Duodenum-preserving pancreatic head resection versus pancreatoduodenectomy for surgical treatment of chronic pancreatitis: a systematic review and meta-analysis

Diener MK, Rahbari NN, Fischer L, Antes G, Buchler MW, Seiler CM

CRD summary
The review found that in patients with chronic pancreatitis, duodenum-preserving pancreatic head resection (DPPHR) and pancreatoduodenectomy seemed equally effective for postoperative pain relief, overall morbidity and incidence of postoperative endocrine insufficiency. However, DPPHR may be superior for some other outcomes, including quality of life. These conclusions should be interpreted with caution, due to the small amount of evidence available.

Authors' objectives
To compare the effectiveness and safety of duodenum-preserving pancreatic head resection (DPPHR) versus pancreatoduodenectomy for chronic pancreatitis.

Searching
The following databases were searched without language restriction: MEDLINE via PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Journals@Ovid, EMBASE, BIOSIS Previews and Science Citation Index. Search dates varied, but spanned 1945 to December 2006. Search terms were reported. Reference lists of articles retrieved were handsearched and experts in the field were contacted seeking further studies. The search was limited to peer-reviewed publications and was not restricted by language.

Study selection
Randomised controlled trials (RCTs) of elective surgery for chronic pancreatitis were eligible for inclusion, provided they compared DPPHR (using Beger, Fry or modified procedures) with conventional or pylorus-preserving pancreatoduodenectomy (ppPD). Studies were required to report specified review outcomes. The primary review outcome was abdominal pain relief, measured by a validated pain scale or by the rate of pain-free postoperative patients. Secondary outcomes were mortality, morbidity (total and pancreatitis-related), perioperative clinical events (such as blood loss, operation time, hospital stay) and quality of life. Paediatric studies and comparisons of endoscopic or laparoscopic techniques were excluded.

The mean age of participants in the included studies ranged from 43 to 47 years. The percentage of females ranged from 10 to 25. Indications for surgery included abdominal pain, pancreatic head enlargement, duodenal obstruction and bile duct stenosis. Interventions included DPPHR via Beger or modified/unmodified Frey techniques versus ppPD or pancreatoduodenectomy. Duration of follow-up was six or 12 months in two studies and varied between participants in the other two studies. The studies were conducted in Germany or Hungary.

Study selection was conducted by two reviewers working independently. Disagreements were resolved in discussion with a third reviewer.

Assessment of study quality
Study validity was assessed using published criteria (Schulz 1995, Jadad 1996) that related to randomisation, allocation concealment, sample size, participant characteristics, type and duration of follow-up, losses to follow-up and statistical analysis.

Validity assessment was conducted by two reviewers who worked independently and used a standardised form. Disagreements were resolved in discussion with a third reviewer.

Data extraction
Relative risks (RRs) were calculated for binary outcomes and mean differences for continuous outcomes, with 95% confidence intervals (CIs). If standard deviations were not reported, they were calculated from interquartile ranges.
Authors were contacted to request additional information. Data were extracted by two reviewers working independently; disagreements were resolved in discussion with a third reviewer.

Methods of synthesis
Data were combined to produce pooled relative risks and weighted mean differences (WMDs). A random effects model was presented, due to clinical heterogeneity between studies. The effect of using a fixed effect model was also explored. Statistical heterogeneity was assessed by scanning forest plots and by means of the $I^2$ statistic. Subgroup analyses were conducted; studies were grouped by pancreatoduodenectomy technique. A power calculation was performed for the primary review outcome.

Results of the review
Four RCTs were eligible for inclusion (n=200, range 43 to 64). All RCTs described randomisation procedures, two described adequate allocation concealment, three gave details of outcome measures and none justified their sample size or used blinded outcome assessment. Studies included from 83% to 100% of participants in analysis.

**DPPHR versus pancreatoduodenectomy:**

**Postoperative pain relief:** There was no statistically significant difference between the groups (RR 1.08, 95% CI 0.88 to 1.33, p=0.46; four RCTs, n=173).

**Mortality, morbidity and perioperative outcomes:** Pooling of four RCTs showed no statistically significant difference between the groups in mortality, overall morbidity, postoperative pancreatic fistula, delayed gastric emptying and median operating time. DPPHR was associated with a significantly lower need for blood replacement (WMD -1.28 units, 95% CI -2.32 to -0.25, p=0.02; four RCTs, n=184) and shorter hospital stay (WMD -4.23 days, 95% CI -6.46 to -2.00, p<0.01; three RCTs, n=123).

**Function and quality of life:** The DPPHR group had a significantly reduced risk of pancreatic exocrine function impairment (RR 0.20, 95% CI 0.06 to 0.66, p<0.01; three RCTs, n=106) and significantly superior postoperative weight gain (RR 1.93, 95% CI 1.33 to 2.81, p<0.01; four RCTs, n=173), occupational rehabilitation rate (RR 1.36, 95% CI 1.07 to 1.71, p=0.01; four RCTs, n=164) and quality of life (WMD 25.07, 95% CI 18.83 to 31.31, p<0.00001; two RCTs, n=101).

Heterogeneity: The $I^2$ statistic exceeded 50% in the analyses of blood replacement need (88.7%), length of hospital stay (60.7%), pancreatic exocrine function impairment (57.7%) and quality of life (57.1%).

Results did not differ when a fixed-effect model was used. Subgroup analyses were also reported.

Authors' conclusions
In patients with chronic pancreatitis, DPPHR and pancreatoduodenectomy seemed equally effective for postoperative pain relief, overall morbidity and incidence of postoperative endocrine insufficiency; DPPHR may be superior for some outcomes, including quality of life.

CRD commentary
The objectives and inclusion criteria of the review were clear and relevant sources were searched for studies without language restriction. The restriction to published studies meant that at least one relevant study was excluded. It did not appear that publication bias was formally assessed. Relevant criteria were used to assess study validity and steps were taken to minimise the risk of bias and error by having more than one reviewer independently undertake study selection, validity assessment and data extraction. Appropriate statistical methods were used to pool studies and assess for statistical heterogeneity, although the authors did not define how they interpreted the $I^2$ statistic. Heterogeneity was explored by subgroup analyses and discussed in the text, along with other potential sources of bias such as small sample sizes. The review was in most respects well-conducted but, as the authors noted, their conclusions should be interpreted with caution due to the small amount of evidence available.

Implications of the review for practice and research
**Practice:** The authors did not state any implications for practice.
The authors stated that larger and better-designed RCTs were required in this area, including comparisons between duodenum-preserving procedures. They calculated that an RCT with 279 participants in each arm would have 80% power to rule out a 10% reduction in pain associated with DDPHR compared with pancreateoduodenectomy.

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