Extended pancreaticoduodenectomy with vascular resection for pancreatic cancer: a systematic review

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CRD summary
This review concluded that morbidity, mortality and survival outcomes after extensive surgery to remove the pancreas plus associated duodenum/blood vessels for pancreatic cancer with vascular involvement was acceptable in an expert referral centre; it should not be a contraindication to curative surgery. These conclusions should be treated with caution given possible publication bias and the poor quality study designs included.

Authors' objectives
To evaluate the efficacy and safety of extended pancreaticoduodenectomy (surgical removal of the head of the pancreas and the connected encircling loop of the duodenum) with vascular resection compared with standard pancreaticoduodenectomy alone in patients with pancreatic cancer involving critical adjacent blood vessels.

Searching
PubMed was searched from January 1995 to August 2009 for studies published in English. Search terms were reported. Reference lists of retrieved studies were examined for further relevant studies.

Study selection
Controlled trials, well-designed cohort studies and observational studies (level I to III evidence as described by the US Preventative Services Task Force) of more than 10 patients with pancreatic cancer that investigated pancreaticoduodenectomy with vascular resection were eligible for inclusion. Eligible studies had to report complications, mortality and survival outcomes.

The included studies were conducted in the USA, Europe and Asia. Included patients were selected for treatment using computed tomography scans, magnetic resonance imaging or magnetic resonance cholangiopancreatography (radiographic examination of the bile ducts and pancreas) or angiography, where reported. All studies included patients with pancreatic head tumours; 43% of studies included patients with pancreatic body tumours and 25% included those with pancreatic tail tumours. In all included studies, resection of the superior mesenteric-portal vein was undertaken. The celiac axis was resected in 18% of studies, the hepatic artery was resected in 21% and the superior mesenteric artery was resected in 18%.

The authors did not state how many reviewers selected studies for inclusion.

Assessment of study quality
The methodological quality of the included studies did not appear to have been systematically assessed. The studies were classified according to study design.

Data extraction
Morbidity and mortality outcomes and survival data were extracted independently by two reviewers. Disagreements were resolved by discussion and consensus.

Methods of synthesis
The studies were synthesised narratively by outcome; the authors stated that meta-analysis was inappropriate due to heterogeneity between studies and the lack of control comparator arms. Studies were stratified according to whether the study institution was considered high- or low-volume; high volume centres were defined as those that reported more than 20 pancreatectomy procedures per year.

Results of the review
Twenty-eight studies were included in the review (1,458 patients; range 11 to 200). All were retrospective observational studies.
Margin status (21 studies): The rates of microscopically clear margin status after extended pancreaticoduodenectomy with vascular resection ranged from 14% to 100% (median 75%). Rates of grossly clear but microscopically involved margins ranged from 0 to 86% (median 25%).

Survival: Median survival in studies reporting vein resection was 13 months (range five to 23 months) and 18 months (range three to 20 months) in studies reporting both vein and artery resection. Ten of 16 high-volume centres compared survival between patients who underwent extended pancreaticoduodenectomy with vascular resection versus standard pancreaticoduodenectomy; nine of these studies reported there was no statistically significant difference in survival outcomes. Median survival of patients who underwent extended pancreaticoduodenectomy with vascular resection was 15 months (range nine to 23 months).

Postoperative complications and mortality: Mortality rate ranged from 0 to 17% (median 4%) in 27 studies. The median length of hospital stay was 17 days (range 11 to 69 days). The rates of complications were also reported.

Authors’ conclusions
The morbidity, mortality and survival outcomes after undertaking extended pancreaticoduodenectomy with vascular resection for pancreatic cancer with venous involvement and/or limited arterial involvement was acceptable in the setting of an expert referral centre and should not be a contraindication to a curative surgery.

CRD commentary
The research question was supported by defined inclusion criteria. Only one database was searched for studies published in English, so the review was prone to publication and language bias; there was the possibility that relevant studies could have been missed. Data were extracted in duplicate, reducing the possibility of reviewer error and bias. It was not reported whether similar steps were taken for study selection.

Although included studies were classified by study design and the strength of study design noted, a systematic quality assessment was not performed. The study designs included were at high risk of bias and generally included a small number of participants, so the reliability of their results is uncertain. A narrative synthesis appeared appropriate in light of the heterogeneity between the studies.

The possibility of publication bias and missed studies, and the poor quality study designs included suggests that the authors’ conclusions should be considered with caution.

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

Research: The authors stated that in order to improve survival, an effective systemic chemotherapeutic agent must be sought and tested in trials of neoadjuvant and/or adjuvant therapy with radiotherapy as well as with immunotherapy to complement the oncological benefit after a complete surgical resection.

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