Proceedings S.Z.M.C. Vol: 37(4): pp. 21-25, 2023. PSZMC-902-37-4-2023

Presentation Of Post Cholecystectomy Bile Duct Injuries In A Tertiary Care Hospital

[1]Qaiser Naveed Haral, [1]Ammad Ud Din Nasir, [1]Arslan Hamid, [1]Muhammad Shoaib Khan, [1]Rashid Zahid Ali, [1]Arwah Mansoor, [2]Hassan Mumtaz

ABSTRACT

Introduction: The occurrence of iatrogenic bile duct injuries is few, however potentially linked to life-threatening complications, particularly following the advent of laparoscopic cholecystectomy.
Aims &Objectives: To evaluate the presentation of post-cholecystectomy bile duct injuries in a tertiary care hospital.
Place and Duration of Study: This study was done in the Department of General Surgery at Combined Military Hospital Rawalpindi from Nov 2020 to Dec 2021.
Material &Methods: This cross-sectional study was conducted on 15 subjects with post-cholecystectomy bile duct injuries.All the patients who presented to the emergency department and outdoor were included in the study and had post-cholecystectomy CBD injuries.Laparoscopic and open BDI were classified according to Strasberg classification. In descriptive statistics, mean, and standard deviation was used, and in qualitative analysis, frequency and percentages were calculated with the help of the SPSS 23 version, a p-value of ≤0.05 was considered significant.
Results: In our study, 5 (33.3 %) males and 10 (66.7 %) were females, with a mean age of 47.27 ± 4.79.The presentation on the admission of patients was as follows, 3 (20.0 %) patients had biloma, 4 (26.7 %) had jaundice, 2 (13.3 %) had abdominal pain, 1 (6.7 %) had external biliary fistula, 3 (20.0 %) had Biliary peritonitis and 2 (13.3 %) had a fever.
Conclusion: The most common consequence of cholecystectomy was complete resolution, but bile leak and major duct damage cause considerable morbidity, death, and healthcare expenditures. Better outcome was achieved when a nonprimary and skilled hepatobiliary surgeon repaired severe bile duct damage.

Keywords: Presentation, post-cholecystectomy, bile duct injuries, tertiary care hospital.

INTRODUCTION

One of the most frequent digestive health issues is gallstones.Laparoscopic cholecystectomy (LC) is the preferred method for removing the gallbladder in the treatment of symptomatic cholelithiasis due to its decreased postoperative mortality and morbidity rates[1].Cholecystectomy is one of the most common gastrointestinal surgical procedures to be performed laparoscopically[2].Compared to open cholecystectomy, bile duct injuries (BDI) are more prevalent and severe, with areported frequency of 0.6 % for laparoscopic and 0.1 % for open cholecystectomy.These injuries are a tragedy for surgeons and patients because of the accompanying morbidity,extended hospitalization, and death[3,4].

1. [1]Department of General Surgery, NUMS, Rawalpindi.
2. [2]Department of Clinical Investigation, Maroof International Hospital, Islamabad.

Correspondance:
Dr. Hassan Mumtaz, *Senior Clinical Research Associate, Department of Clinical Investigation, Maroof International Hospital.*
Email: hassanmumtaz.dr@gmail.com

Submission Date: 7th November 2022
1st Revision Date: 17th July 2023
Acceptance Date: 15th August 2023

Bile duct injury (BDI) isa serious complication of laparoscopic cholecystectomy that can be fatal. A 0.5 % to 0.6 % rate of bile duct injuries (BDI) during laparoscopic cholecystectomy has been reported in several studies[3].Patients with significant bile duct injuries provide a surgical challenge that is often best handled by the fellowship-trained specialists at tertiary referral centers. Surgeons, gastroenterologists, and interventional radiologists must work together to treat these types of injuries[1,3].
Bile duct injuries (BDI) may occur when any surgeon performs cholecystectomy surgery. Compared to open surgery, laparoscopic cholecystectomy is the most done procedure in the digestive tract, with a greater prevalence of BDI. Many people believe that this type of damage tarnishes the minimally invasive technique by delaying recovery times that could have been quicker and better and being extremely irritating for patients and doctors[5,6,7,8].
Bile duct injuries (BDI) after cholecystectomy is themain cause of early and long-term death and morbidity, lower quality of life, health-related and frequent legal action[9].
Early diagnosis, precise surgery scheduling, and proper reconstruction can help prevent major

consequences, including hepatic failure, biliary sepsis, and biliary cirrhosis, and improve recovery[10,11]. Surgical mediation aims to restore bile flow by a proper bilio-enteric reconstruction[11].

In patients with uncomplicated and early-stage BDI, endoscopic therapy with sphincterotomy and stent insertion is first indicated[5]. Surgical treatment is necessary when an endoscopic technique is impossible. Successful repair at a multidisciplinary facility by a competent hepatobiliary surgeon will minimize morbidity, cost and length of stay[12].

The surgical repair timing is debatable and relies on the kind and degree of the injury, the patient's overall health, sepsis presence, surgeons and resources of the hospital[11,13].

The most frequent causes of BDI, which are frequently ignored, are anatomical misunderstandings and technological mistakes. This delinquency can cause a delay in the patient's admittance to the hospital, which can subsequently cause a delay in diagnosis and care, affecting the repair's result. Many risk variables can be utilized as intraoperative guidance to help prevent BDI[14]. Our study aimed to evaluate the presentation of post-cholecystectomy bile duct injuries in a tertiary care hospital.

MATERIAL AND METHODS

This cross-sectional study was conducted on 15subjects with post-cholecystectomy bile duct injuries from Nov 2020 to Dec 2021 at Combined Military Hospital, Rawalpindi. Data collection was done after approval from the Combined Military Hospital's Ethical Review Board, ref no 187/8/21.All the patients who presented to the emergency department and out door were included in the study and had post-cholecystectomy CBD injuries.The sample size of our study was 15 patients with bile duct injuries, which we calculated using the WHO sample size calculator. Laparoscopic and open BDI were classified according to Strasberg classification.The data on clinical presentation, demographic and bilio-digestive reconstruction were measured and analyzed with the help of the SPSS 23 version. In descriptive statistics, mean, and standard deviation was used, and in qualitative analysis, frequency and percentages were calculated.

RESULTS

In our study, we enrolled 15 patients with bile duct injuries, of which 5 (33.3 %) were males and 10 (66.7 %) were females, with a mean age of 47.27 ± 4.79. The mean time of admission to patients was 18.07 ± 2.22 days, and the mean time of surgery of patients was 14.07 ± 1.44 days. Most of the patients had malnutrition. 10 (66.7 %) cases of females occurred in the laparoscopic surgery procedure and 5 (33.3 %) of males cases were in the open surgery procedure.The presentation on the admission of patients was as follows, 3 (20.0 %) patients had biloma, 4 (26.7 %) had jaundice, 2 (13.3 %) had abdominal pain, 1 (6.7 %) had external biliary fistula, 3 (20.0 %) had Biliary peritonitis and 2 (13.3 %) had a fever.As a diagnostic tool in all patients, abdominal ultrasound was done in 15 (100 %) patients to identify and confirm the bile duct injury. MRCP in 7 patients,ERCP was done in 3 patients, and PTC in 1 patient.

Age	47.27 ± 4.79
Gender Male Female	 5 (33.3 %) 10 (66.7 %)
Time of admission	18.07 ± 2.22days
Time of surgery	14.07 ± 1.44days
Surgical approach	
Laparoscopic	10 (66.7 %)
Open	5 (33.3 %)
Presentation on admission	
Biloma	3 (20.0 %)
Jaundice	4(26.7 %)
Abdominal pain	2(13.3 %)
External biliary fistula	1 (6.7 %)
Biliary peritonitis	3 (20.0 %)
Fever	2(13.3 %)
Diagnostic tools	
Abdominal ultrasonography	15 (100 %)
MRCP	7
ERCP	3
PTC	1
Length of stay	29 days
Morbidity on outpatient follow-up	
Recurrent cholangitis	1
SSI	3
Relaparotomy	1

Table-1: Family History

MRCP:"Magnetic Resonance Cholangiopancreatography"
ERCP:"Endoscopic Retrograde Cholangiopancreatography"
PTC:"Percutaneous transhepatic cholangiography."
SSI: "Surgical Site Infection"

In follow-up of morbidity on outpatient, results showed one (1) patient had recurrent cholangitis, three (3) patients had surgical site infections (SSI), and one (1) had relaparotomy due to the burst abdomen and anastomosis leakage. In our study, the

mean value of the length of stay was 29 days with no hospital mortality and stricture.

Classification	Number	Reconstruction
Strasberg Classification		
Type A	6	Primary cystic duct ligation
Type C	2	End-to-end repair over T tube
Type D	2	Hepaticojejunostomy
Type E2	3	Choledocho-duodenostomy
Type E3	2	Hepaticojejunostomy

Table-2: Classification And Surgical Management Of BDI.

Table-2 shows Classification and surgical management of bile duct injury (BDI) which consists of ten (10) laparoscopic patients and five (5) open surgeries patients were classified according to the classification of Strasberg, in which 6 patients had type A, 2 had type C, 2 had type D, 3 had type E2, and 2 had type E3.Primary cystic duct ligation was performedon six (6) patients, End to end repair over T tube was done in two (2) patients, Choledocho-duodenostomy was done in three (3) cases and Hepaticojejunostomy was done in four (4) cases.

DISCUSSION

Biliary fistula, biliary ligation, hemobilia and biliary leakage are all biliary injuries. Recently, the bile duct injuries pattern has altered or grown more convoluted. A few classification schemes forbile duct injuries and postoperative strictures have been proposed[3]. Our study reported no mortality in all bile duct injury patients.In our study, 5 (33.3 %) males and 10 (66.7 %) were females, with a mean age of 47.27 ± 4.79. 10 (66.7 %) cases occurred in the laparoscopic surgery procedure and 5 (33.3 %) in the open surgery procedure. These findings also matched with other studies[10,11].A similar study was also conducted by Lalisang et al[5]. In which the total enrolled patients were 24 with a mean age of 45 years, and male to female ratio was 9/15. 16 cases occurred in the laparoscopic surgery procedure and 8 in the open surgery procedure. These results were matched with the results of our study. A similar study[15] was also conducted in which the total enrolled patients were 97 with a mean age of 40.86 ± 13.45 years, and male to female ratio was 24/73. In another study by Pandit et al[4]., the total number of patients enrolled was 18, with a mean age of 40. The male-to-female ratio was 7/11. 15 cases occurred in the laparoscopic surgery procedure and 3 in the open surgery procedure. These findings also matched our study results.The mean time of admission to patients was 18.07 ± 2.22 days, and the mean time of surgery of patients was 14.07 ± 1.44 days. Most of the patients had malnutrition.Compared to the bile leakage patients, people with obstructive jaundice present later. The average duration from diagnosis to treatment was 40.87 days, compared to 24.7 days for the bile leak patients[15,16].The presentation on the admission of patients was as follows, 3 (20.0 %) patients had biloma, 4 (26.7 %) had jaundice, 2 (13.3 %) had abdominal pain, 1 (6.7 %) had external biliary fistula, 3 (20.0 %) had Biliary peritonitis and 2 (13.3 %) had a fever.In a study[17], cystic duct leak (type A) was the main BDI form observed in 18 patients. In one patient, the stone of CBD was identified as the cystic duct leak factor, and in all other patients, failure of the clip was the causative factor. This contradicts the popular belief that an undetected stone of CBD is the most prevalent cause of cystic duct 'blow out.'

Biliary leakage/fistula or obstructive biliary symptoms are the most common symptoms of bile duct injuries. These two groups may overlap. Although 15.5 per cent of our patients had obstructive jaundice and 84.5 per cent had bile leakage. At the time of presentation, several patients had jaundice, leakage, and intra-abdominal collection[15,18].

In our study, abdominal ultrasound was used as a diagnostic tool in all patients to identify and confirm the bile duct injury. ERCP was done in 3 patients, MRCP in 7 patients, and PTC in 1 patient.

Transabdominal ultrasonography is frequently the first test performed when a patient has postsurgical biliary damage. Ultrasound can be used to check for ascites or billion and rule out CBD damage or retained stones; however, studies have shown that early ultrasound forbiliary leak is ineffective. Cholescintigraphy, CT abdomen, and MRCP are other diagnostic modalities. These modalities are 100 per cent, 95 per cent, and 95 per cent sensitive in detecting bile leakage[15,19].

In around 20% of the patients with leak cystic duct, a retained CBD stone has been recorded. EPT, ERC,alone for the leaks low-grade, or stenting bile duct are all options for treating type A damage. When there is an intraabdominal collection, a CT or US-guided percutaneously insertedcatheterisused to drain it. ERC is preceded by percutaneous catheter insertion, and laparoscopy is performed after ERC under the same anaesthetic[15,19,20]. The classification of Strasberg types E and A were the most common types found in this study, which was similar to other studies results[5,21].According to a study, type A

injury was more common with laparoscopic cholecystectomy, whereas type E3 was more common with open cholecystectomy[17]. This contradicts earlier research that connected laparoscopic surgery to more severe and complex BDI[22].In a study[4], the results of the classification of Strasberg showed that 9 (50 %) had type A, 1 (5.5 %) had type D, and 8 (44.5 %) had type E in which 5 (27.8 %) had E1, 1 (5.5 %) had E2 and 2 (11.1 %) had E3. No vasculobiliary injury or other organ injury was found. Hepaticojejunostomy was done in four (4) cases, Choledocho-duodenostomy was done in three (3) cases, Primary cystic duct ligation was done in six (6) patients and End to End repair over T tube was performed in two (2) patients.

In a study[4], the procedures done in 7 (70 %) patients were hepaticojejunostomy, 1 (10 %) patients were End to End anastomosis with a 't' tube and 2 (20 %) patients had laparotomy performed with lavage and drainage.When there is a lot of tissue loss, a hepaticojejunostomy is indicated. Inflammation and adhesion can create small inaccuracies in damage categorization in BDI, particularly in early treated cases, and can also make it difficult to recognize healthy biliary tract remnants that will be utilized in the biliary-enteric anastomosis. Due to its flexibility in anastomosis of various sizes of the residual biliary system, hepaticojejunostomy is now regarded as the final treatment[5,23]. Postoperative bile duct damage can be life-threatening for the patient and the physician. Only 30% are detected during operation and have a reasonable prognosis in skilled hands. The kind of damage, the patient's health, and the available facilities all influence how the injury is managed[15]. In follow-up, results showed one (1) patient had recurrent cholangitis, three (3) patients had surgical site infections, and one (1) had relaparotomy due to the burst abdomen and anastomosis leakage. In our study, the mean value of the length of stay was 29 days with no hospital mortality and stricture.No mortality was observed in the study[4], and superficial SSI was observed in 2 (20 %) patients.The pillars of an excellent outcome are early detection and an appropriate interdisciplinary approach. The biliary tree and its vasculature are frequently damaged due to poor injury care. To ensure the best outcomes in the early tertiary care facility approach, experienced and trained surgeons of hepatobiliary and interventional trained radiologists must be involved.

CONCLUSION

The most common consequence of cholecystectomy is complete resolution, but bile leak and major duct damagecause considerable morbidity, death, and healthcare expenditures. Compared to findings of a decade ago, the rate of significant bile duct damage has decreased due to the implementation of safecholecystectomy culture. Similarly, from cystic ducts, bile leakage has become more common. A great outcome is achieved when a nonprimary and skilled hepatobiliary surgeon repairs severe bile duct damage.

REFERENCES

1. Manouras A, Pararas N, Antonakis P, Lagoudiannakis EE, Papageorgiou G, Dalianoudis IG, et al. Management of major bile duct injury after laparoscopic cholecystectomy: a case report. Journal of medical case reports. 2009;3(1):1-6.
2. Renz BW, Bösch F, Angele MK. Bile duct injury after cholecystectomy: surgical therapy. Visceral medicine. 2017;33(3):184-90.
3. Abid KJ, Ishaque S, Naeem I, Ch TS. Management of major bile duct injury after laparoscopic cholecystectomy: a case report. International Journal of Recent Advances in Multidisciplinary Research. 2017;04(03):2398-402.
4. Pandit N, Yadav TN, Awale L, Deo KB, Dhakal Y, Adhikary S. Current Scenario of Postcholecystectomy Bile Leak and Bile Duct Injury at a Tertiary Care Referral Centre of Nepal. Minimally invasive surgery. 2020;2020(4382307):1-6.
5. Lalisang TJM, Situmorang I, Ibrahim F, Widianto P, Marbun VMG. Management of post-cholecystectomy bile duct injuries without operative mortality at Jakarta tertiary hospital in Indonesia–A cross-sectional study. Annals of Medicine and Surgery. 2021;62:211-5.
6. Pesce A, Palmucci S, La Greca G, Puleo S. Iatrogenic bile duct injury: impact and management challenges. Clinical and experimental gastroenterology. 2019;12:121-8.
7. Sugrue M, Coccolini F, Bucholc M, Johnston A. Intra-operative gallbladder scoring predicts the conversion of laparoscopic to open cholecystectomy: a WSES prospective collaborative study. World Journal of Emergency Surgery. 2019;14(1):1-8.
8. Stilling NM, Fristrup C, Wettergren A, Ugianskis A, Nygaard J, Holte K, et al. Long-term outcome after early repair of iatrogenic bile duct injury. A national Danish multicentre study. Hpb. 2015;17(5):394-400.
9. Patrono D, Benvenga R, Colli F, Baroffio P, Romagnoli R, Salizzoni M. Surgical management of post-cholecystectomy bile duct injuries: referral patterns and factors influencing early and long-term outcome. Updates in surgery. 2015;67(3):283-91.
10. Halbert C, Altieri MS, Yang J, Meng Z, Chen H, Talamini M, et al. Long-term outcomes of patients with common bile duct injury following laparoscopic cholecystectomy. Surgical endoscopy. 2016;30(10):4294-9.

11. Vickers NJ. Animal communication: when I'm calling you, will you answer too? Current biology. 2017;27(14):R713-R5.

12. Dominguez-Rosado I, Sanford DE, Liu J, Hawkins WG, Mercado MA. Timing of surgical repair after bile duct injury impacts postoperative complications but not anastomotic patency. Annals of surgery. 2016;264(3):544-53.

13. Törnqvist B, Waage A, Zheng Z, Ye W, Nilsson M. Severity of acute cholecystitis and risk of iatrogenic bile duct injury during cholecystectomy, a population-based case–control study. World Journal of Surgery. 2016;40(5):1060-7.

14. Buddingh KT, Nieuwenhuijs VB, van Buuren L, Hulscher JB, de Jong JS, van Dam GM. Intraoperative assessment of biliary anatomy for prevention of bile duct injury: a review of current and future patient safety interventions. Surgical endoscopy. 2011;25(8):2449-61.

15. Ghazanfar S, Qureshi S, Leghari A, Taj MA, Niaz SK, Quraishy MS. Endoscopic management of postoperative bile duct injuries. JPMA-Journal of the Pakistan Medical Association. 2012;62(3):257-62.

16. Elhamel A, Nagmuish S, Elfaidi S, Dalal HB. Handling of biliary complications following laparoscopic cholecystectomy in the setting of Tripoli Central Hospital. HPB. 2002;4(3):105-10.

17. Ibrarullah M, Sankar S, Sreenivasan K, Gavini S. Management of bile duct injury at various stages of presentation: experience from a tertiary care centre. Indian Journal of Surgery. 2015;77(2):92-8.

18. Kaman L, Sanyal S, Behera A, Singh R, Katariya RN. Comparison of major bile duct injuries following laparoscopic cholecystectomy and open cholecystectomy. ANZ journal of surgery. 2006;76(9):788-91.

19. Eisenstein S, Greenstein AJ, Kim U, Divino CM. Cystic duct stump leaks: after the learning curve. Archives of Surgery. 2008;143(12):1178-83.

20. Aksoz K, Unsal B, Yoruk G, Buyrac Z, Haciyanli M, Akpinar Z, et al. Endoscopic sphincterotomy alone in the management of low-grade biliary leaks due to cholecystectomy. Digestive Endoscopy. 2009;21(3):158-61.

21. Karanikas M, Bozali F, Vamvakerou V, Markou M, Chasan ZTM, Efraimidou E, et al. Biliary tract injuries after lap cholecystectomy—types, surgical intervention and timing. Annals of translational medicine. 2016;4(9):1-9.

22. Chaudhary A, Manisegran M, Chandra A, Agarwal A, Sachdev A. How do bile duct injuries sustained during laparoscopic cholecystectomy differ from those during open cholecystectomy? Journal of Laparoendoscopic & Advanced Surgical Techniques. 2001;11(4):187-91.

23. Kelsoe J, Greenwood T, Akiskal H, Akiskal K. The genetic basis of affective temperament and the bipolar spectrum. International Clinical

24. Psychopharmacology. 2012;28:e5-e6.

The Authors:

Dr. Qaiser Naveed Haral,
Postgraduate Resident,
Department of General Surgery,
NUMS,

Dr. Ammad Uddin Nasir,
Classified Gen Surgeon,
Department of General Surgery,
NUMS,

Dr.Arslan Hamid,
Postgraduate Resident,
Department of General Surgery,
NUMS,

Dr.Muhammad Shoaib Khan,
Classified Gen Surgeon,
Department of General Surgery,
NUMS,

Dr. Rashid Zahid Ali,
Postgraduate Resident,
Department of General Surgery,
NUMS,

Dr. Arwah Mansoor,
Postgraduate Resident,
Department of General Surgery,
NUMS,

Dr. Hassan Mumtaz,
Senior Clinical Research Associate,
Department of Clinical Investigation,
Maroof International Hospital,

Authorship:

QNH: Data Analysis, Article Writing
ADN: Study Design, Article Correction
AH: Drafting & critical evaluating for academic content
MSK: Data Collection
RZA: Methodology
AM: Results
HM: Drafting & critical evaluating for academic content