Plastic or metal stents for benign extrahepatic biliary strictures: a systematic review

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CRD summary
The review concluded that based on clinical success and risk of complications, use of multiple plastic stents for benign extrahepatic biliary strictures was the optimal choice. In view of potential limitations that arose from the review process and poor-quality and small-sized included studies, the authors’ conclusions should be treated with caution.

Authors' objectives
To evaluate the safety and effectiveness of plastic or metal stents for benign extrahepatic biliary strictures.

Searching
PubMed (from 1966) and EMBASE (from 1980) were searched to March 2008 for publications in English. Search terms were reported. Letters, editorials and reviews were excluded. Bibliographies of each retrieved article were handsearched.

Study selection
Studies of all designs (except single case studies) of placement of biliary stents for benign extrahepatic biliary strictures in adults were eligible for inclusion. Studies were excluded if they were: of covered self-expandable metal stents (cSEMS); of intrahepatic strictures, strictures of unknown origin or malignant strictures; or did not contain relevant outcome data.

Relevant outcomes were: stenting time (defined as time between stent placement and removal, which for uncovered self-expanding metal stents (uSEMS) was further defined as time between stent placement and further treatment due to obstruction); technical success rate (technically successful stent placement); clinical success rate (defined as no need for further treatment, relief of symptoms and/or significant decrease in bilirubin level after stent placement); complications/adverse events (such as cholangitis, pancreatitis, stent migration or haemorrhage); and procedure-related and stent-related mortality.

Stents used in the included studies were single plastic stents, multiple plastic stents and uSEMS. Different types of plastic stent were used and study protocols differed. Most studies used endoscopic retrograde cholangiopancreatography (ERCP) but some used percutaneous transhepatic cholangiography (PTC).

Reasons for stent placement in the included studies were: biliary stricture secondary to liver transplantation; chronic pancreatitis; surgery; and other causes. Most strictures were located in the common bile duct, followed by anastomotic strictures and hilar strictures. Single plastic stents were generally used for chronic pancreatitis patients (85%) and for stricture after liver transplantation (82%) and uSEMS (50%) followed by multiple plastic stents (35%) after surgery.

Median age of patients, where reported, ranged from 38 to 65.7 years. The proportion of females ranged from 0% to 100%. Some patients had received previous treatment (dilatation, balloon dilatation, sphincterectomy, pancreatic duct stenting, plastic stent placement, laparotomy, T tube, surgery, nasobiliary drainage).

One reviewer performed the study selection.

Assessment of study quality
Methodological quality was not formally assessed.

Data extraction
Numbers of events for each outcome were extracted in order to calculate percentages for each study. Stenting times were calculated (months).

The authors did not report how many reviewers performed data extraction.
Methods of synthesis
Data were pooled with a fixed-effects model to calculate median stenting time (months) and overall percentages for success rates, complications and mortality. Publication bias was assessed with Egger's test, visually with funnel plots and with the Mann-Whitney U test and Spearman's rank correlation test to determine the correlation between technical and clinical success rates and the number of patients for each stent type.

Results of the review
Forty-seven studies were identified (n=1,116, range two to 143): one retrospective non-randomised study (n=46); and 46 case series (n=1,070), which comprised 14 prospective case series and 32 retrospective case series. There were discrepancies between the figures in the text and tables; figures given here are from the tables. The statistical significance of individual results was not reported.

Median (range) stenting time was longer for uSEMS (20 months, range 4.5 to 60 months) than for multiple plastic stents (11.3 months, range 4.6 to 13 months) and single plastic stents (10.5 months, range 0.3 to 24 months).

Technical success did not differ between different stent types (98.9% for uSEMS, 94.8% for single plastic stents and 94.0% for multiple plastic stents). Overall clinical success rate was highest for multiple plastic stents (94.3%), followed by uSEMS (79.5%) and single plastic stents (59.6%). For chronic pancreatitis patients, clinical success rate was higher for uSEMS (80.4%) than for single plastic stents (36.6%). Multiple plastic stents had higher clinical success rates for strictures following liver transplantation (89.0%) and surgery (87.6%) than uSEMS (50% for liver transplantation and 59.6% for surgery). The corresponding clinical success rates for single plastic stents were intermediate between the other two stent types (81% for liver transplantation and 64.9% for surgery).

Complications were more frequent with uSEMS (39.5%) compared with single plastic stents (36.0%) and multiple plastic stents (20.3%). The most frequently reported complications were cholangitis, pancreatitis, stent migration and haemorrhage. Stent-related mortality was 0.9% for single plastic stents and 1.1% for uSEMS (which in all cases was aseptic complication due to cholangitis); no stent-related mortality was reported for multiple plastic stents.

There was no evidence for publication bias for uSEMS, it was not possible to assess for multiple stents and there was some evidence for publication bias using Spearman's rank correlation for technical success using single plastic stents.

Authors' conclusions
Based on clinical success and risk of complication, placement of multiple plastic stents was the best choice for the treatment of benign biliary strictures at the time of the review.

CRD commentary
The review addressed a well-defined question in terms of participants, interventions, study design and relevant outcomes. Relevant databases were searched. The search was only for studies published in English and there was no specific search for unpublished studies, so some studies may have been missed. However, publication bias was assessed and little evidence for it was found. Study quality was not assessed and the included case series were of relatively low-quality design. No efforts to reduce error and bias were reported. Errors included differences in results between tables and text and a lack of clarity in the numbers of studies with different study designs (results reported in this abstract were given in the review tables). Relevant study details were reported, but more details of the non-randomised study were required. The authors did not assess statistical heterogeneity and it was unclear whether pooling of the results was appropriate. The meta-analysis performed was very limited and the significance of results was not reported. The authors acknowledged the small numbers of patients, that there may have been selection bias in in some studies and the study differences in terms of protocols and types of stents used. In view of potential limitations arising from the review process and the poor quality and small size of the included studies, the authors’ conclusions should be treated with caution.

Implications of the review for practice and research
Practice: The authors stated that although overall multiple plastic stents were the best choice, for chronic pancreatitis patients uSEMS were preferred.
Research: The authors identified a need for randomised controlled trials to compare different stent types for benign extrahepatic biliary strictures. They recommended further investigation of use of cSEMS placement as a more patient-friendly and cost-effective treatment.

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