Scientific Research Publishing

Open Journal of Clinical Diagnostics, 2022, 12, 55-62
https://www.scirp.org/journal/ojcd
ISSN Online: 2162-5824
ISSN Print: 2162-5816

Pattern of Presentation of Iatrogenic Biliary Injury Following Laparoscopic Cholecystectomy

Fahmid-Uz-Zaman[1*], Mohammad Aminul Islam[2], Md. Saba Al Galib[1], Md. Mashkurul Alam[3], Md. Shamsuddoha Khan[4], Muhammad Tanvir Alam Akhanda[4], Sania Hossain[5], Laila Siddika[6], Mohammad Emrul Hasan Khan[1], Abul Bashar Md. Jamal[7]

[1]Department of Surgery, Dhaka Medical College Hospital, Dhaka, Bangladesh
[2]Department of Surgery, Shaheed M. Monsur Ali Medical College Hospital, Shirajgonj, Bangladesh
[3]Department of Pediatric Surgery, Dhaka Medical College Hospital, Dhaka, Bangladesh
[4]Department of Surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh
[5]National Institute of Cancer Research and Hospital, Dhaka, Bangladesh
[6]Department of Laboratory Medicine, Sheikh Russel National Gastroliver Institute and Hospital, Dhaka, Bangladesh
[7]Mugda Medical College and Hospital, Dhaka, Bangladesh
Email: *fahmidzaman@gmail.com

How to cite this paper: Zaman, F.-U., Islam, M.A., Al Galib, Md.S., Alam, Md.M., Khan, Md.S., Akhanda, M.T.A., Hossain, S., Siddika, L., Khan, M.E.H. and Jamal, A.B.Md. (2022) Pattern of Presentation of Iatrogenic Biliary Injury Following Laparoscopic Cholecystectomy. *Open Journal of Clinical Diagnostics*, **12**, 55-62.
https://doi.org/10.4236/ojcd.2022.124006

Received: October 17, 2022
Accepted: December 3, 2022
Published: December 6, 2022

Abstract

Background: Cholecystectomy is one of the most now common abdominal surgeries performed every day. The incidence of bile duct injury (BDI) following open cholecystectomy is only 0.1% - 0.2%. After the introduction of laparoscopic cholecystectomy, the incidence has gone up to 0.4% - 0.7%. The present study is a prospective analysis of all patients with bile duct injury who were admitted to Dhaka Medical College Hospital during or at a variable period following cholecystectomy. **Methods:** To determine the pattern of presentation of iatrogenic biliary injury following cholecystectomy in the department of surgery of Dhaka Medical College Hospital, a total of 30 patients were purposively selected from May 2018 to November 2018. Patient particulars, records of physical and clinical evaluation, and operative details were collected by individual researchers. Data analysis was done by SPSS for windows version 21. **Results:** BDI was found very common among the age group 21 - 30 yrs (36%) and female dominant (60%). Majority of the patients presented with abdominal pain (96%), intra-abdominal collection (88%), biliary peritonitis (68%), cholangitis (60%), and obstructive jaundice (40%), and biliary fistula (40%). Laparoscopic cholecystectomy (84%) was the principal cause of biliary injury in our study. 48% of patients experienced clinical features within 7 days post-cholecystectomy. Per-operative diagnosis was done in only 12% of cases. 44% of patients in this study were recognized as Bismuth grade-3, followed by 36%, grade-2 patients. Management outcomes in-

cluded wound infection (41.66%), minor bile leak (25%), peritonitis (8.33%), and renal impairment (8.33%). **Conclusion:** The effect of BDI is an extremely distressful clinical condition for the patients and their family members, hence proper care and management protocol should be followed.

Keywords

Bile Duct Injury, Laparoscopic Cholecystectomy, Post-Operative Complications, Bangladesh

1. Introduction

Iatrogenic biliary injuries during cholecystectomy can have deleterious impacts on patients' health, including a significant risk of early death [1]. Bile duct injury (BDI) occurs mostly due to iatrogenic causes when it is termed iatrogenic bile duct injury (IBDI). It has been an inherent complication of this surgery due to the surgeon's perceptive error [1].

Cholecystectomy is a surgical procedure for patients suffering from symptomatic gall stones. Though patients undergoing open cholecystectomy have long been susceptible to biliary injuries, the advent of laparoscopic cholecystectomy has refocused attention on this issue because of the significant increase in the number of injuries [2]. At the beginning of the laparoscopic surgery era, bile duct injuries were attributed to the learning curve effect due to inadequate experience [2]. In previous studies concerning open and laparoscopic surgery, the injury rate for open cholecystectomy has been estimated to be 0.2%, which is 0.4% - 0.6% in the case of laparoscopic cholecystectomy [3] [4] [5] [6] [7]. The highest incidences were reported in the early 1990s when laparoscopic cholecystectomy was introduced [8].

Several factors affect the occurrence of bile duct injury during cholecystectomy. Previous studies indicate that the use of intraoperative cholangiography could decrease the incidence and severity of bile duct injury. In addition to that, age, sex, the severity of the disease, and factors related to hospital and surgeon could also enhance the risk of bile duct injury [9].

Bile duct injuries can entail very minor accessory duct injuries to complicated hilar injuries [10]. Late complications such as anastomotic bile duct strictures or secondary biliary cirrhosis may result in life-long disability.

If major bile duct injury (MBDI) occurs, then an experienced hepatobiliary surgeon should be consulted without much delay [11]. In addition, collaboration with surgeons, interventional radiologists, and gastroenterologists is usually necessary for the care of such injuries. Considering current research evidence, it is of paramount importance that iatrogenic bile duct injuries are identified and managed early minimizing the risks of serious complications. The study aims to ensure better management and the best possible outcome for the patient with iatrogenic biliary injury following cholecystectomy by understanding the complete clinical scenario of admitted patients.

2. Methods

Study design and location: This is a prospective observational type of study. The study was conducted in the inpatient department of surgery at DMCH, Dhaka from 17.05.2018 to 16.11.2018.

Study population: The patients admitted with iatrogenic biliary injury following cholecystectomy were admitted to the surgery ward of DMCH. A total of 30 patients were included in this study after obtaining written informed consent.

Inclusion and Exclusion criteria:

Inclusion criteria:

- Patient with iatrogenic biliary injury following cholecystectomy;
- Patients with postoperative complications following cholecystectomy;
- Patients of both sexes.

Exclusion criteria:

- Patient with biliary injury following trauma;
- Patient underwent other abdominal surgery except for cholecystectomy;
- Those who are not willing to participate in the procedure.

3. Procedures of Data Collection

After taking informed written consent from the eligible patient-

1) Information about the patient has been taken by a researcher at the surgery emergency department and surgery ward.

2) Records of particulars of the patients were checked and physical examinations were carried out by a researcher.

3) Operative details of the cholecystectomy were collected from a history, clinical findings, investigations report, operation notes, and discharge certificate with the help of a predesigned data collection sheet.

4. Data Processing and Analysis

All data have been checked and edited after collection. Later on, data were analyzed with the help of the software program SPSS for windows version 21 and MS Excel worksheet 2010.

5. Ethical Issue

Before the commencement of this study, the research protocol was approved by the ethical review committee of DMCH. The aims and objectives of the study along with its procedure, methods, risks, and benefits were explained to the patients and their guardians in an easily understandable local language and informed consent was taken from them or/her legal guardian (in case of unconscious patients).

6. Results

Table 1 shows that out of 30 patients the maximum number of patients 29 (96%) presented with abdominal pain followed by intra-abdominal collection 26 (88%).

The maximum number of patients in this study came from the age group of 21-30 years followed by 41 - 50 years. The lowest number of patients were from the <20 years age group.

25 out of 30 patients (84%) suffered from biliary tract injury due to laparoscopic cholecystectomy followed by open cholecystectomy 5 (16%).

Table 2 shows, that out of 30 patients 14 (48%) cases resulted from surgical intervention during acute cholecystitis and acute biliary pancreatitis;12 (40%) from bleeding in Calot's triangle or unclear anatomy; 3 (8%) from large, impacted stone in Hartmann's pouch, and 1 (4%) from Mirizzi syndrome.

Table 3 shows that out of 30 patients 15 (48%) patients were diagnosed within 7 days after operation whereas 4 (12%) patients were diagnosed immediately after operation. The remaining 11 (40%) patients were diagnosed between the 8th postoperative day and 6 months after surgery.

Table 4 shows that out of 30 patients 13 (44%) were diagnosed as Grade-3 which was followed by the Grade-2 population (36%)

Table 5 shows that out of 30 patients 14 (48%) patients experienced postoperative complications. Among them, the highest number of patients experienced wound infection 6 (41.66%) followed by minor bile leak 4 (25%).

Table 1. Distribution of patients by clinical presentation.

Type of presentation	Number of patients (n)	Percentage
Abdominal pain	29	96%
Intra-abdominal collection	26	88%
Biliary peritonitis	20	68%
Features of cholangitis	18	60%
Obstructive jaundice	12	40%
Biliary fistula	12	40%

Table 2. Risk factors of biliary injury.

Name of risk factors	Number of patients (n)	Percentage (%)
Surgical intervention during acute cholecystitis and acute biliary pancreatitis.	14	48%
Bleeding in Calot's triangle, unclear anatomy	12	40%
Large, impacted stone in Hartmann's pouch	3	8%
Mirizzi syndrome	1	4%

Table 3. Time of presentation.

Time interval	Number of cases (n)	Percentage (%)
Per operative	4	12%
Within 7 days	15	48%
8th day - 1 month	7	24%
2^{nd} - 6^{th} month	4	16%

Table 4. Distribution of patients according to Bismuth grading.

Bismuth classifications	Number of cases (n)	Percentage (%)
Bismuth Grade-1	1	4%
Bismuth Grade-2	11	36%
Bismuth Grade-3	13	44%
Bismuth Grade-4	4	12%
Bismuth Grade-5	1	4%

Table 5. Distribution of patients by postoperative complications.

Complications	Number of patients (n)	Percentage (%)
Wound infection	6	41.66%
Minor bile leak	4	25%
Peritonitis	1	8.33%
Renal impairment	1	8.33%
Chest infection (pneumonia)	1	8.33%
Mortality	1	8.33%

7. Discussion

The exact incidence rate of bile duct injury among the Bangladeshi population is not available. Injury to the biliary tree is reported in approximately 0.2% of patients undergoing open cholecystectomy [12]. A recent review of literature determined the laparoscopic bile duct injury rate to be greater than the open technique at 0.5% [13].

In the present study, the highest number of participants were in the age group of 21 - 30 yrs, followed by 41 - 50 yrs. Females were predominating as per gender was concerned in each age group. The findings indicate that people of a young and active state, especially females are the common sufferers. In this study, the male: female ratio is 0.66:1. Thus age & sex distribution is almost like the study conducted by Mirza *et al.* [14]. This higher incidence of injury in females is probably since gallstone disease is more common in females. These findings in this study are consistent with a previous report from Slater *et al.* [15].

In this study, most of the patients presented with abdominal pain (96%), intra-abdominal collection (88%), biliary peritonitis (68%), cholangitis (60%), and obstructive jaundice (40%), biliary fistula (40%). A study conducted in Australia showed that the most common presenting features were abdominal pain or distension, nausea, vomiting, and ileus [16]. Another study revealed that the most common clinical presentations were obstructive jaundice (89%) biliary fistula (30%), and biliary peritonitis (9%) [17].

Regarding the time of presentation, 15 (48%) patients presented within 7 days of surgery. 4 (12%) patients were referred for expert opinion per-operatively. A study showed patients were transferred at a median of 26 days after laparoscopic cholecystectomy although initial symptoms were noted at a median of 3 days af-

ter cholecystectomy [18]. In another study, out of 54 patients, 20 were referred immediately, and 34 were referred within a few days after the operation. So, most patients with bile duct injury present in the early postoperative period, usually within a few hours to a few days. In a study by Slater *et al.* [15], it was seen that more than 50% of bile duct injuries went undetected at the time of operation, whereas only 39% of the duct injuries were identified at the time of laparoscopic cholecystectomy. In another case series, 11 out of 20 injuries were identified at the time of operation; the remainders were diagnosed at a median of 7 days (range 1 - 566 days) after surgery with a presentation of jaundice or abdominal pain [19]. All these study findings are almost consistent with that of our study.

In this study, most of the cases were Bismuth grade 3 (44%), grade 2 (36%), and grade 1(12%). A study conducted in France showed Bismuth grade 1, 2, 3, 4, 5 injuries were 15%, 23%, 25%, 20%, 17%, respectively [20]. The outcome was dependent on the Bismuth level. The bile duct injuries that occurred at laparoscopic cholecystectomy were of greater severity than in open cholecystectomy. A similar study reported 117 laparoscopic bile duct injuries & found the commonest type was Bismuth grade 3 [21]. Wound infection (41.66%) was the most frequent complication, followed by minor bile leak, peritonitis, renal impairment, and chest infection. The average hospital stay was 18 days (range of 15 - 60 days).

8. Conclusion

Once the bile duct injury occurs the postoperative revision surgery should be done in a specialized center. The problem should be treated with a multidisciplinary approach. The prompt and appropriate management in a dedicated center offers the best chance of reversal from a potentially fatal condition to the restoration of good health. The best results are achieved through early diagnosis, proper clinical judgment, and skill along with technical expertise.

Acknowledgements

The authors would like to pay tribute to all the participants who agreed to participate in this study.

Consent for Publication

Consent for publication was obtained from each study participant before enrollment.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Availability of Data and Material

The data that support the findings of this study are available on request from the

corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Authors' Contribution

Conception: FUZ, ABMJ;
Methodology: FUZ, ABMJ, MAI, SAG;
Data collection and surgical procedures: FUZ, SAG, MMI, MSK, MTIA;
Writing—Original draft: FUZ, SH, LS;
Writing—Revisions and Editing: MMAM;
Supervision: ABMJ.

Provenance and Peer Review

Not commissioned, externally peer reviewed.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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