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Bile duct injury during laparoscopic cholecystectomy

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Abstract---Background and Aim: Bile duct injuries (BDIs) are complex complications developed during laparoscopic cholecystectomy leading to the postoperative morbidity and mortality. Auxiliary bile duct injury, vascular structures injuries, portal vein, cyst duct leakage and damage to right hepatic artery are caused by bile duct injuries. The purpose of the present study was to investigate the incidence, clinical presentation, and treatment modality of bile duct injuries during laparoscopic cholecystectomy. Patients and Methods: This descriptive case series was conducted on 96 extra hepatic biliary injuries in the Department of General Surgery, Rehman Medical Institute, Peshawar from April 2022 to March 2023. Patients with extra hepatic biliary injuries of either gender were enrolled. Abdominal ultrasonography, ERCP, and MRCP were the different investigating modalities performed on each individual. Complete blood picture, activated Partial thromboplastin time (APTT), liver function tests, blood sugar, prothrombin time (PT), Creatinine, serum electrolytes, and Urea were thoroughly performed on each patient. HIV, HBs, and HCV were various screening tests performed. SPSS version 27 was used for data analysis. Results: Of the total 96 patients, there were 26 (27.1%) male

and 70 (72.9%) females. The overall mean age was 41.63± 2.6 years with an age range 25 to 60 years. The incidence of sustained bile duct injury was 19.8% (n=19). Pain, vomiting, fever, and jaundice were the most prevalent complaints found in 76 (79.2%), 47 (49%), 71 (74%), and 68 (70.8%) respectively. The incidence of biloma (sub hepatic collection) and biliary leak through the drain during the initial stage of surgery was 43.8% (n=42) and 35.4% (n=34) respectively. Based on MRCP and ERCP, about 12.5% (n=12) developed biliary peritonitis signs and 13.5% (n=13) had biliary stricture. Of the total 96 cases, the incidence of CHD injury, CBD injury, and Porta hepatis injury was 27.1% (n=26), 51% (n=49), and 9.4% (n=9) respectively. Conclusion: The present study found that the incidence of bile duct injury during laparoscopic cholecystectomy was 19.8%. Pain and fever were the most prevalent complaints followed by jaundice. The overall prevalence of bile duct injury during laparoscopic cholecystectomy was reduced by improving surgical technique, ample time, and experience.

Keywords---bile duct injury, major complaint, laparoscopic cholecystectomy.

Introduction

Cholelithiasis is the most frequent gallbladder pathology globally. Gallstones affect around 10-15% of individuals globally, and are more frequent in women[1]. Laparoscopic cholecystectomy has altered the treatment method for patients with cholelithiasis. Due to the lesser discomfort associated with the surgery, it soon became the treatment of choice for the majority of patients with symptomatic stones[2]. When a common bile duct was injured during a laparoscopic cholecystectomy, serious complications occurred. Common bile duct injuries are related with increased postoperative morbidity and death, as well as a lower life expectancy, particularly when they go undetected[3]. Previously, bile duct damage in open cholecystectomy varied between 0.1% and 0.2%, but with the introduction of laparoscopic cholecystectomy, the rate has risen to 0.4-0.6% [4-6]. In the postoperative phase, 77-89% of biliary system damage was detected. Heterogeneous bile duct damage can result in postoperative stomach discomfort, bile secretion, jaundice, and cholangitis[7].

After replacing traditional open cholecystectomy, laparoscopic cholecystectomy (LC) represents the gold standard for surgical cholelithiasis therapy. Despite advances, bile duct injuries (BDIs) remain a significant consequence and have grown more common than in the past [8-11]. Even though some researchers claim a tendency towards a reduction, the rate of BDI does not appear to have altered significantly since the introduction of LC more than ten years ago[12]. Furthermore, an examination of the literature on BDI therapy reveals that the true rate of BDI may be greater than typically thought. Bile duct injury can occur as a total or partial transection of the bile duct, resulting in biliary leak, or as an occlusion of the primary bile duct, both of which cause stricture development in the long term. Iatrogenic bile duct damage manifests as chronic bile outflow in the drain,

elevated blood bilirubin and alkaline phosphatase levels, localized or widespread peritonitis, and indications of septicemia. Abdominal ultrasonography, CT abdomen, MRCP, ERCP, and intraoperative cholangiography are specific studies used to detect biliary damage and plan future care[13,14]. The purpose of this investigation is to identify bile duct injuries and associated treatment results after laparoscopic cholecystectomy.

Methodology

This descriptive case series was conducted on 96 extra hepatic biliary injuries in the Department of General Surgery, Rehman Medical Institute, Peshawar from April 2022 to March 2023. Extra hepatic biliary injuries patients of either gender were enrolled. Abdominal ultrasonography, ERCP, and MRCP were the different investigating modalities performed on each individual. Complete blood picture, activated Partial thromboplastin time (APTT), liver function tests, blood sugar, prothrombin time (PT), Creatinine, serum electrolytes, and Urea were thoroughly performed on each patient. HIV, HBs, and HCV were various hepatitis screening performed. LFTs and abdominal ultrasounds were conducted on all first visits to check liver function and to look for postoperative collection. The wound was cleaned and the sutures were removed. MRCP was conducted at the fourth visit (after 6 months) to verify the patency of bilioenteric anastomosis in cases with dilated biliary tree or one incident of ascending cholangitis. Data on age, gender, duration between initial surgery and final diagnosis, surgical procedure, and postoperative morbidity were gathered and analyzed using SPSS version 27.

Results

Of the total 96 patients, there were 26 (27.1%) male and 70 (72.9%) females. The overall mean age was 41.63± 2.6 years with an age range 25 to 60 years. The incidence of sustained bile duct injury was 19.8% (n=19). Pain, vomiting, fever, and jaundice were the most prevalent complaints found in 76 (79.2%), 47 (49%), 71 (74%), and 68 (70.8%) respectively. The incidence of biloma (sub hepatic collection) and biliary leak through the drain during the initial stage of surgery was 43.8% (n=42) and 35.4% (n=34) respectively. Based on MRCP and ERCP, about 12.5% (n=12) had developed biliary peritonitis signs and 13.5% (n=13) had biliary stricture. Of the total 96 cases, the incidence of different sites of injuries such as CHD injury, CBD injury, and Porta hepatis injury was 27.1% (n=26), 51% (n=49), and 9.4% (n=9) respectively. Figure-1 depicts the gender's distribution. Different sites of injuries are illustrated in Figure-2. Figure-3 demonstrates the postoperative morbidity. Table-I represents the major complaints of patients underwent laparoscopic cholecystectomy.

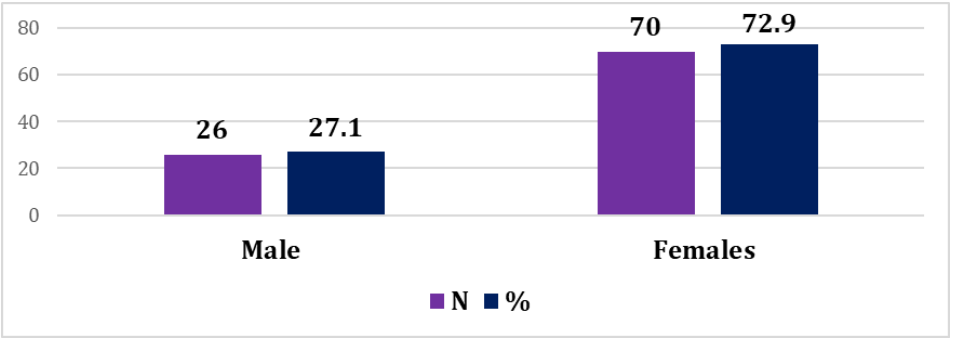

Figure 1. Gender's distribution (N=96)

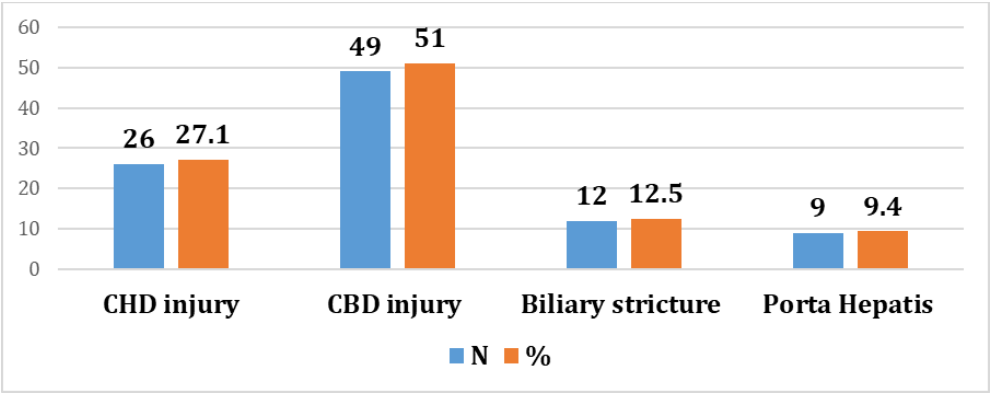

Figure 2. Different site of injuries (N=96)

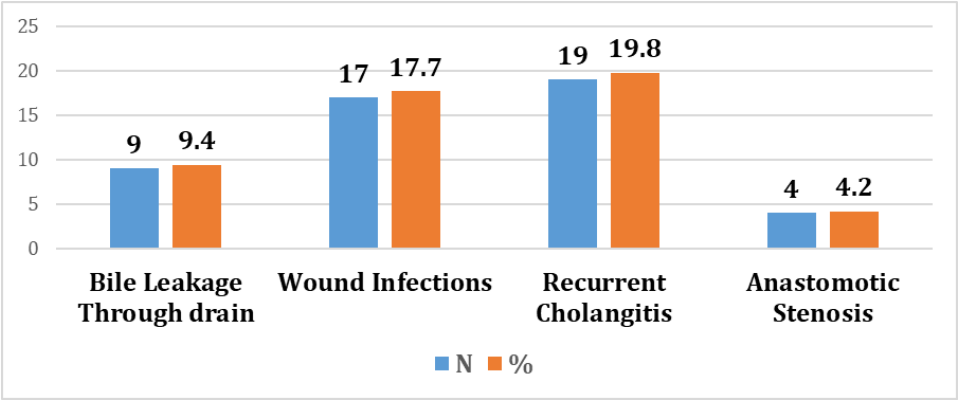

Figure 3. postoperative morbidity

Table I
Major complaints of patients underwent laparoscopic cholecystectomy

Complaints	Frequency (N)	Percentage (%)
Pain	76	79.2
Vomiting	47	49
Fever	71	74
Jaundice	68	70.8

Discussion

The present study mainly focused on the bile duct injury during laparoscopic cholecystectomy and Bile duct injury occurred in 19.8% of laparoscopic cholecystectomy patients. The most common complaint was pain and fever, followed by jaundice. By enhancing surgical skill, expertise, and time, the overall prevalence of bile duct injury during laparoscopic cholecystectomy was lowered. As cholecystectomy is the most frequent procedure, iatrogenic bile duct damage is a significant complication that can occur after open or laparoscopic cholecystectomy. Bile duct injury manifests itself as biliary leak, resulting in localized collection, continuous bile leakage, and biliary peritonitis [15]. Biliary injury might manifest late because the patient is asymptomatic and then develops increasing jaundice owing to stricture development[16].

Misinterpretation of anatomy, Calot's triangle, diathermy injury producing partial or full bile duct transection, and incorrect clip application are the most prevalent causes of biliary injury[17]. According to the literature, the incidence of biliary damage during open cholecystectomy is 0.13% and 0.55% after laparoscopic cholecystectomy. The discrepancy in this incidence can be related to a lack of experience as well as the availability of high-quality tools for laparoscopic cholecystectomy[17]. In affluent nations, laparoscopic cholecystectomy is regarded as the gold standard for gallbladder stones and other benign gallbladder disorders [19]. Iatrogenic biliary injury is a devastating complication of biliary surgery that poses a significant challenge to both primary surgeons and skilled referral institutions [20-21]. It has long been associated with higher morbidity and death [22]. The most severe consequence of the Laparoscopic Cholecystectomy surgery is common bile duct damage. A 0.42% common bile duct damage was identified in an international survey conducted in Italy on 56,591 laparoscopic cholecystectomies performed in 187 different institutions [23]. During the first several days following laparoscopic cholecystectomy.

One team performed 150 laparoscopic cholecystectomies in three years, with a 0.9% rate of CBD injury recorded, whereas another team performed over 450 laparoscopic cholecystectomies, with a 0.3% incidence of CBD injury observed [24]. In 87.5% of cases, a local investigation found stomach pain, jaundice, fever, and vomiting [25]. Faridoon S found nearly identical results in a study of 20 instances [26] . In his series, Ding et al. documented biliary colic (83%), dyspepsia (60%), and flatulence (60%) [27]. External biliary fistula (59.4%), stomach discomfort (15.6%), jaundice (3.1%), and septicemia (9.4%) were all noted by Dip et. al. [28]. Abdominal ultrasonography, ERCP, and MRCP were among the tests used to detect a case of biliary injury. In situations of biliary injury, ERCP and MRCP are regarded as the investigations of choice for reaching a definite diagnosis [29-30]. This number of 81.1% is smaller than the 90.6% and 100% reported in several studies [31-32], but is nearly equivalent to the 75% mentioned in another research [33].

In two separate investigations, Ismael et al had 0.6% and 0.85 CBD injuries, respectively. Pesce et al reported 45% cystic duct leak, 15% CHD leak, and CBD leak in patients [34-35] . According to the Bismuth classification, 53.4% of patients had Category I injury, 26.6% suffered Type II injury, and 7.7% suffered Type IV injury [36] . Fong et al. observed 12.5% type II injury and 12.5% type III injury in

his patients [37]. Halbert et al reported a wound infection rate of 12.5% [38]. In their investigations, Gordon et al reported 1.5% wound infection and Iwashita et al. reported 1.6% wound infection [39-40]. Patients (20%) experienced recurrent cholangitis. They experienced recurring pain episodes that required hospitalization and were managed conservatively.

Conclusion

The present study found that the incidence of bile duct injury during laparoscopic cholecystectomy was 19.8%. Pain and fever were the most prevalent complaints followed by jaundice. The overall prevalence of bile duct injury during laparoscopic cholecystectomy was reduced by improving surgical technique, overtime, and experience.

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