Is Microsurgical Technique Useful in Biliary Reconstruction of Living Donor Liver Transplantation?

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ABSTRACT

Introduction. Biliary reconstruction remains the “Achilles’ heel” of living donor liver transplantation (LDLT). In the last decades, the technical aspects of biliary reconstruction have been debated for their impact on biliary complications in LDLT. A microsurgical technique in biliary reconstruction is more attractive.

Patients and methods. From December 2010 to June 2011, 15 primary LDLTs underwent duct-to-duct biliary reconstruction using a microscopic technique. External stents were inserted in all patients. All procedures were performed under a microscope by a single transplant microsurgeon.

Results. The time consumed for bile duct reconstruction using the microscopic technique was 35 minutes. There were 8 grafts with a single bile duct orifice and seven with two orifices. The average duct size was 3 mm in patients with two orifices and 5 mm in those with a single orifice. There was no bile leak or biliary stricture associated with the biliary reconstruction over a median 5-month follow-up. There were two cases of bile leakage from the cut hepatic surface.

Conclusion. The microscopic technique reduced early biliary complications. However, further technical advances are needed to decrease the time consumptions for the procedure.

Despite refinements in surgical techniques for living donor liver transplantation (LDLT), biliary complications are still associated with significant morbidity and mortality. The overall biliary complication rate after duct-to-duct reconstruction of the bile duct in LDLT remains high, ranging from 14% to 67%.

The higher incidence of biliary complications in LDLT is believed to be related to the size of the graft bile duct, the anastomotic technique, and the vascular supply to both the donor and recipient bile ducts. So it is significant to prepare the bile duct optimally and to apply a safe suture technique for a duct-to-duct reconstruction of small bile ducts.

In the last decades, the technical aspects of biliary reconstruction have been debated for their impact on biliary complications in LDLT. A microsurgical technique in biliary reconstruction is attractive. Its first introduction to LDLT for both adult and pediatric recipients was reported by Yan et al. After that, good results have been reported using routine microscopic reconstruction, especially for grafts with small ducts. Herein we have introduced our microsurgical reconstruction of bile ducts to evaluate its feasibility and advantages.

PATIENTS AND METHODS

From December 2010 to June 2011, we performed 31 LDLTs, including three dual grafts and three ABO-incompatible LDLTs. Microsurgical biliary reconstruction was attempted in 15 grafts by a single transplant surgeon. The biliary anastomosis was performed using 7-0 monofilament with an interrupted suture technique. When the duct size was above 5 mm, a continuous suture technique used 6-0 polydioxanone only on the posterior wall. External stents were routinely used in all cases (Fig 1).

The recipients consisted of eight men and seven women of mean age 45.7 years (range 35–61 yrs). The indications for LDLT were hepatitis B-related hepatocellular carcinoma and liver cirrhosis (n = 11), alcoholic liver cirrhosis (n = 4). The median follow-up was 5 months (range 2–8).

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RESULTS

There were eight grafts with single and seven with two bile duct orifices. The median diameter of the anastomosed bile ducts was 3 mm (range = 2–4 mm) in patients with two and 5 mm (range = 3–10 mm) in patients with a single orifice.

Duct-to-duct anastomosis in seven grafts with two orifices was completed by three techniques. In three cases of two separate ducts, one anastomosis was accomplished after ductoplasty. In another two cases, we performed two separate anastomoses, while in the other two cases, two separate ducts were anastomosed to single large recipient ducts.

The time required for bile duct reconstruction using the microsurgical technique was a median of 35 minutes (range = 30–55 minutes).

Biliary complications were not observed to be associated with microsurgical biliary reconstruction; however, two cases displayed bile leakage from the cut surface of the graft.

DISCUSSION

Biliary complications, including stricture and leakage, have been major problems using partial liver grafts. Also, bile leakage has been suggested to be one of the most important factor causing biliary strictures. A suboptimal surgical technique may lead to late biliary strictures because of ischemia or fibrosis. However, the optimal technique for biliary reconstruction in LDLT remains controversial.

The feasibility of microsurgical bile duct reconstruction was established in an experimental animal study. Using an operative microscope in the setting of a small hepatic duct (≤2 mm in diameter) reconstructed by hepaticojejunostomy, Yan et al showed good results. Moreover, Lin et al reported that routine microsurgical reconstruction could reduce the risk of early biliary anastomotic complications by 2.5-fold among LDLT. However, the use of a microscope in biliary reconstruction may be more difficult because of the troublesome bile drainage and bleeding from the duct edges as well as the reduced flexibility of bile duct manipulation.

In our institute, biliary reconstruction is performed by a transplant surgeon experienced in microscopic hepatic artery reconstruction. Even though the reconstruction time was still long, we have made greater efforts to decrease it by using a continuous suture on the posterior wall for anastomoses of ducts ≥5 mm.
To secure good vascular integrity, the inner epithelial layer of the recipient bile duct has been used for the anastomosis in duct-to-duct reconstruction. To reduce the incidence of biliary complications, we employ 7-0 monofilament suture and a small external stent routinely for anastomoses of ducts ≤5 mm.

In conclusion, there was no early biliary complication related to the microsurgical reconstruction technique. Accordingly, these delicate manipulations using a microscope improve the outcomes of biliary reconstruction, especially among grafts with small ducts or multiple orifices. However, further technical advances are needed to decrease the time consumption.

REFERENCES