CRD summary
This review compared techniques for closure of the pancreatic remnant after distal pancreatectomy. The authors concluded that the quality and quantity of data are insufficient to allow firm conclusions on the optimal surgical technique. Despite limitations in the analysis of this review, the authors' cautious conclusion accounts for the quality of the evidence presented and can be considered reliable.

Authors' objectives
To compare the techniques available for closure of the pancreatic remnant after distal pancreatectomy.

Searching
MEDLINE (1966 to July 2004), EMBASE (1988 to July 2004) and the Cochrane CENTRAL Register were searched without any language restrictions; the search terms were reported. The reference lists of retrieved studies were also checked. Unpublished studies and studies reported as abstracts were not encountered or included.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) and observational studies were eligible for inclusion.

Specific interventions included in the review
Studies that reported a technical description of at least one surgical procedure for the closure of the pancreatic remnant after distal pancreatectomy, and one control group, were eligible for inclusion. Most of the included studies compared hand suture with stapler closure; others evaluated ultrasonic dissection, scalpel dissection, pancreaticoenteric anastomosis, application of meshes and sealing with fibrin glue.

Participants included in the review
Studies of participants undergoing distal pancreatectomy were eligible for inclusion.

Outcomes assessed in the review
Studies that evaluated pancreatic fistula were eligible for inclusion. Other outcomes related to morbidity and mortality were also of interest to the review.

How were decisions on the relevance of primary studies made?
Three reviewers independently assessed the eligibility of the retrieved studies. Any disagreements were resolved through discussion.

Assessment of study quality
Each of the included studies underwent detailed critical appraisal of the following items: design, population, definition of pancreatic fistula, size, procedure performed, mortality, morbidity and frequency of pancreatic fistula. The authors also assigned a level of evidence to each study and a grade, based on the adequacy of allocation concealment. Three reviewers independently assessed the validity of each included study. Any disagreements were resolved through discussion.

Data extraction
Three reviewers independently extracted data from each of the included studies. Any disagreements were resolved through discussion. Data were extracted on the occurrence of pancreatic fistula, morbidity (not defined) and mortality.

**Methods of synthesis**

How were the studies combined?

Data on the occurrence of pancreatic fistula from studies that compared hand suture with stapler closure were combined using a random-effects meta-analysis. The studies were weighted by sample size and quality of allocation concealment. A pooled odds ratio (OR) with 95% confidence intervals (CIs) was calculated. Data from studies comparing other interventions, and morbidity and mortality outcomes, were tabulated and presented in a narrative synthesis.

How were differences between studies investigated?

Statistical heterogeneity was assessed using the I-squared statistic and visually examined using forest plots.

**Results of the review**

Two RCTs and 8 observational studies (n=1,080) were included in the review. Six of these studies (1 RCT and 5 observational studies; n=479) were included in the meta-analysis.

Overall, the methodological quality of the included studies was poor. Most of the studies were retrospective, observational studies with small sample sizes and did not use methods to minimise selection bias. In addition, there were variations in the reported definition of the outcome.

No statistically significant difference was found in the occurrence of pancreatic fistula between stapler closure and hand suture (OR 0.66, 95% CI: 0.35, 1.26, P=0.21), based on 479 patients in 6 studies. There was moderate evidence of statistical heterogeneity (I-squared 26.3%).

Across all 10 included studies, the rate of pancreatic fistula ranged from 0 to 60.9% and the reported post-operative morbidity ranged from 13.3 to 64%.

**Authors' conclusions**

The quality and quantity of available data were insufficient to allow firm conclusions about the optimal surgical technique for pancreatic stump closure; there was a trend in favour of the stapling technique.

**CRD commentary**

The review addressed a broad range of interventions, but the inclusion criteria were clearly defined. Several relevant sources were searched and attempts were made to limit language bias. However, the authors stated that unpublished data or data from abstracts were not encountered, which suggests the possibility of publication bias. Methods were used to minimise bias and error in the study selection and data extraction processes. In addition, a detailed critical appraisal of each included study, which included an assessment of aspects relating to validity, was undertaken.

The authors acknowledged that the details presented for each study highlight considerable methodological and clinical differences across the included studies. Therefore, the decision to statistically combine studies of the most commonly evaluated techniques was not appropriate, particularly as this involved pooling observational studies and RCTs. The decision to present studies of rare techniques narratively was, however, appropriate. Despite the limitations of the review, the authors’ suitably cautious conclusion accounts for the quality of the evidence presented and appropriately highlights the need for further trials to substantiate the results of the meta-analysis. Thus, the authors’ conclusion can be considered reliable, although it should be noted that the trend observed was not significant.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.
Research: The authors stated that further RCTs are needed to determine whether stapler closure of the pancreatic remnant is superior to handsewn closure, and to evaluate the rarer techniques.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.