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Incidence of Iatrogenic Bile Duct Injury Following Open and Laparoscopic Cholecystectomy and its Treatment Outcome

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Abstract

Objective: To find out the incidence of iatrogenic bile duct injury following open and laparoscopic cholecystectomy and their postoperative outcome.

Material and methods: Twenty patients with iatrogenic bile duct injuries were admitted through the OPD and emergency department of PMC Hospital Nawabshah. Apart from baseline investigations, MRCP and ERCP were performed in selected cases. Postoperatively patients were monitored in the surgical ward and sent home after removing their drains. Patients were followed up in the OPD for 6 months. Data was collected and analyzed on SPSS Version 10.

Results: Out of 20 cases, 8 (40%) sustained injuries in our unit while 12 (60%) were referred from peripheral hospitals. The mean age was 40 ± 3 years and the male to female ratio was 1:4. Presenting complaints were jaundice, abdominal pain and persistent bile discharge. Procedure performed included Roux en Y (65%), choledochoduodenostomy (25%) and primary repair over T-tube (10%). Post-operative complications were bile leak (10%), wound infection (15%) and recurrent cholangitis (5%). Mortality was zero. The average hospital stay was 10-15 days.

Conclusion: Roux en Y choledochojejunostomy is the preferred surgical procedure for iatrogenic bile duct injuries with minimal postoperative complications.

Keywords: Bile duct injury • Biliary leak • Roux en Y choledocojejunostomy

Introduction

Stone formation is the most common pathology of the gall bladder. About 10-15% of the adult population has gall stones worldwide and is more common in females. Cholecystectomy is the treatment of symptomatic gall stone disease and is associated with an increased incidence of bile duct injuries. The first planed cholecystectomy was performed in 1882 in Burlen by Langenbach. Incidence of iatrogenic bile duct injuries (IBDIs) increased with an increased number of bile duct interventions and was first described by Sprengel in 1891. Doyen described end to end anastomosis of the bile duct in 1892. Monprofit was the first person who performed Roux en Y than 0.5% due to the increasing experience of the surgeons and availability of the advanced quality of instruments. The most common causes of iatrogenic bile duct injuries include less experience of the operating surgeon, adhesions near operating area, insufficient anatomical knowledge of the operating field, failure to consider the presence of aberrant duct, use of diathermy near bile duct, excessive dissection near Calot's triangle and unexpected bleeding. The iatrogenic bile duct injury includes complete to the partial transaction of bile duct leading to leak, ligation of the major bile duct and both of these can lead to stricture formation later on.

Persistent drainage of bile stained fluid, increasing serum bilirubin and alkaline phosphatase level, local or generalized peritonitis and signs of septicemia indicate the possibility of iatrogenic bile duct injury. Other investigations for the diagnosis and planning of definitive treatment modality include ultrasonography abdomen, Computed Tomography (CT) abdomen, Magnetic Resonance Cholangiopancreatography (MRCP), Endoscopic Retrograde Cholangiopancreatography (ERCP) and Intra-Operative Cholangiography (IOC). The interventional procedures include an end to end anastomosis over T-tube, Roux-en Y biliary enteric reconstruction and enteric (jejuna) interposition grafting. The aim of the current study is to assess the incidence of iatrogenic bile duct injuries following open and laparoscopic cholecystectomy and their postoperative outcome.

Materials and Methods

This prospective study of 20 patients was conducted from April 2014 to May 2016 in the Surgical Unit. In this study, 8 (40%) cases sustained iatrogenic bile duct injury in our unit while 12 (60%) cases of bile duct injuries were referred from the periphery which comprised of 10 (83.3%) cases of open cholecystectomy and 2 (16.6%) of laparoscopic cholecystectomy. Out of 8 cases operated at our Unit 2 were diagnosed preoperatively during open cholecystectomy and the other 4 were diagnosed within 7-14 days], while 2 cases of lap cholecystectomy were diagnosed within 1st postoperative week. All the 12 referred patients presented to the surgical department of HMC within one month after surgery. These patients having IBDIs were admitted through the Open Patient Day (OPD) in an emergency. A detailed history and physical examination performed. The clinical features of patients were vomiting, fever, jaundice and persistent bilious discharge in the drain placed in the right hypochondrium. All the patients were subjected to basic investigation like liver function tests, Full blood count, Blood urea/creatinine, Randam blood sugar, serum electrolytes, Prothrombin Time (PT) and Activated Partial Thromboplastin Time (APTT) specific investigations done to diagnose iatrogenic bile duct injury, classify the type of consent was taken and the type of procedure was explained to patients and their relatives. Surgeries were performed by experienced surgeons through a subcostal incision under general anesthesia. Postoperatively patients were monitored in the surgical ward. Strict intake output and blood pressure and pulse record were maintained. Drain was removed before discharging the patients. Patients with T-tube were advised to undergo a T-tube cholangiogram on the 10th postoperative day. Patients were advised to attend OPD for follow up on the 10th postoperative day and one

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Table 1. Site of injury (n=20).

Procedure	Site of injury		No. of cases	Percentage
	CHD	CHD		
Lapchole	4	0	4	20%
Openchole	2	14	16	80%
Total	6	14	20	100%

Operative procedures performed were Roux-en Y choledochojejunostomy in 13 (65%) patients. Choledochoduedenostoomy was performed in 5 (25%) cases while 2 (10%) patients underwent primary repair over T-tube.

Table 2. Procedure performed (n=20).

Procedure	No. of cases	Percentage
End-end anastomosis over t-tube	2	10%
Choledocoduedenostomy	5	25%
Roux-en y choledocojejunostomy	13	65%

Postoperative complications were encountered in 8 (40%) cases. The postoperative leak was recorded in 2 (10%) cases, wound infection in 3 (15%) while recurrent cholangitis was noted in 1 (5%). There was no mortality. The average hospital stay was 10-15 days. Patients were followed up in OPD for 6 months.

Table 3. Postoperative Mortality (n=20).

Complications	No. of cases	Percentage
Wound infection	3	15%
Post op-leak	2	10%
Cholangitis	1	5%

month after surgery. At 1st follow up, the wound was examined, postoperative complications noted and stitches were removed. T-tube was removed when the free flow of dye into the duodenum on T-tube cholangiogram was noted. USG abdomen was performed as required for any suspicion of intra-abdominal collection. Post operatively data was collected on a proforma and analyzed on SPSS version 10.

Results

The study group consisted of 20 patients with iatrogenic bile duct injuries following open and laparoscopic cholecystectomy. Out of 20 patients, 4 (20%) were male and 16 (80%) were females, with male to female ratio was 1:4. The mean age of the patients was 40±3 years. Eight (40%) patients sustained bile duct injury in our surgical unit, while 12 (60%) cases were referred from other hospitals and Afghanistan. Out of 8 patients who sustained an injury in our unit, 2 (25%) cases were recognized preoperatively and were managed accordingly in the same anesthesia. While 6 (75%) cases were diagnosed postoperatively within 7-14 days. All the patients who were referred from periphery within one month after surgery. The clinical presentation of the patients included vomiting, fever, jaundice and abdominal pain in all 20 (100%) cases. Sixteen (80%) patients presented with biliary leak who presented with biliary peritonitis and persistent bile discharge in the drain, while 4 (20%) patients presented with a localized collection of the bile in the right hypochondrium. Out of 20 patients, 4 (20%) sustained the injury during laparoscopic cholecystectomy while 16 (80%) had iatrogenic bile duct injury during open cholecystectomy. Investigation performed to reach a diagnosis included abdominal USG in 18 (90%) cases and revealed a localized collection of bile in right subhepatic space in all cases. ERCP was performed in 9 (45%) cases. MRCP was performed in 16 (80%) patients to find the exact location of the injury and to plan the type of procedure. In the case of an open cholecystectomy, 12 (75%) patients had type 1 injury according to Bismuth classification, 2 (12.5%) patients had type 2 injury while 2 (12.5%) patients had type 3 injury. In the case of laparoscopic cholecystectomy, all the 4 (100%) patients had type 3 injury (Tables 1-3).

Discussion

Latrogenic bile duct injury is a dreadful complication of biliary surgery and is a great challenge not only for the primary surgeon but also for the experienced referral center [1-10]. It is associated with prolonged morbidity and increased early mortality [11-13]. Improper management of iatrogenic bile duct injury can lead to serious complications like peritonitis, sepsis, multi-organ failure and cirrhosis. The reported incidence of iatrogenic bile duct injury in the case of laparoscopic cholecystectomy has dropped down to less than 0.5%. Shaikh et al. reported an incidence of 0.13%-0.55% of IBDIs in a local study [14-17]. In our study, the incidence of IBDIs is 0.9% in open cholecystectomy group while it is 1.3% following laparoscopic cholecystectomy which is consistent with other local study conducted. The common factors involved in iatrogenic bile duct injury are lack of experience of the operating surgeon, obscured anatomy near the calot's triangle due to adhesions, excessive dissection, and inadvertent use of diathermy near common bile duct, Mirrizi syndrome and presence of aberrant duct. Latrogenic bile duct injury may not be diagnosed preoperatively and the patient may present later with common symptoms like progressive jaundice due to biliary leak or stricture formation [18]. In the current study 18 (90%) patients presented with jaundice which is comparable with another local study. Eight (40%) patients presented with features of peritonitis due to localized or generalized collection which is also comparable with the local study.

To diagnose IBDIs, the first line of investigation is abdominal USG which can detect localized or generalized collection. In our study ultrasound was done in 18 (90%) of the patients. MRCP performed in 9 (45%) and 16 (80%) patients respectively which is consistent with another local study. Many authors suggest the use of IOC for the avoidance and early detection of IBDI. Latrogenic bile duct injury can be prevented by careful surgical techniques. However if it is suspected preoperatively, the best time of the repair is during the same setting by the same or another experienced surgeon. Surgeons who caused the injury should repair it in the same setting or should seek another opinion preferably from the senior colleague. In case, a competent hepatobiliary surgeon is not available then the patient should immediately be referred to a specialized center for further treatment with the placement of drain. Surgical intervention is the treatment of choice for almost all types of IBDSs. Roux en Y hepaticojejunostomy is the gold standard for iatrogenic bile duct injury.

Conclusion

In our study all the patients underwent surgical reconstruction. Two (10%) patients who were diagnosed per operatively underwent T-tube end to end anastomosis which is comparable to other study conducted. Five (25%) patients underwent cholecodeudenostomy which is similar to those reported. While 13

(65%) underwent choledochojejunostomy, all these figures are consistent with other studies conducted. The surgical procedure was successful in 16 (80%) patients.

Roux en Y choledochojejunostomy is a better surgical option for bile duct injuries and is associated with fairly acceptable low post-operative complication rate.

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