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Effects of antecolic versus retrocolic reconstruction for gastro/duodenojejunostomy on delayed gastric emptying after pancreatoduodenectomy: a systematic review and meta-analysis



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ABSTRACT

Background: Delayed gastric emptying (DGE) is a relatively common complication after pancreatoduodenectomy (PD). The aim of this study was to determine whether DGE is affected by antecolic or retrocolic reconstruction for gastro/duodenojejunostomy after PD. **Methods:** A literature search was performed of the MEDLINE (PubMed), Ovid SP, ISI Web of Knowledge, EMBASE, and Cochrane databases to identify randomized controlled trials (RCTs) and clinical observational studies related to this topic from January 1995 to November 2014. Pooled odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for categorical outcomes, and mean differences (MD) using fixed-effect and random-effects models were calculated for the meta-analysis.

Results: Fourteen studies including 1969 patients met the inclusion criteria. Six studies were RCTs, and eight studies were clinical observational studies. DGE was less common in the antecolic reconstruction group than in the retrocolic reconstruction group (OR = 0.24 [0.12–0.48], $P < 0.0001$). Postoperative days to start solid foods (MD = -3.67 d [-5.10 to -2.33], $P < 0.00001$) and length of hospital stay (MD = -2.90 d [-5.36 to -2.33], $P < 0.00001$) were also significantly in favor of the antecolic reconstruction group. There was no difference in the incidence of pancreatic fistula, intra-abdominal fluid collection or abscess, biliary fistula, or mortality. However, in the subgroup analyses, using the data of six RCTs or seven studies according to the International Study Group of Pancreatic Surgery definition, there was no significant difference in the incidence of DGE.

Conclusions: Antecolic reconstruction for gastro/duodenojejunostomy does not seem to offer an advantage over retrocolic reconstruction with respect to DGE after PD.

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1. Introduction

Since Whipple *et al.* first reported three patients who underwent pancreatoduodenectomy (PD) in 1935 [1], it has been considered as the standard surgical treatment and the only possibly curative treatment for pancreatic and other periampullary malignancies. In recent decades, the operative mortality of PD has been reduced to <5% in high-volume centers, but postoperative morbidity still remains high, at 30%–60% [2–4]. One of the most common postoperative complications after PD is delayed gastric emptying (DGE), with an incidence of between 5% and 81% [5–9]. DGE is usually not a life-threatening complication, but this condition results in delaying oral alimentation, prolonging the hospital stay, decreasing quality of life, and increasing the cost of hospitalization [10]. The most widely accepted definition is the consensus definition of the International Study Group of Pancreatic Surgery (ISGPS), which is structured by a three-level classification based on the clinical impact (i.e., the inability to eat a normal diet or the prolonged use of a nasogastric tube or the need for re-introducing a nasogastric tube) [7].

Although previous studies have reported that DGE is related to the presence of other intra-abdominal complications such as hemorrhage, pancreatic fistula, and abdominal collections, the etiology of DGE without intra-abdominal complications remains largely unclear [11].

Several studies have shown that DGE is closely related to the reconstruction technique. Therefore, various modifications of the reconstruction method, including PD with or without pylorus preservation, Billroth I *versus* Billroth II, associated Braun enteroenterostomy, route of gastro/duodenojejunostomy, etc., have been advocated to reduce the incidence of DGE [12,13].

After PD, two reconstruction routes for gastro/duodenojejunostomy (G/DJ) are associated with the transverse colon (the antecolic route and the retrocolic route), which have been widely accepted and commonly used according to surgeons' preferences. Several studies have reported that the incidence of DGE ranges from 5% to 81%, and they generally favor the antecolic over the retrocolic route [6,9,10,14–17]. However, other studies have recently reported that the route of gastro/duodenoenteric reconstruction after PD does not affect the postoperative incidence of DGE [18–21]. This systematic review and meta-analysis were performed to compare antecolic and retrocolic reconstruction after PD with respect to the relative risk of DGE and measure other secondary outcomes.

2. Methods

2.1. Study selection

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used in the construction of this systematic review and meta-analysis [22]. A comprehensive systematic literature search was carried out in the MEDLINE (PubMed), Ovid SP, ISI Web of Knowledge, EMBASE, Cochrane Central Register of Controlled Trials, and the

Cochrane Database of Systematic Reviews in the Cochrane Library to identify articles reporting randomized and observational studies from January 1995 to November 2014. The following medical subject headings or keywords were used with the appropriate combinations: “pancreaticoduodenectomy, pancreatoduodenectomy, Whipple, pancreatoduodenal resection, duodenojejunostomy, gastrojejunostomy, delayed gastric emptying, antecolic reconstruction, and retrocolic reconstruction”. An extended manual search was performed using the “related article” function of the databases and by scanning the references of all relevant articles.

2.2. Inclusion and exclusion criteria

In this systematic review, all studies were included based on the following criteria: English-language articles published in peer-reviewed journals; human studies; randomized controlled trials (RCTs), and prospective or retrospective clinical observational studies comparing the results of antecolic *versus* retrocolic reconstruction for G/DJ after PD; and reporting on the definition and outcomes of DGE.

The following studies were excluded: conference abstracts, reviews, letters, expert opinions, editorials, case reports, studies lacking control groups or appropriate data for extraction, and studies that focused on comparisons of the route of the afferent jejunal limb.

In the final analysis, when multiple studies were published by the same institute and/or authors, either the higher quality study or the more recent publication was included.

Each included study was evaluated according to the grading system of the Centre for Evidence-Based Medicine (Oxford, UK).

2.3. Outcome measures

The primary outcome measure was the incidence of DGE. Secondary outcome measures included postoperative days to start solid foods, pancreatic fistula (PF), intra-abdominal fluid collection, biliary fistula, length of stay, and mortality. DGE was defined in accordance with the ISGPS definition [23] or as defined by the authors in studies reported before 2009 (i.e., the need for nasogastric decompression beyond 10 d after surgery, etc.). Pancreatic fistula was defined in accordance with the International Study Group on Pancreatic Fistula (ISGPF) definition [24] or as defined by the authors in studies reported before 2006. Intra-abdominal fluid collection was defined as the presence of intra-abdominal fluid detected by computed tomography or ultrasonography, regardless of the presence of infection and/or abscess. Biliary fistula was defined as a bilirubin-containing discharge of typical color. Overall morbidity included all complications occurring from operation to discharge. Mortality was defined as death from any cause before discharge from hospital.

2.4. Data extraction

Two authors (M.I. and Y.K.) independently screened the title and abstract of each publication for potentially eligible studies. Then, full articles of eligible trials were obtained for

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