Research Paper: Biliary Duct Injuries Due to Laparoscopic Cholecystectomy: 7-Year Experience at Shahid Modarres Hospital, Tehran, Iran

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ABSTRACT

Background: Nowadays, cholecystectomy is the most prevalent elective abdominal surgery in the U.S., with over 750000 operations performed every year. However, laparoscopic cholecystectomy has been reported with 1% to 8% of major complications, including hemorrhage, wound infection, bile ducts and gallbladder damage.

Methods: A total of 1970 medical records of patients undergone laparoscopically at Modarres Hospital between 2010 and 2017 were studied in this research. Of them 1185 were female (60.15%) and 785(39.85%) male. A total of 1003(50.9%) patients were presented with cholecystitis, 955(48.5%) with symptomatic cholelithiasis, and 12(0.6%) with polyp.

Results: Biliary tract injury was reported in 11 cases, complete cut off of Common Bile Duct (CBD) in 4(0.2%) cases (3 males and 1 female), partial CBD injuries in 3 cases (2 males and 1 female), complete closure of CBD in 1 female case, and partially closure of CBD by clips in 3(0.1%) cases (1 male and 2 female).

Conclusion: The laparoscopic method seems to be the ideal method of cholecystectomy, not just because of its cosmetic reasons, also due to its less invasive procedure.

1. Introduction

Nowadays, cholecystectomy is the most prevalent elective abdominal surgery in the U.S., with over 750000 operations performed every year [1]. The number of operations for gallbladder diseases have considerably increased in developed countries since 1950. Introduction of laparoscopic surgical approach has greatly changed surgical methods from conventional open to newly introduced laparoscopic operations. After introduction and development of laparoscopic cholecystectomy in 1989, the cholecystectomy rate has been substantially risen. For example, there was a 28% increase in the number of cholecystectomies from 1990 to 1993 and in some countries over the 80% of cholecystectomies are

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done by laparoscopy [2]. This change was because of laparoscopic benefits over open approach such as being less invasive, better cosmetic results, and lower surgical risk. These benefits increased the rate of surgeries in high-risk patients or in those with milder symptoms.

However, laparoscopic cholecystectomy has been reported with 1% to 8% of major complications, including hemorrhage, wound infection, bile ducts and gallbladder damage [3]. Bile duct injuries are still a major concern in gastrointestinal surgery. The most important inquiry regarding this matter is the prevention of injury during cholecystectomy. Once it happens, early and definite diagnosis of injury is critical for surgeons and gastroenterologists, because unidentified injury may result in severe complications such as hepatic failure and death. Laboratory tests, radiological imaging, and endoscopic evaluations play a great part in the diagnosis of biliary injuries [4]. In the current study, we assessed the rate of bile duct injury and clinical outcome of its managementat in the cases from medical files collected from Shahid Modarres Hospital Tehran, Iran, from 2010 to 2017.

2. Materials and Methods

The study patients were enrolled by census method. The inclusion criteria were all patients that had been operated laparoscopically for gallbladder problem in the General Surgery Ward at Modarres Hospital from 2010 to 2017. Data were taken using the patients' hospital records along with contact with the patient or their relatives. We called some patients or relatives that we didn't have enough data and asked them about any problem that needed intervention in other than our hospital. All patients' medical history and demographic data including age, sex and the type of intervention were recorded. Eleven patients were excluded from the study due to their incomplete medical records. Statistical analysis was performed using SPSS 22.0 for Windows (SPSS INC, CHICAGO, IL). Quantitative variables were presented by the mean and standard deviation and qualitative variables by number and percentage of cases. All data were saved and patients were reported anonymously.

3. Results

Totally, 1970 cases of laparoscopic cholecystectomy were studied; 1185 (60.15%) cases were female and 785 (39.85%) male. The mean age of female and male cases was 24 and 32 years, respectively; 954(48.4%) cases had diabetes mellitus (501 females and 451 males). In the current study, 1003(50.9%) patients were presented with cholecystitis, 955(48.5%) with symptomatic cholelithiasis, and 12(0.6%) with polyp. The most important complication of cholecystectomy was biliary tract injury during the surgery. In the current study, biliary tract injury was reported in 11 cases that all of them occurred in Common Bile Duct (CBD). Complete cut of CBD in 4(0.2%) cases (3 males and 1 female), partially cut of CBD in 3 cases (2 males and 1 female), complete closure of CBD in 1 female case, and partially CBD closure by clips in 3 (0.1%) cases (1 male and 2 female).

Of 11 cases with CBD injury, 8 had acute cholecystitis and 3 the symptomatic cholelithiasis. Diagnosis of this important complication was made during the surgery in 7 of the 11 cases, and in the rest (4 cases) during the first week after the operation. For fixing the complications in 2 patients with partially CBD closure by clips, laparoscopic removing was done and for the remaining patients we had no resort but performing open surgery. For patients with complete cutting or closure of CBD, Roux-en-Y hepaticojejunostomy was performed. In other three cases of CBD injury, T-tube and primary repair was performed. In one case, damage site could not be found and only drainage was done with Hemovac drain and after 3 days stent was placed in CBD by gastroenterologist. In the 6- and 12-month follow up, no cases of stenosis and cholangitis was reported.

4. Discussion

Regardless of the global approval of Laparoscopic Cholecystectomy (LC), CBD injuries during LC is more frequent than CBD injuries during open cholecystectomy. The incidence of bile duct injury related to LC estimated about 2-3 times more than that in open cholecystectomy.

Overall, biliary injuries include any damage to the biliary system, including the cystic duct and bile ducts, and the types of injuries include cutting the ducts, dividing it, and obstruction of the bile ducts. It has been reported that 67% of biliary injuries occur in the common bile duct, 15% in the common hepatic duct, 11% in the liver and 2.7% in the cystic ducts [5]. CBD injury is mostly iatrogenic, and occurs during cholecystectomy. The CBD injury rates in Kohn and colleagues study was 0.5%. One of its risk factors was acutely inflamed conditions [6].

Most of injuries during laparoscopic cholecystectomy are not due to ignorance, but the consequence of essential technical deficiency and misjudgment [7]. Kaya and colleagues studied the importance of critical view of safety techniques in laparoscopic cholecystectomy especially in acute inflammation phase. They have shown

that the critical view of safety and hydro dissection techniques decreases the bile duct injury during laparoscopic cholecystectomy, even in difficult cases [8].

The management of bile duct injury remains a major dispute in hepatobiliary surgery. Surgery is the best-selected and proven management for these types of damages and traumatic bile duct stricture. The conclusive repair includes precise surgical steps such as exposing the proximal and distal bile duct, anastomotic bile duct tissue preparation and at the end minimally invasive tissue anastomoses [9].

In this study, our 7-years' experience from 2010 to 2017 in Shahid Modarres Hospital, Tehran, Iran about laparoscopic cholecystectomy has been reported. The results of this study showed that the incidence of CBD injuries was about 0.5%, which was similar to the results of other studies [6]. During these 7 years, five patients who suffered from complete damage to CBD were treated by hepaticojejunostomy anastomoses. In the literature, reconstructive hepaticojejunostomy is suggested for extensive bile duct damages during cholecystectomy [10]. Post-operative complications such as biliary leak, cholangitis, bleeding, anastomotic strictures, and biliary cirrhosis have remained a major concern in patient's post-operative care [10]. Early referral to a tertiary care center with experienced hepatobiliary surgeons will result in optimal outcomes in this condition [11].

The laparoscopic method seems the ideal method of cholecystectomy, not only because of its cosmetic reasons, but also due to less post-operative pain and hospital stay. Almost all physicians believe that laparoscopic cholecystectomy is the selective method for patients with gallbladder disease [12]. However, laparoscopic cholecystectomy have been reported with 1% to 8% of major complications, including hemorrhage, wound infection, traumatic injury [3].

5. Conclusion

In the studies during the early years of the onset of laparoscopic cholecystectomy, bile duct injury rate associated with laparoscopic cholecystectomy was reported as 2% and were high in comparison with open cholecystectomy (0-1%). It may be due to the fact that in earlier years of laparoscopic surgeries, the rate of intraoperative cholangiography or CBD exploration during laparoscopic cholecystectomy was significantly lower, while bile duct injury was significantly higher [13]. This fact maybe because of equipment limitations in that era.

Given the fact that Shahid Modarres Hospital is a referral center for the gallbladder surgery candidates in Tehran, the results of the current study can indicate the relative and general state of the laparoscopic cholecystectomy technique in Iran. Further studies on cholecystectomy with longer follow-up are recommended.

Ethical Considerations

Compliance with ethical guidelines

All patients were assured that their information would be confidential.

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Conflict of interest

The authors declared no conflict of interest.

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