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Management of bile ducts injuries in gastroenterology and hepatology teaching hospital

ARTICLE INFORMATION

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ABSTRACT

Background: The incidence of bile ducts injuries (BDI) has risen from (0.1 to 0.2%) to (0.4 to 0.6%) between the era of open cholecystectomy (O C) and the age of laparoscopic cholecystectomy (LC.) The aim of the study is to review the management and surgical outcome of the bile duct injuries in gastroenterology and hepatology teaching hospital .

Methods: This study is Prospective, done in G.I.T hospital, From January 2008 -to -February 2011, patients included in this study had previous history of cholecystectomy which followed by signs and symptoms of bile duct injuries. Most patients have been referred from other hospitals, supporting therapy were given to them and investigations performed to evaluate the type of injuries, minor injuries managed conservatively and by using ERCP while major injuries reconstructive surgery done in form of Roux en Y bilioenteric anastomosis, All patients followed up for 8 -50 months by doing liver function tests, abdominal US and MRCP for some patients. Assessment the outcome of the patients using Treblanche grading to good, fair and poor

Results: The total number of patients are 53, female were 37 patients (70.5%) 16 patients (29%) were male. The range of age group from 18 -65 years. Average age is 29 years. Patient with minor BDI treated with drainage and ERCP, while 36 patients had major BDI treated by surgical reconstruction by elective manner using a technique Roux en Y (HJ). Follow up done for (8-50 months). (69.4%) have good result, (25%) got fair result and (5.5%) had poor results which mainly occur in E3 and E4 type injuries

Conclusions: If the diagnosis of BDI occurrence is delayed more than 24h, any attempt of primary reconstruction should be avoided and early referral of the patient to a tertiary care centre with experienced hepatobiliary surgeons and skilled interventional radiologists to assure optimal short-term and long-term outcome.

Introduction:

Over 750,000 cholecystectomies are performed annually in USA ⁽¹⁾. In the United States and Canada, 34%-49% of surgeons have experienced a major bile duct injury, in one or two cases.

Only 24-38% of the biliary tract injuries are detected at the time of the surgery, and the delay in the diagnosis of lesions varies from 1 to 246 days, most frequently 2 to 30 days ⁽²⁾. The symptoms of biliary tract injury appear often only after discharge (the average hospital stay is 24 to 72 h), We should think of biliary tract injury if atypical pain, abdominal distension, vomiting, ileus, or cholangitis is present in the postoperative period or if peritoneal signs, anorexia, or pathologic laboratory results are detected. With the development of laparoscopic technology in the late 1980s, new techniques for

cholecystectomy were introduced by the early 1990s laparoscopic cholecystectomy (LC) had supplanted open cholecystectomy (O C) in the operative management of gallbladder diseases. Unfortunately, the widespread application of LC has led to a concurrent rise in the incidence of major bile duct injuries (BDI). Reports have estimated the incidence of BDI has risen from (0.1 to 0.2%) to (0.4 to 0.6%) between the era of open cholecystectomy and the age of LC. ^(3,4,5)

Bile duct injury following cholecystectomy is an iatrogenic catastrophe associated with significant preoperative morbidity and mortality, reduced long-term survival and quality of life, and higher rates of subsequent litigation. The other important aspect of the BDI is an economic and social effect because the medical and financial costs of this complication are

significant, and charges related to the treatment bile duct injuries undergoing definitive surgical repair may reach 100000.⁽⁶⁾

Bile duct injuries that were recognized immediately at the time of cholecystectomy ultimately experienced a total cost for their repair and hospitalization of 43% to 83% less than for patients in whom recognition of the injury was delayed.⁽⁷⁾

Mechanism of Bile duct injuries is multi factorial; however, misrecognition of bile ducts as a result of biliary tree anomalies which present in up to 25% of patients⁽⁸⁾, and aberrant right hepatic ducts being the most common.

Also misidentification of the common duct for the cystic duct, with resultant resection of part of the CBD and a variant of the classical injury is seen with a clip or ligation of the CBD with proximal ligation and division of the cystic duct, resulting in biliary obstruction and leakage. A second variant is a simple tenting injury of the CBD. The cystic duct is correctly identified and grasped, and a portion of the CBD is removed between clips or ligature simply due to traction.

Technical error can cause ductal injury or bile leak like failure to occlude the cystic duct securely, deep dissection in the liver bed when there is intra hepatic gall-bladder, or injudicious use of cauterization which cause necrotizing loss of distal and perivascular tissue that may advance over time to quite severe type E injuries.

Many classifications have been used to classify the BDI, best of them is Strasberg's^(5,7) classification table (1)

The outcome after the HJ was graded according to Terblanche clinical classification⁽⁸⁾ which is based on clinical biliary symptomatology and on objective criteria, clinical symptoms, abnormal liver function tests, episodes of cholangitis, and the need for reintervention. Patient outcome was classified into three groups: good when patient asymptomatic with normal liver function tests, "fair" when the patient is asymptomatic with mild change in liver function tests, "Poor" when the patient has intermittent symptom and cholestatic abnormalities managed by antibiotic and/or interventional endoscopy and for patients who need surgical revision of the HJ stricture. The goal of repair is the restoration of a durable bile conduit, and the prevention of short- and long-term complications such as biliary fistula, intra-abdominal abscess, biliary stricture, recurrent cholangitis and secondary biliary cirrhosis.⁽⁵⁾

Optimal results were achieved when elective correction was performed after the resolution of the local inflammatory process. The mean time until the performance of the elective operation was 4.5 months (range 2-12 months) after BDI and this type of surgery called elective surgery. This surgery results in fewer postoperative complications, significantly fewer strictures, and had less need for

re-HJ anastomosis than the other type of repair which are early and delayed type^(9,10)

Methods:

Prospective study done in G.I.T. hospital which is a tertiary referral centre in managing gastrointestinal hepatobiliary problems, From January 2008 -to -February 2011, fifty three patients were included all of them having bile duct injuries after cholecystectomy, Patients' files were reviewed for demographics, the specifics of the referring, surgeon's management, type and level of tract injury, diagnostic procedures, therapeutic interventions before and after referral, and our group's perioperative time of surgical management and in some cases we make contact with the primary surgeon to get more information. After examination of the patient and doing baseline investigation which includes: abdominal US, plain abdomen x-ray, liver function tests, blood urea, serum creatinin, Hb, WBC and virology screening. For all patients we did abdominal MRI&MRCP and for 23 patients we did an ERCP to see the level of the Injuries and to demonstrate aberrant biliary anatomy, and the state of the biliary tree.

Our protocol for evaluation and management of those patients includes: Sepsis control and Supportive therapy by intravenous fluid, vitamin K for obstructive jaundice and proper antibiotic, nutritional support. Drainage of any collection or leaks by insertion of the catheter under local anaesthesia and US guidance, this performed in 42 patients, complete healing occurred in 6 patients of them and the drain removed after 5 to 12 days. The charts of all patients were analysed, and they were divided into the following two groups: group I, patients with minor ducts injurers and the second group with complex injuries of the major ducts. First group managed by nonsurgical way while the other group managed surgically by creating biliary-enteric anastomosis.

The timing of repair depends on when the patients were referred and the presence of complication such as cholangitis, jaundice and abscess formation. For outcome analysis, we defined three periods: immediate, delayed, and elective. If the BDI was identified during the primary procedure, an immediate reconstruction was performed. Missed injuries recognized and corrected within 3 days of the cholecystectomy were categorized as delayed. All other corrections were elective and performed after waiting until most of the inflammatory process had subsided. In elective cases and in the presence of cholangitis, abscess, or biliary fistula, ERCP or PTC with stent placement was utilized to stabilize and improve local conditions, and surgical reconstruction was deferred for a minimum of 8 weeks.⁽¹¹⁾

Surgical reconstruction done by anastomosis the jejunum to a healthy, non-inflamed, non-scarred duct. Once the bile duct is explored, the scarred duct was removed up to a level at which a healthy duct is found. When the bifurcation is lost, with the isolated left and right hepatic duct, or the confluence is high and deep in the liver or dissection of the proximal bile ducts is not easily obtained. In such cases, partial liver resection of the segment 4 is done to allow adequate exposure of the left ducts. When bile duct openings at the hilum are nearby, plastic reconstruction was done to merge them into one or two openings. Tension-free, mucosa-to-mucosa (bilioenteric) repair were performed, and the anastomosis was

performed using separate 3-0 polyglycolic acid stitches, indwelling biliary stents not used .

The type bilioenteric anastomosis which done were as follows 21hepaticojejunostomy (HJ), 5 choledochojejunostomy, 5 RT and LT hepaticojejunostomy, 5 LT. hepaticojejunostomy with segment 4 resection

Results:

The total number of patients 53 patients ,31 patients (56.6%) Open cholecystectomy, 22patients (39.6 %) Laparoscopic cholecystectomy , 37 patients (67.9 %) were female 16 patients (28.3 %) were male .Thirty six patients (64.1%) had major bile duct injuries like a common hepatic duct, common bile duct , or major segmental ducts at portahepatis.Seventeen patients(32%) had minor bile duct injuries like a bile leak from cystic duct or the gallbladder bed or lateral injuries to major duct . The time interval from BDI to referral was variable, 3 patients (5.6%) immediately recognized during surgery and managed accordingly, 30 patients (60.7%) referred within the first week, 16 patients (27.4 %) referred after that for their acute complications, including bile leak, jaundice, cholangitis, and biloma. 4 patients (7.8%) were referred after 2 months after their cholecystectomy for symptoms consistent with biliary stricture .

Patients presented in several scenarios depending on the severity of injuries and time of presentation ranging from critically ill in 21,patients, stable with bile leak 19 patients. Progressive jaundice 8 patients, with mild jaundice and \or controlled cholangitis 5 patients,

Abdominal US showed biliary ascites in16 patients, biloma in7 patients, dilated intra and extra biliary tree in13 patients,retained CBD stones in 2 patients.

While abdominal plain x-ray showed a subphrenic collection in11 patients and left sided pleural effusion in 9 patients .

According to MRCP & abdominal MRI and ERCP (Table2)the level of injuries as follows: 5 patients type A injuries, 7 patients type C injuries , 6 patients type D injuries , 14 patients type E1 type injuries .11 patients type E2injuries , 7 patients type E3 injuries , 3 patients typeE4 injuries .Biloma in15 patients, dilated biliary tree in 15 patients, biliary ascitis in16 patients and retained CBD stones in two patients

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surgery and managed accordingly, 30 patients (60.7%) referred within the first week, 16 patients (27.4 %) referred after that for their acute complications, including bile leak, jaundice, cholangitis, and biloma. 4 patients (7.8%) were referred after 2 months after their cholecystectomy for symptoms consistent with biliary stricture .

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After definitive repair, follow up done every month for the first three months and then every three months for one year, then every six months. The follow up include history & clinical examination, abdominal US, liver function tests (especially serum bilirubin and alkaline phosphatase and MRCP to some patients with signs and symptoms of strictures or obstruction Follow up period was (8-60) months. 3 patients who managed previously by ERCP for type D injuries get fixed stricture after 6 months which cannot be dilated endoscopically, they were admitted and surgical reconstruction done by Roux en -y hepaticajejunostomy.

According to Terblanche grading the patients in our study, 25patients (69.4%) have good result , 9 patients (25%) got fair result and 2 patients (5.5%) had poor results

TABLE (1) Strasberg's classification (1995)

A	Cystic duct leaks or leak from ducts in the liver bed
B	Occlusion of a part of the aberrant right hepatic duct.
C	Transaction without ligation of the right hepatic ducts.
D	Lateral injuries to major bile ducts less than 50%.
E	Subdivision as per Bismuths' classification into E1 to E5.
E1	Low stricture with a length of CHD > 2 cm

- E2 Proximal CHD stricture hepatic duct stump < 2 cm
- E3 Hillary stricture, no residual CHD but hepatic ductal confluence is preserved.
- E4 Hillary stricture, with involvement of confluence and loss of communication between right and left hepatic duct.
- E5 Involvement of aberrant right sectorial hepatic duct alone or with concomitant stricture of CHD .

Level of injuries MRCP/ERCP (TABLE (2))

Level of injury (Strasberg) MRCP +ERCP	Number of patients	%
A	4	7.5
B	0	0
C	7	13.2
D	6	11.3
E1	7	13.2
E2	10	18.8
E3	13	42.5
E4	4	7.5
E5	2	3.7

TABLE(3)postoperative complications

Complications	Number of patients (total 36)	%
Mortality	0	0%
Wound infection	3	8.3%
Cholangitis	2	5.5%
Anastomosis leaks	2	5.5%
Intra abdominal abscesses \ biloma	1	2.7 %
Pulmonary complication	2	5.5%
Prolonged ileus and diarrhea	4	11.1%

Length of post operative hospital stay.	
Mean	9.5 days
Median	8 days
Range	4-18 days

Conclusion:

The pattern of bile duct injuries has changed or become more complicated in recent years.. The most important factor in the management is early recognition and the provision of appropriate treatment which is often challenging because most of these injuries are high-level injuries, Numerous studies have noted that level of injuries correlates with surgical outcome ,with worse outcome in patients with higher level of biliary injuries⁽⁷⁾, in our study type E2,E3&E4 form about 52.5% of major BDI and good result in E1,E2 and poor results is from E4 .while in study done by Lygia Stewart⁽¹³⁾ in 2009 showed E2,E3&E4 form about 90% with successful rate 89- 90% ,while E1 found in 10% with successful rate 100%.but when the surgery done by primary surgeon there no successful rate in repairing E3 &E4 injuries .This probably reflects the difficulty of identifying injured bile ducts in these resectional injuries .

Most studies showed that the treatment of leaks from the cystic duct and liver bed is well managed with non operative methods by percutaneous drainage and observation⁽¹⁴⁾ and in some cases when the leaks not decreasing or high output more than 300 ml per day we did for them ERCP The objective of endoscopic intervention is to abolish the pressure gradient across the sphincter of Oddi, there by promoting preferential bile flow

into the duodenum and allowing the leak to heal⁽⁸⁾. This can be successfully achieved by a diversity of techniques, including biliary sphincterotomy, stent insertion (with or without sphincterotomy), or nasobiliary tube drainage alone. Treatment success has ranged from 85% to 100% in most studies^(15,16) with very low complication rates reported for all endoscopic treatment modalities. In our study all patients with type A and most type C&D injuries managed in this way with good result in 88%.

In type E injuries, the primary goal of biliary reconstruction is a high-quality bilioenteric anastomosis that will not malfunction over time. Attention to the anatomical placement of the anastomosis is of great importance as failure after hepaticojejunostomy is usually caused by an anastomotic stricture, which is often ischemic in nature⁽¹⁸⁾. If the biliary confluence is intact and there is no associated vascular injury, a hepaticojejunostomy onto the extrahepatic bile duct gives the best result and, the number and diameter of bile duct openings at the hilum is not the limiting factor of the surgery⁽⁵⁾. Patients recognized their BDI intraoperatively and immediately repaired had a lower restenosis rate than patients undergoing operative surgery after 24 hours or in revision of a previous ductal repair or biliary reconstruction (2.5% versus 25%).^(12,15)

Reconstruction in the presence of peritonitis results in worse outcome for patients. Therefore in the present study we use an elective type of repair after sepsis control initially via drainage of any collection, radiologic intervention, antibiotics and generally operate on patients at a later date, at a median of 6-8 weeks after injuries, when the associated inflammation has subsided. Our study demonstrates good results in 89.9% of cases without the need for reoperation. This success rate similar to the Johns Hopkins Medical Institution report in which 94% of 109 patients with BDI, elective repair, and a follow-up approaching 5 years had a successful outcome, while in immediate repair successful outcome only 36% only. While in study done by Lygia Sewart et al⁽¹²⁾ they found no correlation between timing of biliary reconstruction and successful repair and no need to delay operative repair and the key objective was the eradication of intra-abdominal infection and inflammation and in their study 44% of cases were repaired in the first 2 weeks with good outcome.

Conclusions:

- BDI can cause life-threatening complications as a result of delayed referral or, rarely, after surgical repair. Early referral should be done to a tertiary care centre with experienced hepatobiliary surgeons and skilled interventional radiologists to assure optimal short-term and long-term outcome results.
- The level of injury correlates with surgical outcome, with worse outcome in patients with higher level of biliary injuries. The primary goal of biliary reconstruction is a high-quality bilioenteric anastomosis that will not malfunction over time by using an elective type of repair after sepsis control.

- Patients need long term follow up as the incidence of delayed strictures may reach 10-15% and 65 to 85% of the strictures present in the first 2 years and only 5 to 10% of them appear later than 10 years.

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