

Management of Iatrogenic Bile Duct Injuries Following Cholecystectomy

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ABSTRACT

Objective: The objective of the study is to analyzed Iatrogenic bile duct injuries (IBDI) following laparoscopic and open cholecystectomies and their management.

Study Design: Observational study

Place and Duration of Study: This study was conducted at Surgical Unit, Civil Hospital, Karachi from January 2009 to December 2015.

Materials and Methods: The study includes twenty three patients by convenient sampling technique. Patients with common bile duct (CBD) injury following open & laparoscopic cholecystectomy were included whereas patients with CBD injury following hepatobiliary pancreatic malignancy, gastrectomy, abdominal trauma, CBD exploration due to stone disease/stricture were excluded from the study.

Results: A total of twenty three patients, 20 (87%) female and 03(13%) male were included in the study after IBDI following laparoscopic/open cholecystectomy. Mean age was 42.65 (range: 25-65). Emergency department admission was common mode of admission (15 patients, 65.2%). Whereas mean time to referral following injury was 4.87 (median 5) days. Roux-en-Y hepatojejunostomy were the commonest surgical procedure performed 14(60.2%) patients. Major complications noted were stricture at anastomosis site (1 patient, 4.3%) and liver abscess (1 patient, 4.3%) but overall no mortality.

Conclusion: Early diagnosis and treatment of iatrogenic bile duct injury result in reduce morbidity and mortality.

Key Words: Iatrogenic bile duct injuries, Cholecystectomy, Biliary bypass surgery

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INTRODUCTION

One of the most common general surgical procedures performed is Cholecystectomy.¹ Following this procedure Iatrogenic bile duct injuries (IBDI) are the postoperative complications that are most difficult challenge to treat. The risk of bile duct injuries is 0.2-0.4%, it is more common following laparoscopic cholecystectomy (LC) than after open cholecystectomy (OC).^{2,3} Early identification and repair have excellent outcome, although it also depends on extent of injury. Sprengel in 1891, reported first iatrogenic bile duct injury.^{4,5,6,7,8} The first procedures performed for IBDI was end-to-side choledochoduodenostomy by Mayo in 1905, whereas first Roux-en-Y hepatojejunostomy was performed by Dahl 1909 and in 1954, Hepp and Couinaud described the hilar plate and left hepatic duct dissection for repair of high strictures. Roux-en-Y hepatojejunostomy, is now the procedure of choice used for reconstruction of IBDI.^{9,10}

The object of the study is to analysis the iatrogenic bile duct injuries during laparoscopic and open cholecystectomies and their management at tertiary care center.

MATERIALS AND METHODS

The Prospective observational study was conducted at surgical unit, Civil Hospital, Karachi from 2009 to 2015. Twenty three patients were included in the study.

Inclusion Criteria: Patients with IBDI following laparoscopic and open cholecystectomy were included in the study.

Exclusion Criteria: Patients with CBD injury following hepatobiliary pancreatic malignancy, gastrectomy, blunt and abdominal trauma and CBD exploration due to stone disease/stricture were excluded from the study.

Procedure Details: All patients with IBDI were admitted from outpatient and emergency department by convenient sampling technique. Consent was taken, a proforma was used to record the data which included patient's age, sex, diagnosis at the time of cholecystectomy, time of injury, time of referral, investigative workup, type of injury according to the Strasberg classification,¹¹ type and timing of surgical/nonsurgical management, complications (leak, stricture and need of second procedures) and treatment outcome were assessed. Patients with peritonitis were

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explored in emergency, washed out and drain placed. Definitive procedures for emergency cases and other were performed after stabilization of patients and assessing ductal injuries by Strasberg's classification. Roux-en-Y hepatojejunostomy, primary repair with or without T-tube insertion and ERCP were used in patients management.

Statistical Analysis/outcome measures: The data was analyzed using Statistical Package for Social Sciences (SPSS) version 16. Descriptive statistics frequency, percentage, mean etc. were calculated.

RESULTS

The study included 23 (20 women and 03 men)patients, in which 12(52.2%) patients injury was because of laparoscopy whereas in 11(47.8%) patients it was because of open cholecystectomy. Mean age was 42.65 (range: 25-65).

Table No.1: Final diagnosis according to Strasberg's Classification

Staging according to Strasberg's classification	Frequency	Percent
Type D:Lateral injury to the extrahepatic bile ducts (CBD,CHD,right/left hepatic duct)	1	4.3
Type A/C:Bile leak from minor duct in continuity/ not with CBDi.e.i.e.cystic duct stump/liver bed, right posterior sectoral duct	8	34.8
SubtypeE1:CHD injury,stump>2cm from bifurcation	4	17.4
SubtypeE2:Middle CHD injury,stump<2cm from bifurcation	3	13.0
SubtypeE3:High(hilar):CHD division at bifurcation	4	17.4
SubtypeE4:Separate left & right hepatic duct	1	4.3
Total	23	100.0

Emergency department admissions were common (15 patients, 65.2%). Chronic calculus cholecystitis was primary diagnosis in 14(60.9%) patients, acute calculus cholecystitis and empyema gallbladder were noted in 02(8.6%) patients, whereas no previous record were found in 7 (30.4%) patients. The mean time to referral following injury was 4.87 (median 5) days.CBD injury was assessed according to Strasberg's classification (Table-1). In 4 (17.4%) patients, emergency exploration were carried out without repair, except biliary aspiration and drainage.

Magnetic resonance cholangiopancreatography (MRCP) was carried out to assessed injury in 14(61.1%) patients, whereas Endoscopic retrograde

cholangiopancreatography (ERCP) remained diagnostic in 5(21.5%) patients.

Table No.2: Operative findings with surgical procedures

Finding of first surgery with procedure	No. of patients (Percent)	Finding of second surgery with procedure	No. of patients (Percent)
Conservative management (No second surgery at our unit)	8(34.8%)	Non	20(87%)
Injury at CBD with biliary fluid aspirated, repair done, drain placed	1(4.3%)	Lateral CBD injury, Cut 2cm below confluence, Repair over T- tube	2(8.7%)
Injury at CHD, stemp<2cm, biliary fluid aspirated, drain placed	1(4.3%)	CHD injury, stump<2cm, Roux-Y-Hepatojejunostomy performed	1(4.3%)
No injury identified, biliary fluid aspirated, Drain placed	1(4.3%)		
Lateral injury at CHD, biliary fluid aspirated, drained placed	1(4.3%)		
CHD injury, stump<2cm, Roux-en-Y Hepatojejunostomy	3(13%)		
CHD devison at bifurcation, Roux-en-Y Hepatojejunostomy	3(13%)		
Separate right & left hepatic duct, Gassion capsule dissected, Roux-en-Y Hepatojejunostomy	1(4.3%)		
Injury at CHD, stump>2cm, Roux-en-Y Hepatojejunostomy	4(17.4%)		
Total	23(100%)		23(100%)

Commonest injury noted were type A/C, 8 (34.8%) patients, followed by type E2, 5(21.7%) patients, type E1 and E3 each had 4 (17.4%) patients and lastly 01(4.3%) for each of type D and type E4 injuries. (Table-2) Roux-en-Y hepatojejunostomy was the commonest operative procedure performed 14(60.2%) patients, while in 09(38.7%) patients, no surgery were performed. Therapeutic ERCP was performed in 02(8.6%) patients. Early and late complication were shown in Table 3& 4. Readmission were of 06(25.9%) patients with no associated mortality. (Table 3 & 4).

Table No.3: Early complications

Early post operative complications	No. of patients (Percent)
Bile coming in drain(inadequate injury identified at first surgery, treated as late complication)	1(4.3%)
Chest infection	2(8.7%)
Wound infection	1(4.3%)

Table No.4: Late complication which requires conservative/surgical procedure

Complication	Surgical procedure	No. of patients (Percent)
CHD injury,	Stump <2cm from bifurcation, Roux-en-Y Hepatojejunostomy	1(4.3%)
Liver abscess	Incision & drainage under general anesthesia	1(4.3%)
Stricture at CHD	Roux-en-Y Hepatojejunostomy	1(4.3%)
Cholangitis	Conservative treatment	2(8.7%)

DISCUSSION

Gallstone disease is a major public health problem throughout the world and cholecystectomy is the common procedure. With the operative mortality of less than 1%, it does have a drastic morbidity of bile duct injuries of 0.5% which is comparatively small but difficult to treat. **Error! Bookmark not defined.** This small observation study was dominated by female patients twenty out of twenty three which quit similar to other studies like Gluszek **S****Error! Bookmark not defined.** and Evangelos Felekouras **Error! Bookmark not defined.**. The mean age were 42.65 (rang:25-65) years which is similar to Mercado MA. **Error! Bookmark not defined.** Our study showed almost equal patients of laparoscopic versus opencholecystectomy (12 laparoscopic 11, open cholecystectomy) which is similar to the study conducted by JM Plummer.¹² The mean time to referral following injury was 4.87 (median 5) days. Which was a moderate duration as compare to a study conducted by Evangelos Felekouras **Error! Bookmark not**

defined. comparing early and delayed intervention for LC. Emergency explorations was limited to 04(17.4%) for patients with toxicity due to biliary peritonitis. Primary elective explorations were 11(47.8%). In 04(17.4%) patients, drain placed at cholecystectomy, in which drain output became nil in a week (labeled as type A/C injuries). In 2(8.7%) patients, drain placed under ultrasound (U/S) guidance which later on became nil (again labeled as type A/C injuries), whereas multiple U/S guided aspirations in 01(4.3%) patient and only resuscitation was carried out in 01(4.3%) patient(both labeled as type A/C injuries). Type D injury, 01(4.3%) patient, in which stent passed via ERCP and U/S guided drain placed. So, conservative management were remained successful in 9 patients (39.1%).Roux-en-Y hepatojejunostomy were performed in 14(60.2%) patients. In which the injuries were according to Strasberg classification are: Type E IV:1, Type E III:4, Type E II:5, Type E I:4. ERCP was performed in 05(21.5%) patients in 03(12.9%) patients it was therapeutic, in rest of 02(8.6%) it was diagnostic. Early postoperative complications were chest infection 02(8.7%) patients, wound infection 01(4.3%)patient, lastly failure to identify complete injury 01(4.3%) patient, which later on lead to another surgery ended up in Roux-en-Y hepatojejunostomy. CBD injuries noted in our study are somewhat similar with studies conducted by Evangelos Felekouras **Error! Bookmark not defined.**, Arora A,¹³ AinulHadi,¹⁴ Muhammad Sadique.¹⁵ Readmissions were of 06(25.9%)patients and it was for late postoperative complications. One patient had stricture at anastomosis site two years after CBD repair, for which Roux-en-Y hepatojejunostomy was performed. Another patient developed liver abscess for which incision & drainage under general anesthesia was performed, whereas 02(8.7%) patients developed cholangitis managed conservatively. Lastly 01(4.3%) patient admitted for remove of stents following lateral CBD injury, which was not the complication. The complication observed in our study were less as compare to study conducted by Ozturk E.¹⁶

CONCLUSION

Bile duct injuries are worse complication of both open and laparoscopic cholecystectomy. It can have devastating effects on patients quality of life. If these injuries are diagnosed early (during operation or the early postoperative period) can reduce the morbidity and mortality.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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