Modification of the Longmire Procedure

JOHN L. CAMERON, M.D., BOB W. GAYLER, M.D., DONALD P. HARRINGTON, M.D.

Two modifications of the Longmire procedure of intrahepatic cholangiojejunostomy are reported. The first involves the preoperative placement under fluoroscopic control of a large Teflon catheter in the distal left hepatic duct to facilitate the identification and isolation of the duct at the time of surgery. The second modification is the use of a transhepatic silastic biliary stent positioned by utilizing the Teflon® catheter. These modifications make the Longmire procedure technically much easier, and should help insure long-term success in both benign and malignant strictures. A successful case utilizing these modifications is reported.

From the Departments of Surgery and Radiology, The Johns Hopkins Medical Institutions, Baltimore, Maryland

THE OPERATIVE PROCEDURE of intrahepatic cholangiojejunostomy was first introduced by Longmire and Sanford in 1948.[3] This unique and innovative operation provides an alternative approach to the classic management of benign and malignant biliary strictures. Since the biliary-enteric connection in the Longmire procedure is established utilizing the distal left hepatic duct, the dissection and anastomosis are performed away from the hilum of the liver. Avoiding the porta hepatis is an advantage when dealing with benign strictures that have been repaired several times previously or when dealing with malignant strictures where the hilum may be completely replaced with tumor. Despite this potential advantage of the Longmire procedure, during the 30 years since its introduction it has been utilized only occasionally for benign strictures, and most surgeons feel it is too formidable for patients with malignant strictures. There are two main reasons for its underutilization. First, it is a difficult technical procedure. It requires localizing the left hepatic duct in the midst of the parenchyma of the lateral segment of the left lobe of the liver, a task that can be difficult and bloody. Secondly, after establishment of the biliary-enteric anastomosis, long-term patency often has not been achieved, with recurrent episodes of cholangitis and jaundice frequent. Two modifications of the Longmire procedure have been developed which make the operation technically easy, and should help insure long-term patency. These modifications are described, and a successful application reported.

Reprint requests: Dr. John L. Cameron, Department of Surgery, The Johns Hopkins Hospital, Baltimore, Maryland, 21205.

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Operative Procedure

The patient is first taken to the Cardiovascular Diagnostic Laboratory where a percutaneous transhepatic cholangiogram is performed using an anterior approach and utilizing a longdwell catheter (20 guage × 8 in. thin wall). The puncture is performed through a small stab wound under local anesthesia. Positioning of the catheter tip is done under fluoroscopic control and with small test injections of contrast material until the left hepatic duct has been entered. A standard stainless steel J type guidewire is passed through the catheter into the left hepatic duct and positioned in the most lateral and peripheral branch. The longdwell catheter is removed and a Teflon® introducer, capable of accommodating an 8 French catheter, is inserted over the guide wire through the abdominal wall, liver capsule and liver parenchyma. A tapered 8 French (diameter 2.7 mm) Teflon catheter is then passed through the introducer and over the guide wire to the farthest extent the duct will permit and wedged in this position. A cholangiogram is performed to confirm the position of the catheter in the left hepatic duct (Fig. 1). The catheter is secured with a skin stitch and the patient is then taken to the General Operating Room.

After general anesthesia has been induced, the patient's abdomen is opened through a bilateral subcostal bucket-handle incision. Any adhesions to the left lobe of the liver are divided and the lobe is mobilized. The midportion of the lateral segment of the left lobe is then divided. As described by Longmire and Sanford,[3] this is best done between two parallel rows of horizontal mattress sutures. The main left hepatic duct is easily and quickly identified by palpating the large Teflon catheter. The left hepatic duct is divided and the end of the catheter retrieved (Fig. 2). A silastic

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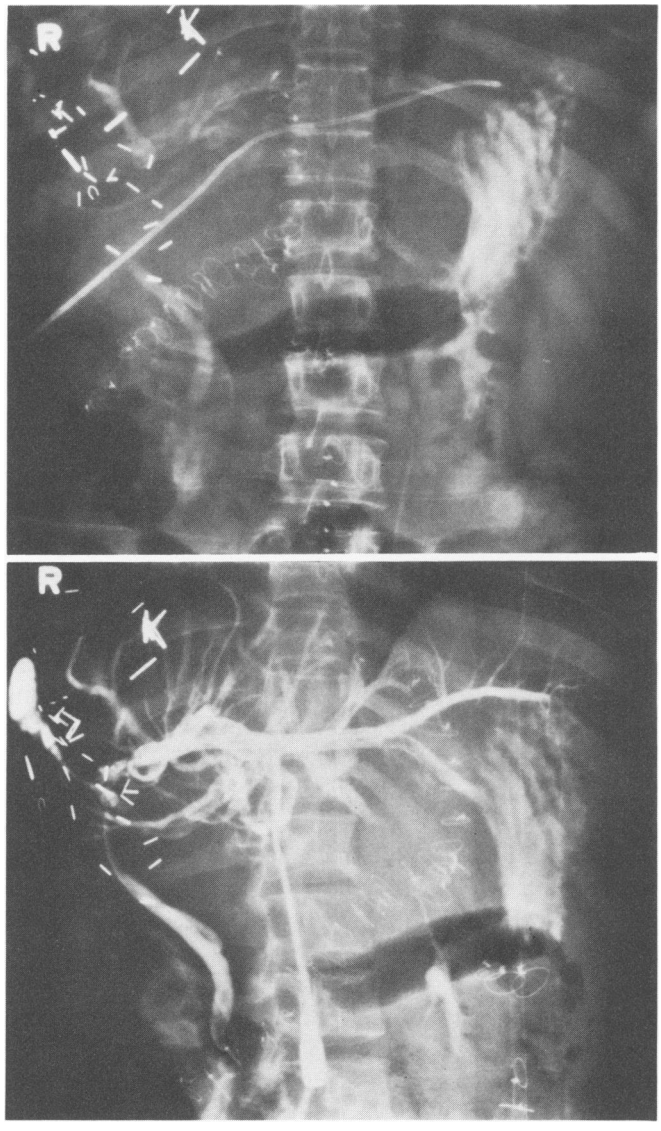

FIGS. 1a and b. (a, top) The teflon catheter can be seen positioned in the distal left hepatic duct. (b, bottom) A cholangiogram performed through the teflon catheter confirms its position in the most peripheral portion of the left hepatic duct.

transhepatic stent (Dow Corning) is then sutured to the end of the Teflon catheter. The silastic stent is drawn into the left hepatic duct, and out the anterior surface of the left hepatic lobe by forceful constant traction on the Teflon catheter at its entrance site into the liver (Fig. 3). A Roux-en-Y loop is then constructed distal to the Ligament of Treitz. The end of the loop is closed, and an end-to-side anastomosis is carried out between the left hepatic duct and the intestinal loop (Fig. 4). The silastic stent passes through the anastomosis into the Roux-en-Y loop for three or four inches. That portion of the silastic stent that resides in the jejunum and left hepatic duct contains numerous side holes. The Roux-en-Y loop is then tacked up to the resected surface of the liver. A large mattress suture is placed in the anterior surface of the left lobe of the liver at the exit site of the silastic tube. This end of the tube is then brought out through a stab wound in the anterior abdominal wall, and initially connected to a bile bag. Penrose drains are left to the anastomosis, and to the site where the silastic tube exits from the liver. Postoperatively once a cholangiogram has demonstrated no leak at the anastomosis or at the exit site in the liver, the tube is clamped. Thereafter, the silastic tube is irrigated twice daily by the patient with 20 ml of saline.

Case Report

K.Y., a 22-year-old woman was admitted to Hopkins for the third time in January, 1977 for repair of a traumatic biliary stricture. In April of 1976, this female jockey was thrown from her horse at Pimlico Race Trace and received blunt trauma to her abdomen. She was taken to a nearby hospital where laparotomy revealed a fractured right hepatic lobe. The right lobe of the liver was removed and after a stormy postoperative course the patient was discharged. Within a few weeks she developed jaundice, fever, and a biliary cutaneous fistula through her abdominal wound. An endoscopic retrograde cholangiogram (ERC) demonstrated a long, tortuous stricture of her left hepatic duct, and a fistula emanating from the stump of the resected right hepatic duct. She was referred to Hopkins for surgical repair. Her first admission to Hopkins was in September, 1976. Exploratory laparotomy revealed portal hypertension with multiple adhesions in her porta hepatis. After several hours of dissecting the hilum of her liver, this approach was abandoned because of the multiple vascular adhesions and massive blood loss. A short segment of the tenth rib was resected on the right and her biliary cutaneous fistula was established out laterally. The patient was then discharged. As an outpatient, her bilirubin remained in the region of 8 mg%, and occasionally when her biliary fistula stopped draining for a day or two, she developed a fever. She was admitted to Hopkins for the second time in

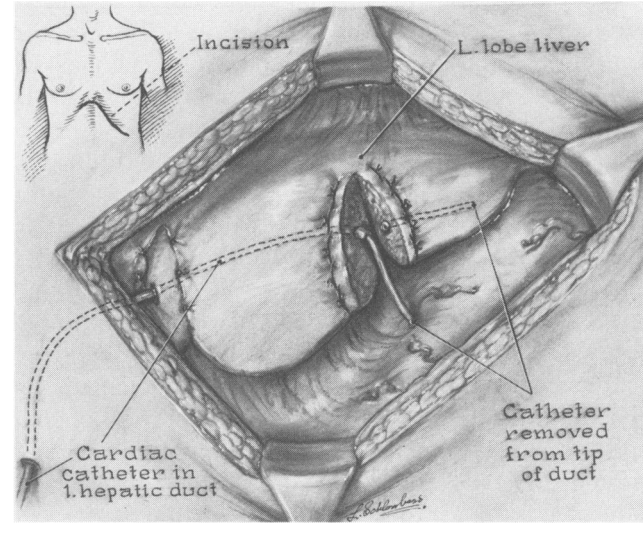

FIG. 2. The midportion of the lateral segment of the left lobe of the liver is divided between mattress sutures. The main left hepatic duct can quickly and easily be identified by palpating the Teflon catheter.

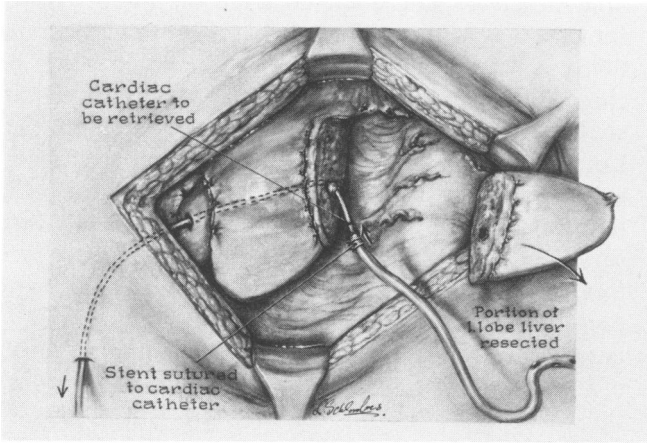

FIG. 3. A silastic stent with side holes (7 mm OD) is then sutured to the Teflon catheter and drawn up through the ductal system of the liver by constant forceful pressure on the teflon catheter.

December, 1976. A superior mesenteric arteriogram on the venous phase revealed a thrombosed portal vein. On esophagoscopy large esophageal varices were seen. ERC again revealed a long, tortuous left hepatic duct stricture with a fistula from the amputated right hepatic duct stump. The left lobe of the liver was markedly hypertrophied and the left hepatic duct was large and dilated. She was discharged to be readmitted in January, 1977 for a Longmire procedure. On readmission her bilirubin was 8.0 mg%, alkaline phosphatase 190 IU/L, SGOT 88 IU/L, SGPT 50 IU/L, and albumin 4.8 gm%. On the fourteenth of January she underwent a modified Longmire procedure as described. She remained in the hospital for several weeks following surgery because of a biliary leak at the site of the hepatico-jejunostomy. The leak eventually sealed, her silastic biliary stent was clamped, and she was discharged. She irrigates her tube twice a day with 20 ml of saline. Her tube was changed as an outpatient five months following surgery when it became partially occluded with biliary sludge and she began leaking bile at the silastic tube-cutaneous exit site. This was accomplished by introducing a guide wire under fluoroscopic control through the silastic tube into the Roux-en-Y loop, and then withdrawing the old silastic catheter. A new tube was then inserted over the guide wire and the guide wire removed. She is now asymptomatic 7 months following surgery, and her bilirubin is 0.8 mg%. Cholangiography demonstrates free drainage of the biliary tree into the Roux-en-Y loop (Fig. 5).

Discussion

The principle advantages and most attractive features of the Longmire procedure are technical. The operative approach allows one to work in an area relatively free of adhesions and removed from the site of previous surgery. Often patients with benign strictures will have undergone several prior repairs, and further dissection in the porta hepatis is not only exceedingly difficult, but also carries the risk of injury to the portal vein or hepatic artery. Furthermore, as pointed out by McArthur and Longmire,[5] portal hypertension will occasionally be present which adds further difficulty and risk to dissection at the hilum of the liver. The bile duct in the porta hepatis will also often be scarred and

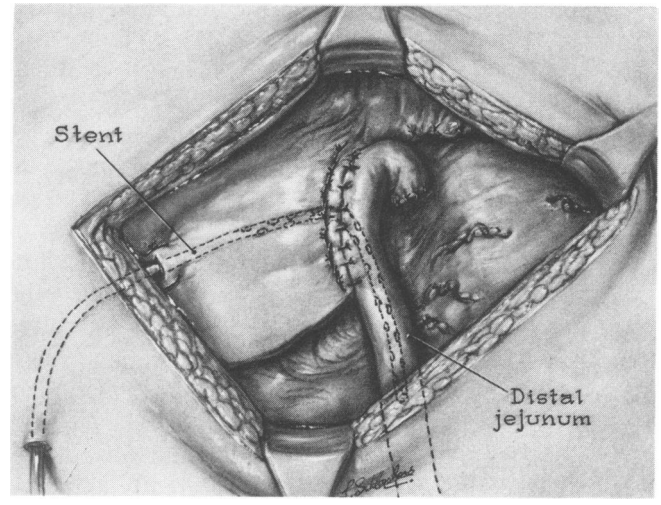

FIG. 4. The left hepatic duct is anastomosed to a Roux-en-Y jejunal loop, over the silastic stent. The loop is then tacked up to the resected surface of the liver. A mattress suture is placed in the anterior surface of the liver around the exit site of the silastic stent.

fibrotic from prior surgery, whereas with the Longmire procedure one works with bile duct that is relatively normal. Despite these advantages of intrahepatic cholangiojejunostomy, the operation has been used only infrequently. Dr. Longmire described its first successful application in 1948.[3] In a review article

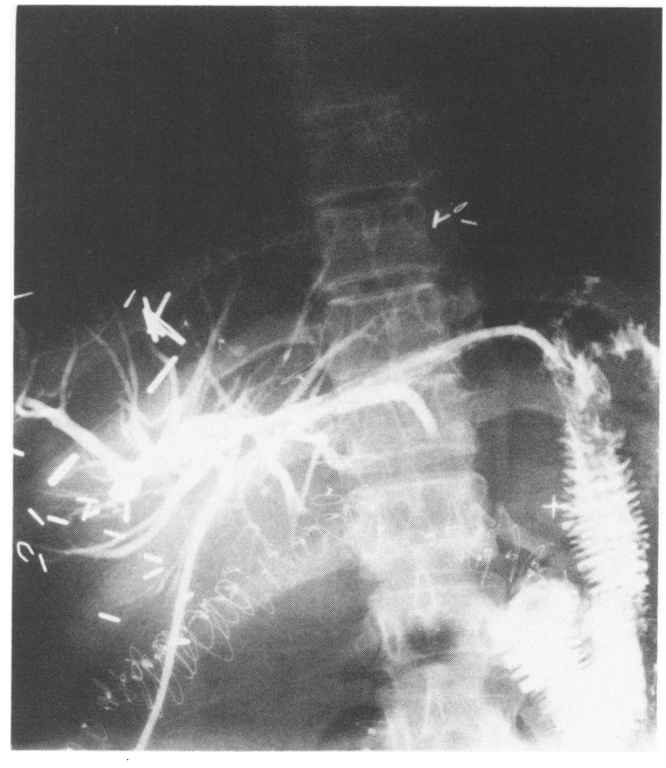

FIG. 5. A cholangiogram performed through the percutaneous silastic stent demonstrates excellent decompression of the biliary tree into the Roux-en-Y loop.

eight years later,[2] Dr. Longmire could find a total of only 19 such procedures in the world literature performed for benign disease, nine of which he had performed personally. The infrequent use of the operation can be attributed to the difficulty of isolating the left hepatic duct in the parenchyma of the liver, and to the inconsistent long-term results. In the series of 19 patients with benign strictures reviewed by Longmire and Lippman,[2] there was one hospital death, four late deaths three months to two and one half years following surgery, and at least three restrictures. Thirteen patients had been followed for an average of just over two years and remained alive, but many continued to have episodes of cholangitis.

The modifications reported here could correct both shortcomings of the procedure, and greatly extend its usage. The percutaneous placement of a large Teflon catheter in the periphery of the left hepatic duct preoperatively completely eliminates the tedious search for a large intraparenchymal biliary radical. In a very short time the catheter can be identified and retrieved at the time of surgery. The use of a transhepatic silastic biliary stent should help insure the long-term success of the procedure. These stents have the advantages of being silastic and relatively nonreactive, are firmly and securely anchored at the cutaneous exit site so they are virtually nondislodgable, provide continuing access for cholangiography, and can easily be changed on an outpatient basis when they become partially occluded with biliary sludge. These transhepatic biliary silastic stents have been used in benign hepatic duct strictures with excellent results.[1] For benign strictures they are left in for 12 months following surgery.

Although the Longmire procedure with the suggested modifications is ideally suited to difficult and recurrent benign biliary tract strictures, such cases fortunately are not common and its most frequent indication should be for malignant strictures. Often because of a large tumor mass in the hilum of the liver, patients with primary or secondary biliary tree malignancies will not be decompressible through the common or common hepatic duct. Decompression via the peripheral left hepatic duct, far from the tumor, should amost always be possible. It has been demonstrated that even if the bifurcation of the hepatic duct is occluded, and only the left lobe of the liver is drained, this should be adequate for normal hepatic function.[4] The Longmire procedure has been felt by most surgeons to be too extensive an operation to be used for palliation for malignant biliary tract obstruction. Only three series of patients with malignant biliary strictures treated with the Longmire procedure have been reported and they contain only seven,[7] nine,[8] and 11[6] patients. The hospital mortality in this combined group of 27 patients was 26%. With the technical modifications suggested in this report, the indications for intrahepatic cholangiojejunostomy should be extended to include many patients with malignant obstruction, with a more acceptable operative mortality and better long-term results.

Addendum

The patient is now 13 months postrepair and remains asymptomatic and with a normal serum bilirubin. Her silastic stent remains in place.

References

1. Cameron, J. L., Skinner, D. B. and Zuidema, G. D.: Long Term Transhepatic Intubation for Hilar Hepatic Duct Strictures. Ann. Surg., 183:488, 1976.
2. Longmire, W. P. and Lippman, H. N.: Intrahepatic Cholangiojejunostomy—An Operation for Biliary Obstruction. Surg. Clin. North Am., 36:849, 1956.
3. Longmire, W. P. and Sanford, M. C.: Intrahepatic Colangiojejunostomy with Partial Hepatectomy for Biliary Obstruction. Surgery, 24:264, 1948.
4. Longmire, W. P. and Tompkins, R. K.: Lesions of the Segmental and Lobar Hepatic Ducts. Ann. Surg., 182:478, 1975.
5. McArthur, M. S. and Longmire, W. P.: Further Indications for Intrahepatic Cholangiojejunostomy. Ann. Surg., 175: 190, 1972.
6. Ragins, H., Diamond, A. and Meng, C.: Intrahepatic Cholangiojejunostomy in the Management of Malignant Biliary Obstruction. Surg. Gynecol. Obstet. 136:27, 1973.
7. Seiro, V. and Hastbacka, J.: Left Lobe Hepatocholangiojejunostomy in Palliative Treatment of Malignant Biliary Obstruction. Acta Chir. Scand., 131:154, 1966.
8. Wülfing, D.: Probleme der Hepato-Enterostomie. Langenbecks Arch. Clir., 302:676, 1963.