Evaluation of Biliary Enteric Anastomosis in Benign Biliary Disorders

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Abstract Evaluation of various methods of biliary enteric anastomosis in benign biliary diseases (BBD). A surgeon operating for BBD needs to improve the internal drainage of bile to prevent stasis and its back-pressure effects. This is best obtained by biliary enteric anastomosis. A total of 121 cases of biliary enteric anastomosis in BBD were included in this study. The postoperative course and long-term outcome were studied prospectively. In the choledochoduodenostomy group, there were no leaks, no strictures, and no mortality. Five (10.41 %) patients had cholangitis attacks and 2 (4.17 %) patients had sump syndrome. The choledochojejunostomy group had no leaks, no strictures. Two (7.14 %) patients had repeated cholangitis and 2 (7.14 %) patients had sump syndrome, no mortality. The hepaticojejunostomy group had 3 cases of anastomotic leak of which 2 healed spontaneously and 1 needed resurgery. There was stricture in 2 cases, in which resurgery was successful—one death, no cholangiocarcinoma. Biliary enteric anastomosis is a safe and effective method for the management of BBD. The method should be selected according to the disease pathology and patient characteristics.

Keywords Hepatobiliary · Surgery · Biliary · Enteric · Stricture · Choledochoduodenostomy · Hepaticojejunostomy · Choledochoduodenostomy · CDD · CDJ · HJ · Anastomosis · Jaundice · Stricture · CBD

Introduction

A surgeon operating for various benign biliary disorders (BBD) needs to improve the internal drainage of bile to prevent stasis and its back-pressure effects. Surgical decompression in BBDs is best obtained by biliary enteric anastomosis [1]. We present our experience with various modalities of biliary enteric anastomosis in 121 cases of BBDs based on specific indications along with review of literature.

The most common cause of benign obstructive jaundice is common bile duct stones and cholangitis. Clinical entities such as benign ampullary disorders, stenosis, and dyskinesia of the sphincter of Oddi also present with jaundice. Bile duct strictures that may involve intrahepatic or extrahepatic biliary tree also present with obstructive jaundice [2]. More than 90 % of bile duct leaks are due to inadvertent injury during cholecystectomy or bile duct surgery. Biliary fistula that results from bile duct injury may close spontaneously or may cause biliary stricture. Biliary stricture may result from abdominal trauma, chronic pancreatitis, impacted calculus, or chemical injury. Main aim in management of benign obstructive jaundice is to prevent biliary stasis and to prevent back-pressure effects. This is best achieved by obtaining internal drainage through biliary enteric anastomosis [3]. In our present study, we present our experience with 121 cases of benign obstructive jaundice managed using various modalities of biliary enteric anastomosis. The rest of the cases managed with

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choledochotomy with choledocholithotomy were excluded from the study. A total of 121 cases of BBDs were managed with biliary enteric anastomosis based on specific indications. The study was conducted at Government Medical College and Rajindra Hospital, Patiala.

Methods

The study was conducted at Government Medical College and Rajindra Hospital, Patiala, a tertiary care centre. A total of 121 cases of BBDs undergoing biliary enteric anastomosis from 1997 to 2010 were included in this study. The procedures used were choledochoduodenostomy (CDD), choledochojejunostomy (CDJ), and Roux-en-Y hepaticojejunostomy (HJ). Forty-eight cases of CDD, 28 cases of CDJ, and 45 cases of HJ were done.

In case of stone disease, the indication for which surgery was done included multiple large stones, incomplete removal of stones, impacted distal common bile duct (CBD) stones, markedly dilated CBD, distal CBD stricture, recurrence, or missed stones. In cases of bile duct injuries, if the patient was referred to us within 48 h, in stable condition, with no intraperitoneal bile collections, simpler injuries with no associated vascular injuries, we did an early repair. Unfortunately most of the patients were referred to us between 1 and 6 weeks of initial surgery. In these cases, due to extensive local inflammation, surgery was delayed. All bile collections were drained using percutaneous tubes, sepsis was adequately controlled, and an interval repair was done after 7–12 weeks. In choledochal cysts, a complete excision with a hepaticojejunostomy was done. Five cases reported to us had a primary endoscopic retrograde cholangiopancreatography (ERCP) and stenting for biliary fistula, which did close but ended with a stricture and needed subsequent surgery.

Informed consent of every patient included in this study was taken. The patients and the procedures were selected based on investigations which included liver function tests (LFTs), ultrasonography (USG), and magnetic resonance cholangiopancreatography (MRCP). Where necessary, an ERCP and fistulogram were done. The patients were given preoperative broad-spectrum antibiotics just before surgery. The principles used in choosing the method and construction of anastomosis were (1) the anastomosis should be tension free, (2) good blood supply, (3) adequate stoma size of at least 20 mm, (4) mucosa-to-mucosa apposition, and (5) it should drain all segments of the liver.

CDD

Generous Kocherization with anterior CBD exposure was done. A long vertical incision in the CBD and a

long axis duodenal incision using diathermy for all incisions were given. Single-layered mucosa inverting anastomosis with vicryl or silk was used. When silk was used, knots were kept outside. The apex of the incision was kept at least 5 cm above the duodenum. Side-to-side CDD was performed using the Goldman Goldman technique.

CDJ

If a CDD was not possible due to a scarred duodenum due to surgery or acid peptic disease, a Roux-en-Y end-to-side or end-to-end CDJ was done. CDJ was also done for bile duct injuries and high strictures. The location of the hepatic artery to the left of the common duct and exploratory aspirations with a fine needle were of great assistance in locating the common duct. The distal part of the duct was ligated or left open if technically ligation was found difficult, and the proximal part was trimmed to achieve maximal diameter, good blood supply, and viable duct tissue. A single-layered anastomosis with 3-0 silk or vicryl was used.

HJ

Depending on the accessibility of the duct at surgery, end-to-side, end-to-end, or side-to-side HJ was done. Single-layered anastomosis using 3-0 silk or vicryl was used. A distance of 3–5 mm between sutures was kept. There was no technical difficulty in anastomosing the end of jejunum to the hepatic duct.

We used a suction drain in all the cases. Removal of drain was based on color of the fluid and volume. If the drain volume was less than 40 ml in 24 h for 2 consecutive days, drain was removed. Stenting was not routinely done. In a few cases, stenting was done for imaging studies. An access loop was not created in any of the cases.

Follow-up was done in the OPD monthly for 3 months, 3 monthly for three visits, then 6 monthly for 4 years, and then every 4–5 years. USG and serum alkaline phosphatase (S.ALP) was done at every follow-up. If the patient had cholangitis, or if S.ALP was found raised, an MRCP or hepatobiliary iminodiacetic acid (HIDA) scan was done. Complications were noted.

Cholangitis was considered present if three of the following signs were observed: right upper quadrant tenderness, fever, leukocytosis (white cell count >12,000), bilirubin concentration exceeding 2 mg/dl, or alkaline phosphatases elevation more than 140 U/L.

Restrictures were defined as continuous IH dilatation and positive evidence on MRCP/HIDA. Leak was defined as 150 cc/24 h after 5 days of surgery. The mean follow-up time was 4 years.

Results

The distribution of patients by the type of procedure was as follows:

- 48 cases of CDD (38.6 %)
- 28 cases of CDJ (23.7 %)
- 45 cases of HJ (37.8 %)

Of the BBDs for which biliary enteric anastomosis was done, 33 (27.27 %) were for choledocholithiasis, 26 (21.48 %) for biliary fistulas, 48 (39.67 %) for biliary strictures, 9 (7.44 %) for choledochal cysts, and 5 (4.13 %) for CBD ligation.

In the CDD group, no leaks and no strictures were noted (Table 1).

Five patients had cholangitis postsurgery (10.41 %). Two patients had sump syndrome (4.17 %) (Table 2). There was no mortality in this group.

In the CDJ group, there were no leaks and no strictures. Two patients had cholangitis postsurgery (7.14 %) and two had sump syndrome (7.14 %). There was no mortality in this group.

In the hepaticojejunostomy group (Figs. 1 and 2), there were three anastomotic leaks (6.67 %) of which two healed spontaneously and one needed a revision surgery which was successful. Anastomotic stricture was noted in 2 patients (4.44 %) who were reoperated after HIDA scans. One of these cases had primary surgery in the emergency, came after 6 years with anastomotic narrowing. The secondary stone was found on revision surgery. For revision surgery, the same loop was used. The resurgery was successful. There was one death in this group. This patient presented with a Strassburg E4 injury and biliary peritonitis.

There was no cholangiocarcinoma development in any of the cases till date.

Discussion

A stricture of the biliary tree (Fig. 3) can be one of the most difficult challenges that a surgeon can face. If unrecognized or managed improperly, life-threatening complications, such as biliary cirrhosis, portal hypertension, and cholangitis, can

Table 2 Complications: cholangitis and sump syndrome

Procedure evaluated	Cholangitis	Sump syndrome
Cholodochoduodenostomy	10.41 %	4.17 %
Choledochojejunostomy	7.14 %	7.14 %
Hepaticojejunostomy	0	0

develop. The causes of benign bile duct strictures include inflammatory conditions such as chronic pancreatitis, biliary calculi, or biliary tract infection. Primary sclerosing cholangitis, a biliary tract disease of unknown cause, is also an important cause of bile duct strictures. However, a vast majority of benign bile duct strictures occur after surgery on the gallbladder or biliary tree [3]. The widespread use of laparoscopic cholecystectomy (LC) has dramatically increased the incidence of bile duct injuries and strictures associated with cholecystectomy [4–8]. Benign strictures of the bile ducts represent a significant clinical problem, most often occurring in young patients. The treatment goal for these patients is long-term absence of symptoms and need for further hospitalization [9].

The plan of treatment of bile duct injury should be tailored to the individual patient based on the type, level and extent of the injury, the timing of diagnosis, overall status of the patient, and the available expertise [1]. Previous reports have suggested hepaticojejunostomy as the best treatment for benign biliary stenosis [9, 10]. The vascular patterns of the bile duct and the pathogenesis of the stricture advocate performing the biliary enteric anastomosis as high as possible on the biliary tree [9]. Overall results of a large stoma (~2 cm in size) with a Roux loop were very

Fig. 1 CBD stricture as seen on ERCP

Table 1 Complications: leaks and strictures

Procedure evaluated	Leaks	Strictures
Cholodochoduodenostomy	0	0
Choledochojejunostomy	0	0
Hepaticojejunostomy	6.67 %	4.44 %

Fig. 2 T-tube cholangiogram showing choledochoduodenostomy

satisfactory in our study. We had two cases of strictures, but there is no evidence that this problem is the result of Roux-en-Y loop; it is probably as a consequence of the primary disease. Both of the patients were successfully managed with reoperation and had no complaints during a follow-up of 2 years after reoperation. As reported by Lasnier, the complications evolution of HJ depends of initial pathology [10]. Obtaining adequate

Fig. 3 T-tube cholangiogram showing end to end hepaticojejunostomy

width of the hepatic duct opening and accurate mucosa-to-mucosa anastomosis is essential for achieving satisfactory reconstruction of the biliary tract [1].

Biliary enteric anastomosis has been used in the management of benign obstructive jaundice in various series. Choledochoduodenostomy (Fig. 4) and hepaticojejunostomy (Figs. 1 and 2) are favored methods of biliary enteric anastomosis [1]. About 98 % good results in patients followed up for 8 years have been recommended [11]. There is reluctance on the part of many experienced surgeons to perform side-to-side choledochoduodenostomy for fear that the flow of partly digested food might cause ascending cholangitis, but long-term follow-up in patients who have

Fig. 4 T-tube cholangiogram showing end to side hepaticojejunostomy

undergone this type of anastomosis does not provide justification for this fear [12]. Patients having this procedure for appropriate indication fare well [1].

Although endoscopic techniques have provided us an alternative mode of treatment, endoscopic stenting, even if performed by an experienced team, could be hindered by the major disadvantage of multiple procedures that must be repeated to accomplish success [9]. The optimal management of patients with major bile duct injuries and strictures in the current era remains surgical reconstruction [3]. Complication rates vary from 7 to 10 % with mortality of 0.5–2 % [13]. Hemorrhage, cholangitis, pancreatitis, and perforation are some of the complications where mortality is highest. Emergency surgical intervention is required in one third of the patients [13].

Choledochoduodenostomy when performed based on listed indication is ideal. The mortality in recently reported series of patients who have undergone CDD for benign disease ranges from 1.3 to 5.3 % [14]. Sump syndrome has been reported in 0.14–1.3 %. Two of our cases had sump syndrome (4.8 %). Side-to-side choledochoduodenostomy is simple and less time-consuming than Roux-en-Y choledochojejunostomy performed by many surgeons as it is more physiological from a theoretical standpoint to return the bile to duodenum rather than have it enter the small intestine further down. In case of benign obstructive jaundice, the CBD is nearly always dilated and thick walled, rendering the procedure relatively easy from a technical standpoint [1].

Biliary enteric drainage is a more permanent and physiological solution to biliary strictures as compared to ERCP and stenting, probably because the stent diameter is 6–8 mm which is hardly adequate to drain the liver besides being a foreign body as compared to biliary enteric anastomosis which provides adequate stoma size. We recommend that CBD stricture 5 cm above the supraduodenal CBD should be converted to a jejunal drainage.

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