

# Case Report of Stented Hepaticojejunostomy in Iatrogenic Bile Duct Injury

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## ABSTRACT

A 49-year woman presented with jaundice 10 weeks following an open cholecystectomy, during which she experienced obstructive jaundice attributed to clip ligation at the confluence of the common hepatic duct. To address this complicated bile duct injury, surgical dissection and exploration of the common bile duct tract were performed. The obstructive clip was successfully removed, and a T-tube was placed to facilitate drainage through the anastomosis. Additionally, a stented hepaticojejunostomy was constructed to ensure proper bile flow. The T-tube remained in place for four weeks, during which the output gradually decreased to a minimal level of 5-10 ml. After confirming that the output was minimal, the T-tube was clamped and subsequently removed. The patient experienced a complete recovery following the procedure.

**Key Words:** Common hepatic duct, Common bile duct, Roux-en-Y.

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## INTRODUCTION

Bile duct injury is a known and recognised complication of open and laparoscopic cholecystectomy. The definite treatment of bile duct injury is hepaticojejunostomy.<sup>1</sup> Other resorts are primary repair of common bile duct (CBD) or repair of bile duct over a T-tube.<sup>2</sup> Difficult hepaticojejunostomy due to difficult biliary anatomy is a known risk factor and is a challenge for the surgeon to manage surgically and renders the prognosis arguable for the patient. Here, we present a case of a patient with iatrogenic bile duct injury, which was recognised late, managed with hepaticojejunostomy, stented with a T-tube through the anastomotic site.

## CASE REPORT

A 49-year overweight woman presented with yellowish discolouration of her eyes 2.5 months after an open cholecystectomy. On the 4<sup>th</sup> postoperative day, the patient developed jaundice which increased progressively and was associated with dark-coloured urine, clay-coloured stools, nausea, off-and-on vomiting, and itching all over her body.

After initial investigations, the patient underwent Endoscopic Retrograde Cholangiopancreatography (ERCP). Subsequently, she developed generalised abdominal pain, which was sudden in onset, continuous, severe in intensity, and not relieved by medication although jaundice improved (iatrogenic injury to bile duct due to clip on the bile duct, surgeon's choice of clipping over suture ligation).

On examination, the abdomen had a right Kocher's subcostal incision mark, mildly tender right hypochondrium and epigastrium, no guarding or rebound tenderness, no palpable masses, no visceromegaly, and no shifting dullness. The bowel sounds were normally audible, and digital rectal examination (DRE) was unremarkable.

The biochemical profile showed total bilirubin of 5.2 mg/dl ( $n = 0.3-1.2$  mg/dl), conjugated bilirubin of 3.2 mg/dl ( $n = 0.01-0.3$  mg/dl), alkaline phosphatase was 469 U/L ( $n = 115-359$  U/L), alanine transferase (ALT) and aspartate transferase (AST) were 101 U/L and 50 U/L, respectively, against normal of 40 U/L. Renal function tests (RFTs) were normal as were the clotting profile and serum electrolytes, while complete blood count showed leucocytosis with total leucocyte count (TLC) of  $11.5 \times 10^9/L$ .

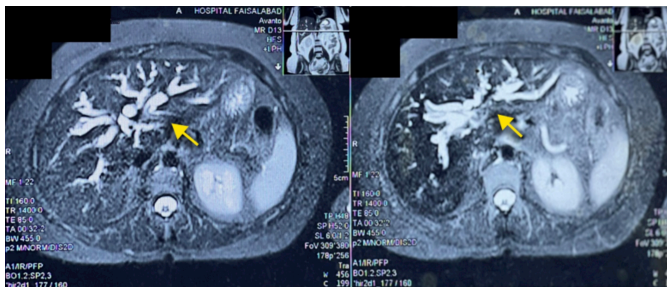
The ultrasound abdomen showed dilated intrahepatic biliary channels; however, CBD appeared unremarkable. Magnetic retrograde cholangiopancreatography (MRCP) (Figure 1) showed dilated intrahepatic biliary channels. The proximal common hepatic duct was grossly dilated (11 mm) with an abrupt cut-off at CBD. However, distal CBD was of normal calibre.

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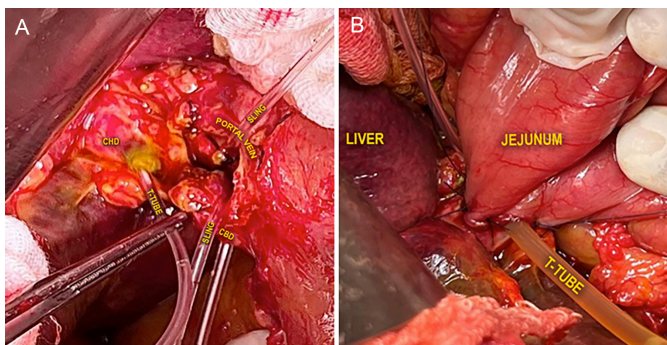
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**Figure 1: Magnetic retrograde cholangiopancreatography (MRCP) of the patient. The yellow arrows show dilated intrahepatic and common hepatic ducts with a cut-off at the common bile duct.**



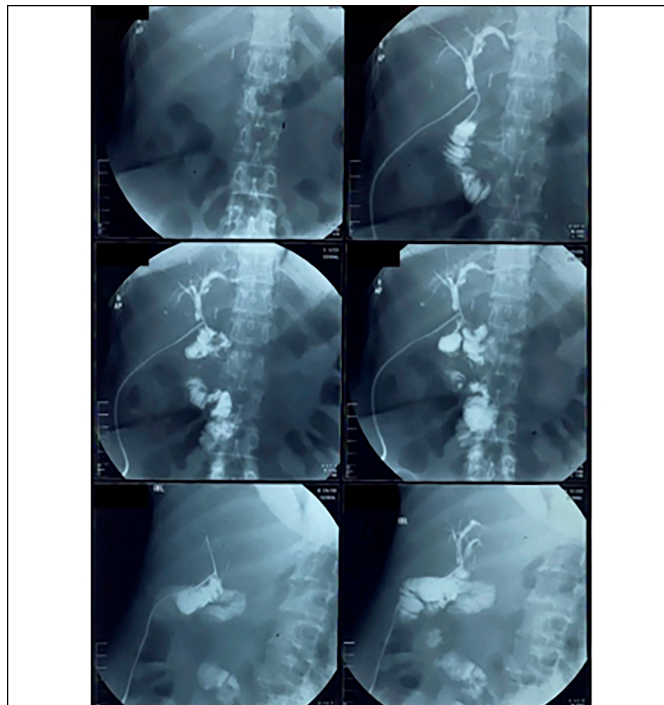
**Figure 2: (A) Feeding tube is present at the site of bile leakage found after exploration and dissection of the bile duct; (B) Hepaticojejunostomy Roux-en-Y anastomosis was done with T-tube through the anastomotic site.**



**Figure 3: Intraoperative cholangiogram (the arrows indicate the respective ducts) (RHD = right hepatic duct, LHD = left hepatic duct, CHD = common hepatic duct).**

During ERCP, guide wire passed into lower CBD but it could not cross the common hepatic duct (CHD); however, after manipulation, the wire passed into the peritoneal cavity. Contrast could not delineate CHD, and extravasation was appreciated into the peritoneal cavity (iatrogenic CHD injury). The patient was admitted under the care of the surgery department, with the plan of CBD exploration and proceeding under general anaesthesia. CBD exploration and Roux-en-Y hepaticojejunostomy (retro colic) with T-tube stenting of anastomosis was done via a right subcostal Kocher's incision.

On exploration, 2 litres of bile collection was found along with CBD stricture at the level of the cystic duct and above it. A clip was found on CHD and a bile leak was observed from CHD. (Figure 2 A, B). An intraoperative cholangiogram was done (Figure 3).



**Figure 4: T-tube cholangiogram showing normal opacification of intrahepatic and extrahepatic bile ducts.**

After the dissection of the bile duct, its proximal edge's arterial blood supply was confirmed. Stay-sutures were secured at the anterior surface of the bile duct and at the corners, which improved lumen visibility. The Roux-en-Y limb from the jejunum was prepared by transecting a section of the jejunum 30 cm distal from the duodenal-jejunal junction. The Roux-limb was closed in two layers in an interrupted manner with PDS 4-0 sutures and manoeuvred in a retro-colic fashion near the hepatic duct. The anastomosis of hepaticojejunostomy as a single-layer was done end-to-side with 4-0 PDS interrupted sutures. The initial two sutures were placed at the left corner of the jejunum and the bile duct. Suture needles were passed through the wall of the bile duct from the outside-in and through the jejunum in the inside-out direction. The jejunal limb was then gently manoeuvred inferiorly to the hepatic duct and secured. All the stitches took ample full-thickness bites of jejunum with an inter-stitch distance of 4 mm. The posterior wall anastomosis was done by suturing in the same manner from left to right. All knots of the posterior wall were kept inside the lumen of the gut. A 10-FR T-tube was placed, one limb was passed into CHD, and the other limb was introduced into the jejunum. The long limb was brought out through the anterior anastomotic site (Figure 2B). T-tube was coming out from the anterior wall of Roux-en-Y hepaticojejunostomy. The anastomosis of the anterior wall was done in the same manner with PDS 4/0. Postoperatively, the patient remained vitally stable. On postoperative day 2, the pelvic drain was removed. The sub-hepatic drain was removed on postoperative day 4. A T-tube cholangiogram was done on the 7<sup>th</sup> postoperative day, and it showed normal opacification of intrahepatic and extrahepatic bile ducts (Figure 4).

Mild dilation of the left hepatic duct was noted, and there was no leakage of contrast from the anastomotic site. The ultrasound abdomen was normal. Liver functions showed a decreasing trend. Bilirubin was reduced to 1.03 mg/dl. Alkaline phosphatase was 331 U/L and gamma glutaryl transferase (GGT) was 124 U/L. The patient was discharged with a T-tube with the output in T-tube reduced to 5-10 ml/day. She was called for a follow-up after four weeks. T-tube was clamped. She remained vitally stable. After 24 hours of clamping, an ultrasound abdomen showed no collection in the subhepatic space and abdominal cavity. The T-tube was removed, and the patient had an uneventful recovery. The patient was then followed at 6 months. Ultrasound abdomen and liver function tests were repeated (bilirubin 1.03 mg/dl, ALT 114 U/L, AST 86 U/L, alkaline phosphatase 331 U/L, and GGT 124 U/L). Ultrasound abdomen showed dilation of intrahepatic channels.

## DISCUSSION

The gold standard treatment for bile duct iatrogenic injuries is hepaticojejunostomy.<sup>1,3</sup> It is indicated in injuries falling in the Strasberg class B to E.<sup>4,5</sup> It is commonly performed for biliary injuries including transection, leak, thermal injury, and stenosis by a clip, stricture, and malignancy.<sup>3</sup> MRI is the gold standard investigation for detecting bile duct injuries.<sup>6</sup> Early postoperative complications include biloma, anastomotic biliary leakage, and anastomotic stenosis. The incidence of postoperative stricture varies from 4 to 38% of patients.<sup>1,3</sup> Late complications include biliary stricture, choledocholithiasis, cholangitis, liver abscess, and portal hypertension.<sup>1,3</sup> The anastomosis between the hepatic duct and jejunal loop must be tension-free and well-vascularised.<sup>1,5</sup> Risk factors for hepaticojejunostomy anastomotic stricture include concomitant vascular injury, post-repair bile leak, and repair by a non-hepatobiliary surgeon.<sup>7</sup> Good results with uneventful outcomes have also been reported with hepaticojejunostomy in Type-I choledochal cyst excision laparoscopically.<sup>8</sup> A study from the Department of Surgery, *Instituto Nacional de Ciencias Medicas y Nutricion Mexico* has supported the use of stents either a T-tube, Nelton tube, or Pigtail catheter through anastomosis to reduce postoperative morbidity, anastomotic leakage, and formation of postoperative stricture,<sup>2</sup> while repair of bile duct injuries with hepaticojejunostomy with decreased short-term mortality and low anastomotic stricture rate have also been reported.<sup>9</sup> Stenting of bilio-enteric anastomosis is debatable among surgeons. The advantages of the use of stent include patent anastomosis, prevention of stenosis and provision of radio-interventional control of anastomosis which allows manipulation and dilation of anastomosis.<sup>2</sup> The use of trans-anastomotic stents must be selective according to the individual characteristic needs of each patient and the experience of each surgeon. Stenting is recommended in unhealthy (*i.e.*, ischaemic, scarred) and small diameter ducts (<4 mm).<sup>2</sup> A study used T-tube to stent Roux-en-Y hepaticojejunostomy with favourable results.<sup>2</sup> T-tube was introduced in 48% of patients from the site of the anastomosis of the hepaticoje-

junostomy, and 52% did not have a T-tube placed. Biliary leakages occurred in 9% of the patients having the T-tube vs. 15% without T-tube. Leakage-associated complications included abscess formation, haemorrhage, sepsis, and mortality. Minor complications associated with T-tube occurred in 15% patients without any major complications. Anastomosis augmentation with a T-tube is less likely to prevent bile leakage but does contribute to reducing the severity of biliary leakage, resulting in less reoperations.<sup>2</sup> Another study supports temporary trans-jejunal stenting of the hepatic ducts to improve the integrity of anastomosis without stenosis or biliary sepsis.<sup>4</sup> It also allows easy access for further diagnostic intervention following the main operation, comparable to Roux-en-Y hepaticojejunostomy. A study from India argues about the preference of hepatico-duodenostomy over a T-tube, with similar results in terms of complications but a smaller duration of surgery. However, more studies are needed to generate sufficient evidence.<sup>10</sup> After pancreatic head resection, biliary leakage from the hepaticojejunostomy secondary to a short or fragile CHD may be reduced by a T-tube inserted at the side of the anastomosis. The present patient's recent ultrasound showed dilation of intrahepatic biliary channels without elevation of liver function tests and the patient had an uneventful recovery. She did not encounter any early postoperative complications.

In conclusion, the authors recommend stenting of bile duct in cases of difficult hepaticojejunostomy. Randomised controlled trials (RCTs) on stented hepaticojejunostomy are not available in the literature. The authors need new RCTs to remove the bias and provide reliable results on this scenario.

## PATIENT'S CONSENT:

Written informed consent for the procedure and for publishing the case report was taken from the patient.

## COMPETING INTEREST:

There authors declared no conflict of interest.

## AUTHORS' CONTRIBUTION:

FU, HZFB, ASA, HA, MSI: Contribution to the conception, designing, acquisition, analysis, interpretation, drafting of the work, and revising the manuscript critically for important intellectual content.

All authors approved the final version of the manuscript to be published.

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