

Review

Pancreaticogastrostomy versus pancreaticojejunostomy
after pancreaticoduodenectomy: A meta-analysis of
randomized control trials



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Abstract

Background: Postoperative pancreatic fistula (PF) is the leading morbidity after pancreaticoduodenectomy (PD). The pancreaticoenteric anastomosis method after PD is associated with the occurrence of PF. Evidence shows that pancreaticogastrostomy (PG) is possibly superior to pancreaticojejunostomy (PJ) in reducing the incidence of PF after PD; however, this remains to be definitively confirmed.

Methods: Randomized clinical trials (RCTs) comparing the outcomes of PG versus PJ after PD were retrieved for meta-analysis.

Results: After a thorough search of the English literature published until March 23rd, 2014, we identified seven RCTs involving 1095 patients (PG group, 548; PJ group, 547) for final analysis. Meta-analysis revealed that the incidence of PF was significantly lower in the PG group (15.7%) than in the PJ group (23.0%, 126/547; OR = 0.61, 95% CI: 0.45–0.83, $P = 0.002$). Furthermore, the incidence of intra-abdominal fluid collection was also lower in the PG group than in the PJ group (OR = 0.43, 95% CI: 0.28–0.65, $P < 0.0001$). No significant differences were found between the PG and PJ groups in terms of delayed gastric emptying, hemorrhage, overall morbidity and mortality.

Conclusions: PG seemed to be superior to PJ in reducing the incidence of PF and intra-abdominal fluid collection after PD.

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Keywords: Pancreaticoduodenectomy; Pancreaticogastrostomy; Pancreaticojejunostomy; Pancreatic fistula; Meta-analysis

Introduction

Pancreaticoduodenectomy (PD) is the gold standard operation for periampullary tumors. However, the morbidity after PD is as high as 40%–50%.^{1,2} One of the most common complications of PD is pancreatic fistula (PF), which occurs in 0–32% of patients.^{3–6} Many factors are associated with the formation of a PF after PD. However, it remains unknown whether the pancreatic reconstruction methods pancreaticogastrostomy (PG) and pancreaticojejunostomy (PJ) are independent risks factors for PF after PD. The results from retrospective studies and randomized clinical trials (RCTs) have been discordant.^{7–16} Due to the relatively small

samples sizes of previous RCTs, it is difficult to draw a definitive conclusion. Thus Topal and his college recently conducted a multicenter RCT of large scale and found that PG remarkably reduces the incidence of PF after PD,¹⁷ in line with another RCT from Spain.¹⁸

To further analyze these mixed findings, we conducted a meta-analysis of all RCTs that compared PG versus PJ, in order to clarify whether PG is superior to PJ in reducing PF and other morbidity after PD.

Methods

Search strategy

A computerized search of the Medline, Embase, Web of Science, Cochrane Library and Cochrane Clinical Trials

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Registry databases was performed to identify articles published in English until March 23rd, 2014. The following Medical Subject Headings (MeSH) terms combined with free-text search terms were used: pancreatic resection, pancreaticoduodenal resection, Whipple's operation, pancreaticoduodenectomy, pancreaticogastrostomy, pancreaticojejunostomy, pancreaticoenteric anastomosis. Relevant papers were also identified from the references of the searched articles by manual cross-searching. All searches were performed in duplicate and conducted independently by two authors (Dongjie Yang and Kaiwu Xu).

Inclusion and exclusion criteria

Two authors (Zhihui Chen and Yin Li) identified and screened the search findings for potential RCTs that compared the effects of PG versus PJ on PF or overall complications after PD. Final inclusion was determined by consensus, and when this could not be reached, a third author (Yulong He) adjudicated. For inclusion in this meta-analysis, studies were required to be written in English and mention at least one of the following complications: PF, intra-abdominal fluid collection, hemorrhage, and delayed gastric emptying (DGE). Studies published as abstracts, editorials, letters, expert opinions, reviews, case reports or observational studies and studies lacking a control group were excluded. The methodological quality of the included studies was scored using the Jadad scoring system based on the randomization, double-blinding methods, and description of withdrawals.¹⁹

Surgical technique

PD could be performed using the classic method (with distal gastrectomy) or the pylorus-preserving modification. Briefly, after the pancreatic head and duodenum was mobilized and the pancreas was divided anteriorly, the pancreatic remnant was mobilized and ready for anastomosis. For PG, a small gastrotomy (usually 2–3 cm) was made in the posterior gastric wall and PG was performed using end-to-side method, with or without telescoped and invaginated fashion. For PJ, the anastomosis between pancreatic remnant and jejunum was performed using end-to-end or end-to-side or side-to-side method, with or without duct-to-mucosa anastomosis and telescoped fashion. The type of sutures and number of suture layers were decided by the surgeon. The placement of pancreatic duct stent, drainage, and nasogastric tubes were based on the surgeon's judgment.

Definitions of complications

The primary outcome was postoperative PF. PF is an abnormal communication that extends from the pancreatic ductal epithelium to another epithelial surface and contains pancreas-derived, enzyme-rich fluid. PF has been defined definitively by the International Study Group on Pancreatic

Fistula (ISGPF).²⁰ The secondary outcomes were DGE, intra-abdominal fluid collection, hemorrhage, overall morbidity and mortality. Intra-abdominal fluid collection was defined as the presence of fluid inside the abdomen on radiological examination, regardless of infection. DGE was defined as the requirement of nasogastric decompression for more than 9 or 10 days after surgery. Hemorrhage was defined as bleeding through nasogastric tube and/or drains, that confirmed by fibroendoscopy or arteriography but not mandatory.

Data collection

Data regarding study description, population characteristics, intraoperative conditions and outcome parameters were extracted independently by two authors. Inconsistencies were resolved by consensus, and when this could not be reached, a third author adjudicated.

Statistical analysis

All statistical analyses were performed with Review Manager 5 software (The Cochrane Collaboration, Oxford, UK). Heterogeneity was assessed by means of the χ^2 test, with $P < 0.05$ considered to represent a statistical difference. I^2 values were applied for the evaluation of statistical heterogeneity, and $I^2 > 50\%$ indicated the presence of heterogeneity.²¹ A random-effects model was adopted only in if heterogeneity was present; otherwise, a fixed-effects model was used. The results of all meta-analyses are presented as odds ratios (ORs) with 95% confidence intervals (95% CIs). Funnel plots were reported to evaluate potential publication bias. $P < 0.05$ represented a statistical difference.

Results

Study selection

The initial search identified 916 studies published up to March 23rd, 2014. After screening all titles, abstracts and texts, seven RCTs^{13–18,22} that met the inclusion criteria were retrieved for analysis (Fig. 1). All of the included studies did not use blind method, thus all score 3 according to the Jadad scoring system.

The seven RCTs included a total of 1095 patients, ranging from 90 to 329 patients in each study. Of the 1095 PD patients, 548 underwent PG and 547 underwent PJ. The most common primary disease was pancreatic cancer, followed by cancer of the ampulla of Vater, distal common biliary duct cancer and duodenal cancer (Table 1). All but two studies^{13,16} used the somatostatin and its analog during the perioperative period. Data of perioperative nutritional support was available for 2 studies.^{13,17} Stents were not routinely used, except for one study.¹⁶ Pylorus-preserving pancreaticoduodenectomy (PPPD) were partly

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