Placement of percutaneous transhepatic biliary stent using a silicone drain with channels

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Abstract
This report describes a method for percutaneous transhepatic biliary stenting with a BLAKE Silicone Drain, and discusses the usefulness of placement of the drain connected to a J-VAC Suction Reservoir for the treatment of stenotic hepaticojejunostomy. Percutaneous transhepatic biliary drainage was performed under ultrasonographic guidance in a patient with stenotic hepaticojejunostomy after hepatectomy for hepatic hilum malignancy. The technique used was as follows. After dilatation of the drainage root, an 11-Fr tube with several side holes was passed through the stenosis of the hepaticojejunostomy. A 0.035-inch guidewire was inserted into the tube. After removal of the 11-Fr tube, the guidewire was put into the channel of a 10-Fr BLAKE Silicone Drain. The drain was inserted into the jejunal limb through the intrahepatic bile duct and was connected to a J-VAC Suction Reservoir. Low-pressure continued suction was applied. Patients can be discharged after insertion of the 10-Fr BLAKE Silicone Drain connected to a J-VAC Suction Reservoir. Placement of a percutaneous transhepatic biliary stent using a 10-Fr BLAKE Silicone Drain connected to a J-VAC Suction Reservoir is useful for the treatment of stenotic hepaticojejunostomy.

Key words: Biliary tract; Drainage; Hepaticojejunostomy; Stenosis; Stents

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INTRODUCTION
In most operations for hepatic hilum malignancy, the intrahepatic bile duct at the hilum is divided from the hepatic artery, portal vein, and surrounding tissues. Biliary complications, such as leakage or stenosis, are caused occasionally by the presence of several small bilioenteric anastomoses[1]. Stenosis of a bilioenteric anastomosis increases the risk of cholangitis and requires the long-term placement of a stent.

The BLAKE Silicone Drain (Ethicon, NJ, USA) is made of silicone; the entire drain is flexible, and channels along the sides, instead of holes, facilitate drainage. We have reported previously the effectiveness of a BLAKE Silicone Drain connected to a J-VAC Suction Reservoir for the management of pancreatic fistula[2]. We also reported that a 10-Fr BLAKE Silicone Drain has been used as an external stent for a bilioenteric anastomosis during surgery for hepatic hilar malignancy[3].

This report describes a method for percutaneous transhepatic biliary stenting with a BLAKE Silicone Drain, and discusses the usefulness of placement of the drain connected to a J-VAC Suction Reservoir for the treatment of stenotic hepaticojejunostomy.
A 68-year-old man with intrahepatic cholangiocarcinoma invading the hepatic hilum underwent extended left hepatectomy combined with en bloc resection of the extrahepatic bile duct and extended lymph node dissection.

Bilioenteric continuity was reestablished by two hepaticojejunostomies of the anterior and posterior branches of the hepatic ducts, performed using a Roux-en-Y jejunal limb. Silicone drains with an internal lumen and side holes, made by cutting a 5-Fr radiopaque tube for pancreatic drainage (Sumitomo Bakelite, Tokyo, Japan), were used as an internal stent for each bilioenteric anastomosis. Two external drainage catheters (19-Fr BLAKE Silicone Drain) were positioned at the cut surface of the liver and connected to the J-VAC Suction Reservoir. Fixation of the greater omentum was performed to avoid delayed gastric emptying. After operation, major bile leakage occurred, but resolved gradually. The drainage catheter was removed on postoperative day 12, and the patient was discharged on postoperative day 18.

Forty days after discharge, the patient was readmitted because of severe pyrexia. Upon admission, computed tomography demonstrated two low-density areas associated with dilatation of the intrahepatic bile ducts in the anterior segment. Hepatic abscesses caused by stenosis of the hepaticojejunostomy were diagnosed. Percutaneous drainage catheters were inserted into each abscess, and pus was discharged. Abscessography demonstrated communications between the dilated intrahepatic bile ducts of the anterior branch and each of the abscesses (Figure 1). Pyrexia improved, and discharge of clear bile from one of the drainage catheters continued. One week after insertion of the drainage catheters, abscessography was repeated. It was difficult to insert the catheter from the abscess into the intrahepatic bile duct. Another percutaneous transhepatic biliary drainage catheter was inserted directly into the intrahepatic bile duct under ultrasonographic guidance. An 11-Fr tube (11 Fr PTCS tube; Sumitomo Bakelite) with several side holes was placed in the jejunal limb through the intrahepatic bile duct, and passed through the stenosis of the hepaticojejunostomy (Figure 2). Bile juice was discharged from the 11-Fr tube, and discharge from the drainage catheters of the abscess decreased. One of the catheters was removed from the abscess because pus discharge stopped. One week after initial insertion of the 11-Fr tube, cholangiography was performed via the tube. After insertion of a 0.035-inch guide wire, the 11-Fr tube was switched to a 10-Fr BLAKE Silicone Drain. The drain was connected to a J-VAC Suction Reservoir, and continued low-pressure suction was applied. The remaining catheter was removed from the abscess. The patient was discharged 5 d after switching the 11-Fr tube to a 10-Fr BLAKE Silicone Drain connected to the J-VAC Suction Reservoir. After 4 mo, the patient was readmitted because of liver failure. The portal vein was obstructed by recurrent carcinoma. Three weeks after readmission, the patient died. The 10-Fr Blake Silicone Drain was not occluded.

**DISCUSSION**

Diagnostic techniques for hepatobiliary disease have improved recently, but advanced hepatic hilum malignancy is still encountered frequently. Palliative treatment with a biliary stent is carried out in patients with inoperable malignancy in order to relieve symptoms related to obstructive jaundice. In patients undergoing hepatectomy for advanced hepatic hilum malignancy, aggressive dissection may compromise the ductal blood supply. Peripheral branches of blood vessels,
with small diameters and a poor blood supply, may be damaged along with the bile duct, which increases the risk of biliary leakage[11]. The use of stents has been recommended to decompress the bile duct, reduce the risk of bile leakage, and decrease fibrotic narrowing of the anastomosis during early healing[9,12]. However, the risk of biliary complications such as leakage or stenosis is increased by the presence of small biliary branches. The continuous channels instead of holes along the sides, and contains no plasticizing agents. It has four diameters of the anastomosis is maintained if bilioenteric anastomosis leaks, a 10-Fr intraluminal drain is therefore suited for long-term placement. The input port of the J-VAC Suction Reservoir has an anti-reflux valve, which reduces the risk of retrograde infection. This valve enables the patient to use the reservoir without having to worry about the level of the drainage bag during position changes and ambulation. The J-VAC Suction Reservoir is portable and convenient in size, which enables the patient to carry it around in a specially designed pochette on the shoulder. A BLAKE Silicone Drain connected to a J-VAC Suction Reservoir usually remains free of occlusion for about 6 mo.

In conclusion, placement of a percutaneous transhepatic biliary stent using a 10-Fr BLAKE Silicone Drain connected to a J-VAC Suction Reservoir was useful for the treatment of stenotic hepaticojejunostomy.

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