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The Efficacy of Biliary Diversion for Benign Disease: Long-Term Follow-up†

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Retrospective analysis of 70 patients who underwent biliary bypass operations for benign disease over an eight-year period was undertaken to evaluate long-term complications. Operative procedures included choledochoduodenostomy in 60 patients, choledochojejunostomy in four, and cholecystoduodenostomy, cholecystojejunostomy and hepaticojejunostomy in two patients each. The most common indication for surgery was choledocholithiasis, with or without hepatic stones, viscid bile, and ampullary stenosis (61 to 70 patients). Other indications included chronic

pancreatitis, choledochal cyst, and sclerosing cholangitis. One patient died postoperatively from hemorrhage, and two others died from causes unrelated to surgery. Two patients developed cholangitis without reflux and demonstrated anastomotic stenosis at re-operation. Sixty-four patients in the series had reflux but remained asymptomatic. Our study supports the concept that cholangitis results from relative obstruction of the anastomosis rather than from reflux.

In 1888, shortly after the advent of gallbladder surgery, Reidel (1) attempted to anastomose a dilated common bile duct to the duodenum. Although a fatal leak occurred in this patient, later reports (2) showed successful recovery after this operation. Currently, surgical opinion on the value of choledochoduodenostomy varies. Although popular in Europe, it has never gained adequate support by groups elsewhere. Many experienced surgeons fear that the flow of partly digested food might cause puddling in the common bile duct, which would result in ascending cholangitis. However, others (4,5,6) have seriously questioned whether this fear is substantiated. In 1952, Musgrove (3) showed experimentally in dogs that no jaundice or ill effects occurred as long as the anastomosis was patent. Madden has pointed out (7) that reflux does not cause cholangitis but rather bile stasis secondary to stenosis of the anastomotic stoma. We also believe that the size of the anastomosis may be critically affected by inflammation secondary to anastomotic dehiscence. Our experience at Henry Ford Hospital has been reviewed to determine the outcome of patients over long-term follow-up.

Clinical Material

From January 1968 until January 1977, 70 patients (48 men and 22 women) underwent biliary drainage operations for benign biliary disease at Henry Ford Hospital (Table I). The average age for the whole group was 60 years; the youngest was 5 months old and the oldest 87. Sixty-four patients were followed for at least five years, and six were lost to follow-up.

TABLE I
Age Distribution of Subjects
Undergoing Biliary Drainage
at Henry Ford Hospital: 1968-1976

Age	Number of Patients
0-9	1
10-19	0
20-29	4
30-39	4
40-49	9
50-59	13
60-69	17
70-79	18
80-89	4
Total	70

There were several reasons for these operations. Most patients who have an exploratory common bile duct operation can be treated satisfactorily by removal of their stones and progressive, graduated dilatation of the sphincter of Oddi. However, dilatation may not be enough for patients whose common bile duct stones are accompanied by viscid bile or muddy bile in a thick-walled, dilated duct. In others it may be hazardous to dislodge a firmly impacted

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stone in the lower common bile duct. Transduodenal sphincterotomy, used by many surgeons, may be effective in those cases, although we have been concerned about occasional postoperative pancreatitis. Other indications were strictures of common bile duct, stenosis of papilla and recurrent cholangitis, chronic pancreatitis, and choledochal cyst. The reasons for choosing biliary drainage are tabulated in Table II. Some patients had more than one indication; 35 had a previous history of biliary surgery.

TABLE II
Indications For
Biliary Drainage Procedures

Indications For Biliary Drainage Procedures	Number of Patients
Cholelithiasis and Choledocolithiasis with viscid bile, thick walled CBD, and/or ampullary stenosis	26
Choledocholithiasis (recurrent) (3 patients also had hepatic duct stones)	35
Choledochal cyst	4
Chronic pancreatitis	4
Sclerosing cholangitis	1

Sixty patients underwent choledochoduodenostomy (side-to-side), four patients had choledochojejunostomy (Roux-en-Y), and two each had cholecystoduodenostomy, cholecystojejunostomy, and hepaticojejunostomy. Two of the 70 developed cholangitis, but neither showed reflux during the barium upper GI x-rays. One had undergone a choledochoduodenostomy elsewhere, and one had a hepaticojejunostomy performed by one of us to bypass a segmental type of sclerosing cholangitis (8). Stenosis of the anastomosis was found in both patients during surgery. One underwent a newly created hepaticojejunostomy and the other a revision of the same. Both have been well for over five years. One of the 70 patients, a 60-year-old man with leukemia who had presented with acute suppurative cholangitis, died from bleeding on the second postoperative day. Two other patients died from unrelated causes during the study period.

Operative Technique

We prefer to make a transverse incision in the most distal portion of the supraduodenal common bile duct and a parallel incision at or just distal to the junction of the first and second portion of the duodenum. After the Kocher maneuver has taken the tension out of the suture line, a side-to-side anastomosis is performed with #4-0 chronic catgut for the inner row and 4-0 silk for the outer row. A T-tube is used as an internal splint for the anastomosis, which is placed via a choledochotomy (Fig. 1). We also believe it is important in the postoperative period to drain the bile away from the anastomosis, since even minor leaks may

cause enough inflammatory changes to make the anastomosis stenotic.

Discussion

Choledochoduodenostomy has never enjoyed much popularity for several reasons. A former objection was that it predisposed to ascending cholangitis, due to reflux of intestinal contents into the biliary tree. Our findings were different. In our patients, 42 demonstrated reflux of barium in the biliary tree by upper gastrointestinal examination, without attending cholangitis. Our radiologist also noted that the common duct was smaller postoperatively in 29 patients, which suggests that the operation effectively reduces pressure in the biliary tree. All patients who demonstrated reflux remained asymptomatic. On the other hand, as described earlier, two patients who developed cholangitis, six months and two years postoperatively, showed no reflux but at surgery proved to have stenosis of the anastomotic site.

Another objection to choledochoduodenostomy is that it creates a blind pouch between the site of anastomosis and the papilla of Vater, with the so-called sump syndrome

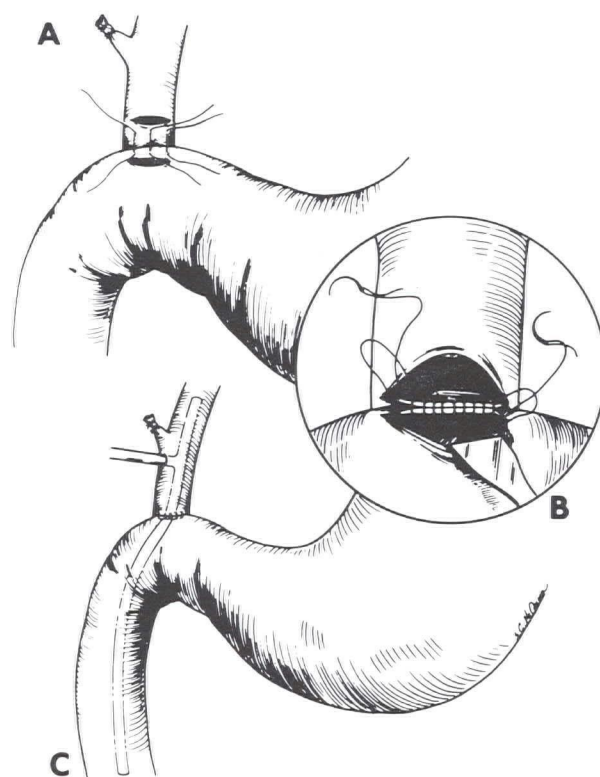


Fig. 1
T-tube provides internal splint of the anastomosis and diverts the bile from it.

Biliary Diversion Follow-up

acting as a nidus for food, infection, stone formation, and possible secondary pancreatitis. None of our patients, however, suffered from this syndrome.

Theoretically, a third objection to biliary drainage operations is that calculi may become lodged in the lower end of the common bile duct and initiate pancreatitis by blocking the pancreatic duct after surgery. This complication has not occurred in our series, not even in three patients in whom impacted stones could not be removed from the lower common bile duct (Fig. 2). Removing these stones may cause potentially serious problems, such as false passage or injury to the portal vein (9).

We prefer choledochoduodenostomy because it is simple, safe, and involves only one intestinal anastomosis. However, we believe that this procedure should be performed only when a dilated common bile duct is present, that the stoma should be at least 2 cm in diameter, and that the anastomosis should be decompressed to divert the bile away from it. Otherwise, leaks may bring about possible stenosis. Intraoperative cholangiography, instrumental duct exploration, and even choledochoscopy have not completely eliminated the problem of overlooked stones (10). While there may be a question whether bile acid is altered by these operations, unpublished data from our laboratory show that bile acid pool is unchanged in fed animals after a biliary bypass. On the other hand, it was diminished in cholecystectomized animals. It may be that choledochoduodenostomy should be considered for all patients with choledocholithiasis.

Summary

We have reviewed our experience with biliary bypass procedures for benign tract disease. Choledochoduodenostomy was used for 60 of our 70 patients. During the follow-up period, two patients developed cholangitis; neither showed reflux into the biliary tree, and both were found at surgery to have stenosis of anastomosis. Choledochoduodenostomy should be performed only when a dilated common bile duct is present, and the stoma should be at least 2 cm in diameter. A T-tube seems beneficial as an internal splint and to divert bile away from the anastomosis. Our study supports the concept that ascending cholangitis following choledochoduodenostomy is due to a stricture of anastomosis rather than to reflux.

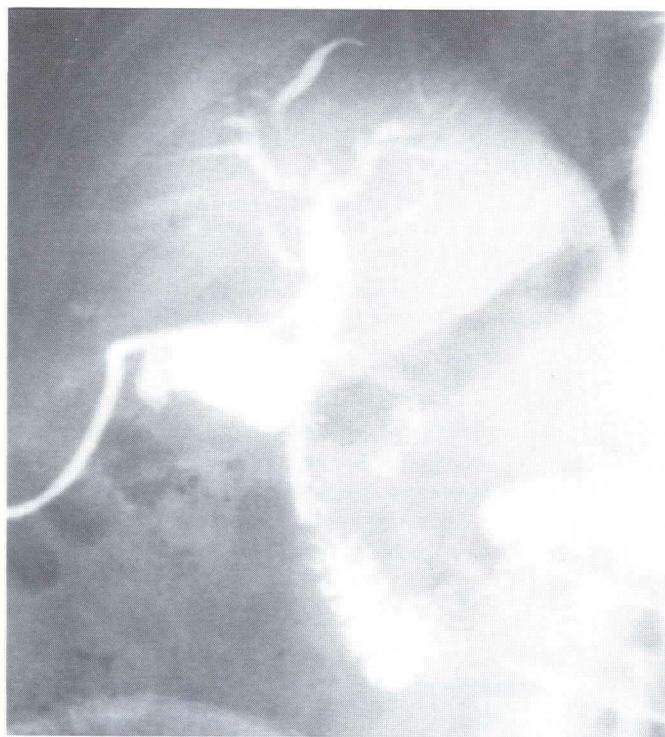


Fig. 2

Two stones impacted in the distal common bile duct; instrumentation failed to free them.



Fig. 3

Upper GI x-rays visualize the biliary tree in the presence of patent anastomosis, thus providing easy follow-up.

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