



## Choledochoplasty Using Serosal Surface of Stomach in a Case of Complete Destruction of Hepaticocholedochus Wall Following Necrotizing Pancreatitis

Bali S\*

Department of General Surgery, Adesh Medical College and Hospital, India

### Abstract

Necrotizing pancreatitis can involve the biliary system due to its close proximity. When destruction of part or whole of extra-hepatic biliary tree is encountered at operation, the situation may sometimes not be suitable for a biliodigestive anastomosis. The present case report is about such a situation, which was handled by utilizing the serosal surface of the pyloro-antral region of stomach to reconstruct a conduit for flow of bile along natural passage. Post-op recovery was uneventful and result was heartening.

**Keywords:** Biliary injury; Necrotizing pancreatitis; Serosal patch; Choledochoplasty; Biliary repair

### Background

Bile duct injuries can occur during cholecystectomy in the presence of dense inflammation resulting from long standing cholecystitis, gall-stone pancreatitis or Mirizzi syndrome. The traditional method of dealing with such biliary tract injuries is Roux-en-Y choledochojejunostomy or a choledochoduodenostomy. This may not be possible in the first instance, and is usually deferred to a second sitting (operation). Here we present a repair of the entire extra-hepatic biliary duct (up to the retro-duodenal part) using the serosal surface of the stomach to re-construct the anterior wall of the bile duct.

### OPEN ACCESS

#### \*Correspondence:

Sharadendu Bali, Department of General Surgery, Adesh Medical College and Hospital, Mohri, Kurukshetra, Haryana, India, E-mail: drsharadbali@yahoo.com

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### Review of Literature

The proximity of the biliary tract to the pancreas makes it vulnerable to damage by the inflammatory process occurring in necrotizing pancreatitis. The pancreatic necrosis can spread far beyond the confines of the pancreas, causing a variety of locoregional complications [1], and though likely, there are only a few case reports of involvement of the biliary tract through the necrotic process [2-4]. In a retrospective analysis of 93 cases who underwent surgery for necrotizing pancreatitis, Choudhary et al. found that only six patients had involvement of the biliary tree [1] due to the necrotic process. In all these cases, the diagnosis could be made only after laparotomy. They concluded that in the presence of bile-duct erosion, proximal biliary diversion seemed to be the logical option. Dhal et al. reported a case of necrosis of the extrahepatic bile duct, which was managed successfully by a Roux-en-Y hepaticojejunostomy [5].

Various experimental studies have been conducted to repair bile duct injuries, including serosal patches. Thal and Kobold in 1963 successfully repaired experimental wounds of duodenum using a serosal onlay patch technique in a canine model [6]. Since then, the technique has been modified and utilized for management of a wide variety of surgical problems [7-10]. James and Santa in 1965 reported the first clinical application of the serosal patch in repairing a duodenal fistula, and they achieved perfect closure of the perforation with no evidence of continued leak [11]. The onlay jejunal serosal patch is now regularly used to cover defects arising from duodenal ulcer perforations and injuries [12].

The applicability of the serosal onlay patch principle in the management of an experimental biliary stricture in dogs was studied by Condon et al in 1973. Animals were sacrificed 10 weeks after the repair, and histologic examination of the area of common duct repair demonstrated coverage of the serosal patch by biliary mucosa. They found no evidence of formation of abnormal amounts of fibrous tissue between the regenerated biliary epithelium and the adjacent bowel serosa. Their findings

suggest that the serosa of normal bowel is tolerant to the necrosis-inducing properties of bile and it can form an effective substrate for regeneration of biliary epithelium. They concluded that the adequate regeneration of mucosa on the serosal surface of the patch utilized for roofing the defect is an important factor in enlarging the lumen with minimal fibrosis, thereby averting subsequent stricture [13].

Sanchez in 1978 reported a case having repeated episodes of obstructive jaundice and cholangitis secondary to anastomotic stricture between a choledochal cyst and the duodenum. Patient had a very narrowed proximal common hepatic duct. The surgical repair of the common duct was carried using onlay of jejunal serosa [14]. Kaushik and Sharma in 2001 published a case of Mirizzi syndrome type III, in which around three fourths of the CBD was eaten away by a large gallstone where the repair was carried out using an onlay serosal patch of the jejunum [15].

## Case Presentation

A 28-year-old lady, a known case of gall stones presented for cholecystectomy. She had recovered from a severe attack of necrotizing gall stone pancreatitis two months back, for which she was hospitalized for two weeks in the ICU. At admission, her blood reports were essentially normal, she had no jaundice and serum amylase and lipase were also within normal limits. Abdomen was soft and there was no palpable lump. USG revealed multiple gall stones and a cholangitic abscess communicating with the CHD. She was managed with antibiotics for one week to treat the abscess. Contrast CT scan done at the end of one week revealed:

### CECT abdomen: Pre-operative

1. Liver is enlarged measuring approximately 17.5 cm in size and is normal in outline. It shows decreased attenuation, suggestive of fatty liver. Central IHBRs are mildly prominent. CHD and CBD show mildly diffuse thickening. Portal vein is normal.

2. Gall bladder is seen in mildly dilated state with small hyperdense calculi in its lumen. Walls are diffusely thickened. Mild fat stranding is seen in pericholecystic region.

3. Pancreas is normal in size, outline and enhancement. An ill-defined hypodense collection measuring approximately 8.5 cm × 2.6 cm is seen in peripancreatic region in relation of body of pancreas extending anteriorly and superiorly into the lesser sac and inferiorly in the root of mesentery with mild lateral extension into left anterior pararenal space. No fat density/calcification or air is seen within it. Mesenteric vessels are normal.

4. Small nodular areas of fat necrosis are seen in periportal region and in close proximity to CBD.

5. Mild stranding is seen in peripancreatic fat, root of mesentery, bilateral anterior pararenal spaces with thickening of bilateral Gerota's and lateroconal fascia. Inflammatory thickening of adjacent part of duodenum and stomach is seen.

6. Another linear collection with peripheral enhancement is seen in right perihepatic space extending inferiorly till the right subhepatic space. It measures approximately 18.3 cm × 1.9 cm. No air/oral contrast is seen within it. It is causing scalloping of hepatic capsule.

7. Spleen and splenic vessels are normal.

8. Bilateral kidneys are normal in size, outline, density and enhancement.

9. Bilateral adrenals appear normal.

10. Urinary bladder, uterus and adnexa appear normal.

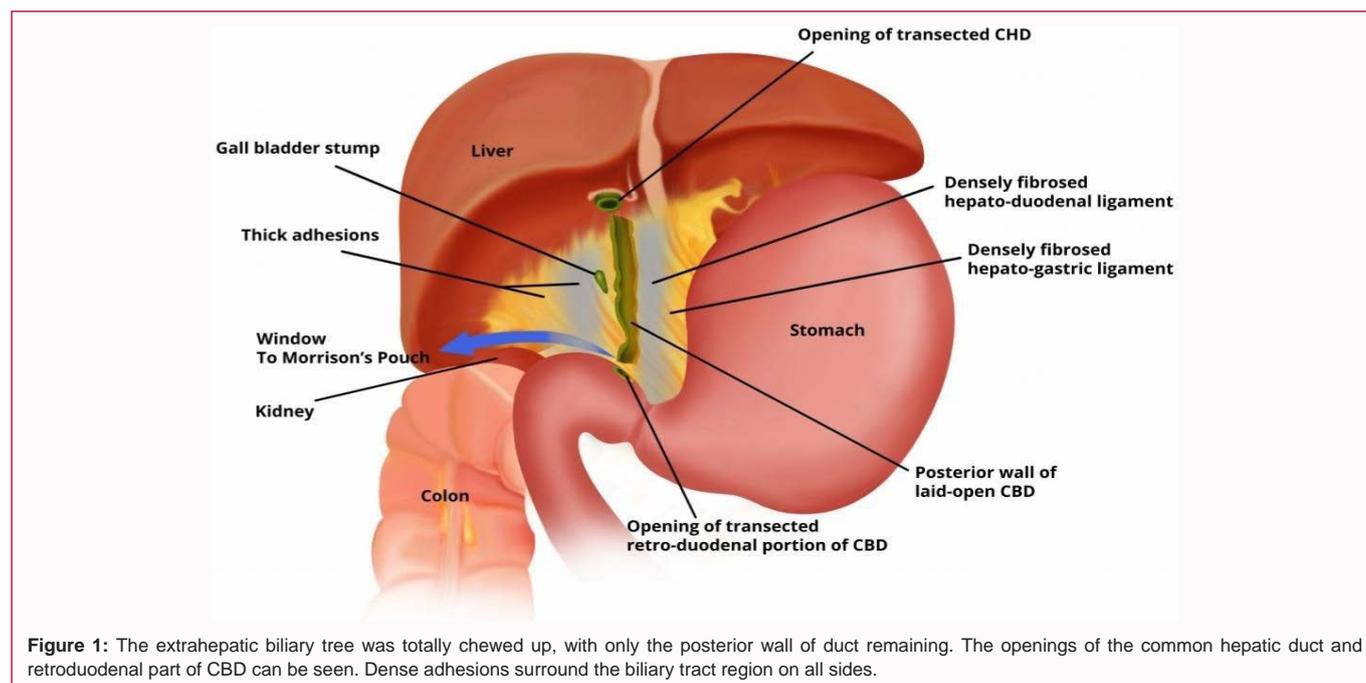
11. Stomach is seen in distended state. Duodenum is normal and D3 is seen to cross the midline.

12. Various small and large bowel loops appear normal. Appendix is normal.

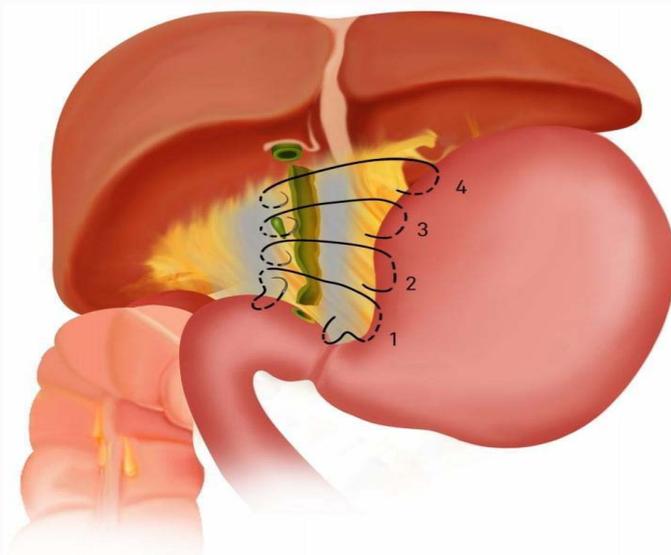
13. Small ascites is seen.

14. No significant abdominal lymphadenopathy is seen.

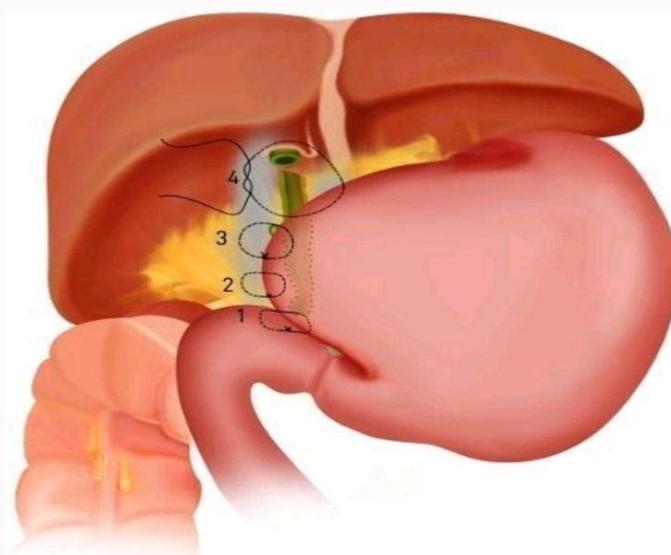
15. Note is made of small right pleural effusion with basal atelectasis.



**Figure 1:** The extrahepatic biliary tree was totally chewed up, with only the posterior wall of duct remaining. The openings of the common hepatic duct and retroduodenal part of CBD can be seen. Dense adhesions surround the biliary tract region on all sides.



**Figure 2:** Four sutures were placed using vicryl 30, starting inferiorly. Over the stomach and duodenum, the sutures took the seromuscular bites, and towards the right, the fibrous tissue. Suture 1 also took a seromuscular bite of the duodenum in order to close the posterior window opening into the Morrison's pouch.



**Figure 3:** Sutures 1, 2 and 3 are shown tied, covering the anterior part of the destroyed biliary ducts by the serosa of the pyloro-antral region of stomach. Suture 4 is yet to be tightened, and the opening of common hepatic duct and posterior wall of necrotic CBD can be seen. After tightening suture 4, a conduit was created for the entire length of the extra-hepatic biliary tract, from liver to duodenum. The posterior wall of this conduit was formed mainly by the posterior remnant of CBD, the anterior and left walls by the stomach serosa, and the right wall by the dense fibrous tissue.

**Impression: F/U/C/O? Recurrent acute pancreatitis. Present CT shows**

- Ill-defined peripancreatic and perihepatic collections with small ascites and peripancreatic inflammation as described.
- Cholelithiasis (Adv: USG/MRCP to rule out choledocholithiasis).

**Operation**

Abdomen was opened through right subcostal incision. Entire gall bladder was adherent to duodenum and bowel on all sides, and dense adhesions were present between parietal peritoneum, bowel and omentum all around the area. Gall bladder was dissected free of the surrounding capsule-like adhesions up to the Hartman's pouch.

While dissecting out the CBD, it was observed that entire anterior wall of the duct was destroyed, and necrotic posterior wall was seen. Sub-total cholecystectomy was carried out at this stage. On further inspection, the opening of CHD was seen in region of porta, and an opening was also recognized in the superior surface of duodenum, which was identified as the opening into the retro-duodenal portion of CBD (Figure 1). An opening was also seen in the antral region, suggestive of a transected cholecysto-antral fistula.

The stomach and duodenum were firmly adherent to structures at the porta hepatis, and along the entire length (to the left) of the opened-out bile duct. The situation has been depicted in Figure 1. On the right side of the lacerated duct also, the bowel was densely edematous and adherent (except inferiorly), creating a sort-of closed space in the region of the duct.

Faced with this situation, the worker placed Lembert interrupted sutures (in the longitudinal axis), starting inferiorly and suturing the antral serosa (on left) to duodenal serosa distal to the opening seen in duodenum (first suture). In this region inferior-laterally on the right, and posterosuperior to duodenum, there was a “window” communicating with Morrison’s pouch- it was vital to make this part water-tight. The bite through antral serosa was sutured posteroinferiorly (in relation to lower end of supra-duodenal part of CBD) to duodenal serosa and adjacent tissues in a way to create a snug fit. Similar longitudinal Lembert sutures were taken in ascending fashion, suturing small lengths of antral serosa to the tissues on the right side of the duct, including the gall bladder stump in one. In total four horizontal mattress (Lembert) sutures were applied, using Vicryl no 2/0 (Figure 2, 3). Before the last superior suture, an infant feeding tube no 6 was placed into CHD opening and transfixed to surrounding tissue with Vicryl 2/0.

A tube drain was placed in sub hepatic space with great difficulty (due to adhesions) lateral to the sutures placed.

### CT scan (3 weeks post-operative)

- Liver – same as before.
- Gall bladder is not visualized. Small pocket of fluid is seen in gall bladder fossa. Postoperative changes are seen in upper anterior and right lateral abdominal wall.
- CT cholangiogram done by injecting non-ionic contrast through the “T-tube” (infant feeding tube). The contrast is seen to extend *via* IFT into CHD with further superior extension into bilateral biliary radicals and inferior extension into CBD and further in the duodenum. Small amount of contrast is seen to pool into irregular hypodense collection/pouch near the gall bladder fossa, closely abutting the gastric antropyloric region and D1 part of duodenum which shows mild thickening. Small nodular areas of fat necrosis are seen adjacent to CBD.
- Pancreas is normal in size, outline and enhancement. An ill-defined hypodense collection measuring approximately 8.5 cm × 2.6 cm is seen in peripancreatic region in relation of body of pancreas extending anteriorly and superiorly into the lesser sac and inferiorly in the root of mesentery with mild lateral extension into left anterior pararenal space. No fat density/calcification or air is seen within it.
- Mild stranding is seen in peripancreatic fat, root of mesentery, bilateral anterior pararenal spaces with mild thickening of bilateral Gerota’s and lateroconal fascia.
- Another linear collection with peripheral enhancement is seen in right perihepatic space extending inferiorly till the right subhepatic space. It measures approximately 18 cm × 1.9 cm. No air/oral contrast is seen within it. It is causing scalloping of hepatic capsule.
- Small ascites is seen.

### Outcome

Post operatively, the tube drain output was around 200 ml for two days, and reduced rapidly after that to around 20 ml/day after 5 days. The IFT placed in the CHD drained about 20 ml to 40 ml of bile/

day. Patient passed flatus on third postoperative day, and brownish stools on fifth POD. Thereafter, stool color remained normal. Ryle’s tube was removed on fourth POD. CT cholangiogram was carried out after 3 weeks, and on being found normal, the IFT in the CHD was removed. The tube drain was removed the next day. In all, the postoperative period was uneventful.

### Conclusion

In present case, the dense fibrous tissue in the region was a key factor in the success of the transposition of stomach surface to cover the large biliary defect. A similar usage of serosal surface of stomach may however, be feasible in other situations where there are small defects following injury to the bile ducts during cholecystectomy.

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