Pancreaticogastrostomy — an alternate for dealing with pancreatic remnant after pancreaticoduodenectomy — experience from a tertiary care center of Pakistan

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Abstract

Whipple's pancreaticoduodenectomy has been refined over the years to be a safe operation though the morbidity rate still remains high (30-50%). Pancreatic fistula is the most important cause of mortality following pancreaticoduodenectomy. To prevent it, surgeons have used two anastomotic techniques: pancreaticojejunostomy and pancreaticogastrostomy. Recent studies found that pancreaticogastrostomy is associated with fewer overall complications than pancreaticojejunostomy.

This is a retrospective review of patients who underwent Whipple's at Aga Khan University Hospital and had pancreaticogastrostomy as a preferred anastomosis for pancreatic stump.

Forty four patients met the inclusion criteria, 27 were male. No patient developed post-operative pancreatic fistula, 13 (31%) patients had morbidities including delayed gastric emptying 4(9.1%), wound infection 3(6.8%), and haemorrhage 6(13.6%). Mortality is reported to be 5 (11.9%).

Pancreaticogastrostomy seems to be a safe alternative and easier anastomosis to perform with less post-operative morbidity and mortality. Further data should become available with greater numbers in the future.

Keywords: Pancreaticogastrostomy, Pancreatic anastomosis, Pancreatic leak.

Introduction

Pancreaticoduodenectomy (PD) has become increasingly acceptable as a safe and appropriate surgical technique for managing malignant or benign diseases of the head of the pancreas and periampullary region.[1]

First successful PD was done by Walter Kausch in 1912. Allen Whiple in 1935,[2] introduced and popularized the operation. Cameron in 1993 presented his case series of 145 consecutive PD from Johns Hopkins Medical institute. Initially Pancreaticoenteric anastomoses was not included as part of PD. Therefore it was associated with high morbidity and mortality resulting from high rates of leakage from pancreatic stump.

Pancreatcogastrostomy is a repopularized technique which has been described previously in literature.[3] This study was done to review the experience of PG being done as an alternate to PJ after PD.

Material and Methods

It is a case series collected at the Department of Surgery of Aga Khan University Hospital, Karachi from July 2008 till March 2016. This case series includes all adult patients who were diagnosed to have peri-ampullary mass on preoperative imaging and underwent Pancreatico-duodenectomy (Whipple procedure) with pancreatico-gastrostomy as preferred anastomoses, instead of pancreatico-jejunostomy, to maintain pancreatico-enteric continuity. Retrospective review of files of these patient's was done and a detailed performa was developed to record information on patient's demographics, clinical features, haematological and radiological investigations, preoperative ERCP and stenting, final histopathology, surgical details and duration of hospital stay. Postoperative 30-day mortality and morbidity (including postoperative pancreatic fistula, delayed gastric emptying, haemorrhage and wound infection) were also recorded. The data were analyzed by using Statistical Package for the Social Sciences (SPSS version 20.0). Quantitative variables are reported as means ± standard deviations, Qualitative variables are reported as proportions and percentages. This case series was approved by hospital Ethical Review Committee (ERC number 4083-Sur-ERC-16).

Results

A total of 44 patients were included in this case series, of whom 17 patients were females and 27 were males. Mean age was 55.5±11.5 years. Most commonly occurring comorbidity was Hypertension (18 patients) and Diabetes Mellitis (14 patients). Most common presenting complaint was jaundice (35 patients, 79.5 %) followed by abdominal pain (25 patients 56.8%). CT Scan Abdomen was used as main diagnostic and staging tool and was done in all patients. A total of13(29.6%) patients underwent ERCP, 9

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Table-1: Demographic and clinico-pathological data.

Variables	Frequencies
Total no. patients (N)	44
Age	
Mean	55.5 years (SD ±11.5)
Gender	
Male	27 (61.4 %)
Female	17 (38.6%)
Presenting complaint	
Nausea	12 (27.3%)
Weight loss	16 (36.4%)
Abdominal pain	25 (56.8%)
Jaundice	35 (79.5%)
Preoperative stenting	9 (20.5%)
Histopathology	
AmpullaryAdenocarcinoma	16 (36.4%)
Adenocarcinoma CBD	8 (18.2%)
Adenocarcinoma Duodenum	4 (9.1%)
Carcinoma head of Pancreas	11 (25.0%)
Distal CBD Cholangiocarcinoma	2 (4.5%)
Chronic Pancreatitis	2 (4.5%)
GIST duodenum	1 (2.3%)
Duration of Surgery (mean)	7.14 hours (SD±1.0)
Duration of hospital stay (mean)	14.1 days (SD±5.6)
Morbidity	
Pancreatic leak/Fistula	NONE
Delayed Gastric emptying	4 (9.1%)
Haemorrhage	6 (13.6%)
Wound infection	3 (6.8%)
Choledocho-jejunostomy leak	1 (2.3%)
Mortality	5 (11.4%)

SD: Standard deciation. CBD: Common bile duct. GIST: Gastrointestinal stromal tumour.

(20.5%) had stent placement and10 (22.30%) patients had endoscopic biopsy as well. Peroperatively pancreas was found to be firm in seven patients, soft in eleven patients and in rest consistency was not documented. Mean duration of surgery was 7.14±1.0 hours. Mean time period to establish oral feeding was 7±1.9 days. Final histopathology of the resected specimen was ampullaryadeno carcinoma in 16 (36.4%) patients, carcinoma head of pancreas in 11(25.0%) patients, adeno carcinoma Distal CBD in 8 (18.2%) patients and adeno carcinoma duodenum in 4(9.1%) patients, (Table-1). All resected specimens had tumour free margins, except 1which was borderline resectable to start with. In 17 patients lymph nodes were positive for metastases. Mean duration of hospital stay was 14.1±5.6 days. All the cases were discussed in multidisciplinary meeting (tumor board) after surgery and were referred for adjuvant chemo-radiotherapy where necessary.

Post-operative morbidities were reported in 14 patients. Four patients had delayed gastric emptying, all were

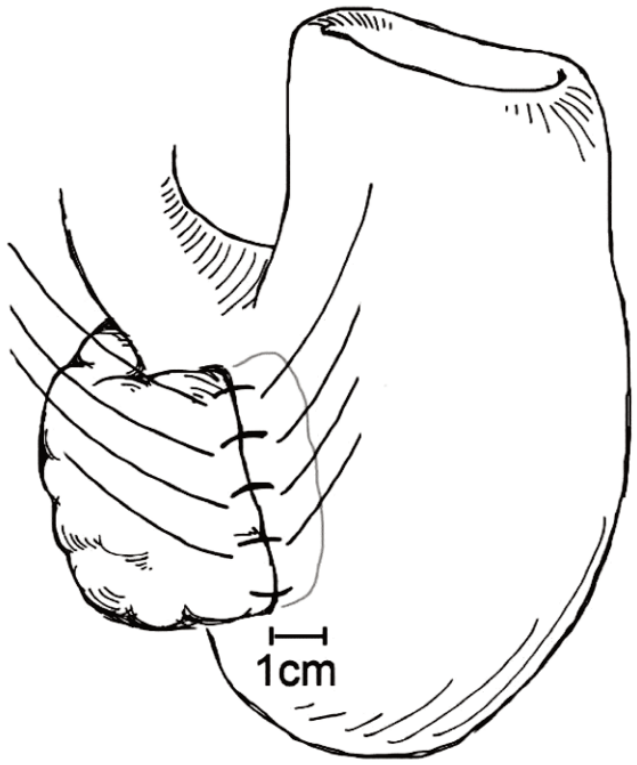

Figure-1: Pancreaticogastrostomy.

managed conservatively, and 3 had wound infection. A total of 6 patients had Intraluminal gastro-intestinal haemorrhage; 2 patients had bleeding from pancreaticogastrostomy and 1 had bleeding from gastrojejunostomy site, out of these 3 patients, one was re-explored after endovascular attempts but died even after all measures and 2 patient were attempted to be managed via endovascular means but only one endeavor was successful. The other 3 patients were managed conservatively and required no intervention for control of haemorrhage. One patient had a leak from choledochojejunostomy site which was managed conservatively by PTC drainage. None of our patients developed pancreatic fistula. Five patients expired, 2 due to non-surgical causes, one had massive pulmonary embolism and the other suffered from aspiration pneumonia, acute kidney injury and atrial fibrillation. One patient had ongoing sepsis because of persistent postoperative cholangitis. The other 2 patients died of massive gastrointestinal hemorrhage.

Discussion

Pancreaticoenteric anastomoses for the first time was introduced by Whipple[4] in 1945. Throughout 1960s and 70s this procedure was associated with high morbidity and mortality.[5] However current statistics

show that preoperative mortality after PD has decreased to < 5% in high volume centers, probably because of innovation in surgical techniques and development in perioperative care.[6,7] But post-operative morbidity of pancreatic resection continues to remain 30 - 50%.[8] Most common postoperative complications include: Delayed gastric emptying (19-23%), Anastomotic leakage or fistula from pancreaticoenetrostomy (9-18%), Intra-abdominal abscess (9-10%) and Gastrointestinal or intra-abdominal hemorrhage (1- 8%).

Among the above mentioned complications the most dreadful and important of all is proven to be formation of pancreatic fistula.[8-10] Incidence of pancreatic fistula after PD ranges from 6% to 24% (mean 13.6%), resulting in mortality rates of approximately 8-40%, (mean 12.5%).

Pancreatic fistula is diagnosed as amylase activity in peritoneal fluid greater than three times the upper serum normal value after 3rd post-operative day.[10] The independent risk factors associated with high incidence of pancreatic leak are: Type of pancreaticoenteric anastomosis, Soft pancreas, Duration of surgery (> 6 - 8 hours), Intraoperative blood loss, Ischaemia and Surgeon volume.

To minimize leak rates, over 70 technique variations of PJ have been suggested in literature, whether the modifications of PJ really reduce leak rates or not is still a matter of great debate.[8]

Recently repopularized option for enteric drainage of the pancreatic remnant is Pancreaticogastrostomy. This technique was first reported in literature in 1934 by Tripodi.[3] In 1946 it was described in detail by Waugh and Clagett.[11]

Pancreaticogastric anastomoses in our cases was undertaken as; Pancreatic stump was anastomosed with posterior wall of stomach. After preparing the pancreatic stump, anterior capsule of pancreas was sutured with posterior wall of stomach, using 3.0 PDS interrupted sutures. Gastrostomy is made after this step, parallel to the suture line. Next step was to suture posterior capsule of the pancreatic stump to the other lip of gastrostomy with the help of 3.0 PDS interrupted sutures as shown in Figure-1.[12] After completion of this anastomosis, pancreatic stump protruded into the lumen of stomach up to 1 cm. As a routine we measured drain amylase level if there was considerable output from the drain.

Advantages of pancreatico gastrostomy over pancreaticojejunostomy are as follows:

- Anastomosis is protected against enzymatic damage because of acidic environment of stomach which inactivates the pancreatic proteolytic enzymes.[13]

- It is known to be a technically easier and tension-free anastomosis as the posterior wall of the stomach lies immediately anterior to the mobilized pancreatic remnant, which acts not only as a thick suture bed for the anastomosis, but has an excellent blood supply as well when compared to the jejunum. Moreover absence of a long jejunal loop eliminates the hanging effect of it.[13,14]

- Early detection of bleeding from the pancreatic remnant or the anastomosis can be done by routine N/G decompression and direct examination of the anastomosis can be performed by endoscopy.[15]

- If needed (in case of intraluminal bleeding), easy exploration of the anastomosis can be undertaken by opening the anterior wall of the stomach, without disassembling the pancreatic anastomosis.[15]

The results of earlier prospective randomized trial conducted by Yeo et al[16] comparing PG with PJ suggested that surgical volume and soft pancreatic texture were the most significant factors associated with pancreatic fistula. In our study eleven of our patients had soft pancreas but none of them developed pancreatic fistula.

Most randomized control trials and meta analyses done in recent years suggest that PG is associated with reduced incidence of overall postoperative complications, pancreatic fistula and intra-abdominal collections,[17-24] when compared with PJ after PD; making it a safer anastomoses to perform with respect to immediate postoperative morbidity.

We are a low volume center (approximately 5 pancreaticoduodenectomy/ year) and our mortality rate was 11.4%. This is higher than those reported by large volume centers but comparable to reports from other regional centers.[25-28] As our surgical experience and volume increases, along with better critical care management, the mortality rates are likely to decrease in future.

Conclusion

Pancreatic anastomosis is precious anastomoses because of its associated high morbidity. In our experience we found PG not only technically simple but a safe procedure in both firm and soft pancreas, with regards to postoperative pancreatic fistula.

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Conflict of Interest: None to declare.

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