

Lesions of the common bile duct following cholecystectomy: Treatment strategies

*Corresponding Author: **M Boukhene**

Email: mohamedboukhene@yahoo.fr

M Boukhene^{1*}; A Lamara¹; S Medjahdi¹; S Benyarbeh¹; M Gadda¹; S Zatir²; S Haddad²; S Lounici²

¹Department of General Surgery, Constantine Regional Military University Hospital, Algeria.

²Department of General Surgery, Central Army Hospital, Algeria.

Abstract

Introduction: Biliary tract injury is a rare but serious complication of cholecystectomy that can have disastrous consequences in terms of morbidity, mortality and healthcare costs. Furthermore, these injuries have an impact on the long-term quality of life of young patients, which must be taken into consideration before any biliary repair is performed. The aim of our study is to highlight the difficulties encountered during these iterative repairs and to evaluate their outcomes.

Method: Eighty patients who had suffered a surgical wound to the bile duct during laparoscopic cholecystectomy were referred to us. As part of this retrospective study, we took into account the severity of the injuries, the number of repairs, the failures of iterative bile duct repair, and the impact on patients' quality of life.

Results: In most cases, these were young women who underwent surgery for gallstones. Intraoperative cholangiography was not performed in 76% of patients. In 34 patients, the lesion was identified intraoperatively. In the other patients, conversion and/or reoperation was required. We received these patients for complications often associated with this condition (peritonitis, deep suppuration, external biliary fistulas and jaundice). Some patients were referred by the surgeon responsible for the wound after one or more attempts at repair or drainage. Others were treated as emergencies following complications (jaundice, peritonitis, external biliary fistula) or even multiple organ failure (renal and hepatic). The severity of these injuries is exacerbated by the infectious syndrome associated with fibrosis resulting from repeated repairs (64%). Initially, we treated the complications: 28 surgical procedures for biliary peritonitis and 12 percutaneous drainages. In three patients, we performed early biliary repair using a Roux-en-Y loop. Twelve patients required dialysis for acute renal failure and two patients required assisted ventilation in intensive care for pulmonary embolism. Definitive repair was performed on average two months later, using a bilio-digestive bypass

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on a Y-shaped loop. A young female patient developed secondary biliary cirrhosis, which was treated with a liver transplant (right lobe from a living related donor). The overall morbidity rate was 36.5%, with a long hospital stay and delayed return to normal activities.

Conclusion: Surgical reconstruction yields excellent or good results in the vast majority of patients with post-cholecystectomy bile duct injury. A longer delay before definitive repair and a previous repair attempt were significant independent predictors of an unsatisfactory long-term outcome. It is therefore strongly recommended that patients be referred promptly to referral centres. tertiary centres with experienced hepatobiliary surgeons for definitive treatment in order to achieve satisfactory long-term results.

Introduction

Bile Ducts Injury (BDI) during laparoscopic cholecystectomy, which causes significant morbidity and mortality, reduces long-term survival and quality of life and exposes surgeons to legal action. The frequency of these accidents is unclear due to underreporting of such events. The circumstances of these injuries, which are often not mentioned in surgical reports, are frequently accompanied by serious lesions, infectious syndromes and biliary peritonitis, which can lead to visceral failure (hepatic or renal) and malnutrition. Repeated attempts at repair by the team responsible for the trauma exacerbate the injuries and make their management more difficult.

Methods

We report the results of a retrospective study on biliary repair following iatrogenic trauma during cholecystectomy. Patients were referred to us by the surgeons responsible for the injuries, either because of failed attempts at repair or because of complications. Other patients were seen on an emergency basis for septic complications and/or postoperative cholestasis. Some patients required life-saving procedures due to the severity of their condition (biliary drainage, collection drainage, peritoneal lavage). All patients underwent a systematic examination including an assessment of various functions, an abdominal CT scan and an MRI cholangiogram. We took into account the type and severity of the biliary injuries, whether or not Intraoperative Cholangiography (IOC) was performed, the number of repair attempts and the results of the final repairs.

Results

In this retrospective study, we included 80 patients: 65 women (81.25%) and 15 men (18.75%), with a mean age of 43 years (range 24-63 years). We studied patient records and surgical reports provided by the surgeons responsible for the trauma. Laparoscopic cholecystectomy was performed in 73 patients for gallstones, in three patients for gallbladder polyps, and in four patients for other reasons. Biliary injury was observed intraoperatively in 32 patients (40%). Repairs were performed by the same surgeon. The repair method is not clearly identified in the surgical protocols: 13 Kehr drain sutures, 16 contact drains and attempted biliary-digestive diversion in three patients.

Operative difficulty during cholecystectomy is mentioned in 12 cases. In 26 patients (32.5%), conversion and reoperation are mentioned without any mention of trauma. Intraoperative cholangiography was performed in 19 patients (23.75%). Repeated reoperation for biliary fistula and deep suppuration was reported in 17 patients (21.25%). The diagnosis was made in the early postoperative period in 26 patients (32.5%) based on clinical findings: postoperative jaundice in 12 patients, external biliary fistula in 19 patients, and biliary peritonitis in 14 patients. In the majority of cases, there was a combination of signs of infection and jaundice.

Forty-four patients (55%) underwent early reoperation and thirty-six (45%) underwent more than two early reoperations for septic complications (Table 1).

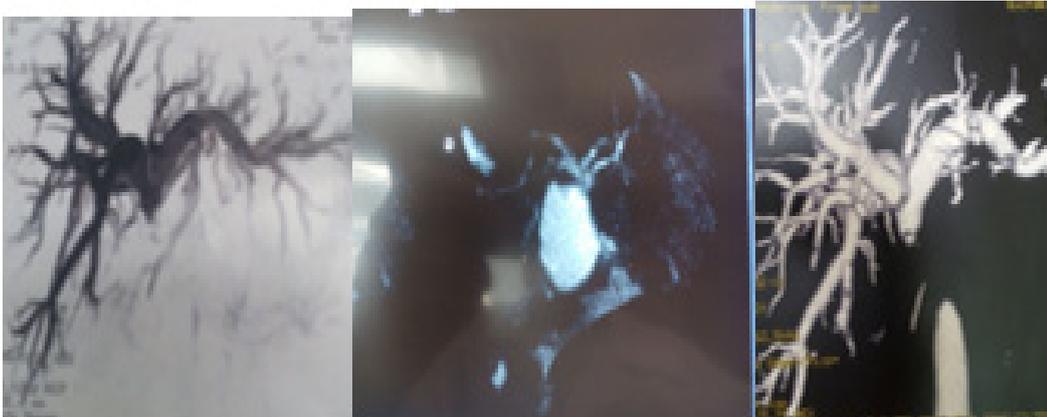


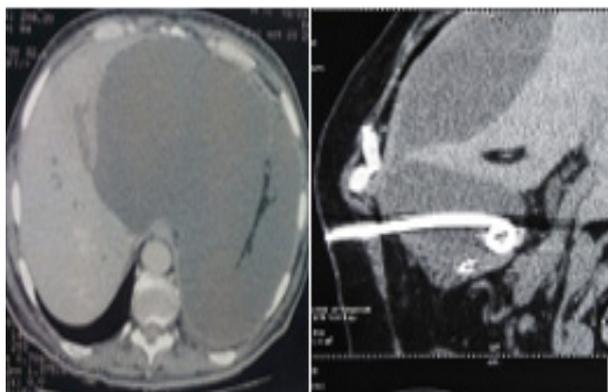
Figure 1: Radiological images of biliary wounds.

Table 1: General characteristics of patients.

Characteristics		Sex ratio
Women	65	4.33
Men	15	
Hospital of origin	N	%
Intraoperative diagnosis	32	40
Drain repair	13	Operative report data
Contact drainage	16	
Biliary-digestive diversion	3	
CPO	19	23,75
Conversion	26	32.5
Revision surgery	44	55
Type of hospitalisation (HMRUC) and emergency admission	N	%
Emergency	22	50
Postoperative peritonitis	14	17.5
Deep suppuration	17	21,25
Jaundice	12	15
External biliary fistula	19	23 .75
Surgical revision	27	67.5
Cleaning + drainage	23	
Repair (ABD)	4	
Percutaneous drainage	11	13.75

The clinical picture on arrival was varied. It involved a combination of several clinical elements: post-operative jaundice in 12 patients, signs of biliary peritonitis in 14 patients, a biloma in 9 patients, and in 17 patients, signs of deep suppuration with deterioration in general health, infectious syndrome, hepatic failure, and renal failure. External biliary fistula was also noted in 19 patients, as well as severe gastrointestinal haemorrhage and pulmonary embolism (Table 1 & Figure 1).

Analysis of the files and reports sent by the surgeons responsible for the trauma revealed that intraoperative cholangiography had been performed nineteen times and that biliary injury had been recognised intraoperatively thirty-two times (40%). Thirty-one patients (38.75%) were treated urgently for septic complications and intra-abdominal suppuration. Twenty-seven surgical procedures, peritoneal lavage and drainage were performed (Figure 2).

**Figure 2:** Post-operative collection.

In four patients, the observation of high lesions on convergence during recovery prompted us to perform a bilio-digestive anastomosis, despite the emergency situation. Seven patients required haemodialysis for acute renal failure. One patient required assisted ventilation in intensive care due to severe pulmonary embolism. Systematic radiological assessment (CT and MRI) revealed various and often associated lesions (Table 2).

Table 2: Type of lesion and type of reparation.

Type of lesion		Type of reparation
Total section of the VBP	12	Repair on T-drain
Lateral wound of the common hepatic duct	11	4 Repair on T-drain 7 AHJ 'Y'
Right canal wound	11	AHJ 'Y'
Biliary convergence section (loss of length)	16	8 AHJ separate channels 8 AHJ reconstruction
Convergence ligature flush with the edge	15	8 AHJ separate channels 7 AHJ reconstruction
Extensive fibrosis	10	Hilar plate/AHJ separate channels
Biliary-digestive fistula	04	Disconnection/AHJ
Cirrhosis (complication of iterative repairs)	01	TH: Right liver//DOV

AHJ: Roux-en-Y Hepaticojejunal Anastomosis; TH: Liver transplant; DOV: Related living donor.

The time to definitive repair ranged from two to three months in three patients who underwent early repair immediately following the trauma. A young female patient with secondary biliary cirrhosis, who had undergone several unsuccessful biliary-digestive repairs, underwent a right liver transplant from a related living donor. No deaths were recorded. Twenty-two patients experienced postoperative complications, including seven cases of organ failure, one early reoperation for deep suppuration, and one percutaneous drainage of a subphrenic collection. The hospital stay ranged from 10 to 29 days (average 19 days), with a return to normal activity after 3 to 9 months. Two stenoses were observed at 14 and 18 months (Table 3).

Discussion

Management of BDI is a multidisciplinary task involving gastroenterologist, interventional radiologist and surgeon. Their roles are complementary to each other. A recent study [1] showed that patients with bile duct injuries were treated most commonly by endoscopists (40%), followed by surgeons (36%) and interventional radiologists (24%). However, success rates were higher for surgery (88%) compared with either endoscopy (76%) or interventional radiology (50%). The goal of surgical repair of the BDI is to restore the biliary-enteric continuity with long-term symptom-free and intervention-free period. In our institution, we have always chosen Roux-en-Y HJ for surgical repair of major BDI. Our results are in accordance with other reports [2-4] which have shown that Roux-en-Y HJ is the most frequently performed surgical reconstruction of BDI and has the best long-term outcome.

Another important observation in the current study was the long injury-repair interval (median 6 months), which was associated with a long-term unsatisfactory outcome (P=0.03). This can be explained by the fact that a prolonged delay be-

Table 3: Morbidity.

Clavien -Dindo	Morbidity	N	%
1	Overall morbidity	27	33,75
	Lung diseases	12	15
2	Haemostasis disorders	8	10
	Metabolic disorders	15	18,75
	Wall suppuration	13	16,25
3	Visceral failure	7	8,75
	Pulmonary embolism	1	1,25
	Early reoperation	1	1,25
	Radiological drainage	1	1,25
	Resumption of activity	3-9 month	

tween BDI and definitive repair often leads to deterioration of the patient's overall clinical condition due to jaundice, recurrent cholangitis, and development of SBC which may increase the short- and long-term complication rates. This longer interval before surgical repair may be due to delay in referral as well as by long waiting lists for operation in our Institution. Being a low to mid-income state, the health care facilities are still lacking in our state with very few tertiary referral centers having experienced hepatobiliary surgeon. It leads to patient congestion in our department. It is usually caused by misinterpretation of normal anatomy or anatomical variations, resulting in lacerations, thermal injuries, occlusion by clips, transection or associated injuries, particularly vascular injuries, with serious consequences [5-9]. Through this retrospective study, we found several similarities with previously published observations: these are young patients who underwent surgery for a benign condition. The data concerning the various stages of the initial surgery do not allow us to clearly identify the factors that contributed to and/or caused the trauma. Nevertheless, certain factors make it possible to anticipate the circumstances and guide the intraoperative diagnosis of a biliary wound, in particular conversions and early surgical revisions. Only 43.2% of lesions were recognised and mentioned in the surgical reports. The detection of a wound during surgery is essential to ensure successful repair. However, only 25 to 32.4% of biliary injuries are recognised intraoperatively [7]. According to Fletcher's study, CPO significantly reduces the risk of injury [10]. However, CPO should not replace careful dissection and delineation of the anatomy; injury can occur before or after its performance. The success of the initial repair influences the duration of the disease and long-term outcomes [11].

The success of the procedure depends on the quality of the initial repair and expertise in hepatobiliary surgery. Initial repairs are usually performed by the surgeon in charge, which can lead to serious complications, loss of bile duct length, and even death. Wan Yee Lau [12] conducted a review of the literature: of 88 TVBs after laparoscopy, 17% were repaired by the primary surgeon; morbidity and mortality were 58% and 1.6% vs. 4% and 0% when the repair was performed at a referral centre. The mortality rate can reach 11% when the repair is performed by the surgeon responsible for the trauma [13]. The number of repair attempts before transfer to a specialised centre is a significant predictor of poor prognosis [14]. Treatment depends on the type of lesions. End-to-end anastomoses cause late stenosis in 50 to 60% of cases, due to underestimation of ischaemic le-

sions of the bile ducts or the creation of an anastomosis under tension.

In the long term, obstruction and infectious complications can lead to liver abscesses and even cirrhosis. This was the case for one of our patients, in whom complicated iterative repairs of the biliary-digestive anastomosis and secondary biliary cirrhosis failed. This patient underwent a liver transplant from a living related donor. It is rare for a Roux-en-Y biliary anastomosis to be associated with cholangitis without stenosis [15].

The long-term outcomes of biliary injuries following surgical treatment depend mainly on the location of the injury, the presence of local inflammation at the time of repair, the type of biliary reconstruction, and the surgeon's experience. Repeated biliary repair leads to loss of biliary tissue and can transform an E1-type injury into an E4-type injury. Each failed repair is associated with loss of substance and loss of length of the biliary tract, making secondary repair difficult [16-18].

Combined vascular and biliary lesions, which cause acute hepatitis, require liver transplantation. The timing of definitive repair remains controversial. Most specialists recommend delayed definitive repair in order to better assess the extent of ischaemic damage and limit the extent of excision, while performing a biliary-digestive anastomosis in a well-vascularised area. However, with this option, the biliary drain is left in place for a long period of time, which can lead to infectious complications or even sclerosis. In three patients, we were forced to repair wounds within less than fifteen days, after several attempts at the original healthcare facility. The extent of the lesions did not allow us to ensure effective drainage of both bile ducts. We were able to perform biliary-digestive anastomoses on separate ducts using a Roux-en-Y loop.

The surgeon's experience is considered to be a factor influencing outcomes, particularly the occurrence of post-operative stenosis and secondary biliary cirrhosis. After several attempts at repair by the surgeon responsible for the trauma and a Y-shaped digestive biliary bypass at a referral centre, this patient developed secondary cirrhosis. She was referred to us for a liver transplant. She underwent a liver transplant (right lobe from a related living donor). This transplant was not easy due to the severity of portal hypertension and, above all, adhesions related to repeated surgical procedures. The recommendations are clear: any bile duct injury must be referred to a hepatobiliary centre.

Conclusion

Surgical reconstruction affords excellent or good results for the vast majority of patients with post-cholecystectomy BDI. Longer delay in definitive repair and previous attempt at repair were significant independent predictors for the occurrence of unsatisfactory long-term outcome. So, early referral of patients to tertiary referral centers having experienced hepatobiliary surgeon for definitive management is highly recommended to achieve satisfactory long-term outcome.

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