A comparison of pancreaticoduodenectomy with pylorus preserving pancreaticoduodenectomy: a meta-analysis of 2822 patients
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CRD summary
This review concluded that pylorus preserving pancreaticoduodenectomy for the surgical excision of pancreatic head and peri-ampullary tumours appeared to be associated with lower mortality and improved long-term survival compared with pancreaticoduodenectomy. The authors' conclusions did not appear to reflect the evidence. Given the limitations of the review and included studies, the conclusions are unlikely to be reliable.

Authors' objectives
To compare the effectiveness of pancreaticoduodenectomy (PD) and pylorus preserving pancreaticoduodenectomy (PPPD) for the surgical excision of pancreatic tumours.

Searching
MEDLINE, EMBASE and unspecified Cochrane databases were searched for studies published up to July 2006. Search terms were reported. No language restrictions were applied. Only published studies were eligible for inclusion in the review. Reference lists of retrieved articles were screened for additional studies.

Study selection
Studies that compared the outcomes of PD and PPPD for the surgical excision of pancreatic tumours were eligible for inclusion in the review. Eligible studies had to report at least one of the following outcomes: survival (primary outcome), perioperative factors or short-term adverse events. In cases where two studies were reported by the same institution, the better-quality study or the most recent publication was usually included. Studies were excluded if their end points were not comparable or were not calculable from published data, or if both treatment groups reported a zero cell in 2x2 tables. Studies that used intraoperative radiotherapy were excluded from the review.

The included studies stated that interventions were carried out between 1973 and 2002. Where reported, 12% to 69% of PD patients received adjuvant therapies compared with 10% to 77% of PPPD patients; most studies failed to report whether adjuvant therapies were used. The age of included participants at the time of surgery ranged from 17 to 86 years. Where reported, 42.45% were female. Tumour size differed significantly between those patients who had tumours resected by PD (0.54cm larger) than those resected by PPPD; there was no significant difference in the number who had stage III or IV disease. Postoperative follow-up ranged from 3.5 to 150 months, where reported.

The authors stated neither how papers were selected for review nor how many reviewers performed the selection.

Assessment of study quality
The authors assessed study quality and each study was awarded a number of stars: studies that scored nine or more stars were judged to be of high quality. The criteria used, how quality scores were awarded and how many reviewers carried out the assessment was not clear.

Data extraction
Data extraction was carried out by two reviewers, with 100% agreement. Survival data (time to event) were extracted using Kaplan Meier plots where necessary and used to calculate the log hazard ratio (HR) and standard error. The authors did not explicitly state how data were extracted for the other outcome measures, but it appeared that odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for dichotomous outcomes. Means and standard deviations were used for continuous outcomes.

Methods of synthesis
The authors did not explicitly report the methods of synthesis used, but they referred to eight papers published by other authors. The methods used were not clear, but it appeared that studies were grouped according to outcome and pooled.
odds ratios, hazard ratios and weighted mean differences (WMDs) were calculated, with 95% CIs. Hazard ratios were pooled and statistical homogeneity was assessed using the $\chi^2$ and $I^2$ statistics. Subgroup analyses were carried out for studies of high quality and studies published during or after 2000; patients with peri-ampullary tumours were analysed separately. The authors referred to the methods of Egger for the assessment of publication bias, but it was unclear whether an assessment was carried out.

Results of the review

Thirty-two studies (n=2,822 patients; 1,335 PD and 1,487 PPPD) were included in the review: five RCTs (n=421); 12 prospective non-randomised studies; and 15 retrospective studies. Eleven studies were given nine or more stars for quality and were judged to be high quality.

In comparison with PD, PPPD was associated with shorter operating times (WMD -41.3 min, 95% CI -9.6 to -73.0; 13 studies), increased overall survival (HR 0.66, 95% CI 0.51 to 0.86; nine studies; significant heterogeneity $p<0.003$), lower perioperative mortality (OR 1.7, 95% CI 1.02 to 2.83; 22 studies) and fewer blood transfusions (WMD 0.9 units, 95% CI 0.85 to 0.96; three studies). No differences between the two groups were reported for postoperative complications, which included pancreatic and biliary leaks or fistulae; only relaparotomy was significantly different and this favoured PPPD (OR 1.59, 95% CI 1.03 to 2.46; six studies).

Overall survival for all tumour types was also significantly improved for PPPD in comparison with PD (HR 0.66, 95% CI 0.51 to 0.86; nine studies). There was no significant difference in overall survival between PD and PPPD for peri-ampullary tumours (seven studies). There was evidence of significant statistical heterogeneity for operating times ($p<0.001$) and overall survival for all tumour types ($p<0.003$); no other analyses were significant.

Subgroup analyses for high quality studies and studies published after 2000 did not show any significant differences in operative time between PD and PPPD.

Authors' conclusions

PPPD appeared to be associated with lower mortality and improved long-term patient survival compared with PD for the treatment of pancreatic head and peri-ampullary tumours; no significant differences in perioperative adverse events were reported.

CRD commentary

This review answered a clear research question. Inclusion criteria for patients in terms of the types of tumour assessed (peri-ampullary or all pancreatic tumours) were not reported clearly and a wide range of study designs were included. A number of databases were searched for relevant studies and no language limitations were used. However, the review was limited to published studies, so there may have been a risk of publication bias. The authors referred to previously reported methods for assessing publication bias, but no data were reported. Two authors extracted the study data, which reduced the risk of bias and error; it was unclear whether similar precautions were taken when selecting the studies for inclusion.

Each study was awarded a number of stars for methodological quality, but the criteria and methods used were not reported and so it was difficult to interpret the reliability of the data. The overall quality was likely to be poor given the reliance on mainly retrospective data and non-randomised designs. The authors failed to report the methods used to analyse their data and merely referred to methods used by a number of other authors in previous publications. Some information can be derived from the tables and figures of data, but it was difficult to make a clear assessment of the validity of the methods without an explicit description of how data were analysed. Abbreviations and symbols used in the data tables were often not explained or defined.

Statistically significant differences between baseline characteristics of patients in the two different treatment groups were identified. Different study designs were pooled together and significant statistical heterogeneity was evident for a number of the pooled effect sizes. Some attempts were made to investigate the effects of different variables, including study quality, study design and publication date on the main outcomes. But, the subgroups often contained only small numbers of studies and patients and therefore may not be reliable. Any assessment of the reliability of this review is severely hampered by the lack of a description of the methods used. The main conclusions stated that PPPD was associated with improved survival, but the subgroup analysis in peri-ampullary tumours showed no significant
differences. Given the poorly described review methods, reliance on retrospective and heterogeneous data and the risk of publication bias, the findings of this review are unlikely to be reliable.

Implications of the review for practice and research
The authors did not state any implications for practice or further research.

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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.