Telescopic Biliary Reconstruction in Patients Undergoing Liver Transplantation With 1-Year Follow-up

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ABSTRACT

Background. Biliary complications are important during liver transplantation because of their effect on recipient and graft survival, incidence, and the long treatment period. These complications are associated with 50% morbidity and 30% mortality rates in recent studies. One of the most important reasons for biliary anastomosis complications is arterial ischemia. We present the results of our telescopic biliary anastomosis technique performed on the mucosa of the main biliary duct.

Patients and Methods. Fifty-six cases of telescopic biliary reconstruction were performed in 203 patients during 2015. Fifty cases and 52 patients who underwent standard reconstruction were chosen and compared. All patients had been scanned retrospectively. Statistical analyses were conducted with χ^2 and Mann-Whitney U tests for the complications that occurred during the first 3 months. A P value $<.05$ was considered significant.

Results. No clinical or demographic differences were detected between the groups. About 90% of both groups were living donor liver transplantation cases. Five (10%) anastomotic leaks occurred in telescopic reconstruction group (n = 50), and 13 (25%) occurred in the standard reconstruction group (n = 52; $P < .05$).

Conclusion. The arterial blood supply is better if the biliary anastomosis is made on the mucosal side of the main biliary duct. Early period anastomotic leaks may decrease significantly.

BILIARY complications (BCs) are one of the most significant sequelae of liver transplantation (LT). BCs are frequent, compromise recipient and graft survival, and require extensive treatment. Recent studies have shown that BCs are associated with 50% morbidity and 30% mortality [1–5]. New immunosuppressive regimens and surgical techniques have reduced BC rates [6–9].

Biliary strictures and biliary leaks are the most significant complications. Nonanastomotic strictures, dysfunction of the sphincter of Oddi, hemobilia, casts, and stones are other complications [9]. These complications are attributable to various causes, the most important of which are the reconstruction technique used, hepatic arterial complications, the number of biliary ducts grafted, the type of LT, and chronic rejection. Various treatment options are available. In the past, surgery was common, but today endoscopic and percutaneous interventions are the principal initial treatments [5,7,9–12].

Despite advances in reconstruction techniques, BC rates remain at 10% to 40%, especially after cadaveric liver transplantation (CLT) [13,14]. Asian countries, including ours, have relatively few cadaveric donors, and living donor liver transplantation (LDLT) is much more common [15–19]. This is also the case in our center.

Several factors cause BC after LDLT. The most important is the presence of multiple narrow bile ducts in the graft

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liver [18]. Also, a low arterial blood supply to the side of biliary anastomosis may cause BC.

We present the biliary mucosal eversion and anastomosis technique, termed "telescopic biliary reconstruction" (TBR), that we use during LT, with 1-year follow-up data.

PATIENTS AND METHODS

In 2015, 203 LTs were performed at the Institute of Liver Transplantation of Inonu University and 56 patients underwent TBR. The control group contained 56 patients who underwent standard biliary reconstruction (SBR). Control patients were those presenting in the same interval, matched as much as possible by transplant type and age. All data were collected retrospectively.

Patients developing postoperative arterial thrombosis or aneurysms were excluded. Finally, 50 TBR patients (group 1) and 52 SBR patients (group 2) were evaluated. Seventy-four of the 102 were male patients and 28 were female patients. Mean patient age was 45.5 ± 16.2 years, and the mean Model for End-Stage Liver Disease (MELD) score 15.75 ± 8.1. Eighty-two patients (80.4%) underwent right-lobe LDLT, 9 (8.8%) left-lobe plus segment 2-3 LDLT, and 11 (10.8%) CLT (Table 1).

In group 1, the recipient bile duct was everted and the posterior biliary duct wall of the graft continuously sutured, with 5-0 or 6-0 Prolene (Ethicon, United States), to a 5-mm-wide region of the inner mucosa of the posterior wall of the recipient bile duct (Fig 1). The anterior wall was similarly sutured to a 5-mm-wide region of the anterior inner mucosal side of the recipient.

In group 2, the graft posterior duct wall was continuously sutured to the posterior side of the recipient biliary duct wall with 5-0 or 6-0 Prolene. The anterior wall was similarly sutured to the recipient bile duct anterior wall.

Magnetic resonance cholangiography (MRCP) and multislice dynamic liver tomography were performed preoperatively on all donors. Intraoperative cholangiography was performed on all living donors. Recipients who underwent catheterization of cystic ducts were subjected to cholangiography on postoperative day 10. If catheterization was impossible, MRCP was performed postoperatively. Patients with narrow cystic ducts, or in whom the duct lay close to the duodenum, were not suitable for catheterization. In such cases, either the duct was not catheterized or a stent was inserted. Patients were postoperatively evaluated with MRCP, multislice dynamic liver tomography, endoscopic retrograde cholangiopancreatography, percutaneous transluminal cholangiography, and measurement of intra-abdominal tube outflow.

Table 1. Clinical and Demographic Parameters of the Patients

Parameter	Standard Reconstruction (n = 52)	Telescopic Reconstruction (n = 50)	*P* Value
Age	46.7 (±17.4)	46.8 (±14.9)	NS*
Sex			
Female (n)	11 (21%)	17 (34%)	NS
Male (n)	41 (79%)	33 (66%)	NS
MELD score	15.5 (±8.0)	16 (±8.2)	NS
Graft bile duct (n)			
1	23	26	NS
2	26	22	NS
3	3	2	NS
Operation time (min)	515 (±97)	529 (±105)	NS
Transplant type			
Right lobe LDLT	42	41	NS
Left lobe LDLT	4	4	NS
CLT	6	5	NS
Ischemia time			
LDLT (min)	212 (±41.3)	202 (±66.5)	NS
CLT (min)	532 (±30.9)	500 (±135.8)	NS
Follow-up period (d)	226 (±87.6)	232 (±94.6)	NS

Abbreviations: NS, not significant; CLT: cadaveric liver transplantation; LDLT, living donor liver transplantation; MELD, Model for End-stage Liver Disease.

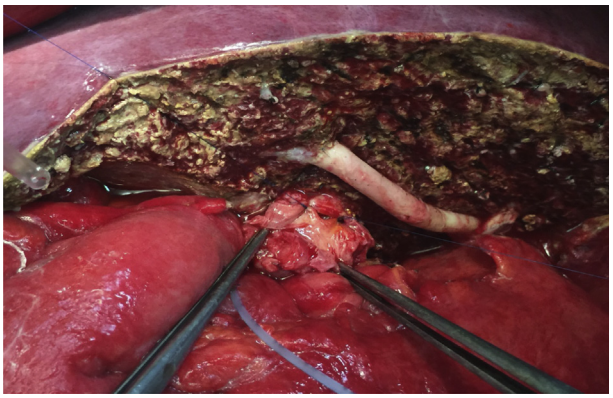

Fig 1. An everted recipient choledoc in one of study cases.

Upon radiological screening, those with surface leaks but intact bile duct anastomoses were not considered to exhibit leakage. Anastomotic stenosis was stenosis at the side of the anastomosis, evident upon cholangiography or MRCP, combined with increased levels of liver functional markers (gamma-glutamyl peptidase, total bilirubin, and alkaline phosphatase), and a need for endoscopic retrograde cholangiopancreatography and percutaneous transluminal cholangiography.

Immunosuppression featured postoperative tacrolimus, mycophenolate mofetil, and steroids. The mean follow-up periods were 226 and 232 days for groups 1 and 2, respectively (90 to 425 days for all patients). Those with both anastomotic stenosis and leakage were treated for both complications but were considered to have a single complication.

We compared the groups in terms of biliary anastomotic complications (BACs) using the Fischer χ^2 and the Mann-Whitney *U* test. A *P* value <.05 was considered significant.

RESULTS

We found no difference between the 2 groups in terms of demographic data (Table 1). In group 1, the mean age was 46.8 ± 14.9 years. Thirty-three of the 50 were male patients and 17 were female patients. Forty-one underwent right-lobe LDLT, 5 CLT, 3 segment 2-3 LDLT, and 1 segment 2-3-4 LDLT. The mean operative time was 529 ± 105 minutes. The total ischemia time was 202 ± 66.5 minutes for LDLT and 500 ± 135 minutes for CLT.

In group 2, the mean age was 46.7 ± 17.4 years. Forty-one of the 52 were male patients and 11 were female patients. Forty-two underwent right-lobe LDLT, 6 CLT, 3 segment 2-3 LDLT, and 1 segment 2-3-4 LDLT. Mean operative time was 515 ± 97.0 minutes. Total ischemia time was 212 ± 41.3 minutes for LDLT and 532 ± 30.9 minutes for CLT. Of