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Comparison of Outcomes in Pancreaticogastrostomy versus Pancreaticojejunostomy in Patients Undergoing Pancreaticoduodenectomy

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Abstract

Introduction: The postoperative mortality and morbidity after pancreaticoduodenectomy with pancreaticogastrostomy and pancreaticojejunostomy is controversial.

Aim of the study: Primary aim was comparison of Post-Operative Pancreatic Fistula (POPF) rate in PG vs PJ. Secondary aim was mortality rate between PG vs PJ.

Method: A retrospective analysis of data of 74 patients who underwent pancreaticoduodenectomy with either pancreaticogastrostomy or pancreaticojejunostomy from June 2012 to June 2014. Statistical analysis done using un-paired 't' test, chi square test, fischer's exact test appropriately.

Result: Out of 74 pancreaticoduodenectomy case. Pancreaticogastrostomy was done in 44(59.5%) cases and pancreaticojejunostomy done in 30(40.5%) of cases. Among them 20(27.16%) patients developed pancreatic fistula of which 9(12.16%) belonged to pancreaticogastrostomy group and 11(15%) belonged to pancreaticojejunostomy group (p=0.708). Grade A fistula occurred in 8(10.8%) patients, grade C fistula in 1(1.35%) patient in the pancreaticogastrostomy compared with grade A fistula in 11(15%) patients in the pancreaticojejunostomy group. Significant post pancreaticoduodenectomy haemorrhage [3

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patients (6.8%) ($p=0.0001$) and mortality [3 patients(6.8%)] was seen in PG group. No significant difference in median hospital stay was ($PG=11.1\pm 2.78$ vs $PJ= 10.4\pm 3.1$) seen in either group ($p=0.305$).

Conclusion: There was no significant difference in pancreatic fistula rate and hospital stay in either groups. However grade a fistula was more in pancreaticojejunostomy group. Significant mortality was seen in pancreaticogastrostomy group though they were not related to pancreatic fistula.

Keywords

Pancreaticoduodenectomy; Pancreaticogastrostomy; Pancreaticojejunostomy; Pancreatic Fistula

Abbreviations

PD: Pancreaticoduodenectomy; PG:Pancreaticogastrostomy; PJ:Pancreaticojejunostomy; POPF: Post-Operative Pancreatic Fistula; SPT: Solid Psuedopapillary Tumour; RCT: Randomized Controlled Trial; ICU: Intensive Care Unit; SD: Standard Deviation; ISGPF: International Study Group for Pancreatic Fistula; ISGPS: International Study Group for Pancreatic Surgery; ARDS: Acute Respiratory Distress Syndrome; SPT: Solid Pseudopapillary Tumor

Introduction

Whipples Pancreatico Duodenectomy (PD) is the only curative option for carcinoma head of pancreas, periampullary tumours and some benign lesions of pancreas. Nevertheless, pancreatico duodenectomy is associated with the overall morbidity between 30% and 60%, and the mortality rate is about 5%. The achilles heel of pancreaticoduodenectomy i.e pancreatico enteric anastomosis is the major contributor for morbidity in the postoperative period [1-3].

Pancreaticojejunostomy (PJ) and Pancreaticogastrostomy (PG) are the commonly used reconstructive methods after PD. The advantages and disadvantages of both the techniques were debated from their inception. In spite of modifications in anastomotic techniques, problem is still challenging. Among the complications of PD, post-operative pancreatic fistula is the most important, which is highly variable (2-30%) [4-7]. The evidence from RCT suggests that there is no difference in two methods in terms of morbidity and mortality [8-10]. However, non-randomized trials differ from literature. Hence we applied standard ISGPF and ISGPF

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criteria for postoperative complications and retrospectively analysed the data to observe our results in patients who underwent PG and PJ reconstruction after PD in last two years [11- 14].

Materials and Methods

A retrospective analysis of data of 74 patients who underwent pancreaticoduodenectomy between June 2011 and June 2013 undertaken at the department of gastrointestinal surgery, Meenakshi mission hospital and research centre, Madurai, India. Two experienced consultant surgeons have performed the standard method of PD and reconstruction. The data on pre, per and post-operative parameters were maintained in database manager.

Our institution has a standard protocols for post pancreaticoduodenectomy care to ensure uniform care. All patients were given prophylactic antibiotic at the time of induction and continued for 48 hrs after surgery. All patients received prophylactic octreotide 100 microgram subcutaneously morning, on the day of surgery and it was continued thrice a day for 5 days.

Surgical technique: Pancreatic reconstruction was performed using either a PG or PJ Technique on individual consultant choice. The technique of PG was carried with dunking, under direct vision through an anterior gastrotomy after preparing 5 cm of pancreatic stump. Stump delivered through posterior gastrotomy and anastomosis done with 3-0 prolene in a continuous fashion, with interrupted 2-0 vicryl stitch ensuring that the pancreatic duct is not occluded. Anterior gastrotomy closed with 3-0 prolene in a continuous, single layer technique. PJ reconstruction was done with end to side, two layered, duct to mucosa technique. Duct to mucosa anastomosis done with 5-0 polydioxanone, interrupted sutures, second layer of binding done with 3-0 vicryl.

Enteral feeding was started from second post-operative day and institutional enteral feeding protocol was followed. All patients had feeding jejunostomy placed at the time of surgery and used whenever it was required. One right subhepatic drain was placed in all patients and drain fluid amylase measured on day 1, day 3 and day 5. Abdominal drain volume measured daily. Pancreatic fistula was classified as per ISGPF criteria in to three grades and for other complications ISGPF definitions were used.

Statistical Analysis

Statistical package for social sciences (SPSS, Inc., Chicago, IL, USA) version 16 was used for statistical analysis. Normally distributed data are depicted as mean and Standard Deviation (SD). For comparison of normally distributed group's independent t-test and proportion test were used. To compare qualitative data chi-square test with Yates' correction or a fisher's exact

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test were used. All p-values were two-tailed test, and the $p < 0.05$ was considered as statistically significant.

Results

Out of 74 pancreaticoduodenectomy cases, pancreaticogastrostomy was done in 44(59.5%) cases and pancreaticojejunostomy in 30(40.5%) cases. Patient demographics, indications for surgery, ICU stay and total hospital stays are detailed in Table 1.

24 patients had post-operative complications, among them, 12(27.2%) patients in PG group and 11(36.7%) patients in PJ group developed single complication. One patient in PG group had multiple complications. The most common complication of pancreaticoduodenectomy, that is pancreatic fistula was seen in 9(12.16%) patients belonging to pancreaticogastrostomy group and 11(15%) belonging to pancreaticojejunostomy group ($p=0.708$) (Fig. 1).

Grade A fistula occurred in 8(10.8%) patients and grade C fistula in 1(2.27%) patient in the pancreaticogastrostomy group, compared with grade A fistula in 11(15%) patients in the pancreaticojejunostomy group. Interestingly there were no grade B fistulas in either group. Only one grade C fistula was observed in PG group.

Though pancreatic fistula is more in pancreaticojejunostomy group, it is not statistically significant ($p=0.708$). Post pancreaticoduodenectomy haemorrhage was seen in 3(6.8%) patients, all of them in PG group ($p=0.0001$). Intra-abdominal collection was seen only in one patient in PG group. Burst abdomen occurred in one patient in PJ group. In our series none of the patient had other complications like delayed gastric emptying, biliary and enteric fistulas. One PG group patient underwent reexploration for post-operative bleeding (The source of bleed was from pancreatic stump-cannot be controlled by angio-embolisation). Overall mortality was seen in 3(6.8%) patients (One with PTE, two with post op MI), all of these in PG group. None of the death was related to the pancreatic fistula. The mean ICU stay was 4.74(sd-2.38) days in PG group and 3.87(sd-1.28) days in PJ group ($p=0.07$). There was no statistically significant difference in mean hospital stay in both the groups ($p=3.05$). Complications are detailed in Table 2.

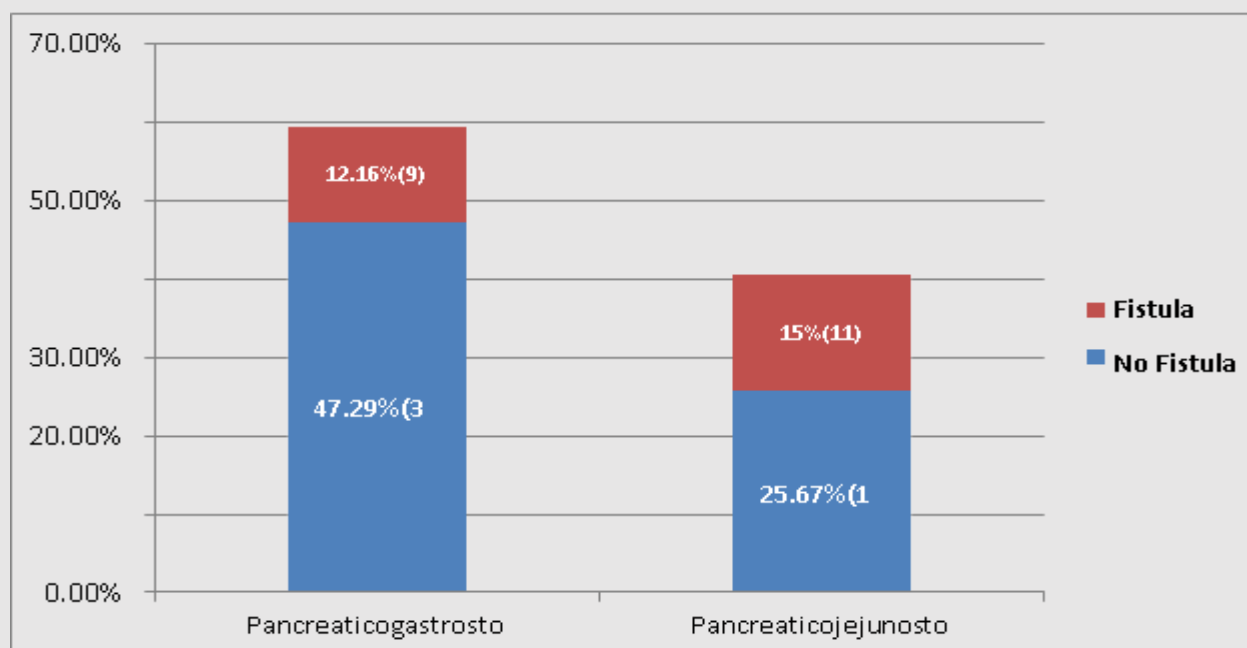


Figure 1: Bar chart depicting fistula rate in both the groups.

Variables	Pancreaticogastrostomy	Pancreaticojejunostomy	P-value
Number of Patients	44(59.5%)	30(40.5%)	0.028*
Age in Years	50.82±13.28	50.17±14.64	0.843
Gender			
Male	21 (47.7%)	22(73.34%)	0.03*
Female	23 (52.3%)	8(26.6)	
Preoperative Biliary Drainage	9(20.45%)	7(23.33%)	0.767
Indications for Resection			
Malignant Tumors	41 (93.18)	25(83.33%)	0.1804
Benign Lesions	3 (6.8%)	5(16.67%)	0.001*
Type of Lesions			
Ca Head of Pancreas	8 (18.18%)	7(23.33%)	0.72
Periampullary Growth	32 (72.72%)	18(60%)	
SPT	1 (2.27%)		
Mean Bilirubin	5.38±4.97	6.51±5.98	0.383
Mean ICU Stay	4.74±2.38	3.87±1.28	0.07
Mean Hospital Stay	11.12±2.78	10.4±3.10	0.305

Table 1: Patient demographics, indications for surgery, ICU stay and total hospital stays.

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Complication	PG	PJ	P-value
Single Complication	12(27.2%)	11(36.7%)	0.4.96
Multiple Complications	1(2.27%)	0	0.0025
Pancreatic Fistula	9(12.16%)	11(15%)	0.708
A	8(10.8%)	11(15%)	0.592
B	0	0	NA
C	1(1.35%)	0	0.035
Post-Operative Haemorrhage	3(6.8%)	0	0.0001
Delayed Gastric Emptying	0	0	NA
Biliary Fistula	0	0	NA
Enteric Fistula	0	0	NA
Intraabdominal Collection	1(2.27%)	0	0.005
Burst Abdomen	0	1(3.33%)	0.001
Re- Exploration	1(2.27%)	0	0.005
Mortality	3(6.8%)	0	0.0001

Table 2: Post-operative out come and complications.

Discussion

Post pancreaticoduodenectomy reconstruction has been debated for a long while now. Lot of randomized and non-randomized trials have compared the outcome following PG versus PJ to identify the ideal method. Difference of opinion about the definitions of complications was a hindrance before 2005. Prior to the introduction of ISGPF, Wente, et al., in their pooled analysis found pancreatic fistula rate of 3.7% in the PG group, compared with 16.5% ($p=0.001$) in the PJ group [14]. In July 2005 the International Study Group of Pancreatic Fistula (ISGPF) developed a universal definition of pancreatic fistula, classifying it into 3 grades based on biochemical and clinical parameters [12]. Though non randomized trials have demonstrated a low fistula rate following pancreaticogastrostomy compared with the pancreaticojejunostomy, 3 randomized clinical trials found no difference in POPF rate, whereas recent metanalysis of seven randomized controlled trails including 1121 patients has revealed that PG reduced incidence of POPF rate compared with the PJ [15]. In the present study ISGPF classification was applied retrospectively to study the rate of pancreatic fistula and it revealed more incidence of POPF in PJ group, but it was not statistically significant (12.16% vs. 15%, $p=0.708$). Similar results were observed by Somaiah Aroori, et al., in their retrospective analysis of 424 patients, where they found POPF in 55(23.5%) patients in the PG group and 30(16.2%; $p=0.067$) patients in the PJ group [16]. Low fistula rate in PG could be because of inhibition of pancreatic enzymes by the acid, absence of enterokinase in stomach, thick walled stomach with excellent blood supply, neutralization of acid by pancreatic juices preventing marginal ulceration, ability

of nasogastric decompression, absence of long jejunal loop without biliopancreatic juices [17,18] . In line with the literature, grade a biochemical fistula is higher in the PJ group in our series when compared with the PG.

After fistula, another dreaded complication of pancreaticoduodenectomy is post-operative hemorrhage, which can be from the gi tract or an intraperitoneal bleed. J Figueras, et al., in their randomized controlled trail of 123 patients found post-operative bleeding in 20 patients, in which early bleeding from gi tract was more frequent in PG group (7 of 13 patients) , whereas late intraperitoneal bleeding secondary to fistula was more in PJ group (3 of 7 patients) [19] . In our series 3 patients had bleeding from gi tract, 1 patient had intraperitoneal bleed, all of them belonging to the PG group (p=0.0001). These results contradict similar retrospective analysis where PJ was associated with higher rate of post pancreatectomy hemorrhage as a result of erosion of adjacent tissue by activated pancreatic enzymes and a high volume of pancreatic juice [16].

Though intra-abdominal abscess, anastamotic leakage and resection technique (Standard vs. PPPD) are the major risk factor for delayed gastric emptying, we did not have any case with delayed gastric emptying , probably due to our modified technique (pylorus resecting pancreatico duodenectomy / subtotal stomach preserving pancreatico duodenectomy), where we transect the stomach at the antrum [20-22]. However the recent meta-analysis showed no significant difference in delayed gastric emptying in either groups [15]. As per ISGPF definition we found one intra-abdominal collection in PG group (p=0.005) which is in contrast to current meta-analysis results [15]. Two patients underwent reoperation in our series (p=0.005) of which one was for early PG site bleed and another for intraperitoneal bleed on 8th pod, where dismantling of PG and exteriorization of pancreas was done. These results are in line with Figueras, et al., and Fernandez-cruz, et al., randomized trials whereas against to Topal, et al., randomized trial results [19,23,10]. In contrast to the previously published studies mean hospital stay (p=0.07) and mean ICU stay (p=0.305) was shorter in PJ group in our series but it was not statistically significant .the overall mortality rate in our series is 4.05% (3 out of 74) which corresponds with the mortality rate at other high volume centers [24]. All those are in PG group (p=0.0001) and the deaths were not related to POPF. Two patients developed post op ARDS, they were on mechanical ventilator for more than one week and died. One patient underwent re exploration for intraabdominal bleed on 8th post-operative day, bleeding got controlled but patient expired after 2 days.

The major drawbacks of the present analysis would be the retrospective nature of study, there is no data on consistency of pancreas and pancreatic duct diameter.

Conclusion

In the current series there is no statistically significant difference in overall pancreatic fistula rate, hospital stay in either group. However, grade A fistula is more in pancreaticojejunostomy group. Mortality rate is significant in PG group which was not related to pancreatic fistula.

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