Endoscopic bilateral stent-in-stent placement for malignant hilar obstruction using a large cell type stent

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BACKGROUND: Bilateral stent-in-stent (SIS) self-expandable metal stent placement is technically challenging for palliation of unresectable malignant hilar obstruction. In the SIS technique, the uniform large cell type biliary stent facilitates contralateral stent deployment through the mesh of the first metallic stent. This study aimed to assess the technical success and clinical effectiveness of this technique with a uniform large cell type biliary stent.

METHODS: Thirty-one patients who underwent bilateral SIS placement using a large cell type stent were reviewed retrospectively. All patients showed malignant hilar obstruction (Bismuth types II, III, IV) with different etiologies.

RESULTS: Sixteen (51.6%) patients were male. The mean age of the patients was 67.0±14.0 years. Most patients were diagnosed as having hilar cholangiocarcinoma (58.1%) and gallbladder cancer (29.0%). Technical success rate was 83.9%. Success was achieved more frequently in patients without masses obstructing the biliary confluence (MOC) than those with MOC (95.2% vs 60.0%, *P*=0.03). Functional success rate was 77.4%. Complications occurred in 29.0% of the patients. These tended to occur more frequently in patients with MOC (50.0% vs 19.0%, *P*=0.11). Median time to recurrent biliary obstruction was 188 days and median survival was 175 days.

CONCLUSIONS: The large cell type stent can be used efficiently for bilateral SIS placement in malignant hilar obstruction. However, the risk of technical failure increases in patients with MOC, and caution is needed to prevent complications for these patients.

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KEY WORDS: biliary tract disease; cholangiocarcinoma; endoscopic biliary drainage; stent insertion

Introduction

Malignant hilar obstructions are the result of cholangiocarcinoma or gallbladder cancer in most cases. The associated prognosis is poor and surgery provides the only chance for a cure.[1] However, nearly half of hilar cholangiocarcinoma cases are not candidates for curative resection owing to advanced disease or the presence of significant comorbidities.[2] Endoscopic stenting is commonly performed for palliation of malignant hilar obstruction. The choice between the self-expandable metal stent (SEMS) and plastic stent (PS) is still debatable. Theoretical advantages of SEMS include larger diameter, ability to drain side branches, and good conformability. A prospective study reported fewer adverse outcomes following SEMS deployment compared to PS recipients.[3]

A recent retrospective study revealed that draining more than half of the liver volume, which frequently requires bilateral stent insertion, is an important predic-

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tor of effective drainage and is associated with a longer median survival in malignant hilar obstruction.[4] Bilateral SEMS placement can be performed by the side-by-side or stent-in-stent (SIS) method. The side-by-side method is technically easier but can cause excessive expansion of the bile duct in the region of SEMS overlap. In a study comparing the two methods in bilateral endoscopic metal stenting, the incidence of adverse events was significantly higher for the side-by-side method.[5] In addition, reintervention can be difficult for stents placed side-by-side. Stents are often placed with complete intraductal positioning in this technique. If the distal ends of stents are not positioned next to each other, reintervention is difficult because each lumen cannot be individually cannulated with ease.[6] The SIS technique is free from these limitations. However, this method is technically more difficult; passing a guidewire and stent delivery system into a contralateral bile duct through the mesh of SEMS placed first is not easy. To overcome these difficulties, several newly designed SEMSs have been developed for bilateral SIS placement.[7-10] The Niti-S large cell D-type biliary stent (LCD; Taewoong, Seoul, Korea) has large cells (7 mm) that allow the passage of a second stent through the mesh, with the radial force maintained at the central portion of the stent because of its uniform cell size. The chain-like connection of each stent cell confers low axial force, which prevents bile duct kinking at both ends of the hilar stent.[7] In a prospective multicenter study using the LCD, bilateral SIS placement was technically successful in 25 (96%) of 26 patients in a single session. The final technical and functional success rates were 100% and 89%, respectively.[11] The study did not explored any factors related to technical success and no further study has been reported.

The present study aimed to assess the high technical and functional success rates of LCD and investigated the factors related to technical success in bilateral SIS placement for malignant hilar obstruction.

Methods

Patients

We retrospectively analyzed the endoscopic retrograde cholangiopancreatography (ERCP) prospectively maintained database of Seoul National University Hospital that contains information about consecutively enrolled patients. The patients who underwent bilateral SIS placement for malignant hilar obstruction between December 2011 and March 2014 were identified. Among them, those who underwent stent insertion using LCD were included in this study. The diagnosis of malignant hilar obstruction was made principally on the basis of computed tomography (CT) and/or magnetic resonance image (MRI), and was confirmed by pathologic examination. In our institution, endoscopic bilateral SIS placement is tried for all malignant hilar obstruction cases initially, unless the patient has comorbidities that preclude endoscopic procedures. If endoscopic procedure fails, percutaneous transhepatic biliary drainage (PTBD) is considered as rescue therapy. The study was approved by the Institutional Review Board of Seoul National University Hospital.

Technique

LCD has thick nitinol wires (0.203 mm) and the diameter of the stent delivery system is 8 Fr (Fig. 1). All patients underwent the procedures under conscious sedation with intravenous midazolam and meperidine. Standard duodenoscopes were used (TJF-240 and 260 V; Olympus, Tokyo, Japan), and an experienced pancreatobiliary endoscopist (Lee SH) carried out all of the procedures. An endoscopic biliary sphincterotomy was performed routinely, and two guidewires were placed through the hilar stricture into the left and right intrahepatic ducts. A 10-mm diameter LCD was used as the first or second stent; the stent was advanced over a guidewire inserted into the left hepatic duct and placed across the hilar stricture. After deployment of the first stent, the guidewire across the first stent was withdrawn and then inserted into the right hepatic duct via the mesh of the first stent. The other guidewire was used as a landmark and the second LCD was deployed over the reinserted guidewire. If it was difficult to insert the guidewire or second LCD into the undrained duct through the mesh of the first stent, the hilar stricture was dilated up to 6 or 8 mm using a Hurricane biliary balloon dilation catheter (Boston Scientific, Natick, MA, USA) prior to a second attempt of guidewire insertion or second LCD. If the second LCD insertion failed after balloon dilation, a HANAROSTENT (M. I. TECH, Seoul, Korea) or BONASTENT (Standard Sci-Tech, Seoul, Korea) having a slimmer delivery system (7 Fr) was used in place of the LCD. The procedure was performed under fluoroscopic guidance.

Study outcomes and definition of events

Study outcomes were described according to a stan-

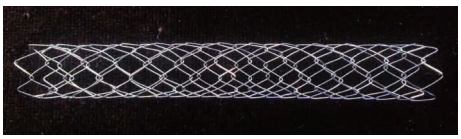

Fig. 1. Niti-S large cell D-type stent.