Anterior gastrotomy technique of fashioning pancreaticogastrostomy following pancreaticoduodenectomy for pancreatic head and periampullary cancer

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Several techniques are available for reconstruction of pancreaticoenteric continuity and include pancreaticojejunostomy (PJ) with its numerous modifications and pancreaticogastrostomy (PG). The technique used largely depends on the surgeon’s preference.

Most individual studies, multicenter retrospective analysis and certain prospective studies report a lower leak rate with PG when compared to PJ.[1-3]

Although we have been using PG lately, we intend not to discuss the superiority of one over the other in this article. Here we describe a technique using anterior gastrotomy and retraction of the cut end of the stomach to fashion PG following pylorus preserving pancreatoduodenectomy (PPD) and the standard pancreaticoduodenectomy (PD) (Whipple’s operation) respectively. No report about the anterior gastrotomy technique has been published in indexed medical literature from India, though it has been reported in world literature before.[4-8] We have slightly simplified the procedure and have found it suitable for creating PG. It intends to overcome the disadvantages of the traditional technique of PJ and has low complication rates.

OPERATIVE TECHNIQUE

Steps of pancreaticogastrostomy
We prefer constructing the PG after PD by retracting the cut end of the stomach and in PPD by the anterior gastrotomy technique.

Preparation of pancreatic stump for PG
The cut end of the pancreas is examined carefully and hemostasis is secured by applying loops of 3 ‘0’ silk sutures. The pancreatic duct is identified and its position marked with a long silk suture. A 2 cms length of pancreas is mobilized from all around taking care on the superior and posterior part to safeguard the splenic vein.

Preparation of the stomach
a. For PG after PPD
A 10 cms long anterior gastrotomy is made. Next a 3 cms long incision is made in the line of axis of the stomach, on its posterior wall. Hemostasis is secured [Figure 1].
b. For PG after PD
The clamps on the cut end of the stomach are opened. Anterior cut end of the stomach is retracted. A 3 cms long incision in the line of axis of the stomach, on its posterior wall, is then made. Hemostasis is secured at each step [Figure 2].

Method of PG
A pair of Babcock forceps is passed through the posterior gastrotomy wound and the mobilized cut end of the pancreas is lightly held and steadied as the stomach is pushed around the pancreas. The stump of the
The pancreas is now within the lumen of the stomach. Interrupted silk sutures are applied from within the stomach in single layer. Each stitch is taken through full thickness of the stomach and half cm rim of the pancreas all around at 1 cm interval. Care is taken not to include the pancreatic duct in the suture line with the help of the identifying suture. All sutures are next tied avoiding undue tension or tightening (tension causes sutures to cut through the friable pancreas and tightening can result in stump pancreatitis). The cut end of the pancreas protrudes in the lumen of the stomach. The pancreatic duct is checked before closure, using a fine probe, to ensure that the pancreatic duct is patent. The anterior gastrostomy is closed in case of PPD and the duodenal end (or cut end of the stomach in PD) anastomosed to jejunum.

**DISCUSSION**

We have used the anterior gastrostomy and retraction of the cut end of stomach for PG anastomosis in 55 patients in the last 3 years. The indications for pancreaticoduodenectomy were periampullary cancer (n=19), ampullary cancer (n=10), and carcinoma head of the pancreas (n=26). Altogether, 35 patients underwent PPD and 20 standard PD. There was no operative mortality, pancreatic fistula or anastomotic site hemorrhage. Delayed gastric emptying needing prolonged nasogastric drainage was seen in 9 (25.7%) patients following PPD and in 6 (30%) patients following standard PD. The duration of operation ranged between 150 to 280 minutes. 27 patients did not require blood transfusion. In the rest 1 to 4 (mean 1.8) units of blood was required in the perioperative period. The mean postoperative hospital stay was 14 days.

Patients routinely received prophylaxis against stress ulceration and none were given octreotide in the postoperative period. We use a feeding jejunostomy to promote enteral nutrition early in the postoperative period. We also routinely administer metoclopramide to all our patients from the immediate postoperative period. It helps not only to overcome postoperative nausea and vomiting but also aids in early return of bowel motility and might contribute to less incidence of gastroparesis in our patients.

**Definition of pancreatic leak**

1. Persistence of nonbilious drain output of more than 50ml > 4 days
2. Drain fluid / serum amylase ratio > 3
3. Radiological evidence of leak with or without clinical features of sepsis.

We have found that fashioning PG through the anterior gastrostomy approach is technically easier to perform as the pancreatic tissue holds suture better with stomach, the latter being anatomically closer to pancreas than jejunum, has thicker walls, wider lumen and rich blood supply making operative handling and healing more secure.

Authors\(^4\) have earlier reported the anterior gastrostomy technique of PG with no reports of pancreatic fistula, gastrointestinal hemorrhage or any major complications related to the technique that corroborated with our finding. Takano S, et al\(^5\) constructed a two layered stented PG using anterior gastrostomy following PPD. We, however never use a stent in construct-
ing the pancreaticogastric anastomosis. Recent literature also suggests that pancreatic stenting may not be vital in preventing pancreatic fistula and exocrine insufficiency after pancreaticogastrostomy.\[9\]

Though a relatively new technique, we have found it particularly useful in PPD with the following benefits:

1. The anastomosis is carried out under direct vision, is technically easier to construct and ensures adequate hemostasis of the suture line, thereby preventing suture line hemorrhage that may result in life threatening postoperative gastrointestinal bleed or predispose to leak.
2. The technique obviates the need for blind invagination of the pancreas that can result in uncontrolled or disproportionate tension on the suture line, accidental inclusion of the pancreatic duct or undue tightening.
3. The total operative time required is also reduced. Duration of operation >6 hours has been reported to act as an independent risk factor for intra-abdominal complications and for pancreaticoenteric fistula.\[10\]

Stump pancreatitis, an important complication of PG, has been attributed to a tight anastomotic technique or due to accidental occlusion of the pancreatic duct by suture.\[11\] Undue tension at the time of invagination of the pancreatic stump can result in cutting of sutures through the friable pancreas. By testing for ductal patency after construction of PG, which is possible only by the anterior gastrotomy technique, one can cross check patency.

The anterior gastrotomy does not add to extra-morbidity or mortality as there are no reports of gastrotomy site leak/hemorrhage or delayed gastric emptying due to the technique per se.

Retraction of the cut end of the stomach after PD: Retraction of the cut end of the stomach after PD is sufficient for PG. It provides a direct view of the anastomotic site without the need for anterior gastrotomy. Also in the standard PD the distal stomach is resected leaving not much of the proximal stomach for the procedure. This is however not possible after PPD.

**CONCLUSION**

The technique of anterior gastrotomy for fashioning PG is a technically easy method and ensures good pancreaticogastrostomy anastomosis following PPD. It might thereby be a step forward in preventing the dreaded postoperative complications like pancreatic fistula, stump pancreatitis or gastrointestinal hemorrhage.

**REFERENCES**