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Original Research Article

Surgical management and follow up of patients with bile duct injuries in tertiary health care institute

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ABSTRACT

Background: Bile duct injury is an iatrogenic catastrophe associated with significant mortality, morbidity, decrease quality of life and higher rates of subsequent litigation. We conducted a study to analyse the presentation and pattern of bile duct injury managed at our surgical unit. Operative details, type of surgery, complications associated with the repair and Follow up in terms of liver function tests.
Methods: The study included evaluation of 56 patients who had suffered bile duct injuries and then were subsequently being managed surgically at our institute retrospectively from October-2009 to 2012 and prospectively onwards till October- 2014. The mean follow up period in case of our study was 26.8 months. The follow up LFTs were performed at regular intervals. MRCP was used as a gold standard investigation.
Results: jaundice (64.2%) was the most common presentation. Injuries noted were, type E1 in 16 (28.5%),type E2 in 11(19.6%), type E3 in 1 (1.8%), type A in 2 (3.6%), type B in 3 (5.4%), type C in 5 (9%) and type D in 18 (32.1%) of patients. Roux-en-y Hepatico-jejunostomy was the common definitive repair performed (85.7%) with various modifications. The mean bilirubin levels and ALP levels showed a downward trend in follow up .5 patients were readmitted with features of cholangitis in which 2 patients were reoperated and 3 patients were managed conservatively, 2 patients died.
Conclusions: The management of patients with BDI is a challenge for a surgeon and often requires the skills of experienced hepatobiliary surgeons at tertiary referral canters.

Keywords: ALP, Bileduct injuries, Hepatico-jejunostomy, LFT

INTRODUCTION

Bileduct injuries are defined as disruption of extrahepatic biliary system which may include ligation, avulsion, resection and narrowing of biliary tree. Most often bile duct injury develops during cholecystectomy, though it may be associated with other surgical operations, abdominal traumas and other related diseases too. After the widespread of laparoscopic cholecystectomy there has been two fold increase in bile duct injuries. The incidence of bile duct injuries from the era of open cholecystectomy to the laparoscopic have risen from 0.1%-0.2% to 0.4% to 0.7%.[1] Untreated biliary injuries can lead to serious complications such as biliary cirrhosis, hepatic failure and death. These injuries are a disaster for both patient and surgeon because of associated morbidity, prolonged hospitalization and mortality. Various risk factors are associated with biliary injury.one of the risk factor

includes training and inexperience of operating surgeon. This was called the ''learning curve'' effect.[2]

Other factors responsible for current rates of injury include patient related local risk factors. Biliary duct injuries are more likely to occur during difficult cholecystectomies. The incidence of injury in laparoscopic cholecystectomy for acute cholecystitis is reported to be three times higher than that for elective laparoscopic cholecystectomy and twice as high as that for open cholecystectomy for acute cholecystitis. Other factors are chronic inflammation with dense scarring. Operative bleeding obscuring the field, fat in the portal area. The role of obesity is difficult to evaluate, because it is often present in patients with cholelithiasis.

Aberrant anatomy is another risk factor associated with bile duct injuries. The aberrant right hepatic duct anomaly is the most common problem. These injuries are probably under reported because occlusion of aberrant duct may be asymptomatic.[3] A low insertion of a right segmental/sectorial duct into the common bile duct or a short cystic duct which joins the right biliary system presenting in 3.2% to 36.1% of the population studied, are important variants that place the right at risk of being injured.[4] An unidentified segmental/sectorial duct injury leads to an intricate post-operative course after injury, often complicated by bile peritonitis, sepsis or even secondary vascular complication.

Prior studies have estimated that 19-39% of the population have anatomic variation of the biliary tree.[5] These aberrant ducts can be mistaken as cystic duct and clipped or cauterized inadvertently. The most common biliary anomaly, occurring in 4-8% of the patients, is an aberrant insertion of the right posterior duct in the biliary tree, usually inserting close to the cystic duct.[6]This low lying duct provides the only drainage for segment 6 and 7, as such injury to the right posterior sectorial duct can present as biliary fistula, Bilioma, abdominal pain or peritonitis. Many patients however remain asymptomatic and thus unreported. The first priority in a patient with biliary duct injury is the control of sepsis-peritoneal and biliary. This can be accomplished non-surgically in almost all cases. Endoscopic technique is recommended as an initial treatment of bile duct injury.[7] When these techniques are not effective surgical management is considered. Management depends on the timing of recognition of injury, the extent of bile duct injury, the patient's condition and the availability of experienced hepatobiliary surgeon. Immediate detection and repair are associated with an improved outcome and the minimal standard of care after recognition of a bile duct injury is immediate referral to a surgeon experienced in bile duct injury repair.

The basic purpose of surgical treatment is to reconstruct the proper bile flow to the gastrointestinal tract. Roux-en-Y Hepatico-jejunostomy (HJ) is the most frequently recommended type of reconstruction. End to End Ductal Anastomosis (EE) is used very seldom in the surgical treatment of bile duct injuries. However, such reconstructions are performed during hepatic transplantation with good results.[8] Some investigators recommend EE because it is more physiological reconstructions of bile duct following injury but is associated with a high risk of stricture recurrence within the anastomosis.[9]

Percutaneous transhepatic cholangiography with fine needle is performed followed by intra-biliary catheterization and attempts to cross the obstruction of bile ducts. If it is possible to reach the CBD, interno-external drainage is established and catheter left for temporary external drainage. If technique fails to cross the obstruction, an external catheter is placed for external drainage and resolution of Bilioma cavity is performed or separate CT guided drainage of Bilioma is performed. Balloonplasty of strictures (dia 5-8 mm) is performed when necessary and stents placed via guide wires to restore the continuity of ducts. Stents are removed after 6wks and subsequently every 3 monthly. In case of endoscopic therapy, endoscopic cholangiography is performed by Trans papillary retrograde catheterization of CBD and attempted cannulation of stricture/obstruction. If cannulation is successful, a stent is placed and if failed PTC and percutaneous drainage is performed.

The objectives of our study were to analyse the presentation and pattern of bile duct injury managed at our surgical unit. Operative details, type of surgery, complications associated with the repair and Follow up in terms of liver function tests.

METHODS

The study was conducted at Sher-i-Kashmir Institute of Medical Sciences Srinagar in our department of surgical gastroenterology and included all cases of bile duct injuries managed from October 2009 to October 2014, which included patients referred to our surgical unit from various secondary health care institutes as well as the patients who suffered biliary duct Injuries within our institute after various surgical operations and abdominal traumas. It was an observational study that included evaluation of all patients treated retrospectively from October 2009 to 2012 and prospectively onwards till October 2014.

All patients referred to us after suffering a bile duct injury were included in the study and patients who were managed by endoscopic stenting were excluded from the study.

A detailed summary was based on proforma made to evaluate cases of bile duct injury. Only patients treated with surgical interventions were included in the study. In retrospective analysis, all data stored prospectively in past was utilized for drawing results and phone numbers

drawn from their records were used to contact the patients and make their follow up possible. The clinical presentation, demographic details, mode of injury, pattern of injury, place of primary surgery and type of primary surgery causing the bile duct injury was recorded. MRCP was used as a gold standard to classify the type of injury. The bile duct injuries were classified according to Strasberg's classification. A baseline investigation, USG abdomen was performed in every patient. ERCP was attempted in every patient prior to surgery in order to get the therapeutic benefit, if possible to the patients prior to surgery and after thorough evaluation patients were prepared for surgery. Patients admitted with cholangitis or Bilioma formations with subsequent peritonitis features were managed by I.V antibiotics, adequate hydration, correction of coagulation profiles and placement of T tubes and drains or percutaneous drainage (pigtail catheters) prior to definitive surgeries. If there was evidence of ongoing bile leak or sepsis, a period of 4 to 6 weeks was usually allowed to pass before repair, with the aim of reducing associated inflammation. During the intervening time, patients were discharged with catheters or drains in place and then readmitted for definitive repair.[10]

All the patients were operated and various operative procedures were performed with Hepaticojejunostomy performed in maximum no of patients. The anastomosis between roux jejunal limb and duct was performed using single layered absorbable sutures material (vicryl) 4-0, 5-0 with or without external stenting. Internal access loops were performed in some patients. Stents Were removed after performing T tube cholangiograms in the patients.

Perioperative morbidity and mortality including intraoperative details in terms of operative findings were studied. A follow up protocol in terms of liver function (LFT), recurrence of jaundice or cholangitis and requirements of reoperating was studied and assessment of quality of life was made in the operated patients. The duration of follow-up was calculated from the date of definitive surgical management. Statistical analysis was performed using standard statistical methods using SPSS version 20. Quantitative variables were analysed using ANOVA while as qualitative variables were analysed using Pearson's chi square tests.

RESULTS

Our study included 56 patients who had suffered bile duct injuries at peripheral hospitals and then were subsequently being managed surgically in the department of surgical gastroenterology skims soura. It was a prospective and retrospective study over a period of 5 years. All the patients had sustained bile duct injuries during the primary surgical procedures and all were cholecystectomies. Out of 56 patients 44 were females (78.6%) and 12 were males (21.4%) Table 1. Out of 56 patients, 47 had underwent open cholecystectomies, 4 had underwent lap cholecystectomies and 5 had underwent open cholecystectomies with CBD exploration Table 2.

Figure 1: Hepaticojejunostomy.

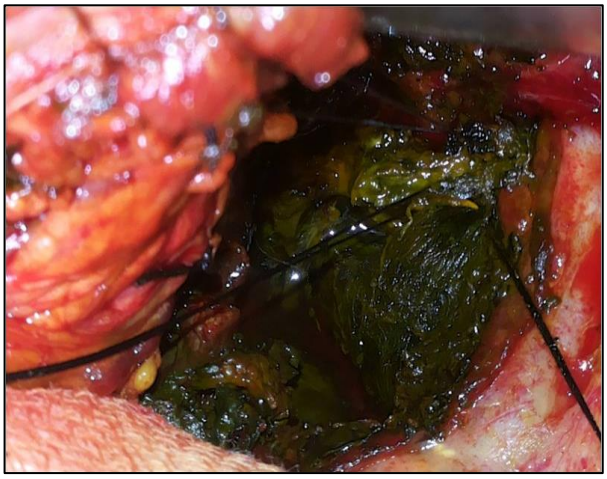

Figure 2: Bile stained operative site.

Out of 56 patients 16 patients (28.6%) presented with persistent bile via drain,11 patients (19.6%) had features of cholangitis on admission(fever, jaundice), 32 patients (57.1%) had complaints of pain abdomen, 36 patients (64.2%) were admitted with features of cholestasis (jaundice), 5 patients (8.9%) had bile leak via wound site on admission, 12 patients (21.4%) were admitted with abdominal distention and 8 patients (14.3%) had biliary peritonitis on admission Table 3. USG abdomen was performed in all the 56 patients with suspected bile duct injury. Usg revealed collection in GB fossa in 11 patients (19.7%), CBD cut off in 14 patients (25%), dilated IHBR was found in 20 patients (35.8%), cholidocholithiasis was associated in 5 patients (9%) and peritoneal collections in 7 patients (12.5%) Table 4.

MRCP was the diagnostic tool used in every patient. The pattern of injury was assessed in all 56 patients using MRCP and classified on the basis of Strasberg's classification with Stype E1 in 16 patients, Stype E2 in 11 patients, Stype E3 in 1 patient, Stype A in 2 patients,

Stype B in 3 patients, Stype C in 5 patients and Stype D in 18 patients Table 5. In 33 patients some sort of interventions were performed by the primary surgeons or in our department prior to definitive surgery which includes drain or pigtail placement in 19 patients, T tube insertion in 10 patients and both drain and T tube in 3 patients and a definitive repair was performed in 1 patient performed by the primary surgeon prior to referral to us Table 6.

Table 1: Distribution of sex.

Sex	Stype E1	Stype E2	Stype E3	Stype A	Stype B	Stype C	Stype D	Total
Male	4	3	0	0	1	1	3	12
	-25%	-27.30%	0.00%	0.00%	-33.40%	-20%	-16.70%	-21.40%
Female	12	8	1	2	2	4	15	44
	-75%	-72.70%	-100%	-100%	-66.60%	-80%	-83.30%	-78.60%
Total	16	11	1	2	3	5	18	56
	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%

Table2: Type of primary surgery.

Age (in years)	Type of surgery			Total
	Open cholecystectomy	Lap cholecystectomy	Open cholecystectomy with CBD exploration	
20-35	17	1	0	18
	-36.20%	-25%	0.00%	-32.10%
36-50	16	3	5	24
	-34%	-75%	-100%	-42.90%
51-65	14	0	0	14
	-29.80%	0.00%	0.00%	-25%
Total	47	4	5	56
	-100%	-100%	-100%	-100%

Table 3: Clinical presentation.

Complaints	StypeE1 (n=16) N (%)	StypeE2 (n=11) N (%)	StypeE3 (n=1) N (%)	StypeA (n=2) N (%)	StypeB (n=3) N (%)	StypeC (n=5) N (%)	StypeD (n=18) N (%)	Total (n=56) N (%)
Bile via drain	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)	3 (60)	12 (66.6)	16 (28.6)
Cholangitis	2 (12.5)	4 (36.3)	0 (0)	0 (0)	1 (33.3)	1 (20)	3 (16.6)	11 (19.6)
Pain abdomen	5 (31.2)	4 (36.3)	0 (0)	1 (50)	2 (66.6)	5 (100)	15 (83.3)	32 (57.1)
Cholistasis	16 (100)	11 (100)	1 (100)	0 (0)	3 (100)	2 (40)	3 (16.6)	36 (64.2)
Biliary fistula	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)	1 (20)	3 (16.6)	5 (8.9)
Abd distention	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)	3 (60)	8 (44.4)	12 (21.4)
Biliary peritonitis	0 (0)	0 (0)	1 (100)	1 (50)	0 (0)	1 (20)	5 (27.7)	8 (14.3)

Table 4: USG findings.

USG	StypeE1 (n=16) N (%)	StypeE2 (n=11) N (%)	StypeE3 (n=1) N (%)	StypeA (n=2) N (%)	StypeB (n=3) N (%)	StypeC (n=5) N (%)	StypeD (n=18) N (%)	Total (n=56) N (%)
Collection in gb fossa	2 (12.5)	0 (0)	0 (0)	1 (50)	0 (0)	3 (60)	5 (27.8)	11 (19.7)
Cbd cut off	4 (25)	5 (45.5)	1 (100)	0 (0)	0 (0)	0 (0)	4 (22.2)	14 (25)
Dilated IHBR	11 (68.8)	7 (63.6)	1 (100)	0 (0)	1 (33.3)	0 (0)	0 (0)	20 (35.8)
Cholidocholithiasis	2 (12.5)	1 (9.1)	0 (0)	0 (0)	0 (0)	0 (0)	2 (11.1)	5 (9)
Peritoneal collection	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)	1 (20)	5 (27.8)	7 (12.5)

37 patients (66.1%) underwent Roux-en-Hepaticojejunostomy (10 Stype E1, 7 Stype E2, 1 Stype B, 4 Stype C, 15 Stype D), in 4 patients (7.1%) Roux-en-y Hepaticojejunostomy with external stunting was performed (1 Stype C, 3 Stype D), 4 patients (7.1%) Hepaticojejunostomy with internal access was performed (4 Stype E2), cholidochodudenostomy in 6 patients (10.7%) (all Stype E1), primary repair in 2 patients (3.6%) (all Stype A), Roux-en-y Hepaticojejunostomy over T tube performed in 2 patients(3.6%)(all StypeB),Roux HJ with repair of duodenal perforation in 1(1.8%) (Stype E3) Table 7, Figure 1. On operative findings, bile staining was present in 26 patients (46.4%), Bilioma in 14 patients (25%). Adhesions were present in 54 patients (96.4%), dilated CBD in 19 patients (33.9%), T tube induced duodenal perforation in 1 patient (1.8%) and associated cholidocholithiasis in 5 patients (8.9%) Table 8, Figure 2. The various complications observed in the post-operative period included 6 patients (10.7%) had wound infection, 3 patients (5.4%) had sub phrenic collections in postoperative period, 9 patients (16.1%) had respiratory tract infections, 1 patient (1.8%) had bile leak, 12 patients (21.4%) had urinary tract infections Table 9.

Table 5: MRCP based Strasberg Classification.

MRCP	Number of patients (%)
StypeE1	16 (28.5)
StypeE2	11 (19.6)
StypeE3	1 (1.8)
StypeA	2 (3.6)
StypeB	3 (5.4)
StypeC	5 (8.9)
StypeD	18 (32.1)
Total	56 (100)

Table 6: Presurgical management.

Pre surgical management	StypeE1 N (%)	StypeE2 N (%)	StypeE3 N (%)	StypeA N (%)	StypeB N (%)	StypeC N (%)	StypeD N (%)	Total N (%)
Drain/pigtail placement	0 (0.0)	0 (0.0)	0 (0.0)	2 (100)	0 (0.0)	5 (100)	12 (66.7)	19 (33.9)
T tube placement	4 (25)	4 (36.3)	0 (0.0)	0 (0.0)	1 (33.4)	0 (0.0)	1 (5.5)	10 (17.9)
Both drain and T tube placement	2 (12.5)	1 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (5.4)
Definitive repair	1 (6.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.8)
Total	16 (100)	11 (100)	1 (100)	2 (100)	3 (100)	5 (100)	18 (100)	56 (100)

Table 7: Operative procedure performed.

Operative procedure	Stype E1 N (%)	Stype E2 N (%)	Stype E3 N (%)	Stype A N (%)	Stype B N (%)	Stype C N (%)	Stype D N (%)	Total N (%)
Roux en y Hepaticojujenostomy	10 (62.5)	7 (63.6)	0 (0.0)	0 (0.0)	1 (33.3)	4 (80)	15 (83.3)	37 (66.1)
Hepaticojujenostomy with external stenting	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (20)	3 (16.7)	4 (7.1)
Hepaticojujenostomy with internal stenting	0 (0.0)	4 (36.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (7.1)
Cholidocho-duodenostomy	6 (37.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (10.7)
Primary repair	0 (0.0)	0 (0.0)	0 (0.0)	2 (100)	0 (0.0)	0 (0.0)	0 (0.0)	2 (3.6)
Roux en y Hepaticojujenostomy with repair of duodenal perforation	0 (0.0)	0 (0.0)	1 (100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.8)
Roux en y Hepaticojujenostomy over Ttube	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (66.6)	0 (0.0)	0 (0.0)	2 (3.6)
Total	16 (100)	11 (100)	1 (100)	2 (100)	3 (100)	5 (100)	18 (100)	56 (100)

In our study the overall mean bilirubin levels on admission was 11.38, in postoperative period mean was 7.9, at 2 weeks mean was 3.1.at 1month mean was 1.6, at 3 months mean was 0.98 and at 6 months mean was 1.2.the mean ALP on admission was 541.8, at 2 weeks

318, at 1 month 226, at 3 months 174.9 and at 6 weeks 229.3, Table 10.

In our study, patients were followed for a mean period of 26.8 months with minimum of 6 months and maximum of 45 months and following outcome was obtained .5 patients had readmissions in view of cholangitis, 2 patients got reoperated and 2 patients died.

Table 8: Intra operative findings.

Findings	N	%
Bile staining	26	46.40
Bilioma	14	25
Adhesions	54	96.40
Dilated CBD	19	33.90
T tube induced Duodenal perforation	1	1.80
Cholidocholithiasis	5	8.90

Table 9: Post-operative complications (n=56).

Complications	N	%
Wound infection	6	10.7
Sub phrenic collection	3	5.4
Bile leaks	1	1.8
Sec peritonitis	0	0
Respiratory tract infections	9	16.1
Urinary tract infections	12	21.4

Table10: Mean LFT Levels.

LFT	Mean (Preoperative)	Mean (at 6 months)
BIL	11.38	1.2
ALP	541.8	229.3
AST	77.2	32.9
ALT	75.2	30.8
ALB	3.15	3.9
TP	6.4	7.2

DISCUSSION

Cholecystectomy is the most common major abdominal procedure performed. Carl Langenbuch performed the first successful cholecystectomy in 1882. In September 1985, ErichMuhe performed first laparoscopic cholecystectomy. In 1987, laparoscopic cholecystectomy was introduced by Philippe Mouret in France and quickly revolutionized the treatment of gallstones. The cholelithiasis is three times more likely to develop in females than males. Although rare but bile duct injury is the worst complication associated with the cholecystectomy procedure. Only about 25% of major bile duct injuries are recognized at the time of operation. Within the first postoperative month more than half of patients with injury have presented and the remainder present months or years later, with recurrent cholangitis or cirrhosis from a remote bile duct injury. In the early postoperative period, patients present either with progressive elevation of liver function tests due to an occluded or a stenosed bile duct, or with a bile leak from an injured duct. Bile leak, most commonly from the cystic duct stump, a transacted aberrant right hepatic duct, or a lateral injury to the main bile duct usually presents with pain, fever, and a mild elevation of liver function tests. If bile duct injuries are recognized at the time of initial surgery, it may be appropriate for the operating surgeon to repair it, if experienced or else transfer the patient to referral institutes for repair of injury.

The incidence of bile duct injuries were more in females because of increased incidence of cholelithiasis in females, similar female predominance was found by Jason et al.[11] Maximum number of patients who had suffered bile duct injury had underwent open cholecystectomy, The reason being that less number of laparoscopic surgeries are performed in our valley and all the patients were referred from peripheral institutions and no one reported from our own institute.

In our study out of 56 patients 16 patients (28.6%) presented with persistent bile via drain, 11 patients (19.6%) had features of cholangitis on admission (fever, jaundice), 32 patients (57.1%) had complaints of pain abdomen, 36 patients (64.2%) were admitted with features of cholestasis, 5 patients (8.9%) had bile leak via wound site on admission, 12 patients (21.4%) were admitted with abdominal distention and 8 patients (14.3%) had biliary peritonitis on admission comparable with studies by Helmy et al and Jerzy et al.[12,13] Most of the bile duct injuries are not detected on table, clues to possibility of injury include persistent abdominal pain, unexpected bileleak, abdominal distention, fever, vomiting, itching. Rossi et al have conducted studies and emphasized on importance of early aggressive investigations in diffuse abdominal pain, fever, malaise or LFT abnormalities after lap cholecystectomies.[14]

The bile duct in all the patients were classified on the basis of Strasberg's classification and following types of injuries were noted, type E1 in 16 (28.5%) patients, type E2 in 11 (19.6%) patients, typeE3 in 1 (1.8%) patients, type A in 2 (3.6%) patients, type Bin 3 (5.4%) patients, type C in 5 (9%) patients and typed in 18 patients, comparable to what was noted by Hajjar et al.[15]

Various surgical measures were taken by primary surgeon or by our department prior to definitive surgery which includes drain or pigtail placement in 19 (33.9%) patients, Ttube insertion in 10 (17.9%) patients and both drain and Ttube in 3(5.4%) patients and a definitive repair was performed in 1 (1.8%) patient performed by the primary surgeon. Drains or pigtails were put in patients with Bilioma or localized peritoneal collections present, while as Ttube was placed in case of severe jaundice or cholangitis.

In our study MRCP was used as a gold standard for diagnosis however USG abdomen was performed in all the patients on admission and ERCP was performed in all the patients in order to get a therapeutic benefit if possible. A study by Tahir et al on 10 patients proved MRCP as efficient investigation.[16] The goal of operative management is the establishment of bile flow into gastrointestinal tract in a manner that prevents cholangitis, sludge or stone formation, strictures or restricturs, this goal is achieved by tension free anastomosis between healthy tissues. In our study 37 patients (66.1%) underwent roux-en-y Hepaticojejunostomy, in 4 patients (7.1%) Roux-en- y Hepatico jejunostomy with external stunting was performed, in 4 patients (7.1%) Hepaticojejunostomy with internal access was performed, cholidochodudenostomy in 6 patients (10.7%), primary repair in 2 patients (3.6%), Roux-en-y Hepaticojejunostomy over T tube performed in 2 patients (3.6%), Roux HJ with repair of duodenal perforation in 1(1.8%). Majority of the patients had Roux-en –y Hepaticojejunostomy performed which makes it the common operation to be performed, which is comparative with the study by Andren et al who found that although a number of alternatives for repair of bile duct injuries exist, the best results have been achieved with cholidochojujunostomy or Hepaticojejunostomy.[17]

Our study is comparable with studies of Lawrence et al.[18] Bile staining was present in 26 patients (46.4%), Bilioma in 14 patients (25%), adhesions were present in 54 patients (96.4%), dilated CBD in 19 patients (33.9%), T tube induced duodenal perforation in 1 patient (1.8%) and associated cholidocholithiasis in 5 patients (8.9%).

The various complications observed in the post-operative period included 6 patients (10.7%) had wound infection, 3 patients (5.4%) had sub phrenic collections in post-operative period which was drained percutaneously, 9 patients (16.1%) had respiratory tract infections,1 patient (1.8%) had bile leak which subsequently stopped within 10 days,12 patients (21.4%) had urinary tract infections.. Jason et al in his study found that most common complications were wound infection (8%), and intra-abdominal abscess/Bilioma (2.9%) comparable to our surgery related complications.[11]

The mean follow up period in case of our study was 26.8 months with minimum of 6 months and maximum of 45 months. The follow up LFTs were performed after 2 weeks, 1 month, 3 months and 6 months period which was a protocol followed in our department. In our study the overall mean bilirubin levels on admission was 11.38, in postoperative period mean was 7.9, at 2 weeks mean was 3.1.at 1month mean was 1.6, at 3 months mean was 0.98 and at 6 months mean was 1.2. The mean ALP on admission was 541.8, at 2 weeks 318, at 1 month 226,at 3 months 174.9 and at 6 weeks 229.3, this means that the mean bilirubin levels and ALP levels showed a downward trend from admission till 6 months of follow up. 5 patients in our study were readmitted with features of cholangitis in which 2 patients underwent redohepaticojejunostomy, 1 was reoperated in our institute and other outside state and 3 patients were evaluated and managed conservatively. 2 patients died in the course of the disease, one patient out of these two did not report to our institute at her terminal episode of illness and another patient died in SICU of our institute with septic shock, comperable to study by Helmy found Roux en Y Hepaticojejunostomy was the treatment of choice for 6 patients, and in other 4 patients was cholidochodudenostomy in one patient, left Hepaticojejunostomy in another, end to end anastomosis of common bile duct over a T tube in a third patient, and removal of a clip in the last patient. There was no mortality, however, 2 developed Cholangitis within 1year which responded to antibiotic.[12] Sahaipal et al. Studied Sixty-nine patients, forty-one Hepaticojejunostomy (59%), 24 choledochojejunostomies (35%), 3 right hepatic hepatectomies with biliary reconstruction (4%), and 1 primary common bile duct repair (1%) were performed. The overall morbidity rate was 30% (21 patients). The mortality rate was 1% (1 patient). Twelve patients (17%) developed short-term postoperative complications.[18]

Limitation

The only limitation associated with the study was to call the patients at regular intervals to get their liver function tests done over a period of 6 months.

CONCLUSION

The management of patient after bile duct injury is a challenge for a surgeon at a tertiary referral centre's which requires collaboration among surgeons, gastroenterologists and radiologists.

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