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Pancreatico-duodenectomy for Periampullary Carcinoma - A Five Years Experience

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SUMMARY

This prospective study was carried out over a five year period (1993 to 1997) at the Department of Surgery Unit-II, Shaikh Zayed Hospital, Lahore. Twenty patients underwent pancreatico-duodenal resection for suspected periampullary carcinoma. The mean age in the study group was 48 years (range 8-70 years). Males outnumbered the females (3:1). Painless progressive jaundice, pruritis and weight loss were the main presenting complaints. Three patients had already had palliative by-pass procedures done elsewhere and were admitted either for persistent pain or cholangitis. Hyperbilirubinemia and raised alkaline phosphatase were significant bio-chemical findings in all patients. Fourteen patients were diabetic. Ultrasound was useful in 18 (90%) cases. ERCP was diagnostic in half of the patients. Two patients had palliative stenting preoperatively by ERCP. Whipple's pancreatico-duodenectomy was done in 19 patients while one patient had pylorus preserving pancreatico-duodenectomy. Two methods were adopted for pancreatico-jejunal anastomosis. In 16 patients pancreatic duct mucosa was anastomosed to jejunal mucosa. Telescoping pancreatico-jejunal ("finger on glove") anastomosis was employed in 3 patients with undilated pancreatic duct. One patient had pancreatic duct ligation. Pancreatic leakage occurred in one patient. Early reoperation was done in one patient for mesenteric vein thrombosis. There were 4 deaths in the study group. Four (20%) of patients are still alive, 4 years after surgery. This study favours pancreatico-duodenectomy as the surgical option of choice for periampullary carcinoma, not only for palliation but also to improve survival. However, a larger study should be carried out.

INTRODUCTION

The incidence of carcinoma of the head of the pancreas and periampullary region has steadily increased in the United States during the last 20 years[1]. In 1935, Whipple et al introduced pancreatico-duodenectomy as a technique for radical resection of carcinoma of the ampulla of Vater and pancreatic head tumours[2]. Since then, it had to face many critics like Crile, Hertzberg, Shaprio and others, who suggested abandoning the operation due to its high mortality and morbidity[3-4]. With better patient evaluation, improved anaesthesia, standardization of technique and good postoperative care this procedure has regained popularity over the last two decades[7].

Although carcinoma of the head of the pancreas has a poor prognosis, periampullary carcinoma carries a comparatively more favourable prognosis. It has higher resectability rates (50 to 80%) and better five-year survival ranging from 20 to 50%[13,31-41].

AIMS AND OBJECTIVES

The specific aims of this prospective study were (i) to see the efficacy of Whipple's pancreatico-duodenectomy in patients suffering from obstructive jaundice due to periampullary carcinoma and (ii) review our peri-operative management and operative technique so as to bring about improvements.

PATIENTS AND METHODS

The study period extended from January 1993 to December 1997. This study was conducted in the Department of General Surgery at Sheikh Zayed Hospital, Lahore.

After clinical assessment, all the patients had haematological, biochemical and radiological evaluation. Hepatitis screening and ultrasound imaging were among initial diagnostic investigations. All the patients were then subjected to ERCP for possible detection and endoscopic biopsy of periampullary growth. CT scan was done in only 4 patients when the nature of disease was still unclear despite ultrasound abdomen and ERCP. FNAC under ultrasound guidance was carried out in 4 patients, and 3 patients had frozen section peroperatively. Final diagnosis, staging and assessment of resectability were done peroperatively.

Rooftop incision was adopted to get adequate access to the area. Fixity of the tumour to the transverse mesocolon, root of the mesentery or superior mesenteric vessels or presence of hepatic metastasis were considered contraindications for resectional treatment. Duodenum was Kocherized and lesser sac opened to get an idea about the macroscopic extent of the tumour. After doing "trial dissection" tumour free portal vein was confirmed. Whipple's pancreatico-duodenectomy was accomplished by en-bloc excision of head of pancreas, duodenum, common bile duct along with the gall bladder, antrum of stomach and the involved lymph nodes. Only one patient in this series had a pylorus preserving pancreatico-duodenectomy.

Reconstruction

a) **Hepatico-jejunostomy**
The first anastomosis to be done was between the common hepatic duct and the jejunum (end-to-end) using a vicryl 2/0 interrupted suture. The anastomosis was stented by a 16 Fr T-tube which was removed after having T-tube cholangiogram on the 10th postoperative day.

b) **Pancreatico-jejunostomy**
The second anastomosis was done between the cut end of the pancreas and the side of the jejunum. Seromuscular layer of the jejunum was stitched with pancreatic tissue by nurolon 2/0 continuous stitches. An ellipse of seromuscular layer of jejunum lying against the pancreatic stump was removed and an opening was made in the exposed mucosa corresponding to the pancreatic duct. The pancreatic duct was anastomosed with jejunal mucosa by using interrupted 4/0 vicryl stitches. A feeding tube of 6 Fr size was used to stent the anastomosis, and was brought out through the jejunum, which was fixed to the anterior abdominal wall, then taken out through a separate stab wound in the abdominal wall. Pancreaticogram was done on the 30th postoperative day by using conray 220 and the tube was removed after documenting integrity of the anastomosis.

c) **Gastro-jejunostomy**
This was the last anastomosis to be performed. The cut end of the gastric remnant was anastomosed to the side of the jejunum. This anastomosis was done in 2 layers with vicryl 2/0. The nasogastric tube was removed on the 5th postoperative day.

Pylorus preserving pancreatico-duodenectomy

The whole of the stomach and the first part of the duodenum were preserved.

Reconstruction was achieved by end to end duodeno-jejunostomy done in 2 layers by using continuous vicryl 2/0 (seromuscular and full thickness) locking stitches. End to side hepatico-jejunostomy with single layer vicryl 2/0 interrupted stitches was the second anastomosis to be performed. Lastly, a pancreatico-jejunal anastomosis was accomplished as already described.

Pancreatic duct ligation was done if pancreatic tissue was too friable to hold the stitches.

Patients were kept in the Intensive Care Unit for the initial 72 hours. Total parenteral nutrition was started on the 3rd postoperative day. Oral sips were allowed at the end of the 1st week. Patients were on a regular diet by the end of the 2nd week. A senior histopathologist examined the excised specimens. No adjuvant therapy was given to these patients.

Records were maintained about the patient's medical history, operating time, intra-operative blood loss, number of transfusions given, postoperative complications, total hospital stay and further treatment on follow-up. These patients were

followed up at the surgical outpatients department initially at monthly intervals up to one year and then 3 monthly afterwards. Mortality and morbidity rates were recorded and survival rates figured out.

RESULTS

A total of 20 patients underwent pancreatico-duodenectomy for periampullary carcinoma over a period of 5 years (1993 to 1997). Male patients outnumbered the females (3:1). The mean age was 48 years (range 8 to 70 years). Painless jaundice along with pruritis and loss of weight were the commonest presenting complaints. Fourteen patients were diabetic. Three patients already had a palliative bypass procedure elsewhere. These patients got relieved of their symptoms temporarily and had presented to us either with signs and symptoms of cholangitis or persistent backache, within 1 year after initial surgery (Table 1).

Table 1: Presenting symptoms & signs.

Presentation	*Number*	*Percent*
Painless jaundice	17	85
Pruritis	17	85
Weight loss	14	75
Loss of appetite	10	50
Backache	6	30
Fever with chills	6	30
Pancreatitis	1	5
Palpable abdominal mass	1	5
Previous history of operation for jaundice	3	15

The youngest patient (8 years old) presented with an upper abdominal mass and progressive jaundice of 6 months duration. He had a pancreaticoblastoma and underwent pancreatico-duodenectomy.

Ten (50%) patients were anaemic. Prothrombin time was raised in 50% of the patients. Hyperbilirubinaemia was found to be ranging from 5 to 35 mg/dl. All of them had concomitant raised alkaline phosphatase levels. Three patients were positive for hepatitis B surface antigen.

Ultrasound abdomen was the most significant radiological study by which diagnosis and staging of the disease was possible in 90% of the patients. In our study no additional information was gained by CT scan over ultrasound. ERCP positively reported periampullary growth in half of the patients and helped in palliative stenting in 2 patients (Table 2).

Table 2: Pre-operative investigations.

Investigations	*Number*	*Percent*
Raised Prothrombin time (2-3 times)	10	50
Raised Activated partial Thrombin time (2-3 times)	6	30
Hyperbilirubinaemia 3-35mg %	17	85
Raised Alkaline Phosphatase (3-5 times)	18	90
Abdominal ultrasound	18	90
ERCP (diagnostic)	10	50
CT Scan	4	20

The definitive diagnosis and resectability were however assessed peroperatively. Whipple's operation was carried out in 19 out of 20 patients. Mucosa to mucosa pancreatico-jejunal anastomosis was accomplished in 16 (80%) patients and telescoping anastomosis was done in 3 (15%) patients. There was a single case of pancreatic duct ligation. Average operating time was 5 hours and the average blood loss was 500 to 1000 ml.

Only one patient, who had a telescoping pancreatico-jejunal anastomosis, leaked on the 3rd postoperative day. This patient later died due to overwhelming intra-abdominal sepsis and acute renal failure.

Wound infection occurred in 15% of the patients. Atelactasis causing mild postoperative pyrexia (99 to 100°F) was observed in 10% of the cases. One patient had mesenteric vein thrombosis, one developed sub-hepatic collection and another had upper G.I. bleeding. The mean hospital stay 16 days (Table 3).

Adenocarcinoma of periampullary origin was reported in 70% of cases. It was of the common bile duct origin in 10% of the cases and of pancreatic duct origin in another 10%. The youngest patient in this series had a pancreaticoblastoma, which is an intermediate tumour of the head of the pancreas. In

one patient, it was difficult to differentiate chronic pancreatitis from adenocarcinoma (Table 4).

Table 3: Early postoperative complications (<30 days).

Complication	*Number*	*Percent*
Atelactasis	2	10
Wound infection	3	15
Haemorrhage	1	5
Pancreatic leakage	1	5
Mesenteric vein thrombosis	1	5
Subhepatic collection	1	5

Table 4: Pathological diagnosis in patients who underwent resection.

Diagnosis	*Number*	*Percent*
A. Malignant		
(Adenocarcinoma) Ampulla of Vater	14	70
Pancreas	2	10
Common bile duct	2	10
Duodenum	none	-
B. Intermediate		
Pancreaticoblastoma	1	5
C. Benign		
Pancreatitis	1	5
Total Patients	**20**	**100**

Late postoperative complications were backache in three (15%) patients 4 months after surgery, tumour recurrence in four (20%) patients within 6 months of operation, postprandial dumping was noted in one (5%) of patient two and a half years after surgery, and incisional hernia occurred through midline scar in another (5%) patient who initially had palliative bypass surgery through the same incision (Table 5).

Reoperation in the immediate postoperative period had to be carried out in two (10%) of the cases. In one patient it was to provide adequate drainage for an anastomotic leak, another had developed mesenteric vein thrombosis within 48 hours of surgery. Both of these patients could not survive and were diagnosed later to have carcinoma of the head of the pancreas. Ultrasound guided coeliac block was done in three patients for relief of backache. It worked for a month or so. Ultrasound guided aspiration was carried out twice in a patient who developed a sub-hepatic collection.

Table 5: Late complications (>01 month - 05 years).

Complications	*Number*	*Percent*
Acute renal failure	1	05
Backache	3	15
Recurrence		
Local	4	20
Hepatic	1	5
Incisional Hernia	1	5
Early Dumping	1	5

Four (20%) patients died in this series. Two deaths were in immediate postoperative period, one due to anastomotic leak and another due to mesenteric vein thrombosis. Third morality was 14 months after surgery, who had pancreatic tumour recurrence and died of upper G.I. bleed. One patient previously labelled as chronic pancreatitis, later found to have tumour recurrence, died of myocardial infarction 15 months after operation. Three patients with carcinoma of the head of the pancreas died. Only one death occurred in patients with periampullary carcinoma (Table 6).

A total of 5 patients had recurrence of the disease. Three had pancreatic head tumour Recurrence within 6 months of surgery. The only other recurrence was in the boy with pancreaticoblastoma. One patient had recurrent periampullary carcinoma, 2 years after surgery. Follow up of all the patients was available. Six (30%) patients who had periampullary carcinoma regularly come to surgical outpatients and are doing well. Follow up data of 4 (20%) patients who survived for up to 4 years is available but only 2 (10%) patients are coming to outpatients uptill now. One patient with carcinoma of head of pancreas was followed-up for one year.

Table 6: Mortality

Causes	*Number*	*Percent*
A. EARLY. <30 days	2	10
Mesenteric vein thrombosis.	1	5
Pancreatic leakage-Acute renal failure	1	5
B. LATE. 2 months to 5 years	2	10
Upper GI bleeding	1	5
Myocardial infarction	1	5
Total Deaths	**4**	**20**
Mortality related to tumor site	**4**	**20**
Periampullary	1	5
Head of Pancreas	3	15

DISCUSSION

Treatment options for periampullary carcinoma include: pancreatico-duodenectomy, total pancreatectomy, transduodenal ampullary excision and simple bypass.

In the past, the poor results obtained after resection for carcinoma of the head of the pancreas have brought into question the resectability of periampullary tumours and the type of operation to be performed[5-8].

For some surgeons, notably Crile, Hertzberg and Shaprio, a comparison of the survival and morbidity after radical resection did not seem to be attractive[3,4,6]. Due to low median survival of patients with pancreatic head tumours, even today, bypass procedures have not lost favour (10). Survival is still better among the resection group compared to the ones who had palliative by-pass[14-15].

In our study the results are encouraging in patients with periampullary carcinoma compared to patients with pancreatic head carcinoma. Most of the complications and mortality were observed in patients suffering from carcinoma of the head of the pancreas. Lesser morbidity and mortality was observed in the periampullary carcinoma group. Ten (50%) patients survived for upto one year and 4 (20%) were enjoying good quality of life upto 4 years after the study. Our total mortality was comparable to that reported in the literature (6-25%) for pancreatico-duodenectomy[15,16,19,25].

It is observed that cancer of the head of the pancreas is quite a malignant condition owing to its position and delayed diagnosis making surgical treatment either impossible or less beneficial due to local cancer spread and dissemination. So better survival can only be achieved by early detection of the disease. Similar were observations made by Nobeli et al[20].

Leakage from pancreatic anastomosis is another cause of potential post operative morbidity and mortality[10]. The reported leakage rates range from zero to 26% with mortality rates of 24 to 56%[21,32-40]. In our series, satisfactory results were achieved with mucosa to mucosa anastomosis. Leakage of the pancreatico-jejunal anastomosis occurred in only one patient. Pancreatic duct ligation was done in one patient, but little can be said about its efficacy due to limited experience with the technique.

Similarly, pylorus preserving pancreatico-duodenectomy was carried out only in one patient in this series with no post operative complications. The technique is in vogue these days due to its speed, easiness, less morbidity and mortality, and more improved nutritional status of patients with lesser chances of marginal ulceration and dumping[19,22-24,33,35,40].

Resection of periampullary carcinoma provides a better palliation and survival than non-operative biliary drainage or a bypass operation, due to its high resectability rate (50 to 90%) as compared to pancreatic head carcinoma (10 to 20%)[8]. Lesser morbidity and 5 year survival of around 30 to 45% merits maximal curative intent at the time of operation for this type of malignancy[7-10,18,25].

Better patient selection with an intent to cure is important to deal with malignant jaundice. Still no adequate means are available to predict resectability based on preoperative imaging, thereby posing a major problem 8. In the present series, pancreatico-duodenectomy was performed for a suspected periampullary neoplasm in the majority of the patients. In most cases an extensive radiological work-up had been inconclusive as to the true nature of the malignancy although in more than half the patients in our series we were reasonably sure preoperatively that the tumours were periampullary. Almost 50% of the patients, who were lacking tissue diagnosis, still underwent pancreatico-duodenectomy based on clinical suspicion of malignancy. As prediction of resectability based on

preoperative imaging techniques poses a major problem, we favour the recommendations of Bakkewood et al for exploratory laparotomy in most of the patients for evaluation of resectability of tumour[27]. The reasons for this are the lack of preoperative means to detect resectability, unnecessary delay on account of too much extensive work-up and false negative results of the studies. In our series periampullary carcinomas were diagnosed only after histopathological examination of the excised tissue.

Thus in our study, 20% four year survival and 15% postoperative mortality and limited morbidity favour radical surgery. Even palliative resectional surgery gives better survival rates than bypass alone. Different centres are now reporting better results after resection[8,9,17,20,28-30,32-41]. Pancreatico-duodenectomy is the only potentially curable treatment. This operation can be performed with hospital mortality rates of approximately 2%. If the resection is curative, 5 years survival in excess of 20% can be anticipated[31-41]. Although the advantage of pancreatico-duodenectomy for carcinoma of the head of the pancreas has been questioned, we still recommend this procedure for all periampullary carcinoma to avoid depriving the occasional patients with pancreatic head carcinoma of long term survival and forfeiting the chance of cure for some misdiagnosed patients with periampullary carcinoma.

Finally, the question of who should operate on patients with periampullary tumours and evaluate them for resection or for bypass is difficult to answer. Definitive surgery becomes difficult if patients were previously operated. The scar tissue and fibrosis of the previous operation make assessment of tumour size and involvement of adjacent structures difficult.

More patients can be benefited by resectional treatment if patients are referred well in time to an appropriate surgeon, well versed with the technique.

In conclusion, our data justifies the continued use of resection in most of the periampullary tumours. Bypass procedures are recommended only for high risk patients or patients with more advanced disease. An experienced surgeon provides the best possible chances for a definitive operative procedure. The results of pancreatic resection are encouraging in case of periampullary carcinoma if surgery is undertaken by a surgeon well versed in the technique along with good support from gastroenterologists, anaesthetists and postoperative caretakers.

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