

quickly occludes the abdominal cavity stoma site, minimizing this loss. Finally, in those patients who have large amounts of subcutaneous fat, we find that it is extremely useful to have some foresight in preparing the stoma.

## References

1. Lyerly HK, Mault JR. Laparoscopic ileostomy and colostomy. *Ann Surg* 1994; 219:317-322.
2. Khoo REH, Montrey J, Cohen MM. Laparoscopic loop ileostomy for temporary fecal diversion. *Dis Colon Rectum* 1993; 36:966-968.

H. KIM LYERLY, M.D.  
JAMES MAULT, M.D.  
Durham, North Carolina

Dear Editor:

We read with great interest the article, "The Incidence, Timing, and Management of Biliary Tract Complications After Orthotopic Liver Transplantation," by Greif et al.<sup>1</sup> Dr. Starzl and his associates are to be congratulated on their pioneering and consistent excellence in the field of liver transplantation. It is indeed disheartening that the rate of biliary strictures and anastomotic leakage is responsible for considerable morbidity, and we agree that extra effort is needed to improve the technical aspects of the reconstruction.

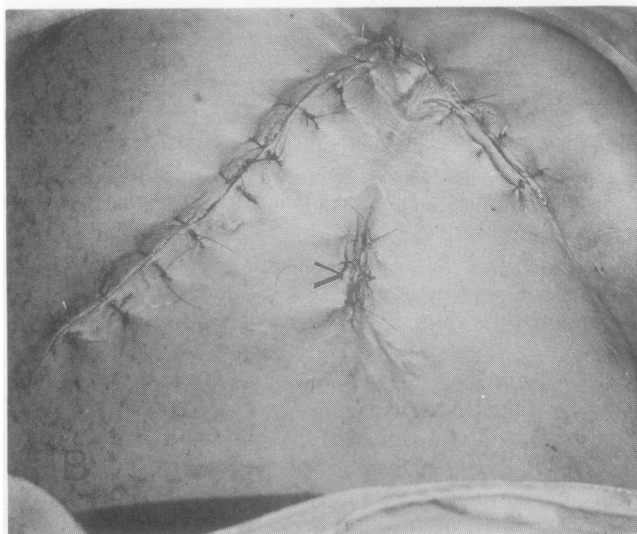
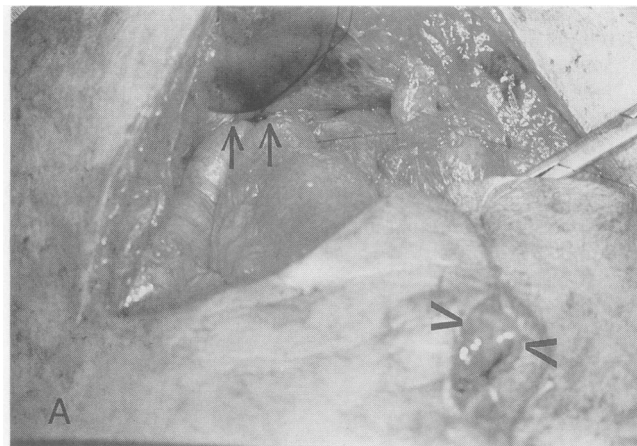
We would like to suggest a slight modification in the reconstruction, which may reduce the incidence of complications. The most common complications described are anastomotic strictures, leakage of bile from the anastomosis and the T-tube site, ampullary dysfunction, and biliary obstruction.

Considering that all cases of ampullary dysfunction were treated successfully by conversion to a Roux-en-Y choledochojejunostomy, we believe that all the reconstructions should be Roux-en-Y choledochojejunostomies. This form of reconstruction also is the basis of our suggestion, which, with a simple modification should make dealing with the complications relatively easier.

The Roux-en-Y choledochojejunostomy is carried out at least 10 to 15 cm distal to the closed end of the Roux loop, which is to be placed subcutaneously in the epigastrium using a separate 2.5-cm incision. The important step is to bring out this loop and retain it in the subcutaneous tissue by anchoring it to the linea alba with a few sutures (Fig. 1A). If a T tube is considered necessary, it should be brought out through this loop, using a separate stab incision, and the skin over the exteriorized loop is closed. No metal clips are used to identify this site, and it is obvious by the small scar. (Fig. 1B)

The advantages of this procedure begin with the solution of the T-tube problems. Because it is brought to the skin through the jejunum and not the peritoneal cavity, it need not be retained for lengthy periods, because a tract is not necessary. This will prevent leakage of bile into the peritoneal cavity once the tube is removed.

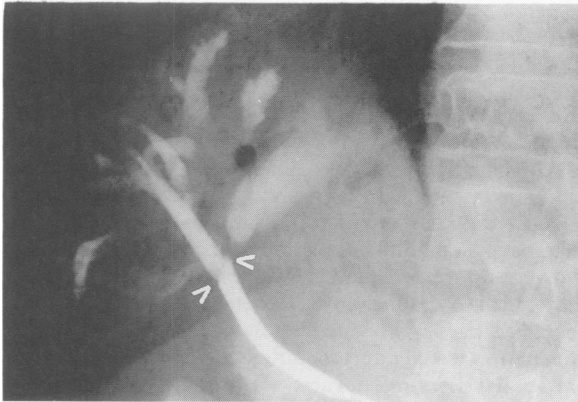
Cholangiography is possible even after the T tube is removed by simple puncture of the subcutaneous loop without sedation or local anesthesia. If an anastomotic leak is discovered, it can



**Figure 1.** (A) Perioperative photograph showing the closed end of the Roux-en-Y loop brought up subcutaneously through the linea alba (arrowheads). The hepaticojejunostomy also is seen (arrows). (B) Photograph after closure of the abdomen. The location of the access loop is indicated by the small vertical scar (arrowhead).

be treated by inserting a stent through the same loop without re-operation. If obstruction by stones, sludge, or casts is documented on cholangiography, clearance is possible with baskets and other steerable catheters. These manipulations can be carried out either percutaneously or by opening the loop and using the choledochoscope, under local anesthesia. An anastomotic stricture can be dilated using balloon dilators under fluoroscopy, repeatedly if necessary.

The rationale of this procedure is to provide a permanent means of simple access to the anastomosis and the entire biliary tree after a Roux-en-Y choledochojejunostomy. Cholangiography or choledochoscopy provides the diagnosis and the same access is used for treatment without surgery. This access is not associated with major procedure-related complications, such as hemobilia and septicemia, because it avoids the liver parenchyma, does not require mature tracts, and is free of indwelling catheters and devices.



**Figure 2.** Balloon dilator in the right ductal system threaded over a guide wire through the access loop. The area of narrowing is marked (arrowheads).

Several authors have reported the efficacy of this procedure for dilatation of strictures and removal of calculi in benign conditions, such as sclerosing cholangitis<sup>2-4</sup> and recurrent cholangitis with hepatolithiasis.<sup>5,6</sup> We also recently submitted our experience with cholangiography and successful dilatation of recurrent malignant stricture after subtotal resection of hilar cholangiocarcinoma (Fig. 2). Based on the aforementioned facts, we believe that with the addition of this modification to a standard Roux-en-Y choledochojejunostomy, centers performing liver transplants may be able to further reduce the incidence of biliary complications, with an improvement in survival and good quality life in their patients.

## References

1. Greif F, Bronsther OL, Van Thiel DH, et al. The incidence, timing, and management of biliary tract complications after orthotopic liver transplantation. *Ann Surg* 1994; 219:40-45.
2. Hutson DG, Russell E, Schiff E, et al. Balloon dilatation of biliary strictures through a choledochocutaneous fistula. *Ann Surg* 1984; 199:637-647.
3. Barker EM, Winkler M. Permanent access hepaticojejunostomy. *Br J Surg* 1984; 71:188-191.
4. Hunt DR, Travers PL. Long term biliary access by modified hepaticojejunostomy for high bile duct stricture. *Aust N Z J Surg* 1986; 56:113-116.
5. Fan ST, Mok F, Zheng SS, et al. Appraisal of hepaticocutaneous jejunostomy in the management of hepatolithiasis. *Am J Surg* 1993; 165:332-335.
6. Toufееq Khan TF, Raj SM, Visvanathan R. Spectrum of cholangitis

in a rural setting in North-eastern Peninsular Malaysia. *Trop Doct* 1993; 23:117-118.

T. F. TOUFEEQ KHAN, F.R.C.S.  
Y. Y. TAN, F.R.C.S.  
Kelantan and Pahang, Malaysia

June 23, 1994

Dear Editor:

We want to thank Drs. Khan and Tan for their comments regarding our article, "The Incidence, Timing, and Management of Biliary Tract Complications After Orthotopic Liver Transplantation." There may be some advantages to the biliary tract reconstruction that these authors recommend, but we believe that this approach is more appropriate for the management of patients with either calculi or tumors.

At this time, approximately one half of our biliary tract reconstructions are done using a choledochojejunostomy. Whether we should exteriorize the tip of this Roux loop is something that we can consider. There is an adherent ease in doing a duct-to-duct anastomosis that should not be ignored. Although there were slightly more complications after a duct-to-duct anastomosis compared with complications after a choledochojejunostomy, few of these complications were fatal. Fatal complications are more common with choledochojejunostomies.

The biliary tract anastomosis after orthotopic liver transplantation may still be the "Achilles heel" of this operation. We will continue to look for techniques that will improve our patient and graft survival. However, at this time, we do not feel it is necessary to completely abandon duct-to-duct reconstructions.

OSCAR L. BRONSTHER, M.D.  
FRANKLIN GREIF, M.D.  
DAVID H. VAN THIEL, M.D.  
ADRIAN CASAVILLA, M.D.  
SHUNZABURO IWATSUKI, M.D.  
ANDREAS TZAKIS, M.D.  
SATURO TODO, M.D.  
JOHN FUNG, M.D.  
THOMAS E. STARZL, M.D.  
Pittsburgh, Pennsylvania