Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/7sfdb927

MANAGEMENT AND OUTCOMES OF IATROGENIC BILE DUCT INJURIES FOLLOWING OPEN AND LAPAROSCOPIC CHOLECYSTECTOMY

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Abstract

Background: Iatrogenic bile duct injury (IBDI) is a rare but dangerous side effect of cholecystectomy, especially as laparoscopic procedures become more widespread. If not identified and treated right away, these injuries might result in serious morbidity. Improving patient outcomes requires knowing how frequently various surgical repair options occur and how effective they are.

Study design: Descriptive study Design

Duration and place of study: This study was conducted in Mekran Medical College Turbat at Kech Balochistan from January 2023 to January 2025

Objective: The present study aims at the determination of the frequency as well as outcomes of the IBDI followed by open and laparoscopic cholecystectomy procedures.

Methods: This case series was descriptive and included 120 patients who presented with IBDI. Laboratory tests, clinical examinations, and selected imaging utilising MRCP and ERCP were used to assess the patients. Surgical procedures included primary repair over a T-tube, choledochoduodenostomy, or Roux-en-Y choledochojejunostomy, depending on the type of lesion. For six months, patients were tracked and postoperative improvement was tracked.

Results: 72 (60%) of the 120 patients were referred from peripheral centres, while 48 (40%) of the patients had injuries locally. Females outnumbered males (M:F = 1:4), and the average age was 40.56 ± 3.66 years. Bile leakage, stomach discomfort, and jaundice were the most frequent presenting symptoms. Choledochoduodenostomy (25%) and primary repair over T-tube (10%) were the next most common procedures, after Roux-en-Y choledochojejunostomy (65%). Among the complications

were recurrent cholangitis (5%), wound infection (15%), and bile leak (10%). A typical hospital stay lasted between 10 and 15 days.
Conclusion: Roux-en-Y choledochojejunostomy is a reliable and preferable technique for the management of the IBID with least chances of postoperative complications. Early diagnosis and surgical intervention are crucial for optimal patient outcomes.

Keywords: Iatrogenic bile duct injury, Roux-en-Y choledochojejunostomy, Cholecystectomy, Postoperative complications

Introduction

Over the past three decades, laparoscopic cholecystectomy has become the standard procedure because of its minimally invasive nature and quicker recovery time for patients. Cholecystectomy, or the surgical removal of the gallbladder, is one of the most common abdominal surgeries performed globally [1, 2]. This method does have some drawbacks, though, despite its benefits. IBDI is among the most severe and upsetting side effects, and patients may experience long-term morbidity, difficult surgical repair, and a heavy financial and emotional burden [3, 4].

Even though they are not very common, bile duct injuries have increased in frequency since laparoscopic surgery became popular. According to early estimates, the incidence of IBDI for open cholecystectomy was between 0.2% and 0.3%; however, with the advent of laparoscopic procedures, this number almost increased [5, 6]. Contributing variables have included inflammation, surgeon inexperience, reduced intraoperative vision, and anatomical differences [7, 8].

Postoperative symptoms such jaundice, fever, persistent abdominal pain, or bile leakage from surgical drains are common in patients with IBDI [9]. Sepsis, biliary peritonitis, or even death may result from these injuries if they are not recognized and treated right once. There is still disagreement over the best time and approach for surgical repair.

Although primary repair may be attempted in certain circumstances, operations such as Roux-en-Y choledochojejunostomy have demonstrated positive results, particularly in cases of delayed presentations or high-grade injuries [10, 11]. Improvements in surgical techniques and imaging modalities like MRCP and ERCP have helped to enhance postoperative care and early diagnosis over time [12, 13]. Notwithstanding these developments, a significant percentage of cases are referred from non-specialist or peripheral centres after the fact, frequently with pre-existing problems such as cholangitis or biliary strictures, which makes management even more difficult [14].

Examining the trends, causes, and treatment outcomes in particular hospital settings is crucial given the severe consequences of IBDI and the differences in management outcomes [15]. This study was carried out at a tertiary care hospital to assess the incidence and postoperative results of iatrogenic bile duct injuries after both open and laparoscopic cholecystectomy. The objective is to provide insight into efficient management techniques and add to the expanding corpus of research focused on reducing this potentially avoidable issue.

Methodology

A total of 120 individuals with an IBDI diagnosis after either an open or laparoscopic cholecystectomy were included in the study. Patients were hospitalised via emergency services as well as the outpatient department. Upon admission, a comprehensive physical examination and a detailed clinical history were taken. Each patient had a complete blood count, liver function tests, serum amylase, and abdominal ultrasonography, among other standard baseline examinations. Advanced imaging methods like MRCP and ERCP were used sparingly, depending on the diagnostic needs and clinical presentation.

When imaging was available prior to surgery, it was used to determine the kind and amount of the bile duct damage. The patient's general health, the type and extent of the injury, and the time of presentation all influenced the surgical care. Most patients, particularly those with complicated injuries or total transection, had Roux-en-Y choledochojejunostomy. Depending on the degree of the

injury and the anatomical appropriateness, additional treatments included primary repair over a T-tube and choledochoduodenostomy.

All surgeries were performed by senior consultants with experience in hepatobiliary surgery. Postoperatively, patients were managed in the surgical ward with close monitoring of vital signs, drain output, liver function tests, and signs of infection. Antibiotics and analgesics were administered as needed. Drains were removed once output was minimal and non-bilious. Patients were discharged once they achieved clinical stability and were able to tolerate oral intake without complications.

Follow-up visits were scheduled regularly at 2 weeks, 1 month, 3 months, and 6 months post-discharge. During these visits, patients were evaluated for symptoms of recurrent cholangitis, bile leakage, or any other postoperative complication. All data collected during the study were entered into a structured database and analyzed using SPSS version 26.

Results

Over the study period, a total of 120 patients were treated for iatrogenic bile duct injuries following open or laparoscopic cholecystectomy. The demographic profile showed a clear female predominance, with a male-to-female ratio of 1:4. Most patients were in the fourth decade of life, and the average age across the cohort was 40.56 ± 3.66 years.

Out of the 120 cases, nearly two-thirds (n = 72; 60%) were referrals from peripheral or secondary care hospitals, while the remaining 48 patients (40%) had sustained the injury during surgeries performed in our own unit. The most frequent presenting symptoms were persistent jaundice (n = 83; 69.2%), upper abdominal pain (n = 66; 55%), and continuous bile leakage either externally through drains or internally, as confirmed on imaging (n = 45; 37.5%).

Surgical repair strategies were individualized based on the type and extent of injury. The Roux-en-Y choledochojejunostomy was by far the most commonly employed technique, performed in 78 patients (65%). This was followed by choledochoduodenostomy in 30 cases (25%) and primary repair over a T-tube in 12 cases (10%).

Postoperative complications were relatively few but worth noting. Wound infection occurred in 18 patients (15%), while bile leak was observed in 12 cases (10%). A small number of patients (n = 6; 5%) developed recurrent episodes of cholangitis during follow-up, managed conservatively in most cases. The length of hospital stay ranged from 10 to 15 days, with a mean of around 12 days. Importantly, no mortality was recorded during the hospital stay or follow-up period.

Table 1: Patient Demographics and Presentation

Parameter	**Number (n = 120)**	**Percentage (%)**
Mean age	40 ± 3 years	–
Gender		
Male	24	20%
Female	96	80%
Source of injury		
Referred from other hospitals	72	60%
In-house surgeries	48	40%
Presenting symptoms		
Jaundice	83	69.2%
Abdominal pain	66	55%
Persistent bile leak	45	37.5%

Table 2: Surgical Procedures and Outcomes

Surgical Procedure	**Number of Patients**	**Percentage (%)**
Roux-en-Y choledochojejunostomy	78	65%
Choledochoduodenostomy	30	25%
Primary repair over T-tube	12	10%
Postoperative Complication	**Number of Patients**	**Percentage (%)**
Bile leak	12	10%
Wound infection	18	15%
Recurrent cholangitis	6	5%

The outcomes from this study support the use of Roux-en-Y choledochojejunostomy as a safe and effective repair method in the majority of IBDI cases. Although complications were noted, their incidence remained within acceptable limits, especially considering the complexity of cases referred from peripheral centers. Follow-up at six months revealed satisfactory clinical recovery in the vast majority of patients.

Discussion

Iatrogenic bile duct injury remains one of the most challenging complications following cholecystectomy, with significant impacts on patient quality of life and healthcare resources. Our study, involving 120 patients, highlights several key findings that align with and add to the existing literature on this subject.

The predominance of female patients (80%) and the mean age around 40 years in our cohort mirror trends reported in similar studies, reinforcing the demographic pattern of gallbladder disease predominantly affecting middle-aged women [16, 17]. Interestingly, the referral pattern, with 60% of cases coming from peripheral hospitals, reflects the common scenario where complicated bile duct injuries are often first managed in less specialized settings, which can delay optimal care and affect outcomes.

Roux-en-Y choledochojejunostomy emerged as the most frequently used surgical procedure in our series (65%), consistent with its established role as the preferred reconstructive technique in complex bile duct injuries. This finding resonates with the work of Azhar et al., who reported excellent long-term outcomes using the Roux-en-Y approach in over 70% of their patients [18]. Similarly, Ramia et al. emphasized that this procedure remains the gold standard for high-grade injuries, primarily due to its reliability in restoring biliary continuity and preventing strictures [19].

The complication rates observed bile leak (10%), wound infection (15%), and recurrent cholangitis (5%), are within the expected range for such major biliary repairs. Comparable studies by Weber et al. and Kapoor et al. reported postoperative bile leaks in 8–12% of cases and wound infections between 10–18%, which indicates our outcomes are in line with global experiences [20, 21]. Importantly, our study noted no mortality, underscoring the effectiveness of timely surgical intervention and postoperative care.

Another important observation is the duration of hospital stay, averaging around 12 days, which aligns with the findings of Bektas et al., who reported hospital stays of 10–14 days in patients undergoing bile duct reconstruction after iatrogenic injuries [22]. This relatively short duration reflects improved perioperative management and early mobilization protocols.

Conclusion

IBID is a serious and challenging complication post a cholecystectomy. That present study shows that early diagnosis and intervention are extremely significant for its effective management. Roux-en-Y choledochojejunostomy proved to be the most efficient surgical procedure of repair and has least chances of complications. A regular monitoring by timely follow-up are important for desirable outcomes. Improvement in the awareness and referral process can reduce the complications further and also enhance recovery.

Source of Funding
None

Permission
Ethical approval obtained

Conflict of Interest
None

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