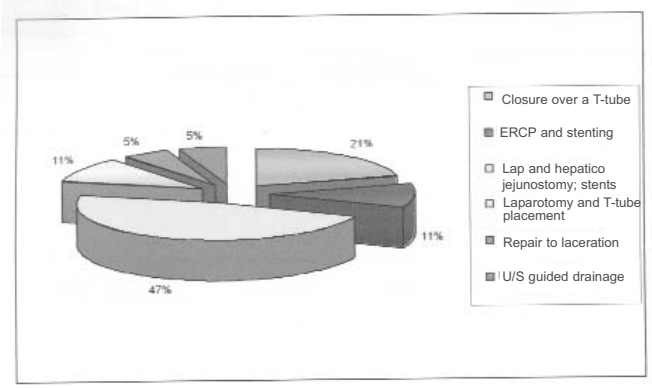

Fig. 4: Treatment of bile duct injuries

Of the 18 patients discharged, seven patients who had major bile duct injury and hepaticojejunostomy were being seen regularly for long term follow-up. These patients were a median of thirty-six months from the time of repair (range: two months to ten years). Six were asymptomatic and had normal liver function tests while the seventh, though asymptomatic had persistently mild deranged liver function tests. Patients who had minor bile duct injuries were not offered long term follow-up.

DISCUSSION

The incidence of bile duct injuries is often difficult to quantify but commonly accepted to be 0.1–0.2% of all open cholecystectomies and 0.5–0.8% of all cases of laparoscopic cholecystectomy (6, 7). That 60 per cent of the cases of bile duct injuries occurred during open cholecystectomy is reflective of the prevalence of this procedure in treating symptomatic cholelithiasis especially those requiring emergency cholecystectomy, and this pattern is reflective of other third world countries (8). In developed countries, laparoscopic cholecystectomy accounts for well over 85 per cent of all cholecystectomies (9). Like most other series (10, 11), the majority of patients in this review had cholecystectomy completed without the injury being suspected and of those referred, a significant number had prior laparotomy and an attempt at repair at the hospital of injury. The benefits of exploratory laparotomy prior to transfer should be carefully considered at these peripheral hospitals if the appropriate pre-operative investigations and surgical expertise are not readily available to manage these patients. While the majority of bile duct injuries detected intra-operatively were repaired at the institutions at which they occurred (12), there is enough evidence to suggest that improved survival is seen when the repair is performed by a different and experienced surgeon at an institution experienced in bile duct injury repair rather than the one performing the initial cholecystectomy (12, 13).

In laparoscopic cholecystectomy, biliary injuries are more likely to occur when the procedure is difficult because of bleeding, acute inflammation or dense chronic inflammation (14). Inexperience on the part of the operator is also a risk factor (15). The protective effect of routine intra-operative cholangiogram continues to be controversial (16) but two large series have provided some evidence in support of its performance (5, 17). It warrants further study.

Transected common bile duct in the vicinity of the cystic duct continues to be the most common type of major bile duct injury encountered (17, 18), and most of these injuries are due a misinterpretation of the anatomy in and around Calot's triangle (14). These injuries are best repaired with a tension free mucosa-to-mucosa Roux en Y hepaticojejunostomy which gives excellent results and similar quality of life when compared to patients undergoing uneventful cholecystectomy or to national norms (19). Increasingly radiological and endoscopic measures are being used to

treat successfully selected cases of minor bile duct injuries (17) as was seen in some of our cases.

Patients with major bile duct injuries need long term follow-up as they have the potential for the development of late complications including recurrent episodes of ascending cholangitis, secondary biliary cirrhosis and the consequences of portal hypertension. There is evidence to suggest that they are three times more likely to die during the first few years after cholecystectomy compared to patients without bile duct injury (13). However, death as a result of bile duct injury is uncommon (13), and sepsis from anastomotic complications or progressive liver failure because of persistent obstruction are more likely causes of death. While in this series of cases follow-up was not complete, those who attended had good intermediate outcome.

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