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Original Research Article

Early postoperative outcomes of dunking pancreatojejunostomy

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ABSTRACT

Background: There is no gold standard method for pancreatico-enteric reconstruction. In our department, dunking pancreatojejunostomy (DPJ) and Duct to mucosa PJ technique are done as per surgeon's choice. In this study, authors evaluate the early postoperative outcomes following DPJ based on ISGPS (2007).
Methods: A Retrospective analysis of prospectively collected data from January 2008 to December 2015. Detailed information on these patients was maintained on a prospectively held computerized database. Routine drain amylase estimations are being done on POD 3and 5 for all patients undergoing pancreatic resections and on all subsequent days if output is suggestive of pancreatic fistula. Details of patients who have undergone pancreatic resection with duct to mucosa type of pancreato-intestinal anastomosis during the same period (64 patients) were also collected prospectively and analysed. DPJ and Duct to mucosa groups were not comparable with respect to age, duct size, pancreatic gland texture and co-morbidities. Hence direct comparison between the two groups has not been carried out.
Results: A total of 75 of 139 pancreatic resections with pancreatointestinal anastomosis who had dunking PJ and fulfilled the study criteria were analysed; none were excluded for analysing early outcomes. 19 out of 75 (25.5%) developed grade 'A' POPF, five out of 75 (6.6%) developed Grade 'B' POPF and three out of 75 (3.3%) developed Grade 'C' POPF. 20 out of 75 (26.6%) had grade 'A' DGE, five out of 75 (6.6%) had grade 'B' DGE. PPH occurred in four out of 75 (5.3%), two out of four were early PPH, one was managed by coiling and other by re-laparotomy, two were late PPH both managed by coiling of the pseudo aneurysms. There was no 30-day mortality.
Conclusions: Dunking (Invagiantion) pancreatojejunostomy has accepatable early outcomes with clinically significant/relevant postoperative pancreatic fistula rates of Grade B (6.6%) and Grade C (4%), delayed gastric emptying (33.2%) and post pancreatic hemorrhage (5.3%) rates. The outcomes are comparable with Duct-to-mucosa PJ mentioned in literature.

Keywords: Delayed gastric emptying, Dunking pancreatojejunostomy, Pancreatic fistula, Post pancreatectomy haemorrhage

INTRODUCTION

Pancreatico-intestinal anastomosis is considered to be the achilles heel after pancreas head resection for benign/malignant disease of pancreas. Over more than 80 types of anastomosis after pancreaticoduodenectomy are described in literature. There is no gold standard method of reconstruction after pancreatoduodenectomy. Despite improvements in operative techniques, materials, instruments and postoperative care, pancreatic fistula remains a serious concern to both surgeon and patient. Pancreatic anastomosis failure rate is around 9-18%, which is not better than previous series in literature.[1-6] Modifications in site and type of anastomosis, use of

tissue glue and trans-anastomotic stent have been and tested in an effort reduce anastomotic failure rates. Risk factors proposed to play an important role in pancreatic fistula are extensively studied. They include age of patient, pancreas texture, duct size, comorbidities, intra operative blood loss and experience of surgeon.[7] There is insufficient literature on incidence of exocrine and endocrine deficiency after a pancreatic resection and any type of pancreatico-intestinal reconstruction is lacking. The present study is based on the hypothesis that single layered dunking pancreatojejunostomy with non-absorbable, monofilament suture without manipulation of duct is comparable to that reported in literature with respect to pancreatic fistula rates. Dunking PJ has the advantage that it can be used universally irrespective of the pancreatic duct diameter and does not need as high a level of surgical expertise as is required for duct-to-mucosa PJ, thereby making the procedure conceptually safer.

METHODS

Retrospective analysis of prospectively collected data from January 2008 to December 2015 was carried out. As per the department policy, detailed information of all operated patients is maintained on a computerized database. Careful recording of patient's demographics and parameters were done. Regular follow up of these patients were carried out as per the department protocol.

Inclusion criteria

- All patients who undergo pancreatic resections with pancreatointestinal anastomosis, in whom dunking pancreatojejunostomy was used to maintain pancreato-intestinal continuity during the study period.

Exclusion criteria

- Chronic calcific pancreatitis/chronic pancreatitis with inflammatory head mass and cirrhotic patients who undergo resection were excluded.

Preoperatively fasting blood glucose (FBG) was checked in all patients undergoing pancreaticoduodenctomy. Routine drain fluid and serum amylase were done on post-operative day three and five and on subsequent days if initial amylase values were three times elevated. Any blood in nasogastric tube or drain was analysed clinically and followed up with computed tomography angiogram and treated accordingly. Routine nasogastric tube removal was done on day three of surgery. Patients developing pancreatic fistula and delayed gastric emptying were graded and treated as per ISGPF definitions.[8]

Details of patients undergoing duct to mucosa type of pancreatico-intestinal anastomosis during the same period were recorded.

DPJ and duct to mucosa technique groups were not comparable with respect to age, gender, comorbidities, pancreatic duct size and texture of the gland, hence direct comparison between the two groups has not been done. Mortality was defined as death occurring within 30 days of surgical intervention.

Technique of dunking pancreatojejunostomy

Dunking pancreatojejunostomy was created with single layer, interrupted monofilament, 3-0 polypropylene seromuscular to pancreatic capsular sutures. Two dunking Trans pancreatic sutures are used to invaginate pancreas into cut end of jejunum. No sutures were put on cut end of pancreas or duct (Figure 1, 2 and 3).

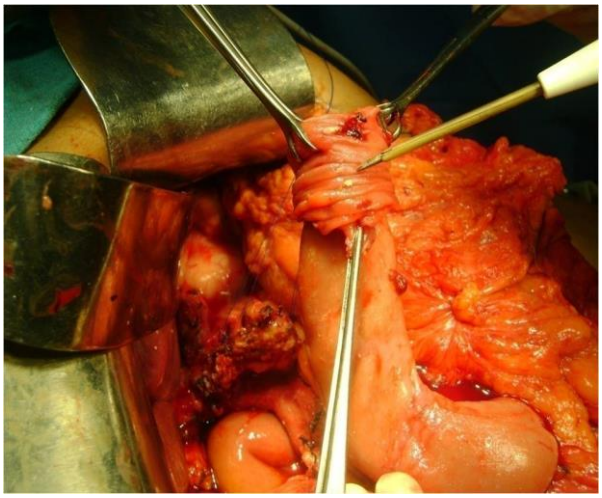

Figure1: Scouring of mucosa of jejunum.

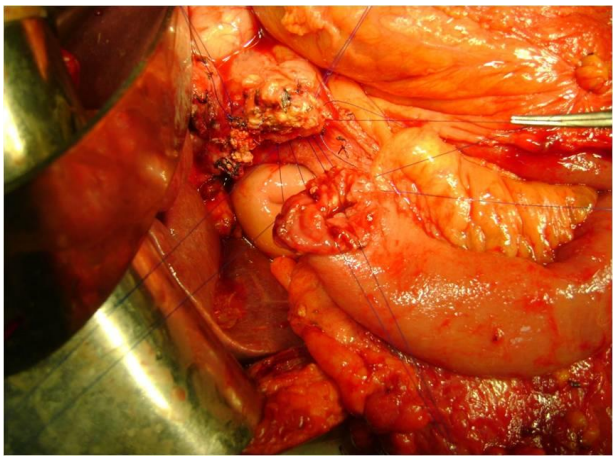

Figure 2: Posterior sero-muscular to capsular sutures.

RESULTS

A total of 139 patients underwent pancreatic resections with pancreatointestinal anastomosis from January 2008 to December 2015. In seventy-five (n=75) patients, Dunking pancreatojejunostomy technique was used as

pancreato-intestinal anastomosis and these patients were studied. There were 33 males and 42 females. End to end DPJ was done in 72 patients and end to side in 3 patients (due to wide gland).

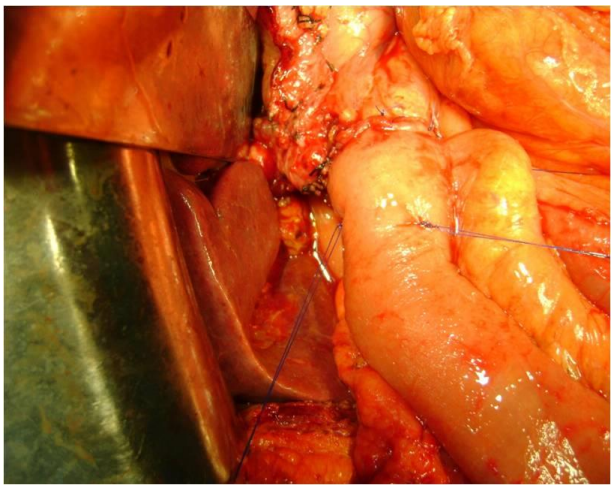

Figure 3: Two dunking sutures and completed anterior layer.

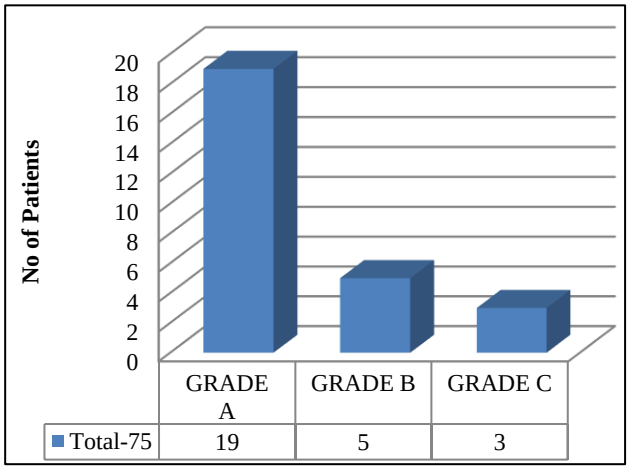

Figure 4: Post-operative pancreatic fistula.

Out of 75 resections, 61 were pylorus preserving pancreatoduodenectomy, 9 were Whipple's resection and 5 were median pancreatectomy.

Histopathology of the specimens revealed carcinoma head of pancreas (22), distal cholangiocarcinoma (26), duodenal adenocarcinoma (17), cystic lesion of pancreas (5), and neuroendocrine tumour of pancreas (5). Post-operative pancreatic fistula occurred overall in 36.1% of the patients, 25.5% patients (n=19) developed grade A, 6.6% (n=5) developed grade B and 4% (n=3) developed grade C pancreatic fistula (Figure 4).

In this present study, clinically relevant POPF (Grade B and C) occurred in 10.4% of patients (Figure 4). A 26.6% (n=20) had grade A and 6.6% (n=5) had grade B delayed gastric emptying (Figure 5).

Post pancreatectomy hemorrhage occurred in 5.3% (n=4) patients (3), out of which, two were early haemorrhage and two were late haemorrhage. In early haemorrhage group, one patient was taken up for surgical control of bleeding and coiling of bleeder was done in the other patient (Table 1).

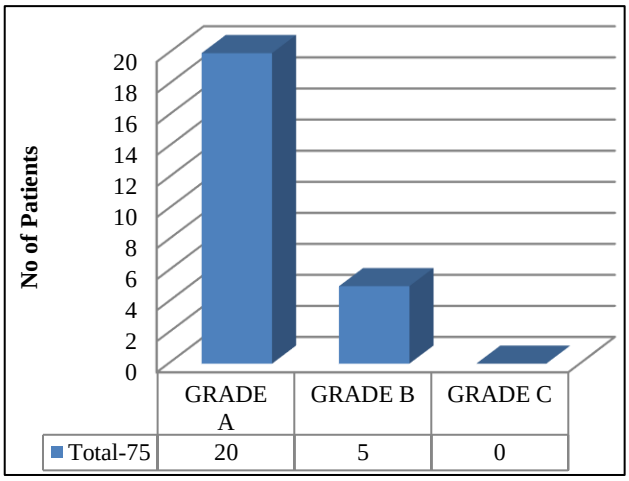

Figure 5: Delayed gastric emptying.

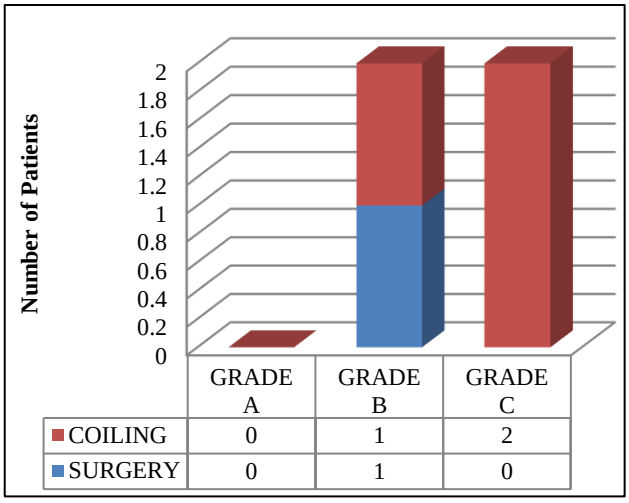

Figure 6: Post pancreatectomy haemorrhage and its management.

Table 1: Post pancreatectomy hemorrhage (PPH) and its management.

	Early PPH	Late PPH
Grade A	0	0
Grade B	1- Laparotomy and 1- coiling of splenic artery	0
Grade C	0	2- coiling of bleeder

DISCUSSION

Of over 80 types, none of the pancreaticointestinal anastomosis techniques described so far in literature can

be considered a gold standard method and has demonstrated superiority over the other technique.[1-6] Of the various factors described to contribute in pancreatic anastomotic failure, soft pancreatic gland and pancreatic duct size less than 3mm are major factors in large series of patients. Posterior placed duct at pancreatic neck region is also associated with increased chances of pancreatic fistula. The advantage of dunking pancreatojejunostomy is that it includes side branches at cut surface in the anastomosis and thereby possibly decreasing the chances of leak.

A UK multicenter study by Roberts J et al, assessed the factors predicting the pancreatic fistula after pancreaticoduodenectomy and found pancreatic duct size, firmness of pancreas was consistently associated with POPF. Preoperative Computed tomography assessment of pancreatic duct size and intraoperative duct measurement didn't have significant difference.[7]

In a systematic review and meta-analysis by Hua J et al, total of five RCT's involving 654 patients were included.[8] Meta-analysis revealed no significant difference in pancreatic fistula rate between the duct to mucosa and dunking PJ techniques (OR=1.2, 95% CI +0.78-1.93; P=0.38). In subgroup analysis using POPF definition by International Study Group of Pancreatic Surgery, the incidence of clinically relevant POPF was lower in patients undergoing invangination PJ than in those undergoing duct-to-mucosa PJ (OR=2.94, 95%CI 1.31-6.60, P=0.009) and there was no significant difference in terms of delayed gastric emptying, intra- abdominal collection, overall morbidity and mortality, reoperation time and length of hospital stay between the two groups.[9] This meta-analysis concludes that Invagination PJ is not superior to duct- to-mucosa in terms of POPF and other complications but appears to reduce the clinically relevant POPF.

In a meta-analysis by Sun X et al, including seven RCT's comparing duct-to-mucosa and invagination PJ with 850 participants, no significant difference was detected in rates of pancreatic fistula (RR 0.98, 95% CI 0.63-1.53), mortality (RR 0.94, 95% CI 0.4-2.18), reoperation (RR 1.23, 95% CI 0.69-2.20) and morbidity (RR 0.98, 95% CI 00.82-1.16) between two groups.[10] However, patients who underwent duct-to-mucosa PJ had a significantly shorter hospital stay (mean difference-280, 95% CI-5.08 to-0.52). In the present study, clinically relevant POPF (Grade B and C) occurred in 10.4% of the patients.

In a randomised control trial comparing duct-to-mucosa versus invagination technique of pancreaticojejunostomy after pancreatoduodenectomy by Bai et al, overall POPF developed in 30.9% v/s 28.5% in invagination v/s duct-to-mucosa PJ, clinically relevant POPF occurred in 10.6% of patients and clinically relevant POPF was more common in invagination group than duct-to-mucosa PJ group (12/14 v/s 2/14 patients, P=0.004). Soft pancreatic gland tends to leak more in both groups. Patients who developed pancreatic fistula had significantly longer hospital stay (median 16 v/s 13 days; P=0.019).[11] They concluded that both techniques yield similar overall rates of POPF, but the rate of clinically significant POPF is lower in patients treated with duct-to-mucosa technique. Merits of this study are, single surgeon's experience, both groups being comparable. Complications of POPF like delayed gastric emptying and post pancreatectomy hemorrhage were not studied.

A dual institution RCT comparing duct-to-mucosa to invagination PJ from Berger et al showed a rate of pancreatic fistula in entire cohort was 17.8%. Pancreatic fistula developed in 24% and12% in duct-to-mucosa technique and dunking pancreatojejunostomy respectively. This trial also re iterated the fact that pancreatic fistula rates are more in soft glands (27% v/s 8% in soft v/s hard gland).[12]

In a prospective randomized trial of 144 patients comparing duct to mucosa to end to side pancreaticojejunostomy in soft pancreatic glands by Bassi et al, pancreatic fistula resulted in 14% of overall patients (duct-to-mucosa group 13% and end to side pancreaticojejunostomy 15% P= NS).[13] In this study, texture of the pancreas has not been assessed uniformly.

CONCLUSION

Dunking (Invagination) pancreatojejunostomy has acceptable early outcomes with clinically significant/relevant postoperative pancreatic fistula, delayed gastric emptying and post pancreatectomy hemorrhage rates of 10.4% (Grade B and C), 33.2% and 5.3% respectively. The outcomes are comparable with those of duct-to-mucosa PJ mentioned in literature.

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