

B. H. Ferraz-Neto
D. F. Mirza
B. K. Gunson
T. Ismail
A. D. Mayer
J. A. C. Buckels
P. McMaster

Bile duct splintage in liver transplantation: is it necessary?

B. H. Ferraz-Neto · D. F. Mirza ·
B. K. Gunson · T. Ismail · A. Mayer ·
J. A. C. Buckels · P. McMaster (✉)
The Liver Unit, Queen Elizabeth Hospital,
Edgbaston, Birmingham B15 2TH, UK

Abstract The choledochochole-
dochal (duct-duct, D-D) anastomo-
sis in orthotopic liver transplanta-
tion (OLT) is usually splinted by a
T-tube to facilitate easy cholangiog-
raphy, monitor bile quality and al-
low biliary decompression. T-tubes,
however, are a focus for sepsis and
sludge deposition, and their removal
may result in bile leakage. From
January 1993 to December 1994, 199
consecutive adult OLTs in 183 pa-
tients (median age 50 years, range
16–69 years, 118 females) with a D-
D anastomosis were studied pro-
spectively with a median follow-up
of 16 (3–27) months. Of the 199
OLTs, 110 had an 8 Fr T-tube

(group 1) and 89 had no T-tube
(group 2). The two groups were
similar for indication, preservation
solution, median cold and warm is-
chaemia times and early graft func-
tion parameters. Biliary complica-
tions developed in 26/110 patients,
including 10 with bile leaks on T-
tube removal in group 1 compared
to 10/89 biliary complications in
group 2 ($P = 0.024$). The use of T-
tubes is associated with increased
morbidity and their routine use
should be discontinued.

Key words Biliary complications ·
Liver transplantation · Surgical
technique

Introduction

Despite improvements in preservation techniques, bile duct complications continue to be a source of significant posttransplant morbidity, with an incidence ranging from 5 to 25% [1–4]. Choledochocholedochostomy is the preferred method of biliary reconstruction in orthotopic liver transplantation (OLT) in cases where the recipient common duct is not diseased. Usually this anastomosis is splinted by means of a T-tube, introduced via the recipient duct. The use of a T-tube facilitates easy cholangiography during times of graft dysfunction, achieves biliary decompression during the early postoperative phase and enables monitoring of bile quality. T-tubes, however, act as foreign bodies, predisposing to biliary sludging, and provide a potential route for infection. External bile drainage affects absorption of oral cyclosporin. In addition, T-tube removal is associated with a risk of bile leakage. Because of this increased

morbidity, many transplant units have questioned the use of T-tubes. The aim of this study was to analyse the incidence of biliary complications in all adult patients undergoing OLT over a 2-year period with a duct-duct (D-D) anastomosis with or without a T-tube.

Patients and methods

From January 1993 to December 1994, 199 consecutive OLTs with a choledochocholedochal anastomosis were carried out in 183 adult recipients (118 females, 81 males). The median age was 50 years (range 16–69 years), and the median follow-up was 16 months (range 3–27 months). In 110 OLTs the choledochocholedochostomy (D-D) was splinted with an 8 Fr T-tube, introduced via the recipient duct (group 1; D-D with T-tube). In 89 patients the D-D anastomosis was not splinted (group 2; D-D no T-tube). All biliary anastomoses were sutured with a continuous 5/0 PDS suture. The two groups were comparable for indication (Table 1), preservation solution used, median cold and warm ischaemic times and early graft function parameters.

Results

Of the 199 OLTs studied, biliary complications developed in 36. Of 110 patients with a T-tube, 26 (23.6 %) developed a biliary complication, compared with 10 of 89 patients (11.2 %) without a T-tube ($P < 0.05$; Table 2). Bile leakage after T-tube removal was the most frequent complication observed (10 of 26). Five patients were managed conservatively, and four were treated with nonsurgical intervention (one percutaneous pigtail drain, one ERC with stent, two ERC with stent and pigtail catheter drainage). One patient underwent a laparotomy for biliary peritonitis, and died 28 days postoperatively due to sepsis and multiorgan failure. When patients with leaks following T-tube removal were excluded from the analysis, the difference in the incidence of biliary complications between the two groups was not statistically significant. Five and six patients in group 1 (with T-tube) and group 2 (without T-tube), respectively, underwent biliary reconstruction. Two patients with bile leakage and associated hepatic artery thrombosis, both in group 1, underwent retransplantation. The management of the biliary complications is listed in Table 3.

Discussion

The development of biliary complications after liver transplantation is related to several factors: technical reasons, preservation injury, arterial inflow, rejection and the use of stents [1–4]. The wide variation in rates of biliary complications may be attributed to the use of different classification methods for bile duct complications. This series included all possible biliary problems, including minor bile leaks and abnormalities visualized on routine protocol cholangiography.

The overall incidence of biliary complications was higher in the group with T-tubes, and this was due to the high incidence of leaks following T-tube removal. Most of these patients were managed without surgery, although the one death due to biliary complications was following surgical drainage of an infected bile collection. The rate of biliary reconstructive surgery was similar in both groups (five and six, respectively), suggesting that the use of stents themselves do not influence the development of major complications necessitating reconstructive surgery.

The ability of endoscopists (or interventional radiologists, if required) to obtain good quality biliary imaging in the absence of biliary ductal dilatation even during the early postoperative period may decrease the importance of easy T-tube cholangiography to investigate graft dysfunction [5, 6]. This, along with the high incidence of complications related to the use of T-tubes, is a strong argument in favour of discontinuing their use.

Table 1 Indications for transplantation

Indication	D-D + T-tube	D-D without T-tube
Fulminant hepatic failure	14	13
Primary biliary cirrhosis	48	22
Alcoholic cirrhosis	7	9
Hepatitis C	4	10
Cryptogenic cirrhosis	8	6
Chronic active hepatitis	9	5
Alpha-1-antitrypsin	5	5
Others	8	10
Regrafts	7	9

Table 2 Biliary complications (*HAT* hepatic artery thrombosis)

Complication	D-D + T-tube	D-D without T-tube
Anastomotic strictures	3	5
Sludge syndrome	3	2
Sphincter of Oddi dysfunction	1	0
Cystic duct syndrome	1	0
Anastomotic leaks	8 (2 <i>HAT</i>)	3
Leaks after T-tube removal	10	–
Total	26/110	10/89*

* $P < 0.05$

Table 3 Treatment (*HAT* hepatic artery thrombosis)

Treatment	D-D + T-tube	D-D without T-tube
Conservative	11	2
Radiological/endoscopic	7	2
Pigtail	1	0
ERCP + stent/dilatation	3	1
ERCP + nasobiliartube	0	1
ERCP + stent + pigtail	3	0
Surgical	8	6
Biliary reconstruction	5	6
Laparotomy + drainage	1	0
Regraft (<i>HAT</i>)	2	0

In conclusion, the use of T-tube splintage of the choledochodochal anastomosis is not necessary, and its discontinuation would reduce morbidity in liver transplantation.

References

1. Chardot C, Candinas D, Mirza D et al (1995) Biliary complications after pediatric liver-transplantation – Birmingham's experience. *Transplant Int* 8: 133
2. Colonna JO, Shaked A, Gomes AS et al (1992) Biliary strictures complicating liver-transplantation. Incidence, pathogenesis, management, and outcome. *Ann Surg* 216: 344
3. Stratta RJ, Wood RP, Langnas AN et al (1989) Diagnosis and treatment of biliary-tract complications after orthotopic liver transplantation. *Surgery* 106: 675
4. O'Connor HJ, Lewis WD, Jenkins RL (1995) Biliary-tract complications after liver transplantation. *Arch Surg* 130: 312
5. Ostroff JW, Roberts JP, Gordon RL et al (1990) The management of T tube leaks in orthotopic liver transplant recipients with endoscopically placed nasobiliary catheters. *Transplantation* 49: 922
6. Kuo PC, Lewis WD, Stokes K et al (1994) A comparison of operation, endoscopic retrograde cholangiography, and percutaneous transhepatic cholangiography in biliary complications after hepatic transplantation. *J Am Coll Surg* 179: 177