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The effect of antecolic versus retrocolic reconstruction on delayed gastric emptying after classic non–pylorus-preserving pancreaticoduodenectomy

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Abstract

BACKGROUND: Delayed gastric emptying (DGE) after pancreaticoduodenectomy increases length of hospital stay and costs, and may be influenced by surgical techniques.

METHODS: We retrospectively compared 400 patients with antecolic gastrojejunostomy with 400 patients with retrocolic gastrojejunostomy for the occurrence of DGE.

RESULTS: The prevalence of DGE was 15% in the antecolic group and 21% in the retrocolic group ($P = .021$), and median length of stay was shorter for the former (8 vs 10 days, $P = .001$). The difference was statistically significant with grade A DGE (9% vs 14%, $P = .038$), but not B or C. In a multivariate analysis, DGE was influenced by retrocolic reconstruction, as well as older age, chronic pancreatitis, preoperative bilirubin level, a history of previous upper abdominal surgery, and postoperative pancreatic fistula.

CONCLUSIONS: An antecolic gastrojejunostomy for classic non–pylorus-preserving pancreaticoduodenectomy is associated with a lower incidence of mild DGE (grade A) and a shorter length of stay.

Within recent decades, pancreatic surgery has become safe in high-volume hospitals. A pancreaticoduodenectomy (PD), the standard procedure for pancreatic and periampullary tumors, should nowadays be performed with a perioperative mortality below 3%.[1,2] Nevertheless, postoperative complications like pancreatic fistula, intra-abdominal abscess, hemorrhage, and delayed gastric emptying (DGE) are still seen in 20% to 45% of patients, with resultant longer length of stay and higher cost.[3] While DGE is generally not a threat to life and can be treated conservatively, interventions like the need for a central line or a percutaneous enteric feeding tube may be required to maintain nutrition until oral alimentation is tolerated.

Little is known about the pathophysiology of DGE. Some authors have reported that DGE is associated with other postoperative intra-abdominal complications such as hemorrhage, pancreatic fistula, and abdominal collections.[3,4] Others have hypothesized that DGE may be caused

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by postoperative local partial ischemia of the stomach, vagal dysfunction, the absence of motilin after duodenectomy, and/or pylorospasm related to devascularization of the pylorus after pylorus-preserving PD.[5–7]

Various surgical techniques, including the method of reconstruction of the gastric outlet (antecolic vs retrocolic) and pylorus-preserving (with or without pylorus dilation) versus classic PD, have been compared.[8–12] A recent meta-analysis showed a significant reduction of DGE after preoperative biliary drainage (12% vs 17%) and for an antecolic gastrojejunostomy versus retrocolic reconstruction (10% vs 22%).[4] Nonetheless, the authors concluded that the evidence did not permit definite conclusions and that larger series are needed.

This study was conducted to compare the impact of the route of gastric drainage (antecolic vs retrocolic) on DGE after classic pancreatoduodenectomy with antrectomy in a large single-center series.

Patients and Methods

With the approval of the Institutional Review Board (IRBprotocol # 2012-P-000619/1), patients who underwent a classic PD with antrectomy at the Massachusetts General Hospital between 2000 and 2012 were identified from a prospective database. Patients were excluded if they had prior history of gastric surgery or subtotal colectomy (n = 13). In addition, patients were excluded if a step-by-step return to a normal diet was not attempted because they were fasted and required parental nutrition to treat postoperative pancreatic fistula after surgery or if they required prolonged mechanical ventilation because of postoperative complications (n = 38), including 11 fatal complications. After exclusion of these patients, 400 consecutive patients with antecolic reconstruction were compared with 400 consecutive contemporaneous patients with retrocolic reconstruction. All patients were operated upon by a team of specialized pancreatic surgeons. One surgeon (C.F.C.) routinely performed an antecolic reconstruction, whereas the others (A.L.W., S.P.T., and J.W.) used a retrocolic technique.

Patient demographic and clinicopathologic characteristics were recorded. Variables included sex, age at the time of surgery, personal medical history, details on the surgical procedure and the postoperative course, and the final pathologic findings.

Surgery

PD was performed with an antrectomy. If the tumor infiltrated into the portal vein or superior mesenteric vein, a segmental or lateral resection of the vein was performed to achieve negative margins. In malignant diseases, a standard lymphadenectomy was routinely performed.

For reconstruction, the proximal jejunum was brought through the transverse mesocolon by a retrocolic route. A standardized 2-layer, end-to-side, duct-to-mucosa pancreaticojejunostomy was performed in the majority of cases (>95%) with an external transabdominal pancreatic stent. Distal to the pancreatic anastomosis an end-to-side hepaticojejunostomy was made. The jejunal loop was then fixed to the transverse mesocolon and an antecolic or retrocolic Hofmeister-type Billroth II gastrojejunostomy was performed. Soft closed-suction drains were placed anterior and posterior to the pancreatic and biliary anastomosis. A nasogastric tube was routinely placed intraoperatively.

Postoperative management

Both groups followed the same postoperative care pathway: The nasogastric tube was typically discontinued on day 1 or 2 and clear liquids were given on day 2. The diet was then step-by-step advanced to low-fat soft solids in frequent small portions as tolerated by the patient. In the event sufficient oral intake was not possible by day 7 to 10, a gastrografin contrast upper gastrointestinal study was usually performed to rule out mechanical obstruction. In cases of severe DGE, measures such as replacement of the nasogastric tube, prokinetic agents, and parenteral nutrition via a central line were undertaken.

Drains were individually removed after day 3 if no pancreatic or biliary fistula was apparent. The pancreatic stent (a 5-F pediatric feeding tube) was removed in the office after 3 weeks.

Definition of DGE

DGE was diagnosed according to the definition proposed by the International Study Group of Pancreatic Surgery.[13] The grades were defined as follows: A: need for nasogastric tube (NGT) intubation for 4 days or NGT reinsertion after postoperative day (POD) 3, or inability to tolerate a solid diet by POD 7; B: need for NGT intubation for 8 days or NGT reinsertion after POD 7, or inability to tolerate a solid diet by POD 14; C: need for NGT intubation for 15 days or NGT reinsertion after POD 14, or inability to tolerate a solid diet by POD 21.

Definitions of other complications

Postoperative complications were classified according to the validated classification system by Clavien grade.[14] Grade I and II (minor) complications describe deviations from a normal postoperative course that can be treated conservatively. Grade III complications require interventions under local (IIIa) or general anesthesia (IIIb). Grade IV complications require intensive care unit management because of single (IVa) or multiorgan failure (IVb). A grade V complication was defined as death during the hospital stay or within 30 days of surgery. Only the most severe complication was accounted. Pancreatic fistula was defined