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Original Research Article

Outcome of whipples procedure in low volume centre and standard high volume centre

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Abstract

Background: Periampullary adenocarcinomas are a set of neoplasms that arise near the ampullaof vater. Although they are all adenocarcinomas, they arise from the different mucosal tissues of the pancreatic duct, bile duct, ampulla, and duodenum, they are treated with pancreaticoduodenectomy also known as whipples procedure, which is a complex, high risk surgical procedure. Before 1980,pancreaticoduodenectomy has been associated with a high rate of morbidity(40%-60%) and a high mortality rate up to 20%[1]. Since that time, the in-hospitalmortality rate has decreased substantially with high-volume tertiary care centers reporting in-hospital mortality rate of 4% or less[2,3]. Luft *et al*.[4] provided theempirical relationship between higher surgical volume and lower post-operative mortality.

Aims and Objectives:

- To compare outcomes of Whipple's surgery in low and high-volume centers.
- Associated complications.

Materials and Methods: Through retrospective collection of data from a prospectively maintained databaseat the NCR region (India), medical records of patients who underwent Whipples for pancreatic or periampullary malignant lesions were identified. Pätient 'demographics, surgical parameters and post-operative events were recorded andanalysed. After performing Whipples (classical or pylorus preserving) with or withoutassociated organ resection, pancreatico-jejunostomy was achieved byanastomosing the pancreatic remnant to the end of the jejunal loop by either mucosato mucosa or dunking method. All the surgical procedures were performed by thesenior surgeon with a senior assistant. Clavien-Dindo classification[11] was used tograde the complications, and complications requiring either intervention under localor locoregional or general anaesthesia, ICU management or causing death wereconsidered as major (grades 3-5). Besides recording the annual volume, according tothe number of Whipples performed per year we categorized the volume into lowvolume

(<15 whipples/year) and high volume (≥ 15 whipples/year) as describedearlier.

Results and Observations: From year 2011-2021, 150 patients underwent whipples procedure in low volume centres. In standard high volume centres 350 patient underwent whipples procedure. The mean operative time, operative blood loss, and need for intraoperative blood transfusion decreased minimally over the volume categories if we compare low volume centre with high volume centre.There was almost equal morbidity noted in high volume centre and low volume centre and slightly shorter length of hospital stay in high volume centre Similarly the rate of mortality dropped from 2.8% for the low volume group to 2.2% for the high-volume group.

Conclusion: This resulted in almost equal mortality and morbidity and complications as compare to high volume centre. So, volume of patient is not critical point in whipples surgery.

Keywords: Pancreaticoduodenectomy, Whipple's surgery, periampullary carcinoma, complications, delayed gastric emptying

Introduction

Periampullary adenocarcinomas are a set of neoplasms that arise near the ampullaof Vater. Although they are all adenocarcinomas, they arise from the differentmucosal tissues of the pancreatic duct, bile duct, ampullaand duodenum, they aretreated with pancreaticoduodenectomy also known as whipples procedure, which is a complex, high risk surgical procedure. Before 1980,pancreaticoduodenectomy has been associated with a high rate of morbidity(40%-60%) and a high mortality rate up to 20%[1]. Since that time, the in-hospitalmortality rate has decreased substantially with high-volume tertiary care centersreporting in-hospital mortality rate of 4% or less[2, 3].Luft *et al*.[4]provided theempirical relationship between higher surgical volume and lower postoperativemortality. Various studies have demonstrated that high volume tertiary centers havesignificantly lower (< 5%) in-hospital mortality rates for Whipples than low volumecentres (> 10%)[5, 6].Some studies conducted before in United States regardingoutcome of low volume and high volume centres but [7],no information is availableregarding low volume vs standard high volume centre outcome association in India.

The purpose of this study was to compare the case oflow volume centre tostandard high volume centre underwent whipples during the period 2011-2021 andanalyse the outcome in view of mortality and morbidity.

Materials and Methods

Through retrospective collection of data from a prospectively maintained databaseat the NCR region (India), medical records of patients who underwent Whipples forpancreatic or periampullary malignant lesions were identified. Pätient'sdemographics, surgical parameters and post-operative events were recorded andanalysed. After performing Whipples (classical or pylorus preserving) with or withoutassociated organ resection, pancreatico-jejunostomy was achieved byanastomosing the pancreatic remnant to the end of the jejunal loop by either mucosato mucosa or dunking method. All the surgical procedures were performed by thesenior surgeon with a senior assistant. Clavien-Dindo classification[11] was used tograde the complicationsand complications requiring either intervention under localor locoregional or general anaesthesia, ICU management or causing death wereconsidered as major (grades 3-5). Besides recording the annual volume, according tothe number of Whipples performed per year we categorized the volume into lowvolume (<15 whipples/year) and high volume (≥ 15 whipples/year) as describedearlier[12].

Pancreatic fistula was categorized according to the International Study Group onPancreatic Fistula criteria[13]. Inability of a patient to return to a standard diet bythe end of the first postoperative week necessitating prolonged nasogastric intubation of the patient was treated as delayed gastric emptying (DGE) as definedby the International Study Group on Pancreatic Surgery (ISGPS)[14], bile leak wasdefined as bilious drain with raised bilirubin leveland culture positive purulentcollection was treated as intra-abdominal abscess.

Post-pancreatectomy haemorrhage (PPH) was defined according to the ISGPS basedon the time of onset, site of bleeding, severity and clinical impact[15]. Overallmorbidity included all major complications including infections, cardiopulmonary andgastrointestinal complications;the primary endpoint was operative mortality definedas death occurring during the period of hospital stay or within 30 days of surgery.

Secondary endpoints were postoperative morbidity rate, occurrence of pancreatic fistula, delayed gastric emptying (DGE) and length of hospital stay. Follow-up forinfectious and non-infectious complications was carried out for 30 day after hospitaldischarge. Readmission rate (within 30 day after discharge) was also recorded.

Statistical analysis

Statistical analyses were performed using x2 and Fishers exact tests for categoricalvariables and ANOVA for continuous variables. Post ho tests were applied to look forinter-group differences. Statistical analyses were performed using SPSS 20 Chicago(United States). P values of 0.05 or less were considered statistically significant.

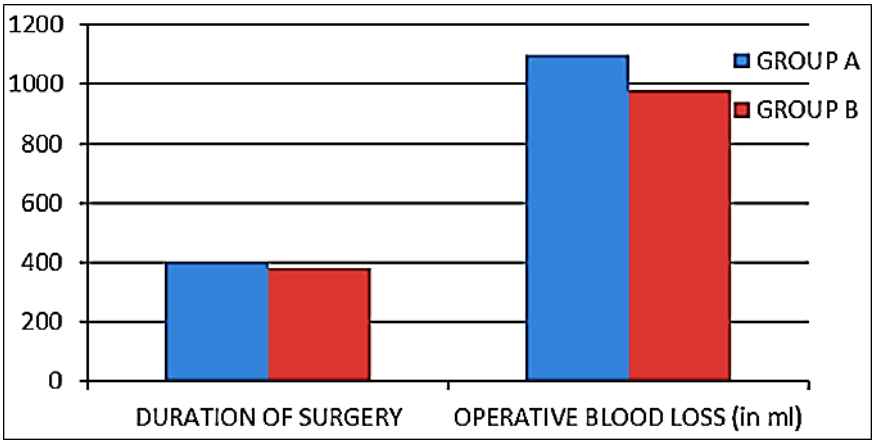

Fig1: Duration of surgery vs operative blood loss

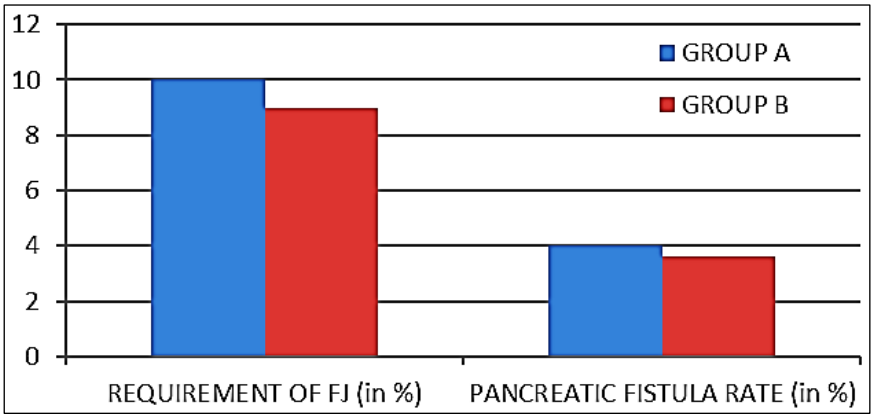

Fig2: Requirement of FJ Vs pancreatic fistula rate

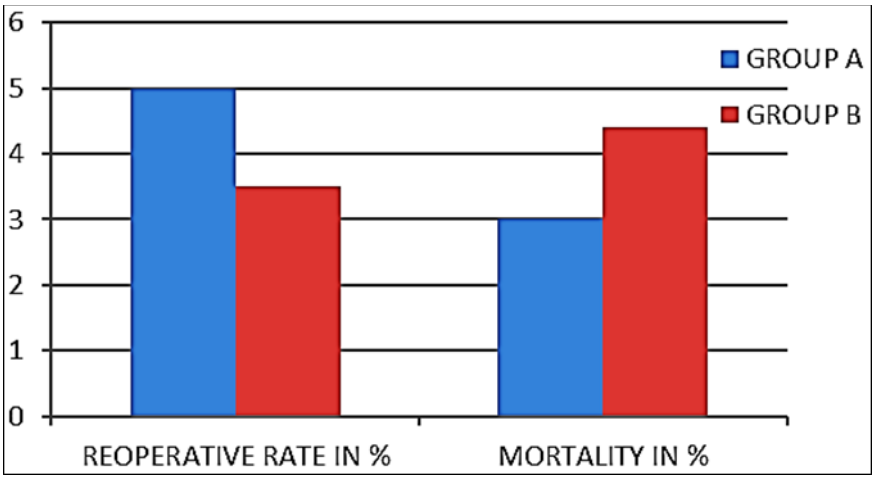

Fig3: Re operative Rate vs Mortality rate

Results

During the 10 year period from January 2011 to December 2021, 150 whipples wereperformed in the NCR'region. The most common indications for surgery werepancreatic adenocarcinoma. The various demographic features between the lowvolume (group A), high volume (group B) and categories revealed no statisticalchange during the study period.

In groups A and B the mean duration of surgery (400+-20min, 380 +-16min, $p \leq 0.001$),operative blood loss (1098.5+-160 mL, 980 +-110mL, $p \leq 0.001$), mean blood units transfused (3 UI, 2.6UI, $p \leq 0.001$) and the requirement of feeding jejunostomy (10%,9%, $p \leq 0.001$) significantly equal with high volume centre. There was a progressiveregression but non-significant in the rate of overall complications across the volumegroups (group A, 30.0%; group B, 27.2%, $p \leq 0.001$).

The most common complications were DGE and occurrence of pancreatic fistula. Both these types of complications showed a no significant difference in rates acrossthe volume groups (pancreatic fistula rate of 4.0% in group A and 3.6% in group B, ($p \leq 0.001$), whereas DGE was observed at a rate of 6.0% in group A, 5.9% in group B ($p \leq 0.001$). The rate of PPH was 0.3% in group A; 0.2% in group B ($p \leq 0.001$). Five patients required reoperative surgery (2 postoperative hemorrhage, 2 pancreatic fistula and 1 DGE). The reoperative rate when comparing the volume groups (in low volume 5.0%, and in high volume 3.5%) Occurrence of intra-abdominal infections and rate of bile leak also equal when comparing the volume categories, but it is observed that patients with total bilirubin level >15mg/dl there is corresponding increase in complication rate.

No decrease in the mean length of hospital stay noticed for the high-volume group when compared with low volume group of patients (16‡ 2 days and 14+-2 days for low and high-volume periods, respectively; $p \leq 0.001$). The consistency of the stepwise inverse relation between volume and in-hospital mortality was notable (3% in low volume and 2.6% for high volume respectively).

Discussion

More than 30 years ago, Luft *et al.*[4] introduced the empirical relationship betweenhigher surgical volume and lower postoperative mortality. This led to the concept of centralization of complex surgical procedures to improve outcome. This relationship of hospital volume and surgical mortality for complex surgical procedures including PD was amply described by Birkmeyer *et al.*[16]. Despite improvements due to regionalization, PD remains a complex procedure associated with high perioperative morbidity and potential mortality. In this study

Strong evidence exists for volume-outcome relationship where high volume centers and low volume have almost equal perioperative morbidity and mortality, although the exact mechanism (surgeon related factors vs system related factors) behind it remains unclear. For example, an experienced surgeon working in a low volume institution may be technically proficient at PD; however, the system support for diagnosis and treatment of postoperative complications may be inadequate. Conversely a high-volume center with intensive care, interventional radiologic and gastro-enterological expertise could provide superior support to a surgeon with lesser PD experience. Previous publications have clearly demonstrated that mortality, survival and overall life expectancy are improved when PD is performed in high volume centers[17-20]. But in this study, it is proved that if surgeon is experienced and adequate facilities available outcome will be same in low and high volume centre.
In Delhi NCR region low volume centre observed and studied for pancreaticoduodenectomy operated by experienced surgeon and assistant and improved caring of patients. This included formulation of treatment protocols and critical care ways, as well as standardizing diagnostic workups, operative details and management of postoperative complications. Further information regarding provider capabilities and surgical results were disseminated locally, regionally and nationally.

Conclusion

This resulted in almost equal mortality and morbidity and complications as compare to high volume centre. So, volume of patient is not critical point in whipples surgery.

References

1. Cameron JL, Riall TS, Coleman J, Belcher KA. One thousand consecutive pancreaticoduodenectomies. Ann Surg.2006;244:10-15.
2. Lieberman MD, Kilburn H, Lindsey M, Brennan MF. Relation of perioperative deaths to hospital volume among patients undergoing pancreatic resection for malignancy. Ann Surg. 1995;222:638-645.
3. Gordon TA, Burleyson GP, Tielsch JM, Cameron JL. The effects of regionalization on cost and outcome for one general high-risk surgical procedure. Ann Surg. 1995;221:43-49.
4. Luft HS, Bunker JP, Enthoven AC. Should operations be regionalized? The empirical relation between surgical volume and mortality.N Engl. J Med. 1979;301:1364-1369.
5. Balzano G, Zerbi A, Capretti G, Rocchetti S, Capitanio V, Di Carlo V. Effect of hospital volume on outcome of pancreaticoduodenectomy in Italy. Br J Surg. 2008;95:357-362.
6. Birkmeyer JD, Finlayson SR, Tosteson AN, Sharp SM, Warshaw AL, Fisher ES. Effect of hospital volume on in-hospital mortality with pancreaticoduodenectomy.Surgery. 1999;125:250-256.
7. Learn PA, Bach PB. A decade of mortality reductions in major oncologic surgery: the impact of centralization and quality improvement.Med Care.2010;48:1041-1049.
8. Shah OJ, Bangri SA, Singh M, Lattoo RA, Bhat MY. Omental flaps reducescomplications after pancreaticoduodenectomy.Hepatobiliary Pancreat DisInt.2015;14:313-319.
9. Shah OJ, Robbani I, Shah P, Bangri SA, Khan IJ, Bhat MY,*et al*. A selective approach to the surgical management of periampullary cancer patients and its outcome. Hepatobiliary Pancreat Dis Int. 2014;13:628-633.
10. Shah OJ, Bangri SA, Singh M, Lattoo RA. The Impact of Fast Track strategy on centralization of Pancreaticoduodenectomy: A comparative study from India.HepatobiliaryPancreat Dis Int., 2016.

11. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg. 2004;240:205-213.
12. Gouma DJ, Van Geenen RC, Van Gulik TM, De Haan RJ, De Wit LT, Busch OR,*et al*. Rates of complications and death after pancreaticoduodenectomy: risk factors and the impact of hospital volume.Ann Surg.2000;232:786-795.
13. Bassi C, Dervenis C, Butturini G, Fingerhut A, Yeo C, Izbicki J,*et al*. Postoperative pancreatic fistula: an international study group (ISGPF) definition. Surgery. 2005;138:8-13.
14. Wente MN, Bassi C, Dervenis C, Fingerhut A, Gouma DJ, Izbicki JR,*et al*. Delayed gastric emptying (DGE) after pancreatic surgery: a suggested definition by the International Study Group of Pancreatic Surgery (ISGPS)Surgery. 2007;142:761-768.
15. Wente MN, Veit JA, Bassi C, Dervenis C, Fingerhut A, Gouma DJ,*et al*. Post-pancreatectomy hemorrhage (PPH): an International Study Group of Pancreatic Surgery (ISGPS) definition. Surgery. 2007;142:20-25.
16. Birkmeyer JD, Siewers AE, Finlayson EV, Stukel TA, Lucas FL, Batista I,*et al*. Hospital volume and surgical mortality in the United States. N Engl. J Med. 2002;346:1128-1137.
17. Ho V, Heslin MJ. Effect of hospital volume and experience on in-hospital mortality for pancreaticoduodenectomy.Ann Surg.2003;237:509-514.
18. Topal B, Van de Sande S, Fieuws S, Penninckx F. Effect of centralization of pancreaticoduodenectomy on nationwide hospital mortality and length of stay. Br J Surg. 2007;94:1377-1381.
19. Kotwall CA, Maxwell JG, Brinker CC, Koch GG, Covington DL. National estimates of mortality rates for radical pancreaticoduodenectomy in 25,000 patients.Ann Surg Oncol.2002;9:847-854.
20. Fong Y, Gonen M, Rubin D, Radzyner M, Brennan MF. Long-term survival is superior after resection for cancer in high-volume centers. Ann Surg. Discussion. 2005;242:540-544, 544-547.