1002

OBSTRUCTING MUCOCELE OF THE CYSTIC DUCT AFTER TRANSPLANTATION OF THE LIVER

Baburao Koneru, M.D., *Newark, New Jersey,* Albert B. Zajko, M.D., Linda Sher, M.D., J. Wallis Marsh, M.D., Andreas G. Tzakis, M.D., Shunzaburo Iwatsuki, M.D., *and* Thomas E. Starzl, M.D., PH.D., F.A.C.S., *Pittsburgh, Pennsylvania*

Reprint from SURGERY, *Gynecology & Obstetrics,* May, 1989, Vol. 168, 394–396

OBSTRUCTING MUCOCELE OF THE CYSTIC DUCT AFTER TRANSPLANTATION OF THE LIVER

Baburao Koneru, M.D., *Newark, New Jersey,* Albert B. Zajko, M.D., Linda Sher, M.D., J. Wallis Marsh, M.D., Andreas G. Tzakis, M.D., Shunzaburo Iwatsuki, M.D., *and* Thomas E. Starzl, M.D., PH.D., F.A.C.S., *Pittsburgh, Pennsylvania*

A tension mucocele was created in three hepatic homografts by ligating a low-lying cystic duct during transplant cholecystectomy and by incorporating its outflow end into the anastomosis of the common hepatic duct to the recipient common duct or Roux limb of jejunum. The consequent complication of obstruction of the biliary tract that necessitated reoperation and excision of the mucocele in all three patients can be avoided by the simple expedient of completely removing the cystic duct when feasible or providing egress to the secretion of the cystic duct as described.

THE LEVEL of the junction of the cystic and common hepatic ducts is variable. In about 20 per cent of the instances, the cystic duct commonly descends for a considerable distance either along the right side or directly posterior to the common duct before emptying into the latter structure (1, 2). When a liver with this anomaly is removed for transplantation, the surgeon sees a double lumen. A common way of dealing with this situation after performing homograft cholecystectomy has been to leave a long remnant of the cystic duct and to incorporate the orifice of the presenting cystic duct into the suture line of a hepaticocholedochostomy or a hepaticojejunostomy.

Such a procedure creates a blind cystic duct remnant and a potential mucocele. In this study, we report three instances in which such a mucocele obstructed the common hepatic duct of the homograft, necessitating operative revision of the reconstruction of the biliary tract. This complication is preventable.

METHODS

Patient material. The three patients were 45, 63 and 50 years old at the time of the transplantations, three years, two weeks and three weeks previous to the diagnosis of the complication. Recurrent bouts of cholangitis prompted percutaneous cholangiography in one patient. In the remaining two patients, bilirubin elevations were the indication for cholangiography. Typical studies are shown in Figures 1 and 2, with evidence of external compression and a string sign of the homograft distal bile duct. In retrospect, all of the patients could have had a correct diagnosis made from these roentgenographic findings, but in prospect, the diagnosis was suspected in none.

Operative procedure. Through an appropriate plane, the homograft duct was dissected free. The mucocele was excised. Excision necessitated resection of the distal part of the common hepatic duct in all of the three patients. Hepaticojejunostomy to a Roux limb was reperformed upon two patients who had undergone this operation primarily, and in the third patient, a previous hepaticocholedochostomy was converted to hepaticojejunostomy using a fresh Roux limb. Internal plastic stents were placed across the anastomoses. The procedures were easy, and there were no serious intraoperative complications.

RESULTS

Recovery was complete in two of the three patients. Bilirubin levels that were 3.2 and 4.5 milligrams per deciliter in those two patients fell to normal levels after six and seven days.

The only complication occurred in one patient. This patient had a leak of the biliary tract develop postoperatively that required further revision of the hepaticojejunostomy. After this, an anastomotic stricture developed and was managed by percutaneous balloon dilation. Currently, the patient is well with normal liver functions and with no biliary drainage catheters.

DISCUSSION

The anomaly of a double-barrelled common duct and cystic duct combination was observed in

From the Departments of Surgery, Radiology and the University Health Center of Pittsburgh, the University of Pittsburgh.

Supported by Research Grants from the Veterans Administration and Project Grant No. Am 29961 from the National Institutes of Health, Bethesda, Maryland.

Reprint requests: Dr. Baburao Koneru, University Hospital, 150 Bergen Street, E325, Newark, New Jersey, 07103.

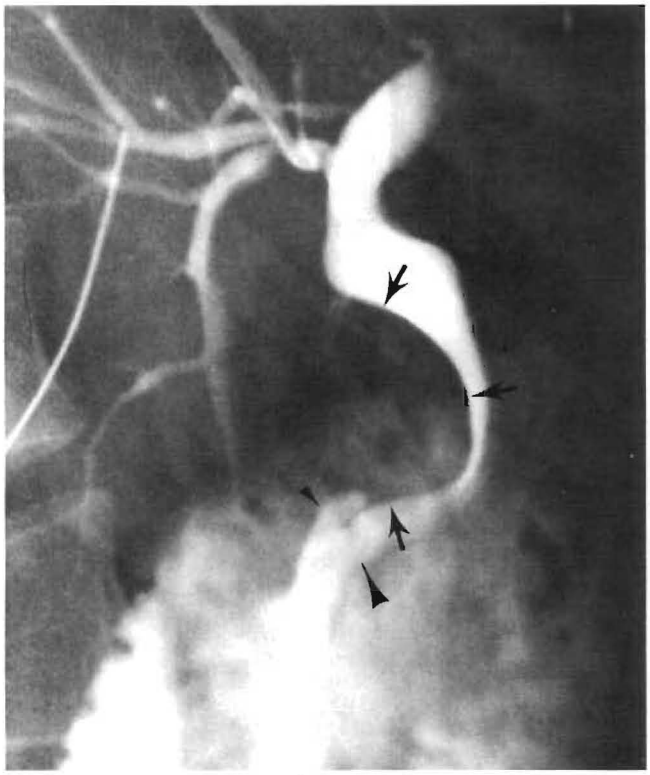


FIG. 1

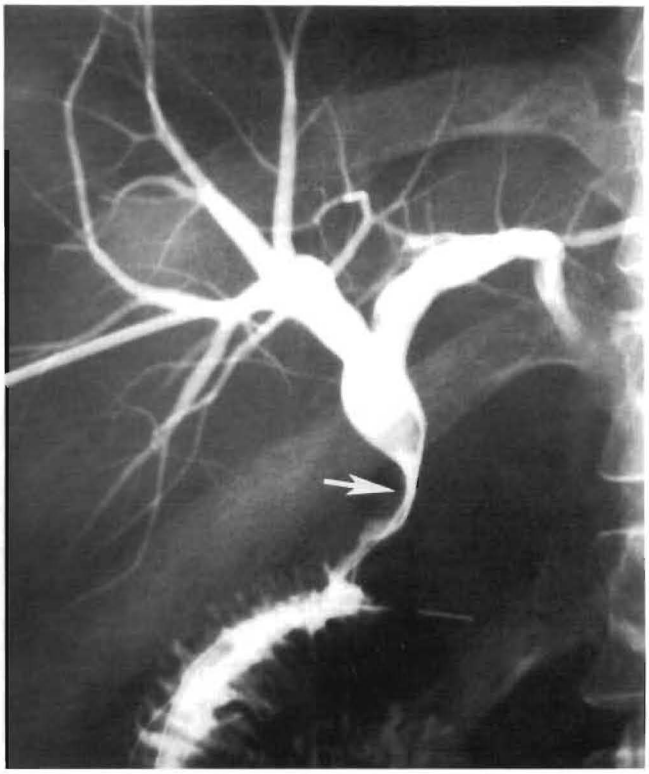
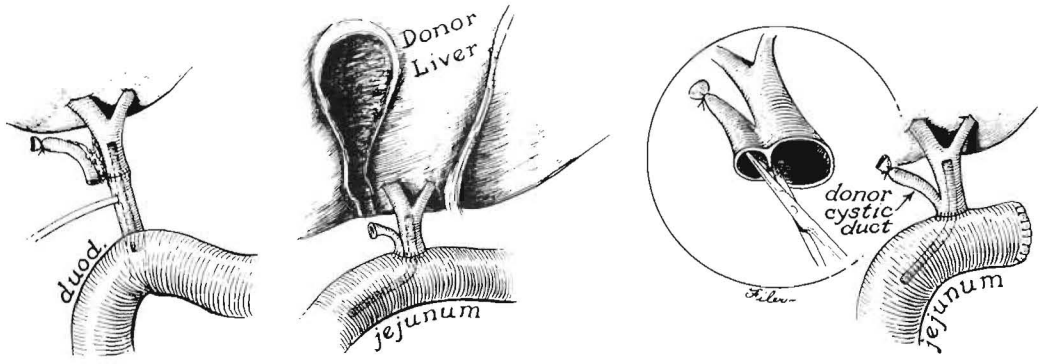


FIG. 2

FIG. 1. Extrinsic mass affect on homograft common hepatic duct (arrows) is demonstrated on transhepatic cholangiogram (lateral view). The hepaticocholedochostomy (large arrowhead) is patent. The remnant of the donor cystic duct is not identified; the remnant of the recipient cystic duct is filled (small arrowhead).

FIG. 2. Extrinsic mass affect on homograft distal common hepatic duct and hepaticojejunostomy (arrow) demonstrated on catheter cholangiogram after transhepatic drainage. The remnant of the donor cystic duct is not identified.

hepatic homografts more than 20 years ago (3). In that era, a commonly used method of reconstruction of the biliary tract with hepatic transplantation was cholecystoduodenostomy, and two patients died when a ligature closing the transected common duct end also closed off the cystic duct, which was expected to allow bile outflow through the gallbladder and into the duodenum. There was virtually little notice taken in the literature of the early 1960s or before this time about this anomaly (4). Since then, articles have been written in the English language describing this anatomic variation (1, 2), usually pointing out that it cannot be reliably recognized during cholecystec-



a b c

FIG. 3. a, b and c, Illustrations of various techniques to prevent a blind cystic duct remnant.

tomy except with operative cholangiography or else warning that the anomaly predisposes to retention of a long remnant of the cystic duct. In relation to hepatic transplantation, Krom and others briefly mentioned in one report (5) a patient having obstruction of the biliary tract with operative findings similar to ours.

When a transected cystic duct is encountered during preparation of a liver for transplantation, the cystic duct should be excised completely even if it is close to the common duct. Usually, there is not a true transmural fusion, and separation is possible (Fig. 3a). If not, as much of the bile duct as necessary must be sacrificed in preference to creating the blind mucosa-lined sac that caused obstruction in the three patients we studied.

If excision of the cystic duct is deemed too dangerous, its central end can be incorporated in the anastomotic suture line, but the other end must not be ligated, as illustrated in Figure 3b). Another alternative in the few patients manifesting true transmural fusion is to excise the common septum between the cystic and common hepatic ducts for a short distance and then perform the biliary anastomosis (Fig. 3c).

SUMMARY

Tension mucocele of the remnant of the cystic duct is another complication of the biliary tract that occurs after orthotopic hepatic transplantation. It is less common than bile leak and obstruction caused by strictures. Tension mucocele of the remnant is preventable in a given allograft anatomic situation either by completely excising the remnant of the cystic duct or after one of the other steps outlined.

REFERENCES

1. Lindner, H. H., and Green, R. B. Embryology and surgical anatomy of extrahepatic biliary tract. Surg. Clin. North. Am., 1964, 44: 1273-1285.
2. Kune, G. A. The influence of structure and function in the surgery of the biliary tract. Ann. R. Coll. Surg., Eng., 1970, 47: 78-91.
3. Starzl, T. E. Intra and postoperative complications and care. In: Experience in Hepatic Transplantation. With the assistance of C. W. Putnam. Pp. 144-158. Philadelphia: W. B. Saunders Co., 1969.
4. Flint, E. R. Abnormaltities of the right hepatic, cystic, and gastroduodenal arteries and of the bile ducts. Br. J. Surg., 1922, 10: 509-519.
5. Krom, R. A. F., Kingma, L. M., Haagsma, E. B., and others. Choledochocholedochostomy, a relatively safe procedure in orthotopic liver transplantation. Surgery, 1985, 97: 552-556.