October 2002 to May 2008, 129 patients were randomized. Distal obstruction was defined in this study, as being ≥1 cm distal to the biliary hilum. As in the previous study, subjects were randomized at the time of the ERCP after successful placement of a guidewire across the malignant stricture, using sealed envelopes. Either an uncovered Wallstent or a Permalume membrane partially covered Wallstent (Boston Scientific Corporation, Natick, Mass, USA) was used. Follow-up data were collected by telephone interview conducted by a research assistant, 1 week after stent insertion and then monthly until patient death.The primary study outcome was time to recurrent biliary obstruction, and secondary outcomes of interest were patient survival, serious adverse events, and the mechanism of recurrent biliary obstruction.

Recurrent biliary obstruction was observed in 11 of 61 uSEMS (18%) and 20 of 68 cSEMS (29%). The median times to recurrent biliary obstruction were 711 days and 357 days for the uSEMA and cSEMS groups, respectively (p=0.530). Median patient survival was 239 days for the uSEMS and 227 days for the cSEMS groups (p=0.997). Serious adverse events occurred in 27 (44%) and 42 (62%) patients in the uSEMS and cSEMS groups, respectively (p=0.046). None of the uncovered and 8 (12%) of the partially covered SEMS migrated (p=0.0061). Cholecystitis developed in 3 patients in each treatment group.

The authors concluded that there was no significant difference in time to recurrent biliary obstruction or patient survival between the partially covered and uncovered SEMS groups. Partially covered SEMS were associated with more serious adverse events, particularly migration.

Commentary

A previously published randomized trial in 2004 demonstrated improved stent patency and an absence of tumor ingrowth with a cSEMS compared with an uSEMS.[1] However, the cSEMS used in this study is not commercially available. A subsequent retrospective cohort study[2] and a prospective cohort with a retrospective comparison group[3] did not demonstrate a difference in stent patency between uncovered and partially covered SEMS. Hence although there is some suggestion that covering a SEMS may increase the duration of stent patency, there is no firm data in this regards. In addition, there is some concern that cSEMS may be associated with an increased incidence of cholecystitis, pancreatitis, and distal migration due to lack of tissue embedding.

The planned sample size for this study was 136 patients, but the study was closed before reaching this goal because of slow accrual. The results of this study did not demonstrate a difference in the time to recurrent biliary obstruction or patient survival between the two stents, but did demonstrate a higher incidence of serious adverse events in those patients who received a cSEMS. Migration of the covered stents contributed to recurrent biliary obstruction in 6 cases. Migration caused duodenal perforation in two cases and contributed to upper GI hemorrhage in one. Duodenal perforation secondary to biliary SEMS migration has not been reported previously. Cholecystitis after cSEMS placement may occur in up to 10% of patients, but was not seen at an increased rate in this study (7% in both cSEMS and uSEMS groups).

In an accompanying editorial in the same issue Willingham states that although not currently indicated for late removal, it is possible that the covered stents, with their inherent propensity to migration and prevention of ingrowth, could be of benefit when the quality of late removability is desired, and the diagnosis of malignancy is not definitely established.[4] In conclusion, the message from these two studies is that cSEMS, although safe, offer no real advantage for patients with distal biliary obstruction.

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Prediction of drainage effectiveness during endoscopic stenting of malignant hilar strictures: the role of liver volume assessment

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The optimal endoscopic approach to the drainage of malignant hilar strictures remains controversial, especially with regards to the extent of desirable drainage and unilateral or bilateral stenting. In this study the records of all 188 patients who underwent endoscopic stenting for malignant

hilar strictures between January 1996 and December 2005, at two academic tertiary referral centers in the greater Paris area (Cochin Hospital and Bicêtre Hospital), were reviewed. Among these, the authors included 107 patients for whom a CT scan performed during the week before ERCP, and clinical and biological data on the day of ERCP and 30 days later, were available. Bismuth I strictures were excluded, as the authors felt that a single stent was sufficient in these cases. All 107 included patients had Bismuth type II- IV strictures. The objective of the study was to identify useful criteria for predicting successful endoscopic drainage.

The volumetry of the 3 main hepatic sectors (left, right anterior, and right posterior) was assessed on CT scans. The liver volume drained was estimated and classified into one of three classes: < 30%, 30% to 50%, and >50% of the total liver volume. The primary study outcome was effective drainage, which was defined as a decrease in the bilirubin level of >50% at 30 days after drainage. Secondary outcomes were early cholangitis rates, and survival.

The main factor associated with drainage effectiveness was a liver volume drained of >50% (odds ratio 4.5, $p=0.001$), especially in Bismuth III strictures. Intubating an atrophic sector (<30% of liver volume) was useless and increased the risk of cholangitis (odds ratio 3.04, $p=0.01$). A drainage volume >50% was associated with a longer median survival (119 vs. 59 days, $p=0.005$).

The key conclusion of this study was that draining more than 50% of the liver volume, which frequently requires bilateral stent placement, was an important predictor of drainage effectiveness in malignant hilar strictures, especially Bismuth III. A pre-ERCP assessment of hepatic volume distribution on cross-sectional imaging may optimize the endoscopic procedures.

Commentary

Draining of only 25% of the liver has been believed to be the minimal requirement for relief of jaundice.[1] This dogma has been challenged by the current study, which concludes that draining > 50% of liver volume is a major predictor of drainage effectiveness and prolonged survival in malignant hilar strictures, especially Bismuth type III. Drainage of > 50% of the liver volume, generally involves drainage of at least two plastic stents to drain two hepatic sectors. It is to be noted that patients with Bismuth I strictures were excluded from the current study. The only RCT found that unilateral stenting was more efficient, but in this study one-third of patients had Bismuth I stricture.[2]

The volume of the liver drained was estimated from a review of the CT scans performed during the week before ERCP. Each sector (left, right anterior, and right posterior) was classified as <30%, 30% to 50%, or >50% of the total liver volume. A sector was considered atrophic if it accounted for < 30% of the whole liver volume. If the tumor extended to > 75% of a sector volume, this sector was also considered as having <30% volume. Normalization of serum bilirubin was achieved in 32% of the patients at day 30.

Several limitations of the current study need to be highlighted. First, this was a retrospective study encompassing a 10-year period. Only 60% of the 188 patients with malignant hilar strictures treated during the study period were included. The authors state that the Bismuth type was defined based on the preoperative MRCP 'when available' and confirmed or otherwise established during ERCP. However, in a separate section it is stated that contrast was 'selectively' injected, and injection into atrophic segments was avoided. This discrepancy casts doubts on the accuracy of Bismuth staging. If complete opacification of the intrahepatic segments was attempted, it would incur significant risks of cholangitis. As such cholangitis developed in 37% of cases overall. The method of volumetry was also very rudimentary, but practical for a clinical study. There are now several automated liver volumetry protocols available like MeVis systems. Use There is currently a limited role for plastic stent placement in malignant hilar strictures. In an accompanying editorial on the paper, Kozarek explicitly states that 'in 2010, the treatment of unresectable hilar malignancies has evolved into placement of one or more metal prostheses, particularly in patients with the potential for prolonged survival.[3] The only possible exceptions would be patients for whom endoscopically facilitated photodynamic therapy or brachytherapy is planned.

Despite these limitations, there are important messages in this study. It reiterates that injecting contrast into undrained ducts is associated with cholangitis, and a decreased survival rate. It therefore reinforces, the importance of preoperative staging and procedural planning, particularly with MRCP, before any attempted endoscopic approach to a hilar lesion.

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