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A STUDY OF BILIARY TRACT INJURIES OCCURING AS A COMPLICATION IN CHOLECYSTECTOMY AND THEIR MANAGEMENT

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ABSTRACT

Background and Objectives: To evaluate the prevalence of bile duct as well as other biliary system injuries resulting after cholecystectomy in our hospital, along with the factors that contribute to the injuries and the way they are treated.

Methods: All patients between 2019 and 2021 who had an iatrogenic biliary tract injury underwent a prospective analysis. Gender, age, the presence of abnormal anatomy (extra-hepatic bile duct and vascular anatomy), the presence of gall stone pancreatitis, acute cholecystitis or cholangitis, the time between cholecystectomy and recognition of biliary tract injury, the time from injury to definite management, the type of injury, and the mode of management, such as endoscopic retrograde cholangiography, are all relevant factors for injuries sustained

Results: Injury to the bile duct occurred 2.52% of the time. Patients undergoing cholecystectomy for cholecystitis lasting longer than 72 hours tended to suffer from the majority of bile duct damage. The likelihood of bile duct injury was enhanced by elements including acute cholecystitis, cholangitis, and choledocholithiasis. Most of the injuries were discovered right after surgery. The most frequent site of injury was the common hepatic duct. The majority of BDI cases were treated with a final repair, which was aided by radiological treatments like ERCP and stenting.

Conclusion: Because of the steep learning curve of laparoscopic surgery, bile duct injury rates have been found to be higher in our institution during cholecystectomy. The best chance of recovery is provided by early detection, repair, and a multidisciplinary strategy.

Keywords: cholecystectomy, bile duct injury, incidence, management.

INTRODUCTION

The biliary tract is a complicated organ system that manages the straightforward but crucial job of gathering, storing, and distributing bile to the digestive system. Biliary tract disorders can be excruciatingly painful, crippling, and occasionally fatal [1,2]. There may be several anatomical variances as a result of the intricate development of the liver and biliary system in utero. For any

hepatobiliary operation to be carried out safely, a thorough understanding of these anatomical variances as well as rigorous dissection and structure identification are prerequisites. The biliary system is merciless, thus mistakes in technique or judgement can have severe effects on the patient, leaving them permanently disabled or even dead. Due to this, there is a high value placed on following the right steps exactly the first time, without any technological mishaps. Recognizing iatrogenic injury is equally crucial so that it can be promptly repaired or referred to a surgeon with experience in hepatobiliary surgery. A balanced combination of good judgement, technical knowledge, and attention to detail is necessary for a successful solution [2,3]. Additionally, in order to effectively manage patients with these illnesses, today's surgeons must be able to combine surgical alternatives with the expanding range of radiologic and endoscopic therapeutic options. Cholecystectomy still causes the most post-operative biliary damage, in part due to the procedure's high frequency of use.

It was determined that 0.2% of the more than 42,000 open cholecystectomies carried out in the United States in 1989 resulted in biliary damage. In a literature evaluation of more than 25,000 open cholecystectomies performed since 1980, Strasberg and collaborators observed a 0.3% incidence of injuries [3,4]. However, due to the sharp rise in injuries, attention to this issue has been brought back by the development and desire for laparoscopic cholecystectomy. Between 0.4% and 1.3% more bile duct damage have been reported in numerous studies conducted globally as a result of the laparoscopic method. In addition, Strasberg and colleagues found a 0.85% overall incidence of biliary injuries in a survey of approximately 125,000 laparoscopic cholecystectomies published in the literature between 1991 and 1993 [4,5].

MATERIAL AND METHODS

All patients at Department of General Surgery, Government Medical College, Nalgonda, Telangana, India, who had an iatrogenic BDI between November 2019 and October 2021 were the subject of a prospective analysis. Data was gathered and the case files, surgical, and postoperative records were examined. Gender, age, extra-hepatic bile duct and vascular anatomy, gall stone pancreatitis, acute cholecystitis, or cholangitis, timing of cholecystectomy after the onset of symptoms (72 hours or >72 hours), presence of BDI, time between cholecystectomy and recognition of BDI, length of time from injury to definitive management, type of injury, endoscopic retrograde cholangiography and stenting and definitive repair are considered [5,6].

Based on the incidence of complications among patients undergoing laparoscopic cholecystectomy, which was calculated using the n-master software as being 0.5% with a relative precision of 10% and an alpha error of 5% (95% confidence interval), the sample size was determined. proportional descriptive statistics to describe the frequency of BDI. The Chi Square test will be used to evaluate the statistical variance across factors like age, gender, and so forth.

Inclusion Criteria:

1. Every patient who had a cholecystectomy at Department of General Surgery, Government Medical College, Nalgonda, Telangana, India, between November 2019 and October 2021, whether it was a laproscopic or open procedure.
2. All patients were included, regardless of their socioeconomic standing, gender, or place of residence.
3. Included were all patients over the age of 12 years.
4. Everyone who is qualified for general anaesthesia has been included.

Exclusion Criteria:

Bile duct injuries that develop as a side effect of procedures other than cholecystectomy

1. As a side effect of ERCP
2. Abdominal piercing and blunt injuries.
3. Cholecystectomies performed in conjunction with other procedures, such as those for pancreatic cancer.
4. Children younger than 12 years old were not included in the study.
5. Study participants who were unfit for general anaesthesia were not included.

RESULTS:

Table. 1 Distribution of age and sex among the study population with injuries (BDI)

AGE GROUP	MALES	FEMALES	TOTAL
30-39yr	0	1	1
40-49yr	3	1	4
50-59yr	0	1	1
TOTAL	3	3	6

During the time of the study, 238 cholecystectomies were done. There were 2.52% of Bile duct injuries. The average age was 43.16 years old, and the range was 38 to 53 years old.

Chart.1 Route of cholecystectomy

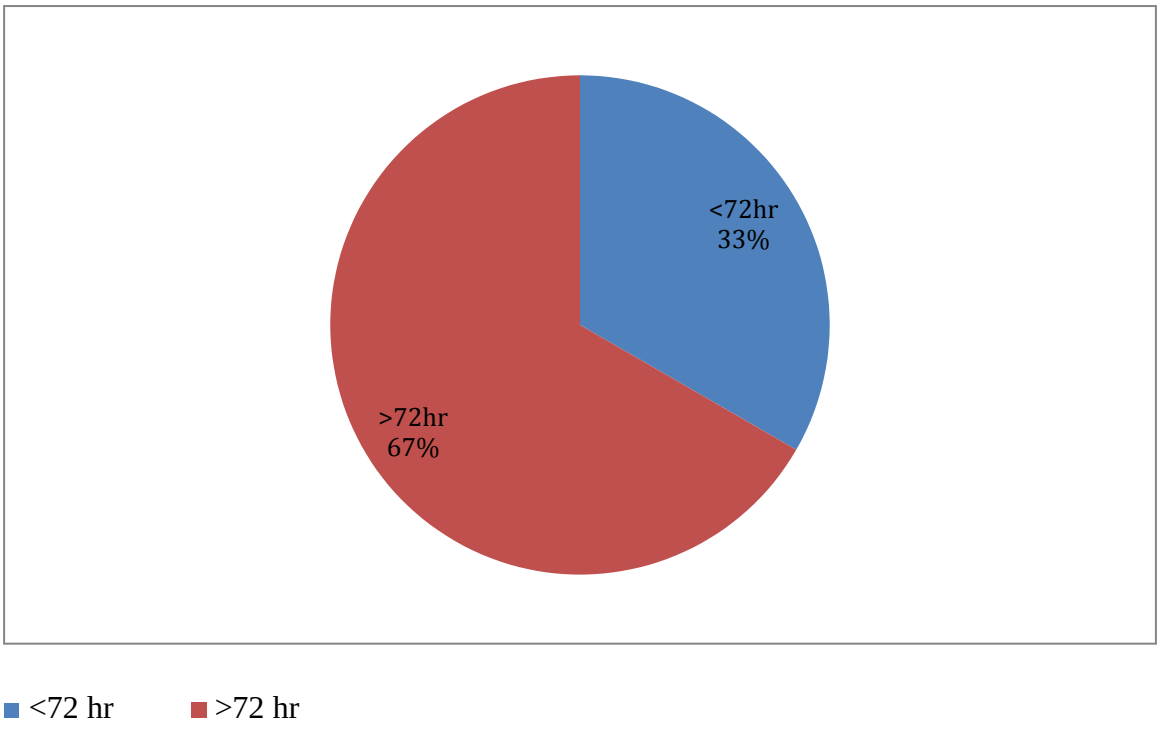

Chart.2 Timing of cholecystectomy from onset of symptoms

Two of the six cases of BDI were documented cases that were sent to a higher centre for more care. BDI was recognised intraoperatively in 33.33%, in the early postoperative period(<1 wk) in 66.67% . None of the people with BDI had choledocholithiasis, pancreatitis, or cholangitis. Two of the people with BDI (33.33%) had cholecystitis that had been going on for less than 72 hours. 33.33% of people with the above risk factors had bile duct injuries.

Majority of the patients who did not undergo any definitive surgery for the bile duct injury immediately in the same setting were evaluated postoperatively. In 4 patients (66.67%), an ultrasound of the abdomen and pelvis was done. A MRCP (66.67%) or ERCP (16.67%) was then done to find out where the injury was.

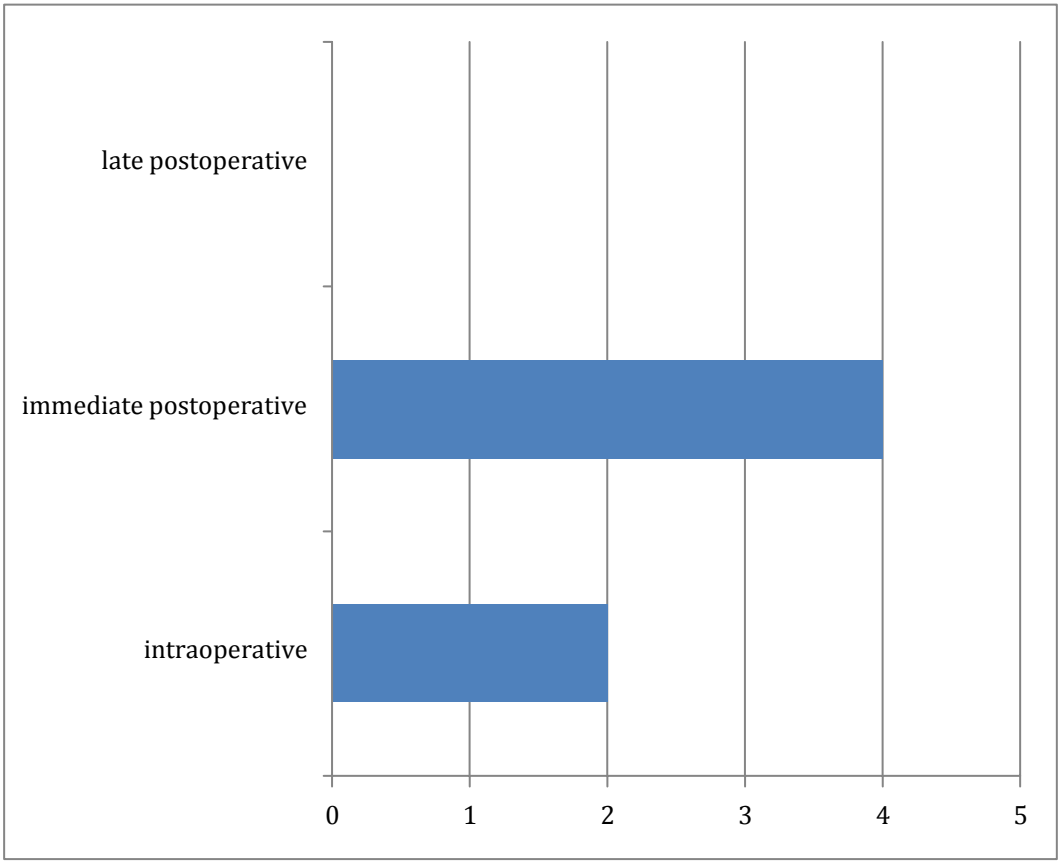

Chart 3: Time to diagnosis of BDI

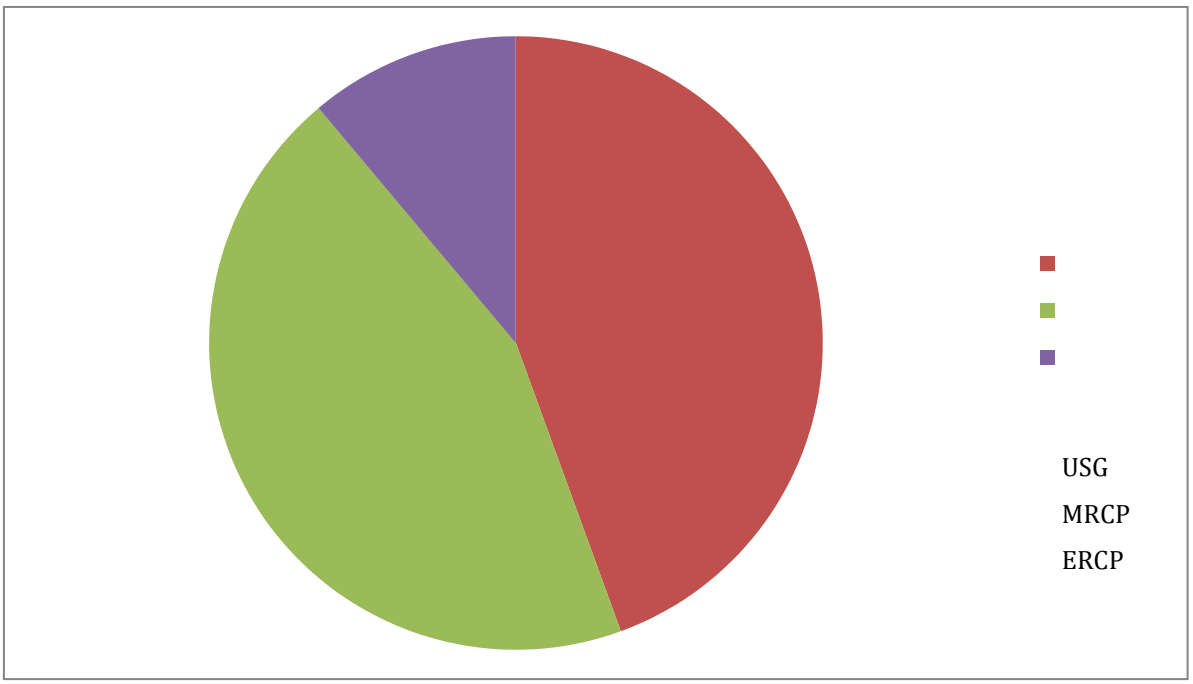

Chart.4 Investigations for evaluating BDI

The site of BDI was determined to be CHD in 50%, CBD in 33.33%, cystic duct in16.67% cases.

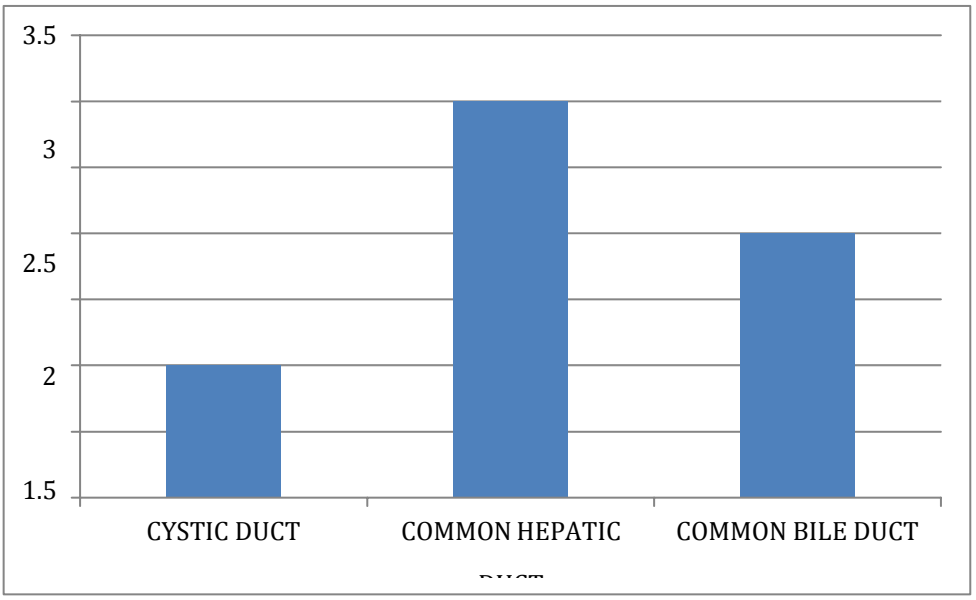

Chart.5 Site of BDI

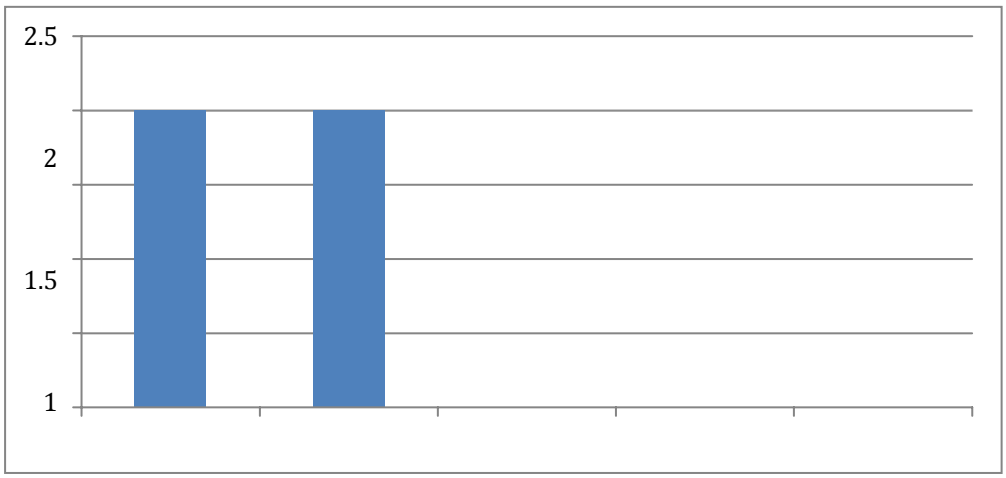

Chart.6 Bismuth's classification of BDI noted in the study

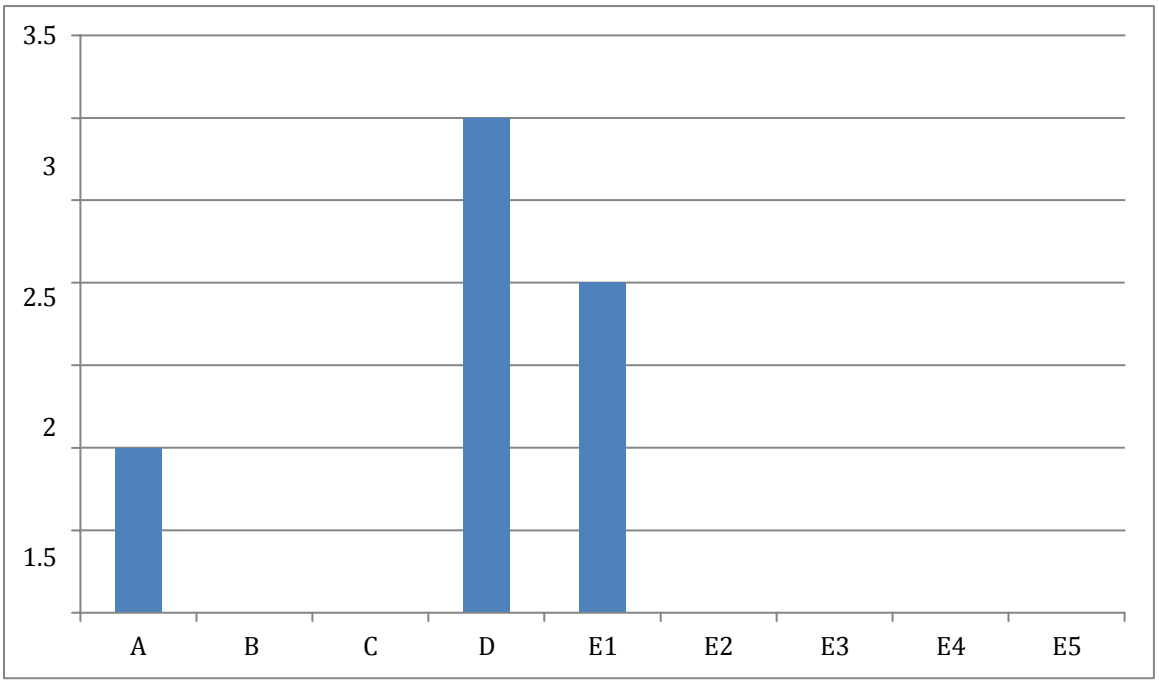

Chart.7 Strasberg's classification of BDI noted in the study

Type A people made up 16.67% of the BDI. Strasberg E1 type made up 33.33%. Half of them were D. Two of the six BDI cases were found during the surgery. Three were stitched together with materials that would dissolve over time. Two cases were found during the surgery, and four cases were found in the first week after the surgery. In one case of a damaged cystic duct, the stump of the cystic duct had to be stitched together first. In one case of CBD injury, an ERCP stent was needed, while in another, a T tube and primary suturing were needed. Two CHD injuries needed percutaneous drainage and were sent to a higher centre for hepatojejunostomy. One CHD injury was treated with a T tube and primary suturing.

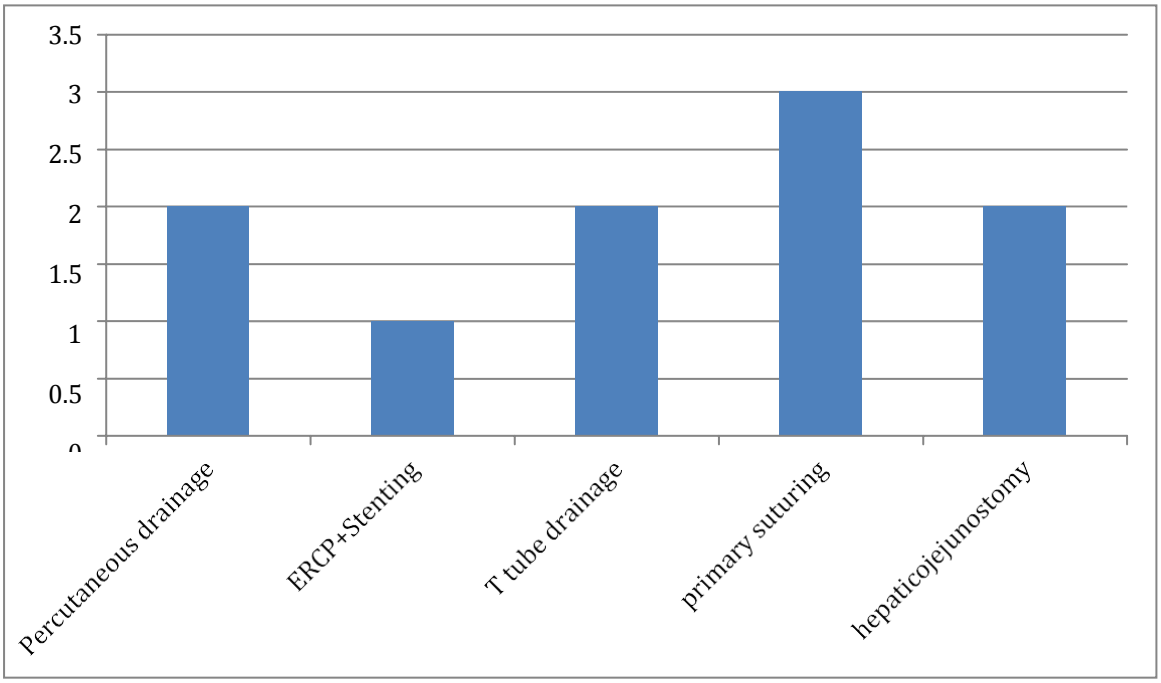

Chart.8 Treatment modalities for BDI in the study

DISCUSSION:

Erich Muhe20 did the first LC in September 1985. Even though surgeons were sceptical of his new operation at the time, by the early 1990s, "minimally invasive surgery," which includes LC, was widely used. Surgeons all over the world started to do the operation, report case series, and create guidelines for it. The widespread use and acceptance of LC had some obvious benefits, like less pain after surgery and a shorter length of stay in the hospital. However, it was also linked to a worrying rise in complications, especially BDI [6,7].

In the last 10 years, studies that looked at how patients were treated after surgery and how their quality of life changed over time have shown that BDI after LC is a major health problem. People thought that the rate of BDI would go down over time as the "learning curve" of LC flattened. However, a recent review of nearly 1.6 million cholecystectomies done on Medicare patients shows that the rates have reached a plateau. From 1992 to 1999, these studies showed that 0.5% of people had BDI [7,8].

Unfortunately, BDI seems to be a problem that may still be around at higher rates than before the LC. Even though technology has gotten better, BDI is still a big clinical problem. To avoid life-threatening complications like cholangitis, biliary cirrhosis, portal hypertension, end-stage liver disease, and death, it is very important to diagnose and treat BDI correctly. Different things can go wrong during laparoscopic cholecystectomy that hurt the bile duct, but what they all have in common is that the anatomy of the triangle of Calot is not understood [9,10]. This failure could have been caused by the way the body is built, by things that are part of the laparoscopic technique, or by not getting enough training. Anatomic risk

factors can include acute or severe chronic inflammation, morbid obesity, bleeding, and the presence of anatomic anomalies.

Factors that are built into the laparoscopic technique include the inability to see depth, differences in the lines of traction of the gallbladder, the difficulty of performing an antegrade cholecystectomy, and the use of electro cautery in a small area that can be easily covered by blood or bile [10,11].

From 2005 to 2014, the California Office of Statewide Health Planning and Development (COSHPD) database had information on 711,454 cholecystectomies, of which 95% were LCs. The California Cholecystectomy Group looked at this information. They found a bile leak rate of 0.5%, which they measured by the need for endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous transhepatic cholangiography (PTC) within 4 weeks of cholecystectomy [12]. In the current study, which looked at 238 cholecystectomies, six cases of biliary tract injuries caused by doctors were found.

Case 1: With the help of USG and MRCP, CHD damage was found right after a laproscopic cholecystectomy. The patient was sent to a higher centre for hepaticojejunostomy after percutaneous drainage was done.

Case 2: CBD injury was found right after a laproscopic cholecystectomy by using USG and MRCP. It was treated with ERCP and stenting because only about 30% of the CBD was affected.

Case 3: Due to cholecystitis, a laparoscopic cholecystectomy had to be changed to an open cholecystectomy, and a CBD injury was found on the operating table and treated with primary sutures and a T tube.

Case 4: Using USG and MRCP, a CHD injury was found right after an open cholecystectomy. A percutaneous drain was held, and the patient was sent to a higher centre where a hepaticojejunostomy was performed.

Case 5: During laproscopic cholecystecomy for cholecystitis, a CHD injury was found during the surgery. Because dissection was hard, the procedure was changed to an open one. Placement of a T-tube and primary suturing or repair are used to care for the patient [13,14].

Case 6: USG and MRCP were used right after a laproscopic cholecystectomy to find that the cystic duct stump had blown out. On the first day after surgery, a relaproscopy was done, and it was found that the clip had moved. The cystic duct stump blowout was fixed by clamping it and stitching it up first [15,16].

When bile duct injuries were found after surgery, they caused fever, bile to leak from the drain, and in a few cases, sepsis. Before deciding how to treat the patient for good, you have to stabilise the patient and stop the sepsis.

The current study shows how big the problem is that BDI has caused. In this study, most injuries were seen in the fourth decade of life, and they were mostly caused by things that had nothing to do with sex. In our study, the rate of BDI after laparoscopic cholecystectomy was 2.52%. In other studies, the rate of BDI after laparoscopic cholecystectomy was between 0.4% and 0.6%. This could be because our hospital is still learning how to do laparoscopic surgery.

33.33% of the BDI were found in people who were getting a cholecystectomy for cholecystitis that had been going on for less than 72 hours. This is one reason why it's hard to do a safe surgery when the anatomy of the Calot's triangle isn't clear. In this study, there were no abnormalities in the structure of the blood vessels or ducts. The laparoscopic cholecystectomy was the cause of 83.33 percent of the injuries. Forty percent of these cases were changed from closed to open. Even though less than a third of bile duct injuries are found during surgery, this rate was 33.33% or one third in our study. Most of these were taken care of at the same time, as soon as they were found, during the cholecystectomy [16,17].

When dealing with complications, it is important to use a multidisciplinary approach that includes surgeons, hepatobiliary surgeons, and interventional radiologists. Ultrasound of the abdomen and pelvis was the most common test done after surgery to figure out BDI. MRCP, ERCP, and PTC were used to find out more about the bile duct and where the injury was. In our study, the common hepatic duct was found to be the most common site of BDI. The BDI we saw most often in our study was Strasberg type D. This is in line with what Strasberg et al., 1995, found in another study. Most cases of BDI were fixed with ERCP and stenting. A small number could be taken care of by stenting alone and did not need surgery. Twenty-five percent of the BDIs that were found after surgery were Strasberg type A, and this case was treated by either stitching the cystic duct stump leak or clipping it again [17].

For the injuries that were found after surgery, two patients were sent to a higher centre for further care, where they had a procedure called hepaticojejunostomy. Most of these CHD injuries were treated with a hepaticojejunostomy, but one was found during surgery and was able to be closed and drained through a T tube. One CBD injury was treated with ERCP and a stent, and the other was treated with primary sutures and a T tube.

CONCLUSION:

Injury to the bile duct is still the most feared complication of cholecystectomy. Because graduate students and new faculty members are still learning, the rate is likely to be higher in schools that teach.

When compared to other studies, there are more cases of BDI at our school. BDI can be caused by things like acute cholecystitis, cholangitis, pancreatitis, and choledocholithiasis. In these cases, help from more experienced colleagues should be sought.

Laparoscopic cholecystectomy must be changed to open surgery if the dissection is hard or if an injury to the biliary tract is found during the surgery. Before cutting the artery and duct, a critical view of safety must be made. Before making a permanent repair, thorough investigations must be done to find out where the damage is.

When anatomy isn't clear, "bailout" procedures like the fundus first technique must be used. When biliary tract injuries might have happened, an intraoperative cholangiogram should be done.

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CONFLICT OF INTEREST: None

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