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Original Research Article

Pancreaticogastrostomy as a choice of reconstruction after pancreaticoduodenectomy: a hospital based observational study

Hetish M. Reddy, Rajendra Bagree, Pradeep Panwar, Gaurav Jalendra*

Department of General Surgery, Sawai Man Singh Medical College and Hospital, Jaipur, Rajasthan, India

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***Correspondence:**
Dr. Gaurav Jalendra,
E-mail: gauravjalendra004@gmail.com

ABSTRACT

Background: The aim of this study was to compare the rate of occurrence of post-operative pancreatic fistulae (POPF) and other complications with pancreaticogastrostomy (PG) or pancreatojejunostomy (PJ) as a choice of reconstruction in classic Whipple's Procedure.
Methods: A hospital based prospective observational study collected data of 60 patients who underwent Whipple's procedure from June 2018 to august 2019, in two different surgical units, where one-unit preferred PG as routine while the other unit preferred PJ.
Results: Two out of 30 patients who underwent PG (Group A) developed POPF while Nine out of 30 patients who underwent PJ (Group B) developed POPF (p-value = 0.04) indicating a significant difference in outcome. The duration of hospital stay (DOHS) in our study in Group A was 12.82±1.74 days when compared to Group B was 13.88±2.01 days (p-value = 0.042).
Conclusions: Our results indicate that the preferred reconstruction after classic Pancreaticoduodenectomy should be Pancreaticogastrostomy, but further validation with randomized control trials or multicenter studies with larger sample size are required.

Keywords: Pancreatic fistula, Pancreaticogastrostomy, Pancreatojejunostomy, Pancreaticoduodenectomy, whipple's procedure, Post-operative pancreatic fistula

INTRODUCTION

Pancreaticoduodenectomy (PD) is the procedure of choice for tumors in and around the periampullary region, pancreatic or duodenal trauma and chronic pancreatitis. This major procedure consists of three important anastomoses, namely the hepaticojejunostomy, gastrojejunostomy and pancreatojejunostomy (PJ) or pancreaticogastrostomy (PG). PD has an incidence of 35-60% postoperative morbidity though the procedure related mortality has fallen to below 5%.[1] Pancreatic fistula (PF) is one of the most dreaded complication after a PD with a prevalence of 5% to 30%.[2,3] Pancreatic fistula is usually associated with intra-abdominal hemorrhage and sepsis.[1] As per an an international study group of pancreatic fistulas (ISGPF) definition a postoperative PF(POPF) represents a failure of healing/sealing of a pancreatic-enteric anastomosis or a parenchymal leak not directly related to an anastomosis.[4] An all-inclusive definition is a drain output of any measurable volume of fluid on or after postoperative day 3 with an amylase content greater than 3 times the serum amylase activity.[4] A postoperative pancreatic fistula grade A is a transient, biochemical pancreatic fistula without clinical impact, grade B is a fistula with clinical impact that requires a change in therapeutic management, and grade C is a

fistula with severe clinical effect that requires a major change in management.[5] Clagett in 1946 described PG for the first time.[6] While PG and PJ are the commonly used reconstruction techniques in PD, the fight for supremacy between PG and PJ has still not been conclusive with many studies giving contradictory results.[7-12] The aim of this study was to compare PG with PJ in terms of rate of incidence of POPF, mean duration of surgery, postoperative hemorrhage (hematemesis/melena), incidence of intra-abdominal abscess, mean duration of hospital stay (DOHS) and mortality.

METHODS

Study was done from June 2018 to August 2019, A prospective observational study consisting of patients between the age group of 18 to 80 years admitted to two surgical units of SMS medical college, Jaipur and diagnosed with periampullary tumors and planned for PD were included in the study.

Inclusion criteria

Patients having periampullary tumors only, the tumors must be resect able, the tumors must be free of vascular invasion, patients with confirmed tissue diagnosis of malignancy, patients willing for surgery, no evidence of distant metastasis, good functional reserve were included in the study.

Exclusion criteria

Patients not fulfilling the inclusion criteria were excluded from the study.

During the above-mentioned time frame 60 patients who fulfilled the criteria were observed prospectively. The number 60 as sample size was not derived mathematically, instead it was just the number of patients that happened to fulfill our study criteria during our study period. Fortunately for us these 60 had already been equally distributed amongst the two surgical units according to their on-call schedule and we did not have to distribute them. Amongst the two surgical units, one unit routinely preferred PG for pancreatic anastomosis and the patients under this unit were considered as Group A.

The other unit preferred PJ for pancreatic anastomosis and the patients under this unit were considered as Group B. The patients in the study were not aware of the type of reconstruction and they were admitted in those units by their own will or based on the day when they got admitted and which unit was on call that day. The pancreatic anastomosis was done in an end-to-side, duct to mucosal, double layered fashion either into the jejunum (PJ) or the posterior wall of the stomach (PG). For the first layer (duct to mucosal) of anastomosis, absorbable sutures, either POLYGALACTIN 2-0 or 3-0 / PDS 2-0 or 3-0 were used. For the second layer (serosal) of anastomosis, non-absorbable sutures, either MERSILK 2-0 or 3-0 / PROLENE 2-0 or 3-0 were used. The choice of suture material was as per availability in our state sponsored center.

A 6 or 8 Fr infant feeding tube was used in all patients to cannulate the MPD before anastomosis. Rest of the anastomoses (HJ and GJ) were as per standard practice in PD. On completion of all three anastomoses, a drain without negative suction was placed near the pancreatic anastomosis and another drain was placed in the pelvis. A feeding jejunostomy was created in all patients. Octreotide was administered to all patients in the post-op period until Day-9 at a dose of 100g twice daily sub-cutaneous. Parenteral nutrition was provided till oral feeds could be initiated. The content of the drains and its volume were recorded daily. The samples from the drain were sent for biochemical analysis on Day-3, Day-5 and Day-7. The primary endpoint was the proportion of patients with a clinical postoperative pancreatic fistula (grade B or C) as defined by the ISGPF.[4] Secondary endpoints were the overall proportion of patients with any type of postoperative pancreatic fistula (grade A, B, or C), and the proportion of patients with postoperative complications. The type of postoperative pancreatic fistula was recorded according to the guidelines of the ISGPF and based on findings starting from day 3 after surgery. Patients were followed up for a period of 60 days from the date of surgery. Data collected was analyzed by a biostatistician.

Statistical analysis

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean±SD and median. Normality of data was tested by Kolmogorov-Smirnov test. If the normality was rejected then non parametric test was used. Statistical tests were applied as follows

Quantitative variables were compared using Independent t test/Mann-Whitney Test (when the data sets were not normally distributed) between the two groups. Qualitative variables were correlated using Chi-Square test/Fisher's Exact test. A p value of <0.05 was considered statistically significant.

The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0.

RESULTS

Among the total of 60 patients, 30 patients in group A (PG), aged 53.3±9.34 (range, 38-76) and in group B (PJ), aged 57.3±10.6 (range, 40-78). In group A, M:F ratio is 19:11 and in group B is 20:10, with overall male: female ratio 1.85:1. Body mass index (BMI) in Group A is 22.8±2.69 kg/m3 and in group B is 23.4±2.56 kg/m3 (p-value= 0.322). Pre-op bilirubin levels in Group A were

2.27±0.58 mg/dL and in Group B were 2.16±0.6 mg/dL (p-value=0.462). The tumor diameter in Group A was 2.23±0.43 cm and in Group B was 2.18±0.47 cm (p-value=0.647). Duration of Surgery in Group A is 4.27□0.37 hours and in Group B is 4.42±0.6 hours (p-value=0.66). Blood loss in group A is 440±59.3 ml and in group B is 430±72.64 ml (p-value=0.628). The duration of hospital stay (DOHS) in our study in Group A was 12.82±1.74 days when compared to Group B was 13.88±2.01 days (p-value=0.042) (Figure 1).

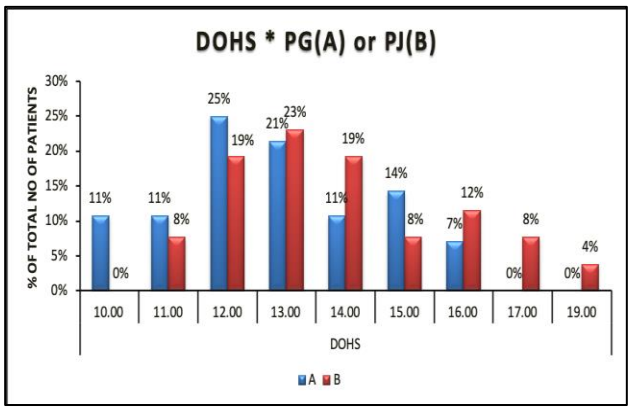

Figure 1: Illustrating duration of hospital stay (DOHS).

Two out of 30 patients in Group A developed POPF while Nine out of 30 patients in group B developed POPF (p-value=0.04) indicating a significant difference in outcome. Both patients from Group A who developed POPF had undergone pre-op biliary drainage where 7 of the 9 (77.77%) patients who had developed POPF in Group B had undergone pre-op biliary drainage. 4 patients from Group A had Hematemesis whereas in Group B it was 2 patients (p-value=0.67). 3 patients from Group A had Malena whereas the number in Group B was 4 (p-value=1.0). Intra-abdominal Abscess (IAA) was seen 6 patients from Group A and 4 patients from Group B (p-value=0.7). In-Hospital mortality was 1 in Group A and 4 in Group B (p-value = 0.3) (Figure 2).

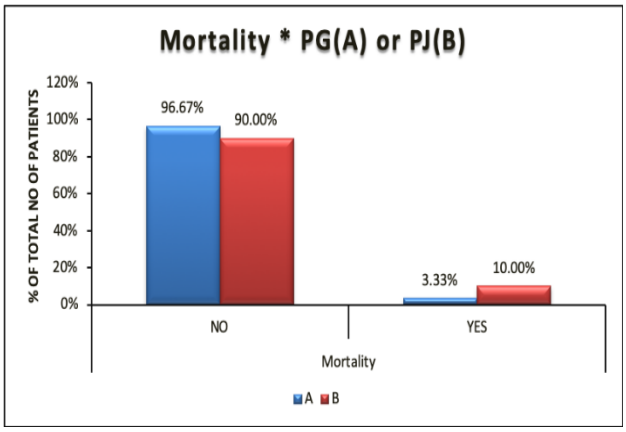

Figure 2: Illustrating mortality rate.

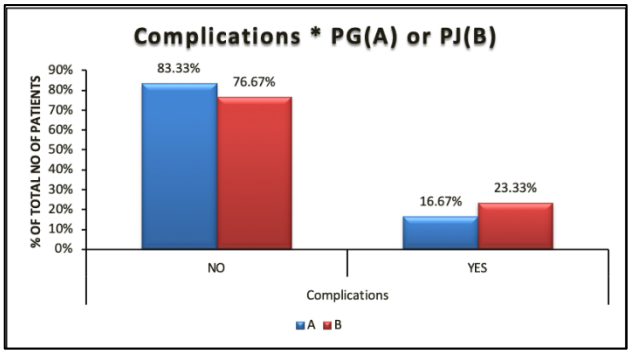

Figure 3: Illustrating overall complications.

DISCUSSION

From this study it is evident that periampullary tumors have a strong predilection for the male gender. The difference in BMI between both the groups in this study was statistically insignificant (p-value=0.32). The difference in preoperative bilirubin levels between the two groups were also statistically insignificant (p-value=0.462). The tumor diameters between the groups were also statistically insignificant (p-value=0.647). Thus, the confounding factors like BMI, Pre-op bilirubin levels and Tumor diameter can be overlooked. Our study also showed no statistically significant difference between the two groups in terms of Duration of Surgery (DOS) and blood loss during surgery with p-values of 0.66 and 0.628 respectively. A statistically significant difference in outcome was seen in terms of incidence of POPF (p-value=0.04) and DOHS (p-value=0.042). With this we can imply that PG can reduce the occurrence of clinical POPF compared with PJ after PD for periampullary tumors.

Reduction in the occurrence of POPF reduces mortality and length of hospital stay. PD is the only therapeutic modality offering long-term survival in patients with operable periampullary tumors. In these patients, we found PG reconstruction will result in improved postoperative clinical outcome and in reduced mortality. This favourable outcome can be attributed to many reasons. Mainly, the pH of the stomach, which is acidic, is not conducive for the activation of exocrine pancreatic enzymes which require an alkaline pH just like the pH within the jejunum. The chances of an anastomotic ulcer, which may eventually lead to a POPF are theoretically low with PG as the activated exocrine pancreatic enzymes can be highly proteolytic. Also, after reconstruction PG comparatively lies further away than PJ from the denuded major vessels like portal vein and the hepatic and superior mesenteric artery. Should a POPF occur, these vessels are more prone to damage by the activated proteolytic pancreatic enzymes from a PJ.

Another reason is the anatomic proximity of the pancreas to the stomach in comparison with jejunum favours a tension free anastomosis, further reducing the chance of an anastomotic leak and POPF. A simple NG tube can be

used for gastric decompression and further reduce tension. This can also function as a drain should a POPF occur after PG, thus avoiding invasive drainage procedures. However, in our study, IAA formation was more frequently noted in patients who underwent PG than in those who underwent PJ anastomosis, though the difference was not statistically significant (p-value=0.7).

High incidence of preoperative biliary drainage could have negatively affected the postoperative course in our study.[13] The incidence of Hematemesis was high in Group A, attributable to the high vascularity of stomach and that of malena was high in Group B but the results were statistically insignificant (p-values 0.67 and 1.0 respectively). Historically many studies have tried to assess the outcome of PG after PD, some even doing a comparative analysis between PG and PJ after PD but their interpretation is complicated.[14-20] Bassi et al, found similar rates of POPF after PG and PJ.[15] Our study on the other hand found a significant difference in POPF after PG and PJ. A study by Fernandez-Cruz et al, happens to be the only other study with similar results.[17] Their surgical approach is similar to the one we adopted in our study i.e. anastomosis together with the placement of a pancreatic stent through the anastomosis (infant feeding tube was used as a stent in our study). The findings in our study are also in favor of the trial done in 2013 by Topal et al.[5]

Limitations

Our sample size of 60 is small to evaluate the effects of confounding factors like pre-op bilirubin levels, BMI, tumor diameter and pancreatic duct size on the final results. We recommend larger randomized and multicenter trials for further validation of our results.

CONCLUSION

Our results favor Pancreaticogastrostomy as the preferred reconstruction after classic Pancreaticoduodenectomy with the use of a pancreatic stent. Randomized trails or multicenter studies with larger sample size are needed for further validation.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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