Original Article

Palliative bypass surgery in elderly patients with resectable periampullary carcinoma: a report of 45 cases

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Background: This study aims to determine whether palliative bypass surgery (choledochojejunostomy and gastrojejunostomy), which has a lower incidence of complications and mortality, remains an option for elderly patients with resectable periampullary carcinoma.

Methods: The clinical data of elderly patients with resectable periampullary carcinoma who had been admitted to Qilu Hospital and had undergone palliative bypass surgery in recent years was collected. Factors concerning these patients, including surgical duration, intraoperative haemorrhage, the incidence of complications, mortality, and survival rate, were compared to those in patients who had received radical surgery.

Results: Surgical duration, intraoperative haemorrhage, the incidence of complications, pancreatic fistula, abdominal infections, pneumonia, and postoperative hospital stay were found to be more apparent in patients in the radical surgery group than in patients in the palliative bypass surgery group and the difference was statistically significant ($P<0.05$). However, regarding blood transfusions, deaths, biliary fistula, postoperative haemorrhage, wound infection, delayed gastric emptying, and heart disease, the difference was not statistically significant ($P\geq0.05$).

Conclusions: For elderly patients with periampullary carcinoma, palliative bypass surgery offers safety, low risks, a quick recovery, a shorter surgery duration, less intraoperative haemorrhage, and a lower incidence of complications compared to radical surgery. Although it has a lower long-term survival rate compared to radical surgery, palliative surgery remains an option for elderly patients who prefer not to undergo the invasive procedure of radical surgery.

Keywords: Periampullary carcinoma; resectable; palliative bypass surgery

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Introduction

Ampulla refers to the slightly swollen part formed when the common bile duct passes through the duodenal wall and converges with the pancreatic duct. Duodenal papilla is formed through a duodenal mucosa bulge induced by the protuberance of ampulla and its surrounding sphincter towards the duodenal lumen. All tumours in the periampullary tissue structure are collectively referred to as periampullary tumours. Periampullary carcinoma refers to periampullary malignant tumours located 2 cm away from the ampulla, including common bile duct lower carcinoma, duodenal papillary carcinoma, and ampullary carcinoma (1).

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The etiologic mechanism of periampullary carcinoma remains unclear. The theory of the anomalous junction of the pancreaticobiliary duct was proposed by Babbitt *et al.* in 1969. Furthermore, studies conducted by Funabiki *et al.* (2) have proven that compared to the general population, the incidence rate of periampullary carcinoma in the pancreaticobiliary maljunction (PBM) population reaches up to 10.4%. This is 285 times its incidence rate in the general population. In terms of the incidence of pancreatic cancer, it reaches up to 0.8%, which is 49.4 times higher than its incidence rate in the general population. Therefore, Funabiki *et al.* consider PBM as a risk factor that leads to ampullary tumours.

Some periampullary carcinoma patients miss the opportunity to undergo radical surgery when diagnosed, with doctors recommending palliative treatment. The objective of palliative treatment is to reduce the obstruction of the bile duct and the gastrointestinal tracts in order to relieve jaundice, itching, and other clinical symptoms, improve the nutritional status and quality of life of the patient, and prolong their life. At present, commonly used treatment methods include endoscopic biliary tract and duodenal stenting, ultrasound-guided percutaneous transhepatic biliary drainage, and palliative surgery. Due to the advantages of less trauma and lower risk, endoscopic stenting and the minimally invasive ultrasound technique have been widely used in recent years. However, these two methods also have certain disadvantages, for instance when alleviating obstructions, stent occlusion or migration can be easily induced, resulting in loss of stent function due to the long-term impact of food residue, bile, and other digestive juices (3). Furthermore, patients with longer postoperative life expectancy have a higher probability of stent occlusion and may require stent reopening and even secondary surgeries. The purpose of palliative surgery is to change the travel direction of bile and food through bile duct reconstruction and digestive tract reconstruction. There are two options for a bile duct reconstruction: a cholangiojejunostomy or a cholecystojejunostomy. The latter option is simple and less invasive, but it has a high recurrence rate of jaundice and cholangitis, while the former option is more difficult to perform. However, a cholangiojejunostomy has a superior effect in alleviating jaundice and the difference in mortality and incidence of complications between these two anastomoses is not statistically significant (4). Therefore, all patients should undergo a cholangiojejunostomy when conditions permit the performance of this procedure. For patients who choose palliative surgery, a preventive gastrointestinal bypass remains necessary, even if there is no occurrence of gastrointestinal obstruction. Previous studies have found that 30% to 40% of patients who receive single internal biliary drainage due to unresectable periampullary carcinoma developed postoperative gastric outlet obstruction, while the number of patients who develop postoperative gastric outlet obstruction after receiving both a choledochojejunostomy and a gastroenterostomy was only approximately 5% (5). There is also evidence that proves that patients who undergo both a choledochojejunostomy and a gastroenterostomy (a double loop bypass) have a more extended postoperative life expectancy and a significantly lower incidence of duodenal obstruction compared to patients who only undergo a single choledochojejunostomy. However, the difference in postoperative complications and mortality is not statistically significant. Therefore, patients having palliative surgeries should undergo both a choledochojejunostomy and a gastrojejunostomy in the same period as much as possible, regardless of the gastric outlet obstruction (6).

The recognised preferred treatment method for resectable periampullary carcinoma is radical surgery, namely pancreaticoduodenectomy. Nonetheless, since this surgical approach induces significant trauma and has a high incidence of complications and mortality, especially in elderly patients, surgeons are extremely cautious about performing a pancreaticoduodenectomy on elderly patients (7). The United Nations (UN) predicts that the proportion of the world's population that is greater than or equal to 60 years old will increase from the present proportion of 10% to 21% by 2040, which poses a serious social problem for the 21st century. The elderly often have concomitant conditions, including heart disease, hypertension, and diabetes, which make surgical treatment challenging. For elderly patients with resectable periampullary carcinoma, palliative bypass surgery (choledochojejunostomy and gastrojejunostomy), which has a lower incidence of complication and mortality, remains an option. The benefits of this surgical method are symptom alleviation and accelerated recovery without causing significant trauma. However, patients who receive this surgery will continue to live with a tumour as the tumour is not resected during the surgery. Hence, adjuvant postoperative anti-cancer therapies, such as radiotherapy and chemotherapy, remain necessary. In clinical practice, the pros and cons of these two surgical strategies were objectively introduced to elderly patients (≥70) with

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Table 1 Patients' characteristics

Variables	DLB (n=45)	PD (n=99)	P value
Age	74.69±3.26	72.88±2.6	0.115
Male/female	31/14	55/44	0.131
Hemoglobin (g/dL)	123.26±17.27	124.97±15.59	0.556
Albumin (g/dL)	38.51±4.28	38.65±4.65	0.869
Comorbidity (%)	9 (20.0)	28 (28.3)	0.292
Hypertension (%)	6 (13.3)	21 (21.2)	0.262
Diabetes mellitus (%)	6 (13.3)	11 (11.1)	0.702
Cardiac diseases (%)	7 (15.6)	9 (9.1)	0.253

The data are shown as n, mean ± SD and (%). DLB, double loop bypass; PD, pancreaticoduodenectomy.

Table 2 Surgical factors

Variables	DLB (n=45)	PD (n=99)	P value
Operation time (min)	221.91±70.766	354.60±92.413	<0.001
Blood loss (mL)	137.56±102.34	287.78±143.196	<0.001
Transfusion	7 (15.6)	14 (14.1)	0.824

The data are shown as mean ± SD and (%). DLB, double loop bypass; PD, pancreaticoduodenectomy.

resectable periampullary carcinoma (excluding pancreatic head carcinoma), as well as their family members, and they finally accepted surgery and provided signed informed consent. The results of a literature search revealed that no contemporary literature provides a systematic analysis and report of this surgical mode. For the present study, the clinical data of elderly patients with resectable periampullary carcinoma who were admitted to Qilu Hospital's Department of Hepatobiliary Surgery and underwent palliative bypass surgery in recent years was collected. Then, certain factors, including surgery duration, intraoperative haemorrhage, the incidence of complications, mortality, and survival rate, were compared to those found in patients receiving radical surgery. The details of the present study are reported below.

Methods

Subjects

A retrospective analysis was conducted on 144 elderly patients (≥70 years old) with resectable periampullary carcinoma who were admitted and treated in our hospital's Department of Hepatobiliary Surgery between January 2009 and January 2012. Among these patients, 45 patients (31 males and 14 females; 70 to 83 years old, with a mean age of 74.69±3.26 years old) received an endoscopic biopsy before palliative bypass surgery, while 99 patients (55 males and 44 females; 70 to 78 years old, with a mean age of 72.88±2.6 years old) received radical surgery. Concerning their pathological classification, 66 patients had common bile duct lower carcinoma (45.8%), 57 patients had duodenal papillary carcinoma (39.6%), and 21 patients had ampullary carcinoma (14.6%) (*Table 1*). Among the patients who chose to undergo palliative bypass surgery, 32 patients received adjuvant radiotherapy and 21 patients received chemotherapy.

Patient follow-up

All the patients received telephone or outpatient follow-ups that included symptoms, laboratory examinations, imageological examinations, radiotherapy, and chemotherapy. The follow-up procedure was designed to proceed until patient mortality or up to three years after surgery.

Statistical analysis

For the present study, a comparative analysis was conducted for the clinical data and the follow-up data of elderly patients (≥70 years) with resectable periampullary carcinoma who received palliative bypass surgery (choledochojejunostomy and gastrojejunostomy) and radical surgery (pancreaticoduodenectomy). Statistical software SPSS 19.0 was adopted for the statistical analysis and a *t*-test and a chi-squared test were performed to analyse the differences. The standard for statistically significant difference used was $P<0.05$.

Results

The intraoperative information presented in *Table 2* is as follows: palliative bypass surgery group: surgery duration: 221.91±70.766 minutes, intraoperative haemorrhage: 137.56±102.34 mL, and blood transfusion: 7 (15.6%) and radical surgery group: surgery duration: 354.60±92.413 minutes, intraoperative haemorrhage: 287.78±143.196 mL, and blood transfusion: 14 (14.1%). The postoperative information presented in *Table 3* is as follows: palliative bypass surgery group: death: 0 (0%),

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Table 3 Postoperative results

Variables	DLB (n=45)	PD (n=99)	P value
Mortality	0 (0)	2 (2.0)	1.000
Morbidity	17 (37.8)	74 (74.7)	<0.001
Bile leakage	1 (2.2)	7 (7.1)	0.435
Pancreatic fistula	0 (0)	32 (32.3)	<0.001
Postoperative bleeding	1 (2.2)	12 (12.1)	0.064
Wound infection	5 (11.1)	18 (18.2)	0.283
Abdominal infection	5 (11.1)	29 (29.3)	0.017
Delayed gastric emptying	4 (8.9)	5 (5.1)	0.461
Pneumonia	4 (8.9)	25 (25.3)	0.025
Cardiac disease	2 (4.4)	9 (9.1)	0.503
Hospital stay (days)	17±7.249	28.97±14.951	<0.001

The data are shown as mean ± SD and (%). DLB, double loop bypass; PD, pancreaticoduodenectomy.

Table 4 Follow-up

Survival rate	DLB (n=45) (%)	PD (n=99) (%)	P value
1-year	26 (57.8)	62 (62.6)	0.580
3-year	5 (11.1)	28 (28.2)	0.023

DLB, double loop bypass; PD, pancreaticoduodenectomy.

incidence: 17 (37.8%), biliary fistula: 1 (2.2%), pancreatic fistula: 0 (0%), postoperative haemorrhage: 1 (2.2%), wound infection: 5 (11.1%), abdominal infection: 5 (11.1%), delayed gastric emptying: 4 (8.9%), pneumonia: 4 (8.9%), heart disease: 2 (4.4%), and postoperative hospital stay: 17±7.249 days and radical surgery group: death: 2 (2.0%), incidence: 74 (74.7%), biliary fistula: 7 (7.1%), pancreatic fistula: 32 (32.3%), postoperative haemorrhage: 12 (12.1%), wound infection: 18 (18.2%), abdominal infection: 29 (29.3%), delayed gastric emptying: 5 (5.1%), pneumonia: 25 (25.3%), heart disease: 9 (9.1%), and postoperative hospital stay: 28.97±14.951 days. Surgery duration, intraoperative haemorrhage, the incidence of complications, pancreatic fistula, abdominal infections, pneumonia, and postoperative hospital stay were more significant in the radical surgery group than in the palliative bypass surgery group and the difference was statistically significant (P<0.05). In terms of blood transfusions, deaths, biliary fistula, postoperative haemorrhage, wound infection, delayed gastric emptying, and heart disease, the difference was not statistically significant (P≥0.05). The results of the postoperative follow-ups presented in *Table 4* indicate the following: in the palliative bypass surgery group, the 1-year survival rate was 26 (57.8%) and the 3-year survival rate was 5 (11.1%), while in the radical surgery group, the 1-year survival rate was 62 (62.6%) and the 3-year survival rate was 28 (28.2%). After comparing the two groups' data, the P value for the one-year survival rate was greater than 0.05, indicating that the difference was not statistically significant, while the value for the 3-year survival rate was lesser than 0.05, indicating that the difference was statistically significant.

Discussion

For younger patients with resectable periampullary carcinoma that have had no corresponding contraindications, radical resection (pancreaticoduodenectomy) is the preferred surgical approach. However, for elderly patients (≥70 years) with resectable periampullary carcinoma, either radical surgery or palliative bypass surgery is selected according to the patient's preference. For the present study, a retrospective analysis of the clinical data regarding palliative bypass surgery and radical surgery in elderly patients with resectable periampullary carcinoma was conducted and short-term (1-year) and long-term (3-year) follow-ups were conducted. The statistical analysis revealed that surgery duration, intraoperative haemorrhage, the incidence of complications, pancreatic fistula, abdominal infection, pneumonia, and postoperative hospital stay were more significant and that the three-year postoperative survival rate was superior in patients in the radical surgery group compared to patients in the palliative bypass surgery group. The explanations follow.

A pancreatoduodenectomy is a major operation that requires a longer operative time and thus induces greater intraoperative haemorrhage (8,9). Since the physiological functions of elderly patients are in varying degrees of degradation, elderly patients tend to have concomitant conditions, such as diabetes, hypertension, coronary atherosclerotic heart disease, and other complications, in addition to a reduced tolerance to anaesthesia and increased surgical risks. In accordance with the statistics presented by the present study, radical surgery requires a longer surgical duration (354.60±92.413 minutes) compared to palliative bypass surgery (221.91±70.766 minutes). Correspondingly, it therefore induces significantly increased intraoperative haemorrhage, which directly results in higher incidences of complications after radical surgery compared to palliative bypass surgeries. According to the statistical data in the

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present study, the incidence of complications is significantly higher in patients in the radical surgery group [74 (74.7%)] than in patients in the palliative bypass surgery group [17 (37.8%)], particularly the incidence of pancreatic fistula, abdominal infection, and pneumonia.

Pancreatic fistula is a possible complication after abdominal surgery, particularly pancreatic surgery, and it is defined as a pancreatic juice leak from the pancreatic duct for more than seven days after pancreatic rupture due to various circumstances (10). Research has shown that pancreatic fistulas are affected by many factors, including general conditions such as gender, age, complications, and nutritional status, disease-related conditions such as cancer staging, pancreatic texture, and pancreatic duct status, and procedure-related factors such as surgery duration, surgical approach, anastomosis, and intraoperative haemorrhage. The incidence of complications such as abdominal infection and pneumonia is inevitably increased due to the extended operative time and greater intraoperative haemorrhage when preforming a pancreatoduodenectomy. In the present study, the incidence rate of abdominal infection in the radical surgery group was 29.3% (29 patients), while the incidence rate in the palliative bypass surgery group was only 11.1% (5 patients). Therefore, radical surgeries that are highly invasive have a much higher possibility of causing abdominal infection compared to palliative bypass surgeries. Furthermore, the slow recovery, poor immunity, and unguaranteed nutritional status of patients after radical surgery increase the prospect of abdominal infection.

The postoperative mortality rate of the radical surgery group was 2.0% (2 patients), while the postoperative mortality rate of the palliative surgery group was zero (no patients). Although this result was not statistically different, it still indicates that palliative surgery has a low surgical risk.

Regarding the postoperative follow-ups, the one-year survival rate for the radical surgery group was 62.6% (62 patients), while the one-year survival rate for the palliative surgery group was 57.8% (26 patients). These two groups are not statistically different. However, in terms of the three-year survival rate, the rate for the radical surgery group was 28.2% (28 patients), which was higher than that of the palliative surgery group [11.1% (5 patients)], indicating that the long-term survival rate for radical surgery is higher than that of palliative surgery.

In this study, among the patients who chose to undergo palliative bypass surgery, 32 patients received adjuvant radiotherapy and 21 patients received chemotherapy. Adjuvant radiotherapy or chemotherapy may be beneficial for the prognosis of patients. The present study focused on investigating whether palliative bypass surgery, which has a lower incidence of complications and mortality, remains an option for elderly patients with resectable periampullary carcinoma. The dose or duration of adjuvant radiotherapy needs to be researched further in a future trial. Furthermore, concerning the pathological classification of this study's participants, 66 patients had common bile duct lower carcinoma (45.8%), 57 patients had duodenal papillary carcinoma (39.6%), and 21 patients had ampullary carcinoma (14.6%), but no specific information about the histological nature of these tumours was touched on and this should be researched further. In addition, in this study, no patients in the palliative bypass surgery group died and only two patients in the radical surgery group died due to haemorrhage during the operation and being older in age. However, the difference between these two groups is not statistically significant. Therefore, further research should be conducted on the mortality rate of elderly patients undergoing palliative bypass surgery.

Conclusions

For elderly patients with periampullary carcinoma, palliative bypass surgery can be characterized as being safe and having low risks, a quick recovery time, a shorter surgery duration, and less intraoperative haemorrhage, as well as a lower incidence of complications compared to radical surgery. Despite its lower long-term survival rate compared to radical surgery, palliative surgery remains an option for elderly patients who do not want to experience the extreme invasiveness of radical surgery.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/tcr.2019.07.22). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are

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appropriately investigated and resolved. The study was approved by the Ethics Committee of Qilu Hospital. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Informed consent was waived due to the retrospective nature of the study.

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