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ORIGINAL ARTICLE

A modified technique of pancreaticogastrostomy with short internal stent: A single surgeon's experience

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KEYWORDS

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Summary *Background/Objective:* Postoperative pancreatic fistula (POPF) remains an important cause of morbidity and mortality after pancreaticoduodenectomy. Pancreaticogastrostomy (PG) as a reconstruction method after pancreaticoduodenectomy is a safe and optional surgical technique in decreasing the risk of POPF. In this study, a retrospective analysis was carried out to evaluate a new modification of PG technique that uses a two-layer anastomoses with an internal stent.

Methods: Forty-seven patients underwent this newly modified PG technique between February 2012 and August 2016. Demographics, histopathological findings, type of surgery performed, perioperative parameters, postoperative length of stay, postoperative complications and interventional procedures, follow-up, and mortality data were collected and analyzed. Clavien–Dindo classification was used to grade the complications' severity.

Results: Postoperative mortality was 4.25%, unrelated to POPF, and postoperative morbidity was 44.68%. Thirteen patients had severe (>Grade IIIa) complications, according to Clavien–Dindo classification. As classified in accordance to the International Study Group of Pancreatic Fistula, 24 (51.06%) patients developed Grade A POPF, and no occurrence of Grade B/C POPF was noted. All patients recovered uneventfully with successful treatment interventions.

Conclusion: The reported PG anastomotic technique is a safe and dependable reconstruction procedure with acceptable morbidity and mortality.

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Conflicts of interest: The authors declare that there are no conflicts of interest.

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1. Introduction

Pancreaticoduodenectomy (PD) or Whipple's procedure is a complex surgery performed for various benign and malignant diseases on the pancreatic head, duodenum, periampullary region, and the distal part of the common bile duct.¹ The development of postoperative pancreatic fistula (POPF) after PD could potentially contribute to severe complications such as intra-abdominal abscess,² intraperitoneal bleeding, delayed gastric emptying (DGE),³ postoperative pancreatic hemorrhage, wound infection, and/or peritonitis.^{4,5} Hence, this would contribute to longer hospital stays, increased healthcare costs, severe morbidity, or even surgical mortality.^{6,7} The occurrence rate of POPF was reported to be between 0% and 17%.^{8,9} Despite advancements in perioperative management and reconstructive surgical techniques, the overall postoperative morbidity remains high, even at high volume centers, ranging from 30% to 50%,^{10–12} whereas the mortality rate has been reduced to less than 5%.¹³

To date, there has been no consensus between the common methods for pancreatic-enteric anastomosis—pancreaticojejunostomy (PJ) and pancreaticogastrostomy (PG), as to which is the superior surgical reconstruction method after PD.^{14,15} Recent retrospective studies proposed that PG reduced the POPF rate more compared with PJ.^{16,17} However, one recent meta-analysis of six randomized controlled trials indicated that there were no differences in the postoperative complications and mortality rates between PJ and PG.¹⁸ Despite this, PG is still an alternative for pancreatic anastomosis for many surgeons, with some theoretical physiologic and technical advantages over PJ,^{2,19} such as excellent anastomotic healing, which is facilitated by the abundant gastric blood supply to the stomach wall, and the ability of the stomach wall to hold sutures well.^{14,15,20}

Several PG anastomotic technical modifications have been reported to reduce PF, including twin square wrapping with duct-to-mucosa anastomosis,²¹ single purse-string suture duct-to-mucosa anastomosis,²² full-thickness suture,²³ and double-binding continuous hemstitch sutures.²⁴ Nevertheless, a "gold standard" surgical technique has yet to be established. The objective of this retrospective, noncomparative study was to evaluate a newly modified PG anastomotic technique—a two-layer anastomosis (an external interrupted suture and an internal continuous suture) with an internal stent.

2. Patients and methods

The medical records of 47 patients who had undergone PD followed by PG between February 2012 and August 2016 at Sunway Medical Centre, Selangor, Malaysia, were retrospectively reviewed. Ethical approval was obtained from Sunway Medical Centre Independent Research Ethics Committee. Patients' data collected included demographics (age and sex), histopathological findings, types of surgery performed [classic Whipple or pylorus-preserving pancreaticoduodenectomy (PPPD)], perioperative parameters (operating time, blood loss, and blood transfusion), postoperative length of stay, postoperative complications and

interventional procedures, follow-up, and mortality. The severity of the complications was scored using the Clavien–Dindo classification of surgical complications,^{25,26} where Grade I and Grade II indicate no or nonsevere complications, Grade IIIa to Grade IVb indicate severe complications to multiorgan dysfunction, and Grade V indicates death. Patients routinely received total parenteral nutrition until Postoperative Day (POD) 5. The volume and concentration of fluid amylase in the surgical drains were measured on POD 3 and POD 5 to identify the presence of POPF. The upper limit of normal serum amylase value in our hospital was 160 U/L. According to the International Study Group of Pancreatic Fistula (ISGPF), POPF is defined as a drain output of any measurable volume of fluid and more than three times the serum amylase concentration in drainage fluid on or after POD 3. POPF was then classified as follows: Grade A, fistula without any clinical impact; Grade B, fistula which required persistent drainage of more than 3 weeks and presented signs of infections; and Grade C, fistula which necessitated aggressive clinical interventions.¹³ DGE was defined as the incapability of tolerating normal diet by POD 7 and required prolonged nasogastric intubation.²⁷ A bile leak was defined as an increase of drainage bilirubin levels on or after POD 3 based on International Study Group for Liver Surgery.²⁸ Chylous ascites was denoted as the lipid-rich lymph collection in the peritoneal cavity.²⁹ Operative mortality referred to the occurrence of death postoperatively within 30 days.

2.1. Surgical technique

After PD was performed (either the classic Whipple's resection or duodenal-preserving resection), the restoration of pancreatic remnant to gastrointestinal continuity was via PG.

After transection of the neck or body of the pancreas, the distal pancreatic stump was mobilized for 2 cm off the splenic vein and the surrounding structures. Two traction sutures were applied to the superior and inferior borders of the pancreas close to the cut edge. Some tributaries of splenic veins joining the posterior surface of the pancreatic stump were carefully cauterized or ligated. The stomach was mobilized distally, and all posterior adhesion was divided. The stomach was positioned to sit naturally in its original position but ensuring that the distal part was mobile.

Next, a small infant feeding tube (6F or 8F) was inserted into the pancreatic duct and secured to the pancreatic parenchyma with 4/0 polydioxanone (PDS) sutures. The protruding end of the tube was cut approximately 3–4 cm away from the pancreatic stump, thus forming an internal stent (Figure 1).

The pancreatic stump was brought to the posterior surface of the stomach, and a series of full-thickness suturings (4/0 Prolene, Prolene, Ethicon, USA) was passed through the pancreatic parenchyma (Figure 1). These sutures were then passed through the posterior layer of the stomach and ligated, thus securely anchoring the pancreatic stump to the stomach. The presence of the pancreatic stent prevented the inadvertent incorporation of the main pancreatic duct with the full-thickness sutures.

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