

Teflon Patch Graft for Reconstruction of the Extrahepatic Bile Ducts *

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INJURY to the extrahepatic bile ducts with subsequent benign stricture formation is one of the gravest complications of abdominal surgery. Cattell^{3,4} states that 90 per cent of bile duct injuries are avoidable and due to faulty surgical technic. Despite the increasing number of well trained surgeons throughout the country, the incidence of stricture remains constant: 1 to 350-400 cholecystectomies. It is of interest that strictures develop most commonly after cholecystectomy and rarely after common duct exploration. A benign stricture of the extra-hepatic bile duct carries a grave prognosis—a mortality of 30 per cent; morbidity, of course, is much greater.

There is general agreement that repair of the injured duct at the time of the original operative procedure has the best chance of a long-term satisfactory result. In patients in which the stricture is diagnosed weeks or months after injury, results are not as satisfactory and a variety of operative procedures have been utilized. The Lahey Clinic recommends that the two ends of the duct be repaired by means of an end-to-end anastomosis. In their series of over 1,000 operative procedures for benign strictures, this method of repair gave best results.^{3,4} The Mayo Clinic reported comparable results using choledochoduodenostomy as most frequent type of repair.¹²

No matter what type of repair is used, a significant number of patients have unsatisfactory results which require further operation. Attempts have been made to bridge the defect in the common duct with various grafts.^{5,9} A variety of autogenous tubular structures have been used and include artery, vein, ureter, appendix, fallopian tube and skin. Free grafts in the biliary tract disintegrate and fibrose, with subsequent stricture formation. All have proved unsatisfactory. A number of synthetic materials have been tried, including polyvinyl,² rubber, monel, vitallium⁸ and silicone. These two have been unsatisfactory because of subsequent obstruction to flow of bile by incrustation of bile pigments.

In recent years a number of new, less reactive synthetic materials^{6,10,11} have been developed and have had extensive clinical trial, particularly by vascular surgeons. Teflon has been used in the experimental animal for bile duct reconstruction with apparently good results.^{1,7} Follow up of these experiments by liver function studies, cholangiography and pathologic examination indicates that Teflon may be a suitable substitute for the bile duct.

With this brief background, we had the opportunity to operate upon a patient, who had a cholecystectomy followed by a common duct stricture. An end-to-end anastomosis was performed six months following her first operation. The patient again developed a stricture and was again operated upon. A Teflon patch graft was applied in the common duct with good result.

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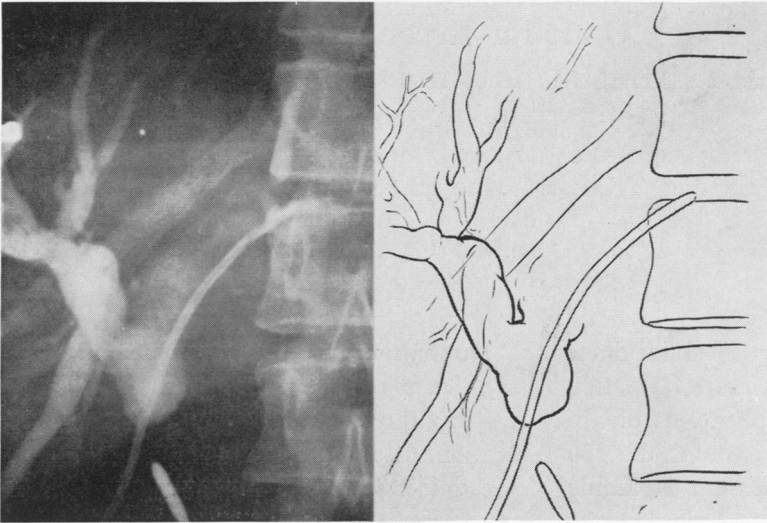


FIG. 1. Operative cholangiogram showing initial defect in bile duct. Note Bakes dilator in common duct, distal to defect and dilated intrahepatic biliary radicles injected via ureteral catheter.

Case Report

H. E. D., N.C.B.H. Unit No. 33 07 62. The patient is a 32-year-old white woman who in November 1960 underwent cholecystectomy for chronic cholecystitis and cholelithiasis at another hospital. One week postoperative she developed a subhepatic abscess which drained spontaneously large amounts of yellowish material. On December 9, 1960 she was re-operated upon and stones were removed from the common bile duct. Following this she did well, until one month later she developed pruritus, nausea, anorexia and jaundice with an 11-pound weight loss.

The patient was then referred to the North Carolina Baptist Hospital on March 22, 1961. Physical examination disclosed jaundice and tenderness to palpation in the right upper quadrant

of her abdomen (Table 1). Intravenous cholangiogram was performed on May 18, 1961. The biliary tract was not visualized and no calcified gallstones were identified.

On May 23, 1961 operation was done. Due to marked fibrous reaction the dissection was tedious. The proximal and distal ends of the common bile duct were identified, however. The proximal end was dilated and completely obstructed, as confirmed by roentgenograms taken at the time of operation (Fig. 1). A small stone and biliary sludge were removed from the proximal common bile duct.

Repair was accomplished by end-to-end anastomosis of the two portions of the common bile duct. The proximal limb of a No. 10 T-tube was placed through the anastomosis as a stent, and



FIG. 2. Operative photograph of completed Teflon patch graft with distal T-tube.

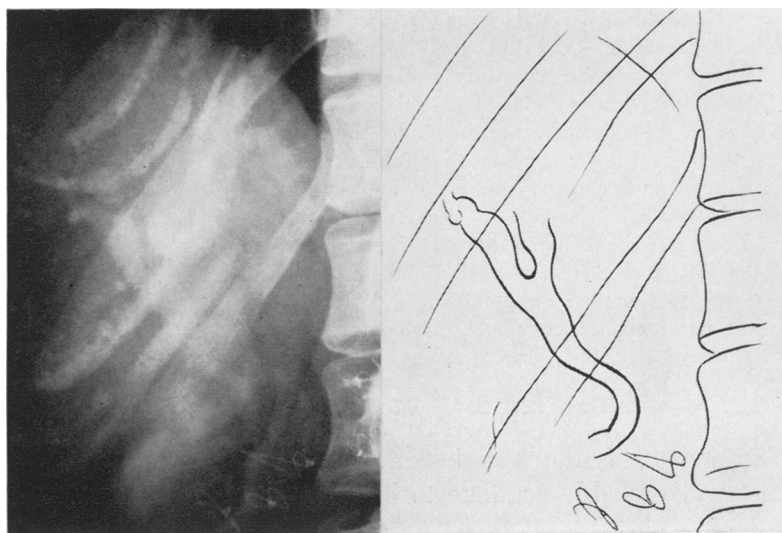
TABLE 1. *Laboratory Data*

Date	Hgb	WBC	Total Serum Protein	Albumin	Globulin	Alkaline Ph'tse	Ceph. Flocc.	Serum Bilirubin
5/17/61	13.3	7,000	6.9	3.7	3.2	44	1+	4.0
12/ 9/61	12.8	8,000	6.7	3.5	3.2	32	1+	2.1
8/15/62								0.2
11/26/62	10.9		7.3	3.9	3.4	3	1+	0.8
2/ 6/63	12.7		9.2	4.8	3.3	4	SGOT 20	0.7
11/23/63	12.9	6,000	8.3	4.9	3.4	4	SGOT 26	0.2

FIG. 3. T-tube cholangiogram 8 months after insertion of Teflon patch graft.



FIG. 4. Intravenous cholangiogram 13½ months after insertion of Teflon patch graft.



the long arm was brought out through a separate incision distal to the repair.

The T-tube was removed on August 23, 1961 when the cholangiogram showed ready passage of radiopaque material. No proximal dilatation of the biliary tract was present at that time.

The patient was re-admitted to the North Carolina Baptist Hospital on December 8, 1961, seven months later, because of jaundice, pruritus, dark urine and light colored stools for one month. Physical examination showed jaundice and numerous excoriations of the skin from scratching (Table 1). An intravenous cholangiogram did not show the biliary tree.

On December 14, 1961, the patient was re-operated upon through the old right subcostal incision. Numerous adhesions were lysed. There was dense scar tissue in the region of the porta hepatis. The common bile duct was strictured at the previous anastomosis. An operative cholangiogram showed the hepatic radicles to be more dilated than on the previous examination and there was no passage of radiopaque medium into the duodenum. After a Kocher maneuver was performed, a longitudinal incision was made in the second portion of the duodenum to expose the ampulla of Vater. A probe was inserted into the distal common bile duct which had been previously identified at the stricture and a longitudinal incision was made at this point. A second incision distal to the anastomosis was used for insertion of a No. 10 T-tube. The proximal limb was brought through the stricture and a diamond shaped piece of tightly-knitted Teflon, 32 mils thick, was sutured over it as a patch graft using continuous 5-0 silk. The T-tube was used for drainage as well as a stent.

The incision in the duodenum was closed transversely in two layers. Omentum was placed around the Teflon patch graft. The T-tube was brought out through a stab wound inferior to the abdominal incision.

Postoperatively the patient did well. On August 15, 1962, after T-tube cholangiogram showed ready passage of the contrast medium into the duodenum, the T-tube was removed (Table 1; Fig. 3). Intravenous cholangiogram on January 30, 1963 showed ready passage of the radiopaque material into the duodenum (Fig. 4). The diameter of the biliary duct was normal. Laboratory data were reported normal on February 6, 1963. The patient has remained completely asymptomatic as of January 31, 1964, approximately two years later.

Summary

Strictures of the extrahepatic biliary tract will probably continue to be a com-

plication of biliary tract surgery and the best results obtained by direct repair of the duct or anastomosis between the duct and the intestinal tract. In selected cases in which a suitable repair cannot be performed using autogenous tissue, a Teflon graft appears to be applicable. An apparently good long-term result is presented in this case report.

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