International Journal of Scientific Reports
Agrawal H et al. Int J Sci Rep. 2025 Mar;11(3):135-138
http://www.sci-rep.com
pISSN 2454-2156 | eISSN 2454-2164
DOI: https://dx.doi.org/10.18203/issn.2454-2156.IntJSciRep20250391

Case Series

Hepaticojejunostomy for iatrogenic bile duct injuries

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Received: 13 December 2024
Accepted: 12 February 2025

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ABSTRACT

Iatrogenic bile duct injuries (BDIs) are a serious complication of cholecystectomy, with an incidence ranging from 0.1% to 0.25% in open procedures and 0.3% to 2.6% in laparoscopic ones. Hepaticojejunostomy (HJ) is considered the gold standard for managing these injuries. This case series presents four patients with iatrogenic BDI, all managed with HJ at a low-volume center. The injuries occurred during laparoscopic or open cholecystectomy, and all were identified intraoperatively. The types of injuries varied, including complete transactions and cautery-related damage to the common bile duct, with one case requiring re-exploration and a side-to-side Roux-en-Y HJ due to postoperative obstructive jaundice. In all cases, the surgical team demonstrated the ability to manage these complex injuries effectively, despite limited experience in advanced hepatobiliary procedures. The cases emphasize the importance of early identification and intraoperative management of BDI, even in low-volume centers. Postoperative recovery was uneventful in most cases, with patients being discharged within 5 to 6 days. This series highlights that with proper surgical expertise, iatrogenic bile duct injuries can be successfully managed with HJ. However, patient safety should remain the top priority. If there is any doubt, referral to a higher center with specialized hepatobiliary expertise is advised.

Keywords: Iatrogenic bile duct injury, Hepaticojejunostomy, Laparoscopic cholecystectomy, Biliary stricture, Roux-en-Y, Surgical complications

INTRODUCTION

Hepaticojejunostomy (HJ) is a surgical procedure that creates an anastomosis between the hepatic duct and the jejunum. It is considered the gold standard treatment for iatrogenic bile duct injuries (BDI). The incidence of iatrogenic BDI ranges from 0.1% to 0.25% during open cholecystectomy and from 0.3% to 2.6% during laparoscopic cholecystectomy. This incidence increases when the operating surgeon has fewer than 20 cases of experience and when the anatomy of Calot's triangle is not well demarcated.[1] Age (≥40 years), abnormal preoperative liver function, gallbladder wall thickening, acute and subacute inflammation of the gallbladder, cholecystolithiasis, and anatomic variations of the gallbladder and cystic duct/artery are closely associated with bile duct injury.[2] Approximately 80-85% of BDI cases are caused during laparoscopic surgery.[3]

We present a four-case series of iatrogenic bile duct injuries managed with HJ. The focus of this discussion is the causation behind these injuries, the surgical team, and the management of these injuries in a low-volume center.

CASE SERIES

Case 1

A 43-year-old woman with gallstone disease, planned for laparoscopic cholecystectomy, experienced complete transection of the common hepatic duct above the cystic duct junction. This patient had a frozen Calot's triangle. The common hepatic duct was misidentified as the cystic duct and was therefore clipped and transected. The injury was identified intraoperatively and was managed with Roux-en-Y end-to-side HJ (Figure 1). The operating team consisted of a senior surgeon with seven years of experience in laparoscopic surgery. The patient had an

uneventful postoperative recovery and was discharged on postoperative day 5.

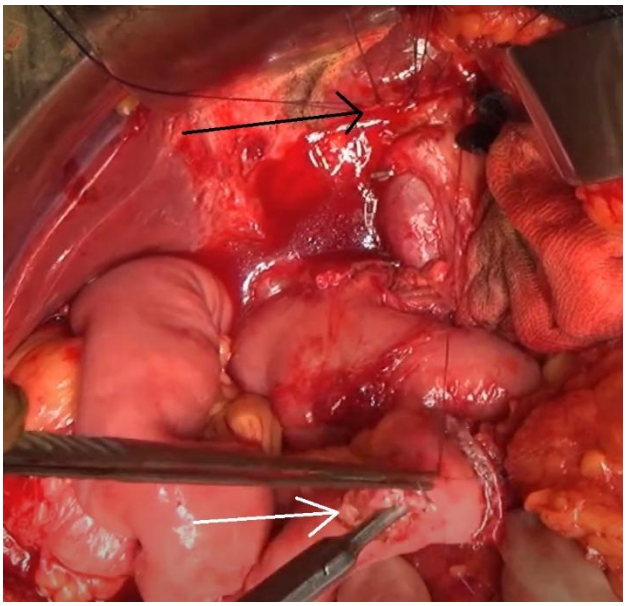

Figure 1: Cut end of common hepatic duct (black arrow) and enterotomy being made (white arrow).

Case 2

A 56-year-old male with gallstones was also scheduled for laparoscopic cholecystectomy. Intraoperatively, he sustained a monopolar cautery-related injury to the common bile duct. The gallbladder was sessile, and the cystic duct was almost absent. The injury was identified intraoperatively, and the patient underwent loop end-to-side HJ (Figure 2). The operating team consisted of a junior surgeon with one year of experience in laparoscopic surgery. The patient had an uneventful postoperative recovery and was discharged on postoperative day 6.

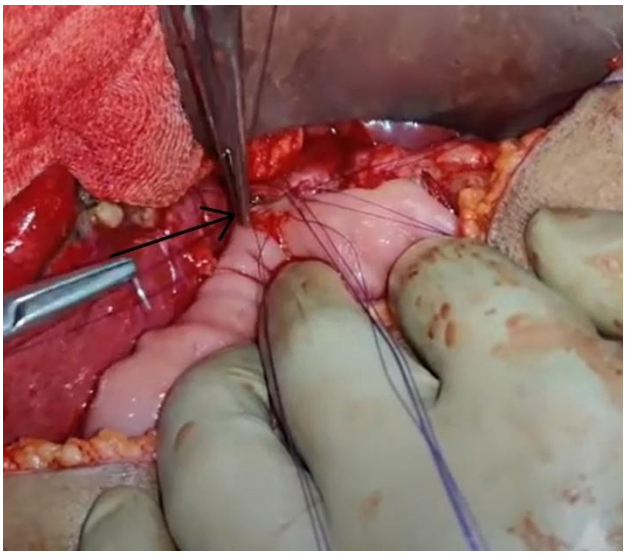

Figure 2: Loop hepaticojejunostomy being made (arow).

Case 3

A 72-year-old male with gallbladder carcinoma was scheduled for open extended cholecystectomy. During periportal lymph node dissection, he sustained a monopolar cautery-related injury to the common bile duct. This injury was also identified intraoperatively. The patient underwent loop end-to-side HJ. The operating team consisted of a senior surgeon with ten years of experience in open surgery. The patient had an uneventful postoperative recovery and was discharged on postoperative day 6.

Case 4

A 26-year-old woman with gallstone disease, scheduled for laparoscopic cholecystectomy, sustained an iatrogenic injury to the common bile duct while dissecting Calot's triangle. The rent in the common bile duct was identified by the presence of golden-yellow bile coming out. The rent was repaired primarily. Postoperatively, the patient developed icterus. On evaluation, she was found to have obstructive jaundice with a direct bilirubin level of 20 mg/dl on postoperative day 3. An MRCP revealed a cutoff of bile in the distal CBD segment (Figure 3).

The patient was re-explored on postoperative day 4, and a loop side-to-side HJ was performed (Figure 4). The operating team consisted of a senior surgeon with seven years of experience in laparoscopic surgery. The patient had an uneventful postoperative recovery and was discharged on postoperative day 5. Jaundice resolved 14 days postoperatively.

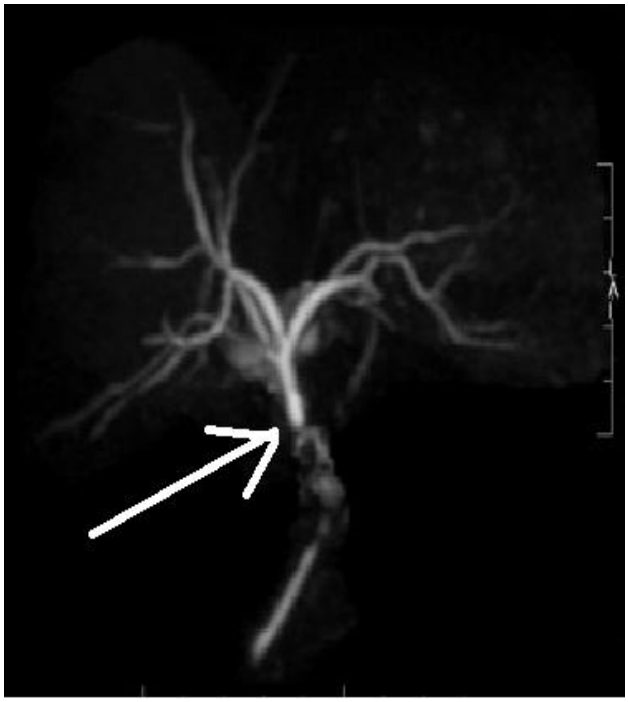

Figure 3: MRCP showing distal cutoff (arow).

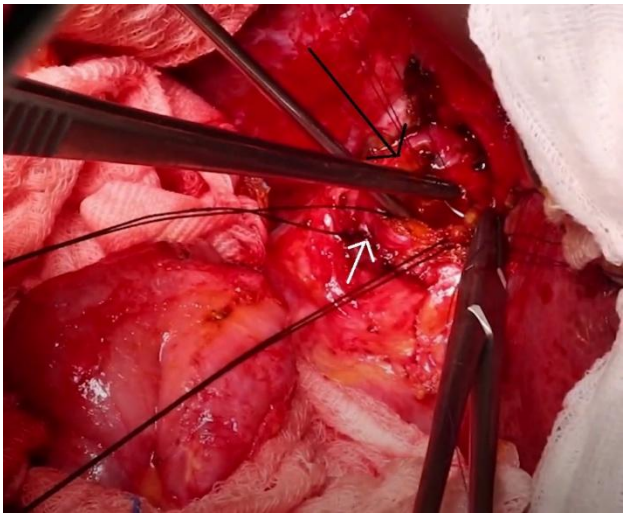

Figure 4: Choledochotomy being made (black arow) and previous suture site (white arrow).

DISCUSSION

BDI can be associated with high morbidity and mortality and requires careful management, often necessitating invasive treatment.[4] BDI can lead to cholangitis, intrahepatic abscesses, secondary biliary cirrhosis, bile leakage, bilioma, subhepatic abscess, and biliary peritonitis if not treated properly.[5] Healthcare centers with limited resources and low patient turnover face a greater challenge in managing BDI. If the surgeon identifies the BDI intraoperatively, the management decision depends on the extent of the injury to the bile duct. In cases of partial small tears, the bile duct can be repaired with absorbable sutures. In cases of complete transection without loss of a segment <1 cm, end-to-end anastomosis over a T-tube is performed. However, in cases of complete transection with segment loss (>1 cm) or cautery-related injury, the distal end of the CBD is closed, and HJ is performed.[6]

BDI recognized in the postoperative period presents a different challenge, especially in centers with limited experience in advanced hepatobiliary surgeries. The decision to operate or refer the patient to a higher center depends on the expertise of the operating team.[7] To ascertain the extent of the injury, magnetic resonance cholangiopancreatography (MRCP) is essential. If only a cystic duct leak is present, Endoscopic retrograde cholangiopancreatography (ERCP) with stenting may suffice.[8,9] In cases of complete or partial stricture or complete ligation of the CBD, re-exploration and HJ may be necessary.[10] The timing of re-exploration is also crucial. Early re-exploration within seven days of surgery is advisable if serum bilirubin levels exceed 7 mg/dl or if there is complete stricture. Lower bilirubin levels and partial strictures can be managed with ERCP.[11] If ERCP fails, particularly after one week of injury, late re-exploration after two weeks is recommended to reduce edema at the previously operated site.

In our cases, most BDIs were caused by senior surgeons. Difficult gallbladder anatomy played a significant role in these injuries. Only one case, performed by a junior surgeon with normal gallbladder anatomy, resulted in BDI. Therefore, it can be concluded that BDI injuries can occur regardless of experience. However, intraoperative identification and management are crucial in preventing patient morbidity and mortality. We, at a low-volume center, successfully managed these cases without complications. Thus, we advocate that these injuries can be managed primarily even in such centers. However, patient safety should remain the highest priority. In cases of even the slightest doubt, patients should be referred to a higher center with expertise in BDI cases.

CONCLUSION

Hepaticojejunostomy remains the gold standard for managing iatrogenic bile duct injuries, even in low-volume centers. Early intraoperative identification and appropriate management are crucial in reducing morbidity. While expertise plays a role, difficult anatomy remains a key factor in injuries. Ensuring patient safety is paramount, and referral to specialized centers should be considered when necessary.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Agrawal H, Jain R, Ahmad U. Hepaticojejunostomy for iatrogenic bile duct injuries. Int J Sci Rep 2025;11(3):135-8.