

# Intrahepatic Bilioenteric Anastomosis

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After extrahepatic bile duct resection with or without hepatectomy for biliary tract carcinomas, reestablishing continuity of the intrahepatic bile ducts to the intestinal tract must be completed. Multiple biliary orifices are often encountered on the transected surface of the liver when hemihepatectomy or central hepatectomy combined with bile duct resection is performed for perihilar cholangiocarcinoma. All orifices of transected bile ducts should be anastomosed to prevent post-operative complications such as persistent bile leak, intraabdominal abscess, or biliary fistulation.

It is worthwhile to have an established routine for bilioenteric anastomosis, although the difficulty of the anastomotic procedure may depend on the size and number of the anastomoses in each case. This chapter describes the basic technique for bilioenteric anastomosis.

## Indications and Contraindications

### Indications

- Hepatectomy combined with bile duct resection for malignancy involving the proximal bile duct, such as perihilar cholangiocarcinoma or gallbladder cancer involving the hepatic hilus.
- Benign stricture/injury of the proximal bile duct, often associated with laparoscopic cholecystectomy.
- Benign bilioenteric anastomotic stricture after extrahepatic bile duct resection. In such cases, after excision of the strictured anastomosis (including dense and inflamed bile ducts), more proximal hepaticojejunostomy should be carried out.

### Contraindications

- In patients with unresectable malignant disease, elective, palliative intrahepatic bilioenteric bypass for hilar obstruction should be avoided. A less invasive procedure, interventional radiology (IVR), including biliary drainage and stent placement by an endoscopic or transhepatic approach, should be recommended.

## Procedures: End-to-Side Anastomosis

The described technique for intrahepatic and proximal extrahepatic bilioenteric anastomoses is quite useful in all cases, particularly those with multiple small ductal orifices onto the transected surface of the liver. Several points are worth emphasizing:

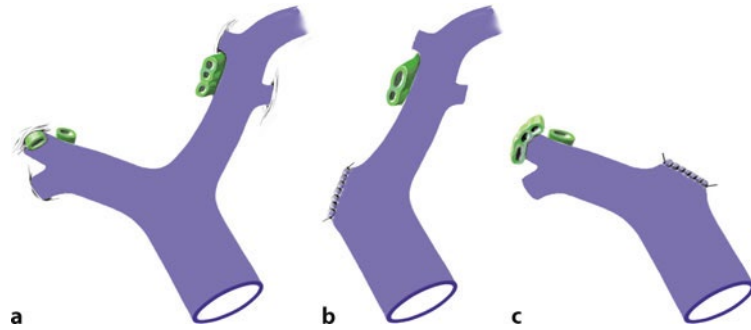
- When more than one ductal orifice is present at the hepatic hilus, adjacent ductal orifices may be grouped as much as possible with a row of sutures, so that separated orifices can be treated as a single duct for anastomosis.
- The anterior layer of sutures on the bile duct is placed first (the needles being passed from the outside in), before any attempt to place the posterior layer. The row of anterior sutures is then lifted upward to obtain good view of the ductal lumen and the posterior ductal wall; then the posterior row of sutures is placed.
- This technique allows precise placement of sutures under direct vision, before apposition of the jejunum and bile duct hinders access. Absorbable suture material (4-0 or 5-0) should be used.

## Step 1

### Identification of transected bile ducts

After adequate exposure of the duct has been obtained, a tension-free Roux-en-Y jejunal loop is brought through the transverse mesocolon, and end-to-side anastomosis is prepared.

It is important that the surgeon must identify all exposed ductal orifices on the transected surface of the liver (■ Fig. 73.1, *left*: isolated caudate lobectomy; *middle*: right hemihepatectomy; *right*: left hemihepatectomy). Failure to provide adequate drainage of all ducts often leads to serious postoperative complications, such as persistent bile leak, intraabdominal abscess, biliary fistulation, cholangitis, or hepatic abscess.

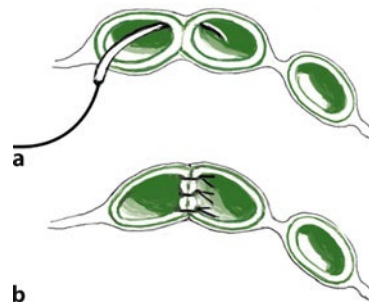


■ Fig. 73.1

## Step 2

### Grouping of separated bile ducts

All exposed bile ducts are carefully identified. When more than one ductal orifice is present, adjacent ductal orifices may be grouped as much as possible. Separated adjacent ducts that are not connected by a septum are brought into apposition by placing two or three interrupted sutures (5-0 absorbable suture) (■ Fig. 73.2), so that they can be treated as a single duct for anastomosis.

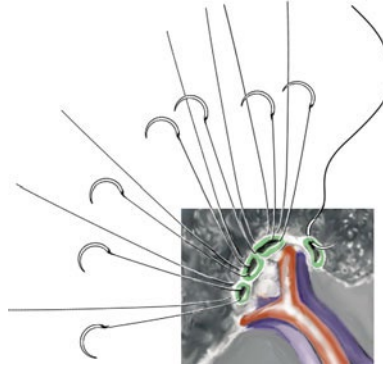


■ Fig. 73.2

**Step 3****Placement of anterior stitches on the bile duct**

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The entire anterior layer of sutures on the bile duct is placed first, the needles being passed from outside to in. The sutures are sequentially clamped and the needles of the sutures are left. It is important to keep the sutures in order for subsequent identification (■ Fig. 73.3).

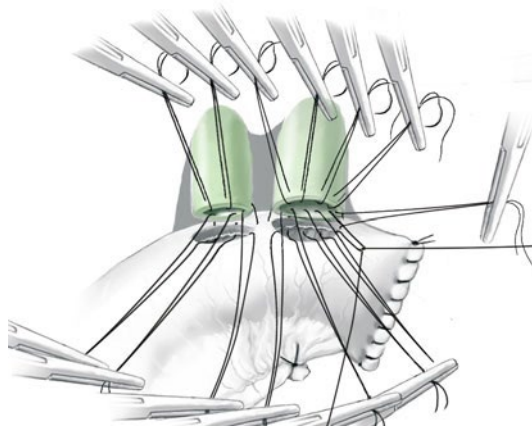


■ Fig. 73.3

**Step 4****Placement of posterior row of sutures**

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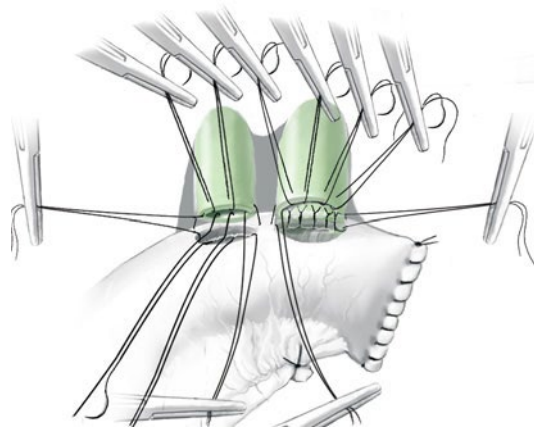
Once the anterior stitches on the bile duct has been placed, the row of sutures is lifted upward to obtain good opening of the ductal orifice. The posterior row of sutures is then placed, which are now introduced from the jejunal limb (inside to outside) to the posterior wall of the bile duct (outside to inside). The sutures are not tied, but are sequentially clamped after removal of the needles, and are kept in order (■ Fig. 73.4).



■ Fig. 73.4

## Tying the posterior stitches

After completion of the posterior full-thickness sutures, the jejunum loop is then brought up along the posterior row of sutures until the back wall of the jejunum and the bile ducts are apposed. It is important to make sure that jejunal openings are properly aligned to the respective ductal orifices. The posterior sutures are then tied from left to right (■ Fig. 73.5). Corner sutures are held, and all other sutures are cut.

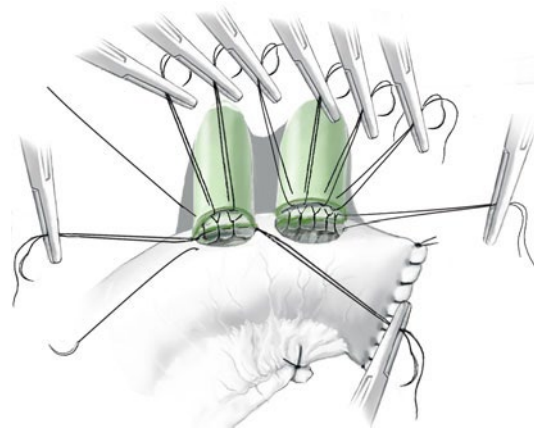


■ Fig. 73.5

## Step 6

## Completing the anterior row of sutures

The previously placed sutures on the anterior wall of the bile duct are now used to complete the anastomosis. The needles are passed sequentially through the anterior wall of the jejunum (inside to outside) (■ Fig. 73.6). The sutures are sequentially clamped and are left in order with the needles removed.



■ Fig. 73.6

## Step 7

## Tying the anterior row of sutures

The anterior anastomosis is then completed by securing the sutures, tying from left to right, making certain that the ductal sutures are correctly placed to the corresponding jejunal openings. Stenting of the bilioenteric anastomosis is not mandatory, but in patients with multiple small ductal orifices, placement of a biliary stent at the anastomosis is recommended to prevent anastomosis leakage and stenosis.

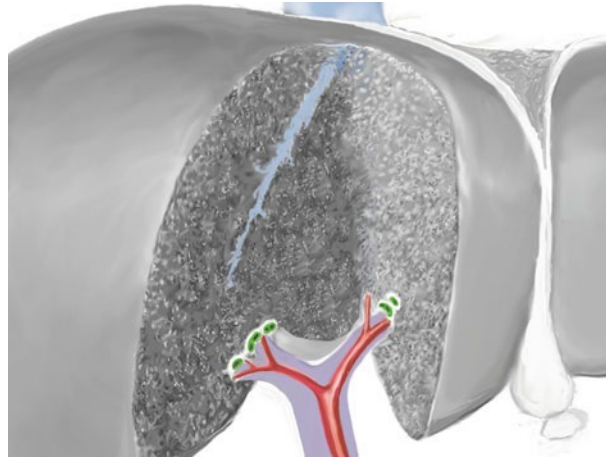
## Side-to-Side Intrahepatic Anastomosis

Side-to-side intrahepatic bilioenteric anastomosis is undertaken for palliative biliary drainage in patients with unresectable perihilar cholangiocarcinoma or gallbladder cancer involving the hepatic hilus. The most common approaches use segment III or the right anterior sectional duct.

The indications for these procedures are presently quite limited. Less invasive interventional radiology (IVR) procedures, such as placement of a biliary stent by either an endoscopic or transthepatic approach, are generally performed in patients with unresectable malignant hilar obstruction.

### Tricks of the Senior Surgeon

- When dividing intrahepatic ducts, stay sutures should be placed before dividing the intrahepatic bile duct; otherwise the small segmental duct will slip away and be hidden in the transected surface of the liver.
- When multiple ductal orifices are encountered, it is particularly important to find and anastomose all orifices of the transected bile duct. If these are left without anastomoses, a chronic fistula may occur.
- When a ductal orifice is too tiny for anastomosis, ligation with a nonabsorbable suture may be possible.
- For benign hilar and more proximal bile duct strictures, which are often associated with laparoscopic cholecystectomy, hilar bile duct resection by separating the liver parenchyma along the interlobar plane (“transhepatic approach”) may be a useful procedure for approaching the second or more proximal biliary ducts without hepatic resection, because of good exposure of the hilar plate. Senior surgeons should keep this procedure in mind at the time of hilar or more proximal bile duct resection and reconstruction (■ Fig. 73.7).



■ Fig. 73.7