ORIGINAL RESEARCH

Bilateral Side-by-Side Metal Stenting for Malignant Hilar Biliary Obstruction

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Introduction

Cholangiocarcinoma accounts for over 3% of gastrointestinal cancers worldwide and is the second most common primary hepatobiliary cancer.[1] Patients commonly present with hilar obstruction. Only 10-20% of cholangiocarcinomas are surgically resectable. Patients who are not surgical candidates require palliative therapy to relieve symptomatic obstruction with endoscopic stenting as they have an estimated survival time of 12-18 months after diagnosis.

The best technical approach to metal stenting of malignant hilar biliary strictures has yet to be determined. While the evidence does support lower rates of occlusion for self-expandable metal stents over plastic stents,[2] randomized control trials show inconclusive evidence in rates of functional success, complications, and mortality in unilateral versus bilateral stenting.[3]

The two main approaches to bilateral stenting include the stent-in-stent (SIS) and the side-by-side (SBS) method. SBS stenting allows for continued access of both right and left biliary systems, an important feature because these stents often require endoscopic re-intervention. The evidence on the preferred method of stenting for malignant hilar obstruction is limited. Our study aimed to evaluate the use of side-by-side metal stenting for malignant biliary strictures with regard to technical feasibility and efficacy.

Materials and Methods

To evaluate the technical feasibility and efficacy of endoscopic bilateral SBS stenting, we retrospectively reviewed bilateral stenting cases at our institution from January 2011 to February 2017. The project was approved by institutional IRB (RF#041021).

Patients who required palliative stenting for malignant hilar obstruction were identified using retrospective chart review. Data were collected with regards to procedure indication, stricture location, placement success, jaundice resolution, and procedure-related complications.

1.1. Endoscopic Technique

The stricture was negotiated by inserting a guidewire into the right and left hepatic ducts (Figure 1). Then both right and left hepatic duct strictures were dilated segmentally using 4mm x 4cm balloon dilations for 30 seconds each. Typically, the first stent was deployed into the left hepatic duct under endoscopic and fluoroscopic guidance with the guidewire remaining in the other duct; then the second stent was deployed.

All stents were of 8-mm diameter and varying length (Wallflex, Boston Scientific, Inc.; Zilver stent, Cook Medical, Inc; Viabil stent, Gore, Inc). All but one stent extended transpapillary into duodenum, and stent placement was performed under fluoroscopic and endoscopic guidance (Figures 2, 3).

Clinical success was defined by decrease in total bilirubin after stent placement. Technical success was defined as successful bilateral bridging of strictures with stents extending into the duodenum without immediate complications.

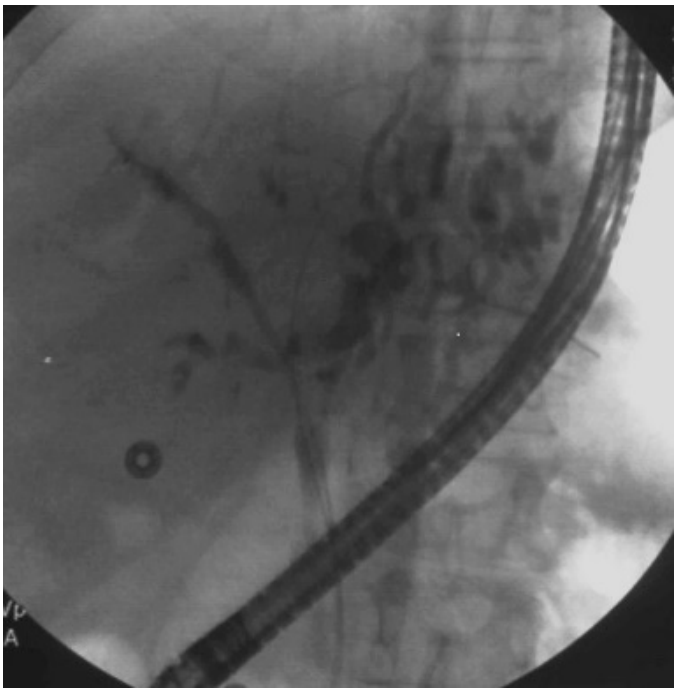

Figure 1: Side-by-side guidewire placement.

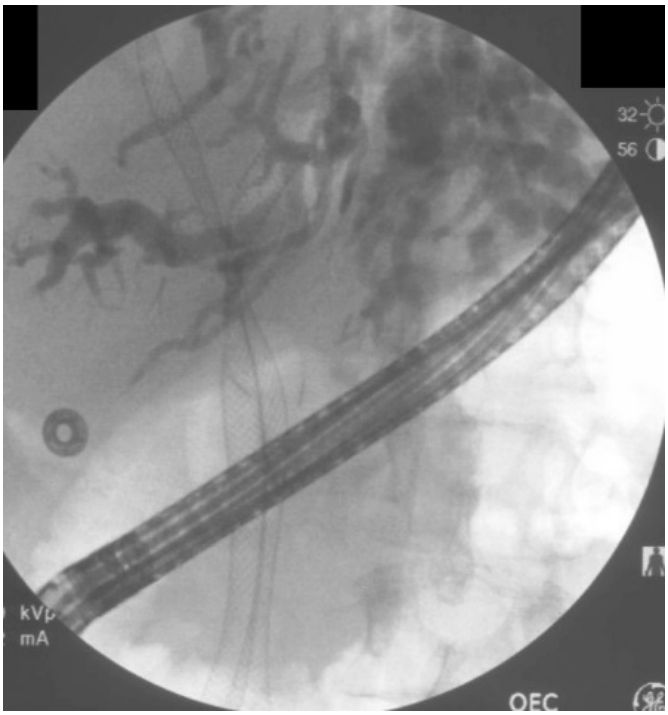

Figure 2: Side-by-side stent placement, fluoroscopy.

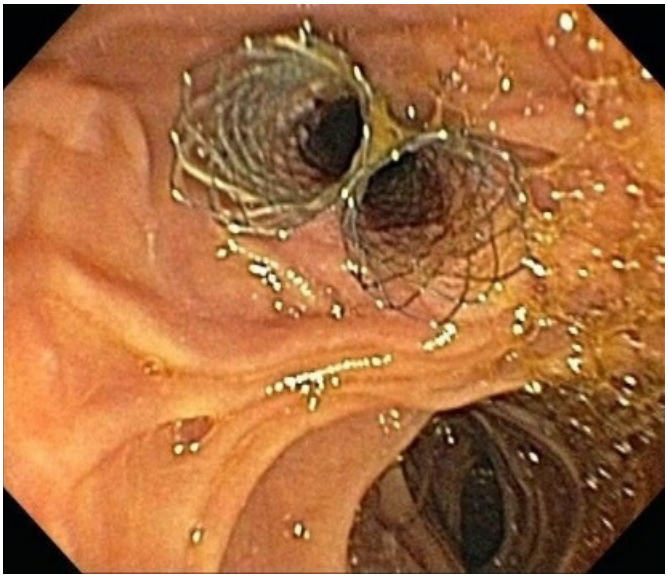

Figure 3: Side-by-side stents duodenum endoscopic view.

Results

SBS stenting was performed on 19 patients with malignant hilar obstruction from January 2011 to June 2017. Baseline patient characteristics are shown in Table 1. The average patient age was 60.7 years (range 41-76). 10 patients were male, and 9 patients were female. 16 of the 19 patients' obstruction was due to cholangiocarcinoma, one patient had gallbladder adenocarcinoma, and two patients' obstructions were due to metastatic cancer. In most (11/16) patients with cholangiocarcinoma, strictures were Bismuth type IV. The average length of the right hepatic duct stricture was 2.69 cm, and the average length of the left hepatic duct stricture was 3.19 cm.

Table 1: Baseline Characteristics

Number of Patients	19
Age: median, years	60.7 (range 41-76)
Sex (male/female)	10/9
Diagnosis:	
Cholangiocarcinoma	16/19 (80%)
Gallbladder Adenocarcinoma	1/19 (10%)
Metastases from other primary	2/19 (10%)
Bismuth Type N=16	
I	1/16 (6%)
II	0/16 (0%)
IIIa	2/16 (13%)
IIIb	2/16 (13%)
IV	11/16 (69%)
Stricture Length (cm)	
Right Hepatic Duct	2.69 (1-6)
Left Hepatic Duct	3.19 (1-7)

Table 2: Results of Bilateral SBS Stenting

Technical Success	19/19 (100%)
Clinical Success	14/18 (78%)
Early Adverse Events	0/19 (0%)
Cholangitis	0/19 (0%)
Cholecystitis	0/19 (0%)
Time to Follow-up (months)	3.02 (0.3-18)
Stent Occlusion	5/19 (26%)
Time to Occlusion (months)	6.94 (2.6-18)
Revision Success Rate	2/2 (100%)

Mean follow up time was three months in 15/19 patients. Five of the 19 patients presented with re-occlusion, as evidenced by elevated total bilirubin or clinical symptomatic jaundice. The average time to re-occlusion was 6.94 months. Three of those patients declined further intervention, and two patients underwent successful balloon extraction of debris from both stents.

Discussion

The two main approaches to bilateral stenting include the stent-in-stent (SIS) and the side-by-side (SBS) method.[4,5] Naitoh, et al (2012) found no significant inter-group differences in technical or functional success of SIS compared to SBS stenting,

however there was a higher rate of complications in SBS stenting with better cumulative stent patency.[5]

Our results support technical feasibility and long-term efficacy of SBS approach with a technical success rate of 100% and clinical success of 78%. There were no complications associated with the procedure in our experience. Past studies raised concerns that the diameter of SBS stenting may be too large, and as a result, may potentially press the portal vein at the hilar portion of the bile ducts and cause portal thrombosis.[6] There is also concern for increased rate of cholangitis due to excessive bile duct compression from parallel stents.[1] None of these complications occurred in our patients.

In our experience, bilateral side-by-side stent placement for malignant biliary obstruction is technically feasible and safe, with high levels of efficacy. Side-by-side stenting may have an advantage of improved access for endoscopic re-intervention.

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