RESEARCH ARTICLE

Is age just a number or does it really affect the surgical and oncological outcomes after pancreatoduodenectomy?

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Abstract

Objective: To review the impact of age on perioperative and postoperative outcomes in patients following pancreaticoduodenectomy.

Method: The retrospective study was conducted at the Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan, and comprised data from January 2014 to December 2018 of all patients who underwent pancreatoduodenectomy. Postoperative morbidity and oncological outcomes were compared between patients aged ≤60 years in group A and those aged >60 years in group B. Data was analysed using SPSS 20.

Results: Of the 161 patients, 103(64%) were males and 58(36%) were females. There were 117(73%) patients in group A; 72(61.5%) males and 45(38.5%) females with an overall mean age of 46±11 years. The remaining 44(27%) were in group B; 31(70.5%) males and 13(29.5%) females with an overall mean age of 67±05 years. The most common pathology was adenocarcinoma 130(81%), commonest site was periampullary 85(53%) and the most common pancreatic reconstruction technique employed was pancreaticogastrostomy 110(68%). Patients in group B had significantly higher comorbidities compared to those in group A ($p<0.05$). Estimated blood loss during surgery was significantly higher in group B ($p=0.004$). There was no significant difference in overall morbidity ($p=0.856$), reoperation ($p=1.000$), 30-day readmission rate ($p=0.097$), 90-day mortality rate ($p=0.324$)) and overall survival ($p=0.551$) between the groups.

Conclusion: Pancreatoduodenectomy could be performed in the elderly with comparable morbidity and oncological outcomes as younger patients. Comorbid conditions remained higher in elderly patients and preoperative optimisation may help improve postoperative outcomes.

Keywords: Pancreatoduodenectomy. Outcomes in elderly, Age, Morbidity. (JPMA 72: 2413; 2022)

DOI: https://doi.org/10.47391/JPMA.3956

Introduction

The world is facing the challenge of aging population and the projected percentage of population aged >65 years in developed and developing countries is 17% by 2050.[1] Pakistan is facing a similar trend, where 60 years is the cutoff age of the elderly. There is a probability that 11% of population will be aged >60 years by 2025 compared to 5.6% population in 1998 according to the World Health Organization (WHO). Also, longevity is expected to increase to 72 years by 2023.[2] Age has a significant impact on the outcomes of patients in the postoperative period. The perioperative management of elderly patients is complex compared to the younger ones because they are more likely to develop adverse outcomes.[3]

The incidence of periampullary and pancreatic cancer increases with age and elderly patients present 60% of all diagnosed cases.[4] Because of increasing proportion of aging population, more patients will be expected to require curative resection for periampullary and pancreatic cancers. Pancreatoduodenectomy (PD) is the only curative treatment for these cancers and is a morbid procedure due to high mortality (5-10%) and morbidity (40-50%) rates.[5] However, the overall operative risk of PD has reduced due to advancements in preoperative preparation, surgical technique and perioperative care. Perioperative mortality <2% is reported by experienced surgeons at high-volume centres[6] and that is why the indications for PD have extended and it is now being offered to elderly patients as well. Despite promising outcomes in young patients, evidence regarding the validity of performing PD for older patients remains controversial. Some studies have shown that postoperative morbidity, length of hospital stay (LOS) and readmission rate increases in older patients post-PD.[7,8] Other studies have reported that age does not affect the outcomes post-PD.[9]

Data in this regard from Pakistan is scarce. The current study was planned to compare the perioperative morbidity and mortality in elderly patients compared to young patients post-PD for malignant diseases.

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Materials and Methods

The retrospective study was conducted at the Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan, and comprised data from January 2014 to December 2018 of all patients who underwent PD. Data was retrieved using non-probability consecutive sampling technique after getting approval from the institutional ethics review board. Data of patients who had total pancreatectomy without pancreatic anastomosis was excluded. As per institutional policy and practice, all cases were discussed in multidisciplinary tumour board meeting with preoperative anaesthetic and internal medicine assessment for perioperative optimisation. Cardiologists, pulmonologists and endocrinologists were consulted for patients with known cardiac, pulmonary and endocrine disorders.

Baseline characteristics noted were gender, comorbidities, pathology, American Society of Anaesthesiologists (ASA) class, and Eastern Cooperative Oncology Group (ECOG)[10,11] performance status. Surgical details included operative time, estimated blood loss, number of intraoperative blood transfusions and pancreatic reconstruction technique. Outcome variables included morbidity and 90-day mortality.

Patients aged ≤ 60 years were placed in group A and those aged >60 years in group B. Baseline characteristics, operative details and postoperative outcomes were compared between the groups.

Data was analysed using SPSS 20. Mean and standard deviation were used to express continuous variables, while categorical variables were stated as frequencies and percentages. Student t-test was used to compare continuous variables, and Fisher's exact test to compare categorical variables. P<0.05 was considered statistically significant.

Results

Of the 161 patients, 103(64%) were males and 58(36%) were females. There were 117(73%) patients in group A; 72(61.5%) males and 45(38.5%) females with an overall mean age of 46±11 years. The remaining 44(27%) were in group B; 31(70.5%) males and 13(29.5%) females with an overall mean age of 67±05 years. The most common pathology was adenocarcinoma 130(81%), the commonest site was periampullary 85(53%) and the most common pancreatic reconstruction technique employed was pancreaticogastrostomy 110(68%). Patients in group B had significantly higher comorbidities compared to those in group A (p<0.05). Estimated blood loss during surgery was significantly higher in group B (p=0.004) (Table-1).

Table-1: Baseline characteristics and operative variables.

	Group A (n=117)	Group B (n=44)	P Value
Mean Age ±SD	46±11	67±5	
Gender			
• Male	72 (62%)	31 (70%)	0.358
• Female	45 (32%)	13 (30%)	
Comorbid conditions			
• Diabetes Mellitus	18 (15%)	11 (25%)	0.172
• Hypertension	15 (13%)	21 (48%)	0
• Ischemic heart disease	7 (6%)	8 (18%)	0.03
• Asthma	2 (2%)	0	
ASA Score			
• ASA I and II	109 (93%)	33 (75%)	0.004
• ASA III	8 (7%)	11 (25%)	
ECOG performance status			
• 0	84 (72%)	37 (84)	0.151
• 1	33 (28%)	7 (16%)	
Pathology			
• Adenocarcinoma	92 (79%)	38 (87%)	
• Gastrointestinal stromal tumors	5 (4%)	1 (2%)	
• Neuroendocrine tumors	9 (8%)	2 (5%)	
• Solid pseudopapillary tumor	3 (2%)	1 (2%)	0.893
• Mucinous cystic neoplasm	4 (3%)	1 (2%)	
• Serous cystic neoplasm	1 (1%)	1 (2%)	
• Chronic pancreatitis	3 (3%)	0	
Operative characteristics			
Reconstruction technique			
• Pancreaticojejunostomy	40 (34%)	11 (25%)	0.342
• Pancreaticogastrostomy	77 (66%)	33 (75%)	
Estimated blood loss (ml)	341±164	460±361	0.004
Intraoperative transfusions (number of patients)	6 (5%)	6 (14%)	0.091
Operating time (mins)	422±98	443±105	0.245

SD: Standard deviation, ASA: American Society of Anaesthesiologists, ECOG: Eastern Cooperative Oncology Group.

There was no significant difference in overall morbidity (p=0.856), reoperation (p=1.000), 30-day readmission rate (p=0.097), 90-day mortality rate (p=0.324)) and overall survival (p=0.551) between the groups (Table-2).

The number of patients re-operated in group A was 10(9%) compared to 3(7%) in group B (p=1.000). In terms of overall mortality, there were 5(4%) deaths within the 90-day postoperative period and all patients were in group A (p= 0.324) There was no difference in overall survival (p=0.551) between the groups, but recurrence was significantly higher in group B (p=0.022)

Table-2: Outcome variables.

	Group A	Group B	P value
Overall morbidity	75 (64%)	29 (65%)	0.856
Superficial surgical site infection	51 (44%)	22 (50%)	0.483
Deep incisional infection	11 (9%)	6 (14%)	0.565
Organ space infection	14 (12%)	7 (16%)	0.6
Wound dehiscence	1 (1%)	0	1
Renal insufficiency	4 (3%)	2 (5%)	0.665
Septic shock	7 (6%)	4 (9%)	0.494
Cardiac arrest	1 (1%)	0	1
Pancreatic fistula	31 (26%)	16 (36%)	0.246
• Grade A	17 (55%)	9 (56%)	0.385
• Grade B	6 (19%)	5 (31%)	
• Grade C	8 (26%)	2 (13%)	
Delayed gastric emptying	13 (11%)	6 (14%)	0.784
Percutaneous drainage of intraabdominal collection	4 (3%)	4 (9%)	0.216
Reoperation	10 (9%)	3 (7%)	1
90-day Mortality	5 (4%)	0	0.324
Clavein Dindo Classification			
• Grade 1	39 (52%)	10 (34%)	
• Grade 2	13 (17%)	12 (42%)	0.096
• Grade 3	12 (16%)	4 (14%)	
• Grade 4	6 (8%)	3 (10%)	
• Grade 5	5 (7%)	0	
Length of hospital stay (days)	11±9.0	13±9.9	0.197
Recurrence	12(10%)	11(25%)	0.022
Adjuvant treatment	64 (55%)	24 (57%)	0.858
Overall survival (months)	26±17	28±25	0.551
Duration of follow up (months)	33±12	31±8	0.861

Discussion

Outcomes of PD in older patients has been a subject of debate in literature. Sohn et al.[12] published the first study in 1998, comparing the outcomes of octogenarian patients compared to younger patients and reported similar morbidity and mortality rates. Since then, multiple studies have been published in the past 15 years evaluating the outcomes post-PD in the elderly. One of the conflicting aspects in these studies is the absence of a universal definition of the elderly. The difference in the cutoff age for the elderly has led to a significant heterogeneity in the various studies, making it hard to interpret the results with clarity.[13] Some studies set the age of 65 years as the cutoff for being defined as the elderly,[14,15] while others set the ages of 70 years,[16,17] 75 years,[18,19] or 80 years[20,21] as the standard. As per the definition of the elderly in Pakistan,[2,13] 60 years was the cutoff used to compare the preoperative characteristics and outcomes in the current study.

The study showed that comorbid conditions, including diabetes, hypertension and ischaemic heart disease, were higher among older patients, resulting in significantly higher ASA score of $\geq$3. Kim et al.[8] showed similar results in a systematic review and meta-analysis of 18 studies. Chen et al.[22] also reported significantly higher ASA scores and comorbidities in a study of 727 elderly patients aged >65 years. The current study did not find any significant difference in the ECOG status of two groups which could be explained by the fact that only patients with better health status were selected for surgery. These results are similar to those of Brahmbhatt et al.[7] When the pathology of the resected tumour was compared, the percentage of patients operated for adenocarcinoma was higher in older cohort than younger counterparts which explains the fact that the incidence of pancreatic and periampullary cancers increase with advancing age.[23]

Considering overall postoperative complications, the current study found no difference in the overall morbidity and mortality rates between the two groups, which is comparable with previous studies.[10,21,24] Interestingly, despite significantly higher ASA scores and comorbidities in group B, systemic complications, including cardiac complications and renal insufficiency, were similar in both the groups. The possible explanation for these results is the fact that all patients undergo preoperative optimisation of chronic disease processes and there is careful patient selection for surgery. Faraj et al.[25] reported that patients aged >65 years are at a significantly higher risk of septic shock, and this is an independent risk factor for mortality. This contrasts with the current study which did not find any significant difference in the incidence of septic shock between the groups. Procedure-related complications that impact the outcomes of patients post-PD include postoperative pancreatic fistula, delayed gastric emptying, bile leak and haemorrhage. It has been reported previously that old age has no effect on the incidence of pancreatic fistula, and the current findings were consistent with published studies.[26] Delayed gastric emptying has been inconsistently reported in literature, with some studies reporting an increased incidence in patients aged >65 years.[27] There was no statistically significant difference in the incidence of delayed gastric emptying in the current series. Similarly, there was no significant difference in the incidence of superficial and deep organ space infection. The study did not find any significant differences in the overall morbidity rates or LOS between the groups. Despite more comorbidities, there was no mortality within the 90-day postoperative period. This could be the result of optimisation of comorbid conditions, improved postoperative care, or selection bias in terms of better functional class before surgery. Review of literature revealed similar results in other series with comparable 30 and 90-day mortality between young and older patients.[7] No significant difference was observed in the median survival between the groups in the current study, which is in line with previous studies.[24]

The current study has its limitations, including its retrospective design and data from a single-centre with a small sample size.

However, the current study is the first from Pakistan to address the effects of age on postoperative outcomes after PD.

Conclusion

PD could be performed in elderly patients with comparable morbidity and oncological outcomes as younger patients. Comorbid conditions remained higher in the elderly patients and preoperative optimisation may improve postoperative outcomes in this age group.

Disclaimer: The text was presented as an e-poster at the 14th World Congress of the International Hepato-Pancreato-Biliary Association, 2020.

Conflict of Interest: None.

Source of Funding: None.

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