



Peri-Operative Outcomes of Pancreatoduodenectomy In Gcri: A 5-Year Experience

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KEYWORDS

Introduction

Pancreatic cancer is the leading cause of cancer-related death worldwide, however its incidence in India is low.¹⁻³ Surgical resection is the only curable treatment and surgical procedure most commonly performed are pancreatoduodenectomy (PD) for tumours of the head pancreas and periampullary regions.⁴ Historically, operative resection of pancreas was regarded with scepticism. The usually high mortality rate, the occasionally prolonged convalescence fraught with multiple major complications, and relatively low percentage of long-term survivals have led several authorities to question whether the operation might better be abandoned. The data on outcomes of PD from developing countries is not as robust as Europe and North America, possibly due to a low incidence and more due to infrastructure and resource constraints.⁵ Escalating standards and widening indications for pancreatic resection have led to greater expectations with regard to patient outcomes. There has been an increase in surgical aggression (multi-visceral and vascular resections) and use of neo-adjuvant chemoradiotherapy in patients of "borderline resectable" tumors in the last two decades.⁶⁻⁷ Many series now report mortality rates of 5% or less and overall complication rates of less than 40% to 50%.⁸⁻¹⁰ This reduction has largely been attributed to variety of factors including surgery being performed in specialized high volume centres, interventional radiology support for management of complications and better critical care support.¹¹⁻¹⁴ The aim of the present study was to evaluate the experience of outcomes of PD performed for pancreatic and periampullary tumours in Gujarat Cancer and Research Institute, Ahmedabad, a tertiary and regional centre for cancer.

Materials and methods

This study is a retrospective observational study, in which we examined medical records of 141 patients (90 males and 51 females), who underwent pancreatoduodenectomy at Gujarat Cancer and Research Institute, Ahmedabad within 5-years period from January-2008 to January-2013. We traced the patients retrospectively through a review of operative log book of the emergency operation theatre and medical records of those patients obtained through record section. No approval of the institutional review committee was needed. We studied patient characteristics, types of surgery, tumour related factors, surgery related factors, peri-operative morbidity and mortality and length of postoperative hospitalization. We calculated the descriptive statistics for our variables such as operative diagnosis, presenting vital signs including serum bilirubin and serum albumin level, rate of complications and overall mortality rates. Standard definitions were used for the classification of complications. Peri-operative mortality was defined as deaths taking place during surgery, immediate post-operative (irrespective of whether they arose as a result of the surgery or other causes), up to 30 days post-operative or any death in a patient outside these criteria that was directly related to a complication of the procedure.

For analysis, we used Excel 2010. Chi-square (χ^2) test was used to compare variables and tests were considered significant when P-Value < 0.05.

Results

During the study period, 141 patients (n=141) underwent PD. The average PD done was 28.2% per year.

Table 1: provides the insight of patient characteristics with respect to demography, previous laparotomy and pre-operative stenting. Incidence was higher in males as compared to females. The most common age group affected was 50-59 yrs; only 2 patients were >70 yrs. As our centre is a tertiary care centre, patients are also referred from different places after previous failed laparotomy by surgeons not experienced in pancreatic resections. Pre-operative stenting was performed in 66 patients (32 patients were stented prior to coming to our centre); indications of stenting at our centre were- cholangitis, pre-operative nutritional support, neoadjuvant chemoradiotherapy or serum bilirubin >20mg/dl as accepted worldwide.

Table 1: Demography and related factors

| Demography | No. | Percentage |
|---------------------|-----|------------|
| Gender | | |
| a)Male | 90 | 63.8 |
| b)Female | 51 | 36.2 |
| Age Group | | |
| a)<50yrs | 34 | 24.1 |
| b)50-59 yrs | 64 | 45.4 |
| c)>60yrs | 43 | 30.5 |
| Previous laparotomy | 9 | 6.3 |
| Stenting | 66 | 46.8 |
| Diabetes Mellitus | 22 | 15.6 |

Table 2: demonstrates the clinical presentations of patients. Jaundice was the commonest presentation seen in 101 cases (72%). Abdominal pain, itching and weight loss were found in 57 (40%), 24 (17%) and 21 (15%) patients respectively. Serum albumin was measured in all patients. 45 patients had low albumin <2.5 mg/dl, 27 patients had level between 2.5-3, and 69 patients had albumin level>3 mg/dl. Rate of complications was inversely proportional to the level of albumin. The rate of complication was 31% pts with normal albumin, as compared to 69% in hypoalbuminemic patients.

Table 2: Presenting symptoms

| Symptoms | No. | Percentage |
|----------------|-----|------------|
| Jaundice | 101 | 72 |
| Abdominal pain | 57 | 40 |
| Itching | 24 | 17 |
| Weight loss | 21 | 15 |
| Vomitting | 18 | 13 |

Table 3: Classical PD was performed in majority of the cases with standard lymphadenectomy. Pancreatojejunostomy (PJ)

was preferred over pancreatogastrostomy (PG) for pancreatic reconstruction. Antecolic gastrojejunostomy was done in majority of the cases. Vascular resection was done in majority of patients who underwent neo-adjuvant chemoradiotherapy. Average blood transfusion was 1 PCV transfused either during surgery or day 0/1.

Table 3: Surgery and related factors

| | No. | Percentage |
|-------------------------|------|------------|
| Surgery : PD | | |
| a)Classical PD | 91 | 64.5 |
| b)PPPD | 50 | 35.5 |
| Reconstruction | | |
| a)PJ | 118 | 83.7 |
| b)PG | 23 | 16.3 |
| Gastrojejunostomy | 121 | 85.8 |
| a)Antecolic | 20 | 14.2 |
| b)Retrocolic | | |
| Vascular Resection | 13 | 9 |
| Avg Blood Loss (ml) | 480 | |
| Avg Transfusion (PCV) | 1 | |
| Avg OT time (hrs) | 6.7 | |
| Avg Hospital stay(days) | 14.3 | |

Table 4: Data analysis revealed pancreatic head as the most common site. Final histology confirmed adenocarcinoma in 125 cases (88.6%); NET, cystic neoplasm and benign disease was evident in 7 cases (5%), 7 cases (5%) and 2 cases (1.4%) respectively.

Table 4: Tumour location and pathology

| | No. | Percentage |
|-------------------|-----|------------|
| Tumour location | | |
| a)Pancreatic head | 62 | 44.0 |
| b)Lower CBD | 36 | 25.5 |
| c)Ampulla | 35 | 24.8 |
| d)Duodenum | 8 | 5.7 |
| Tumour Pathology | | |
| a)Adenocarcinoma | 125 | 88.6 |
| b)NET | 7 | 5.0 |
| c)Cystic neoplasm | 7 | 5.0 |
| d)Benign | 2 | 1.4 |

Table 5: Table indicates post-operative complications in our study. Standard definitions were used for the classification of complications. Wound infections were the commonest complications followed by pulmonary infections. Minor respiratory compromise was noted in 11 patients and major respiratory complications in 5 patients. Among pancreatic leak [as per the International study Group on Pancreatic Fistula (ISGPF) definition], 6 patients had grade A which remained uneventful; 4 patients had grade B leak which were managed by surgical, endoscopic or guided procedures; and 5 patients had grade C leak – 4 patients among these grade C died and 1 patient survived with significant morbidity and prolonged hospitalisation. 7 patients died, bringing mortality rate of this study to 4.96%:- among them 2 died of respiratory (major) complications, 4 died of pancreatic leak (grade C) leading to severe sepsis and 1 patient died of sudden cardiac arrest on post-operative day 2. Six patients developed post operative bleeding. These included 3 patients with an early bleed (<24 h) and 3 patients with a late bleed (>24 h). None of the patients required re-surgery to control the bleeding. Rate of complication was higher in cases with pre-operative stenting (60%) as compared to patients without pre-operative stenting (40%). Overall morbidity within stented group was significantly high (P value= 0.031), as with wound complications (P value=0.039). This indicates that pre-operative stenting should only be done in selected cases to prevent morbidity.

Table 5: Post-Operative Complications

| Complications | No. | Percentage(%) |
|-------------------|-----|---------------|
| a)Wound infection | 29 | 21 |
| b)Abscess | 6 | 4 |

| | | |
|----------------------------|----|----|
| c)Sepsis | 7 | 5 |
| d)Haemorrhage | 6 | 4 |
| e)Leakage | 15 | 11 |
| 1)Grade A | 6 | |
| 2)Grade B | 4 | |
| 3)Grade C | 5 | |
| f)Delayed gastric emptying | 8 | 6 |
| g)Wound dehiscence | 9 | 6 |
| h)Pulmonary complications | 16 | 11 |
| 1)Minor | 11 | |
| 2)Major | 5 | |

Discussion

Pancreatoduodenectomy was first performed successfully by Kausch in 1912¹⁵ and later popularized by Whipple in 1935.¹⁶ Since then, PD has evolved in terms of technical refinements.¹⁷ While considered extremely demanding procedure, surgery remains the only cure for all resectable and ‘borderline resectable’ pancreatic tumors. Despite the complexity of the procedure, there has been increase in the number of PDs performed worldwide.¹⁸

The current study was performed to analyze the pattern of post-operative outcomes for patients undergoing PDs at our institution, GCRI, a high volume tertiary care referral cancer centre.

Our results with morbidity of 35.5% and mortality of 4.96% was in accordance with those of other major centres worldwide, which report death rates of 0% to 5% and complication rates of approximately 40%.⁸⁻¹⁰ Post-operative pancreatic leak occurred for 11% of the patients of which 66.67% were grade A and B which were managed without any mortality. Six patients developed peri-operative haemorrhage, none of them required any re-exploration.¹⁹⁻²¹ Postoperative mortality has significant association with surgeon’s expertise, high volume centres and existence of multidisciplinary teams sufficiently experienced in managing the complications leading to mortality.¹¹⁻¹³

The present study had clearly demonstrated the increased risk of overall morbidity and wound complications in patients undergoing PDs in whom the pre-operative endoscopic drainage was performed.²²⁻²⁴ 32 out of 66 patients (48.9%) had undergone pre-operative endoscopic drainage prior to consultation at our referral centre, which may not necessarily have been undertaken at the centre *per se*. At our centre, indications for preoperative stenting were - cholangitis, pre-operative nutritional support, neoadjuvant chemoradiotherapy or serum bilirubin >20mg/dl.

All patients underwent standard lymphadenectomy as institution policy. A recent meta-analysis comparing standard PJ versus extended PD, has concluded that increased lymph node yield and reduced positive resection margins were observed in extended PD group, however it conferred no survival advantage and was associated with increased risk of delayed gastric emptying (DGE).²⁵

The choice of pancreatic anastomosis showed a trend towards preference of pancreatojejunostomy (PJ). PJ was performed in 118 patients (83.7%) as compared with a pancreatogastrostomy (PG) which was performed in 23 patients (16.3%). Two meta-analyses²⁶⁻²⁷ including three, randomized controlled trial comparing PJ versus PG failed to show any statistically significant benefit of either of the two techniques of anastomosis in terms of anastomotic leak rate.

The choice of antecolic approach for gastrojejunostomy was more favoured than retrocolic approach (85.8% vs 14.2%). Most of the studies have reported a higher incidence of post-operative delayed gastric emptying after the performance of a retrocolic GJ.²⁸⁻³⁰

Majority of the postoperative morbidity and mortality was observed in hypoalbuminemic patients. Low serum albumin levels and cachexia have been shown to correlate with poor outcomes after pancreatic surgery.³¹⁻³² In our study, mean hospital stay after surgery was 14.3 days which was comparable to other studies.³³

Conclusions

This single institution, high-volume experience indicates that pancreatoduodenectomy can be performed safely for tumours of pancreas and periampullary region. Overall survival is determined largely by better patients selection and experience of the surgeon and his or her personal technical skills while performing pancreatic resection. Better anticipation and management of postoperative complications are essential for improving the results of this operation.

References

- Curado M, Edwards B, Shin H, Storm H, Ferlay J, Heanue M, et al. Cancer incidence in five continents. IARC Sci Publ 2007;IX.
- Anderson K, Mack T, Silverman D. Cancer of the pancreas. In: Schottenfeld Jr D, Fraumeni J, editors. Cancer epidemiology and prevention. New York: Oxford University Press; 2006.
- Dhir V, Mohandas KM. Epidemiology of digestive tract cancers in India iv. Gall bladder and pancreas. Indian J Gastroenterol 1999;18:24e8.
- Malleo G, Marchegiani G, Salvia R, Butturini G, Pederzoli P, Bassi C. Pancreatoduodenectomy for pancreatic cancer: the verona experience. Surg Today 2011;41:463e70.
- Pal KM, Bari H, Nasim S. Pancreatoduodenectomy: a developing country perspective. J Pak Med Assoc 2011;61:232e5.
- Varadhachary GR, Tamm EP, Abbruzzese JL, Xiong HQ, Crane CH, Wang H, et al. Borderline resectable pancreatic cancer: definitions, management, and role of preoperative therapy. Ann Surg Oncol 2006;13:1035e46.
- Shrikhande SV, Arya S, Barreto SG, Ingle S, D'Souza MA, Hawaldar R, et al. Borderline resectable pancreatic tumors: Is there a need for further refinement of this stage? Hepatobiliary Pancreat Dis Int 2011;10:319e24.
- Yeo CJ, Cameron JL, Sohn TA, Lillemoe KD, Pitt HA, Talamini MA, et al. Six hundred fifty consecutive pancreatoduodenectomies in the 1990s: pathology, complications, and outcomes. Ann Surg 1997;226:248e57.discussion 257e260.
- Buchler MW, Wagner M, Schmied BM, Uhl W, Friess H, Z'Graggen K. Changes in morbidity after pancreatic resection: toward the end of completion pancreatotomy. Arch Surg 2003;138:1310e4. discussion 1315.
- Cameron JL, Riall TS, Coleman J, Belcher KA. One thousand consecutive pancreatoduodenectomies. Ann Surg 2006;244:10e5.
- Birkmeyer JD, Finlayson SR, Tosteson AA, Sharp SM, Warshaw AL, Fisher ES. Effect of hospital volume on in-hospital mortality with pancreatoduodenectomy. Surgery. 1999;125:250-256.
- Balzano G, Zerbi A, Capretti G, Rocchetti S, Capitanio V, Di Carlo V. Effect of hospital volume on outcome of pancreatoduodenectomy in Italy. Br J Surg. 2008;95:357-362.
- Peri-operative outcomes for pancreatoduodenectomy in India: a multi-center study: Parul J Shukla et al, HPB (Oxford). 2009 December; 11(8): 638-644.
- Sohn TA, Yeo CJ, Cameron JL, Geschwind JF, Mitchell SE, Venbrux AC, et al. Pancreatoduodenectomy: role of interventional radiologists in managing patients and complications. J Gastrointest Surg. 2003;7:209-219.
- Kausch W. Das carcinoma der papilla duodeni und seine radikaleentfernung. Beitr Z ClinChir. 1912; 78:439-486.
- Whipple A, Parsons WB, Mullins CR. Treatment of carcinoma of the ampulla of Vater. Ann Surg. 1935; 102:763-779.
- Shukla PJ, Barreto G, Shrikhande SV. The evolution of pancreatoduodenectomy. Hepatogastroenterology 2011;58:1409e12.
- Rosemurgy A, Cowgill S, Coe B, Thomas A, Al-Saadi S, Goldin S, et al. Frequency with which surgeons undertake pancreatoduodenectomy continues to determine length of stay, hospital charges, and in-hospital mortality. J Gastrointest Surg 2008;12:442e9.
- Bassi C, Dervenis C, Butturini G, Fingerhut A, Yeo C, Izbicik J, et al. Postoperative pancreatic fistula: an international study group (ISGPF) definition. Surgery 2005; 138:8e13.
- Wente MN, Bassi C, Dervenis C, Fingerhut A, Gouma DJ, Izbicik JR, et al. Delayed gastric emptying (DGE) after pancreatic surgery: a suggested definition by the international study group of pancreatic surgery (ISGPS). Surgery 2007;142:761e8
- Wente MN, Veit JA, Bassi C, Dervenis C, Fingerhut A, Gouma DJ, et al. Postpancreatotomy hemorrhage (PPH): an international study group of pancreatic

- surgery (ISGPS) definition. Surgery 2007;142:20e5
- Povoski SP, Karpeh MS, Conlon KC, et al. Association of preoperative biliary drainage with Outcome following pancreatoduodenectomy. Ann Surg 1999; 230: 131-142.
- Mumtaz K, Hamid S, Jafri W. Endoscopic retrograde cholangiopancreatography with or without stenting in patients with pancreaticobiliary malignancy, prior to surgery. Cochrane Database Syst Rev 2007;CD006001.
- Van der Gaag NA, Rauuws EA, Van Eijck CH, et al. Preoperative biliary drainage for cancer of the head of the pancreas. N Engl J Med 2010; 362:129.
- Iqbal N, Lovegrove RE, Tilney HS, Abraham AT, Bhattacharya S, Tekkis PP, et al. A comparison of pancreatoduodenectomy with extended pancreatoduodenectomy: a meta-analysis of 1909 patients. Eur J Surg Oncol. 2009;35:79-86.
- McKay A, Mackenzie S, Sutherland FR, Bathe OF, Doig C, Dort J, et al. Meta-analysis of pancreaticojejunostomy versus Pancreaticogastrostomy reconstruction after pancreatoduodenectomy. Br J Surg. 2006;93:929-936.
- Wente MN, Shrikhande SV, Mueller MW, Diener MK, Seiler CM, Friess H, Buchler MW. Pancreaticojejunostomy versus Pancreaticogastrostomy: systematic review and meta-analysis. Am J Surg.2007;193:171-183.
- Hartel M, Wente MN, Hinz U, Kleeff J, Wagner M, Müller MW, et al. Effect of antecolic reconstruction on delayed gastric emptying after pylorus-preserving Whipple procedure. Arch Surg. 2005;140:1094-1099.
- Tani M, Terasawa H, Kawai M, Ina S, Hirono S, Uchiyama K, et al. Improvement of delayed gastric emptying in pylorus-preserving pancreatoduodenectomy: results of a prospective, randomised, controlled trial. Ann Surg. 2006;243:316-320.
- Murakami Y, Uemura K, Sudo T, Hayashidani Y, Hashimoto Y, Nakagawa N, et al. An antecolic Roux-en-Y type reconstruction decreased delayed gastric emptying after pylorus-preserving pancreatoduodenectomy. J Gastrointest Surg. 2008;12:1081-1086.
- Schnelldorfer T, Adams D. The effect of malnutrition on morbidity after surgery for chronic pancreatitis. Am Surg 2005;71:466e72.
- Pausch T, Hartwig W, Hinz U, Swolana T, Bundy B, Hackert T, et al. Cachexia but not obesity worsens the postoperative outcome after pancreatoduodenectomy in pancreatic cancer. Surgery 2012;152:S81e8.
- A modern analysis of morbidity after pancreatic resection. Behrman SW, Rush BT, Dilwari RA. Am Surg. 2004 Aug; 70(8): 675-82; discussion 682-3