Introduction

Endoscopic biliary stenting is a well-established palliative procedure for treating obstructive jaundice in patients with unresectable hilar cholangiocarcinoma. Plastic tube stents (PS) have been widely used for the procedure, but self-expandable metallic stents (SEMSs) are becoming increasingly popular because of the associated longer patency. However, there are several unanswered questions regarding the endoscopic placement of SEMSs.

Unilateral or bilateral

The first question is whether unilateral stenting is adequate or bilateral stenting is required. Drainage of 25-30% of the liver volume is considered to be associated with resolution of jaundice. [1,2] Therefore, a single stent in the dominant liver segment may be adequate for ameliorating jaundice in most cases.

Previously, several reports have compared the outcomes of unilateral and bilateral stenting. In a retrospective review, Chang et al. [3] reported that survival was significantly longer in the bilateral drainage group than in the unilateral drainage group. In addition, contrast medium injection into intrahepatic ducts without adequate drainage was associated with worse outcomes. Naitoh et al. [4] also found that the cumulative stent patency was significantly better in the bilateral group than in the unilateral group in their retrospective review, although there were no significant differences between the two groups in terms of successful stent insertion, successful drainage, early complications, or late complications. In a retrospective review by Liberato and Canena [5], they divided the patients into four groups based on unilateral or bilateral PS or SEMS placement. Repeat endoscopic biliary drainage for stent occlusion was required less frequently in bilateral SEMS than in the unilateral SEMS. A Kaplan-Meier analysis showed a significantly longer cumulative stent patency period in the bilateral SEMS group than the unilateral SEMS group. In addition, a multivariate analysis revealed SEMS placement and bilateral deployment to be the only independent prognostic factors associated with longer stent patency. These results support the superiority of bilateral stenting.

In contrast, in a randomized controlled trial by De Palma et al [6], there were no differences in the median
survival between unilateral and bilateral groups. However, the unilateral group had a significantly higher rate of successful stent insertion and drainage. Moreover, the unilateral group had a significantly lower rate of early complications than the bilateral group because of the lower rate of early cholangitis. Later, the same group conducted a prospective study to evaluate unilateral SEMS placement in 61 consecutive patients. Successful stent insertion and drainage were achieved in 96.7% of patients. Early complications including stent cholangitis and stent malfunction occurred in 8.2% of patients. Finally, they concluded that unilateral SEMS insertion is safe, feasible, and achieves adequate drainage in the majority of patients with unresectable hilar cholangiocarcinoma.

We also compared the data for unilateral and bilateral stenting as a sub-analysis in a comparative study of PS versus SEMS. As a result, we observed no significant differences in the patency period between the 2 groups. Nonetheless, re-intervention for stent dysfunction is more complicated in bilateral stenting than in unilateral stenting. The success rate for endoscopic re-intervention was significantly higher in unilateral stenting than in bilateral stenting. These results may suggest that unilateral stenting is more advantageous than bilateral stenting. However, in some patients, bilateral stenting is required for adequate amelioration of jaundice and cholangitis. In fact, in this study, approximately 50% of the patients required bilateral drainage.

As mentioned above, it remains under debate whether unilateral or bilateral stenting is better in the treatment of unresectable malignant hilar strictures.

Side by side or partial stent in stent

Bilateral SEMS can be placed with either a “side-by-side (SBS)” or “stent-in-stent (SIS)” method. In the SBS method, the second stent is deployed parallel to the initial stent. In the SIS technique, the second stent is deployed by crossing through the mesh within the initial stent. Each method has advantages and disadvantages.

1. SBS

The SBS technique is preferred in the USA and Europe. It is conceivable that the SBS method is technically easier than the SIS method. Deployment of the two SEMSs can be performed serially or simultaneously depending on the delivery system diameter. However, the subsequent insertion of the second SEMS is often hindered by the expanded first SEMS when the deployments are performed serially. In addition, future endoscopic re-intervention for occlusion may not be possible when the two distal ends of the SEMSs are left in the bile duct and are not aligned. Therefore, it is recommended that the long SEMSs be placed across the papilla; however, some endoscopists believe that the loss of papillary function may cause ascending cholangitis. Another theoretical concern for the SBS method is overexpansion of the bile duct by SEMSs. The radial force caused by the large diameter of the parallel stent placement might be too strong for biliary strictures and the non-dilated distal bile duct. The strong radial force might cause portal vein compression leading to portal vein thrombosis, bile duct rupture, or tumor ingrowth/mucosal hyperplasia through the stent mesh.

2. SIS

The SIS method is preferred in Korea and Japan. However, it is not widely employed due to the technical difficulties involved. Passing a guidewire and stent delivery system into the contralateral biliary system through the
mesh of the first SEMS can be difficult. The other problem is the difficulty of accessing the upstream bile ducts at re-intervention. In order to preserve the papillary function, endoscopic sphincterotomy is not usually performed, and the distal end of the SEMS is placed above the papilla.

3. SBS vs. SIS

To date, there have been no prospective studies comparing the efficacies of the two techniques. Naitoh et al. compared the efficacies of the two techniques retrospectively. Technical success was achieved in all cases in the SIS group but failed in 3 cases in the SBS group because the second SEMS delivery system could not be passed along the first SEMS. The incidence of complications, including cholecystitis, cholangitis, and liver abscess, was significantly higher with the SBS technique. The cumulative stent patency was significantly better for SBS than for SIS placement. However, there is insufficient data to determine which technique is preferable.

Optimal stent type

In our previous retrospective study [12], we considered that SEMSs with low axial force and large cell width are favorable for SEMS placement with the SIS method for hilar biliary stricture. Recently, newly designed SEMSs have been developed to overcome limitations of conventional SEMSs. Some dedicated SEMSs for SIS placement have a loose portion to facilitate the insertion of a guidewire and delivery system for the SEMS through the mesh. This structure may make the SIS method technically feasible during both stent deployment and re-interventions. Recently, smaller delivery systems of 6Fr diameter have become commercially available, allowing simultaneous stent placement with the SBS method. The smaller delivery systems are also helpful in passing the stent mesh with the SIS method.

References

