

## Treatment of post liver transplantation bile duct stricture with self-expandable metallic stent

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### Abstract

**Objective.** The aim of this study is to report our experience using self-expandable covered metallic stents (Wallstent) to treat different types of biliary strictures after orthotopic liver transplantation (OLT). **Patients and methods.** Between January 1999 and July 2004, 222 OLTs were performed with choledocho-choledochostomy (CC) bile duct reconstruction. An anastomotic biliary stricture was diagnosed and treated by endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous procedures in 100 patients (45%). The group of 21 patients (mean age  $57.0 \pm 5.6$  years) that were eventually treated with a biliary Wallstent was studied retrospectively. **Results.** Significant persistent proximal or anastomotic strictures were diagnosed in 4 and 17 patients, respectively. A Wallstent was inserted by ERCP or through a percutaneous route in 18 and 3 patients, respectively. The mean interval between diagnosis and Wallstent insertion was  $179.7 \pm 292.8$  (0–1113) days. The mean total number of procedures required per patient was  $7.4 \pm 5.5$ . The mean stent primary patency duration was  $10.8 \pm 7.8$  (0.9–25.1) months with a 24-month primary patency rate of 26% at a mean follow-up time of  $37.8 \pm 17.2$  months. A hepatico-jejunostomy was performed in five patients (24%). Two patients (10%) underwent retransplantation for diffuse ischemic cholangitis or chronic rejection. The overall complication rate was 4%. **Conclusion.** Treatment of post-transplant biliary stenosis using a Wallstent is a valuable option for delaying or avoiding surgery in up to 70% of patients. Proximal stenosis can be treated in the same manner in selected patients with major comorbidities.

**Key Words:** *Liver transplantation, biliary strictures, self-expandable metallic stent, endoscopic retrograde cholangiopancreatography*

### Introduction

Bile duct anastomotic stricture is a common problem after orthotopic liver transplantation (OLT) with a reported incidence of 15–20% [1]. The two usual types of bile duct reconstruction performed at the time of OLT are choledocho-choledochostomy (CC) and hepatico-jejunostomy (HJ). Technical factors such as duct size, size discrepancy, retransplantation and diagnosis of liver disease such as sclerosing cholangitis will influence the selection of CC versus HJ. Biliary complications have always been a significant cause of post-transplantation morbidity [2].

Endoscopic or trans-hepatic balloon dilatation and stent insertion is a well recognized therapeutic option for treatment of bile duct strictures [1]. However, the use of self-expandable metallic stents to treat benign conditions is not recommended.

The aim of this study was to report our experience using Wallstents to treat different types of biliary strictures occurring after OLT.

### Patients and methods

Between January 1999 and July 2004, 306 cadaveric OLT were performed in 279 patients at our institution. Among these, 222 (73%) had a CC and 84 had an HJ. The HJ patients are excluded from the analysis. Various postoperative biliary anomalies including early postoperative inflammatory stenosis secondary to edema, anastomotic stricture and ischemic cholangiopathy were diagnosed in 100 CC patients (45%). This retrospective study reports all CC patients ( $n = 21$ ) with intrahepatic, proximal or anastomotic stenosis treated by Wallstent.

Presented at the annual AHPBA meeting, 14–17 April 2005, Fort Lauderdale, FL, USA.

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Elevated liver function tests, angiocholitis or abnormal radiological findings such as dilatation of the proximal bile duct or biloma prompted imaging of the biliary tree by endoscopic retrograde cholangiopancreatography (ERCP). If a stricture was diagnosed, endoscopic sphincterotomy, balloon dilatation and plastic stent insertion was performed. Patients were then rescheduled every 6 weeks for dilatation and stent insertion until complete resolution of the stricture. The same operator (A.R.) performed all the endoscopic procedures. The percutaneous trans-hepatic route was used only when the stricture could not be cannulated at the time of ERCP.

Self-expandable metallic stent (Wallstent) insertion was selected for patients with: (i) a persisting stricture despite a minimum of three adequate dilatations with an 8 mm balloon; (ii) a stricture occurring more than 6 months post-OLT with obvious immediate absence of response to dilatation. All patients were treated with a self-expandable biliary metallic Wallstent™ endoprosthesis with Permalume™ covering and Unistep™ plus delivery system from Boston Scientific USA (the simple term Wallstent will be used throughout the text).

Primary patency time was defined by the time interval between Wallstent insertion and the first episode of clinical obstruction requiring treatment. Obstruction was defined by clinical jaundice or angiocholitis and abnormal liver function tests showing cholestasis. The obstruction was always confirmed by ERCP or percutaneous trans-hepatic cholangiogram. Patients without symptoms and with normal liver function tests were considered as having a patent stent. Secondary patency time was defined by the total duration of stent patency even though re-intervention might have been required for removal of biliary sludge but without requiring a new Wallstent or plastic stent insertion.

Demographic and clinical data were collected using systematic review of patients' files and interrogation of a computerized database. Statistics were calculated using Statview version 5.0 for MacIntosh.

## Results

Ten men and 11 women with a mean age of  $57 \pm 5.6$  years (mean  $\pm$  SD) were studied. The patients' characteristics are summarized in Table I. Indications for transplantation included alcoholic cirrhosis (three patients), chronic hepatitis B (one patient) or C (three patients), primary biliary cirrhosis (two patients), non-alcoholic steato-hepatitis (two patients),  $\alpha$ 1-antitrypsin deficiency (one patient), giant cell hepatitis (one patient), cryptogenic cirrhosis (five patients), idiopathic fulminant hepatic failure (one patient) and hepatocellular carcinoma (two patients).

The operative time and cold and warm ischemic times for the 21 studied cases were  $225 \pm 60$ ,  $460 \pm 158$  and  $40 \pm 9$  min, respectively. Blood losses were

Table I. Patients' characteristics.

Parameter	Value
Weight (kg)	$72.2 \pm 12.7$
Height (cm)	$166 \pm 7$
Body mass index (BMI)	$26.3 \pm 4.3$
Child Pugh score (B-C)	$11 \pm 1.5$ (9-12)
MELD	$19.6 \pm 10.5$
Donor age (year) (min-max)	$45.5 \pm 16.2$ (17-70)
Donor CMV +/-	13/8

$1420 \pm 1100$  ml (range 400-3500). Donor age was  $45.5 \pm 16.2$  years (range 17-70).

Proximal and anastomotic stenosis was diagnosed in 4 and 17 patients, respectively. A Wallstent was inserted by ERCP in 18 patients and by percutaneous approach in 3 patients. A concomitant bile leak was identified in four patients (19%) (Figure 1).

The mean interval between diagnosis and Wallstent insertion was  $179.7 \pm 292.8$  (0-1113) days. The total number of procedures required per patient was  $7.4 \pm 5.5$ , with  $3.7 \pm 3.9$  procedures performed before and  $2.7 \pm 3.4$  after Wallstent insertion. Globally,  $1.8 \pm 1$  Wallstents were inserted per patient with nine patients needing a second Wallstent. Eight patients required endoscopic cleaning of biliary sludge inside the Wallstent during the course of the follow-up. Seven patients eventually underwent plastic stent insertion for inadequate drainage by Wallstent only during follow-up.

The mean primary patency duration of the Wallstent was  $10.8 \pm 7.8$  (0.9-25.1) months. After a mean follow-up time of  $37.8 \pm 17.2$  months, the 12-, 18-, and 24-month primary patency rates were 64%, 51%, and 26%, respectively (Figure 2). The yearly secondary patency rates from 1 to 5 years were: 95%, 95%, 88%, 66%, and 35%, respectively (Figure 3).

Fourteen patients (66%) were treated solely by Wallstent without recurrence of problem. An HJ was performed in five (24%) patients because of recurrent obstruction of the Wallstent, in the context of a good

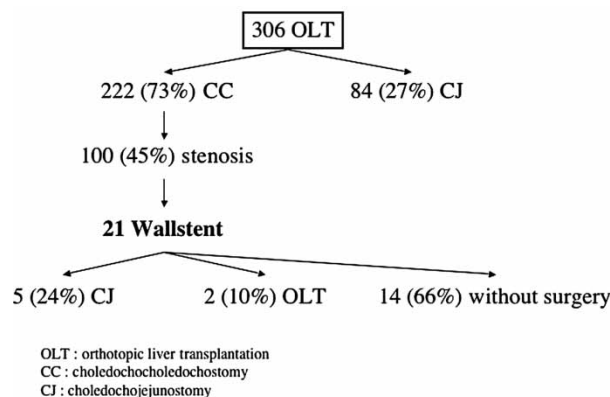


Figure 1. Evolution for patients with Wallstent. OLT, orthotopic liver transplantation; CC, choledocho-choledochoostomy; HJ, hepatico-jejunoostomy.

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