



Research Article

RETROSPECTIVE STUDY OF WHIPPLE'S PROCEDURE DONE AT TERTIARY HEALTH CARE CENTRE

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ABSTRACT

Carcinoma of pancreas is the 4th most common cause of death worldwide and Whipple's procedure is curative surgery.

Most common complication of this surgery are delayed gastric emptying, post-operative pancreatic fistula, midline wound sepsis, bile leak and intraabdominal abscess. Our study is on operated Whipples in tertiary health care centre and aims to find out clinical presentation, diagnostic modality, surgical management, and outcomes in terms of morbidity and mortality

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INTRODUCTION

The Whipple Procedure or pancreaticoduodenectomy (PD) was described in 1940 by Allen Whipple. The Whipple procedure has undergone a gradual evolution in the last 20 years. The mortality of pancreaticoduodenectomy, approximately 2.1% (Seppänen *et al.*, 2016)¹, has decreased precipitously in high-volume referral centers after decade. Near zero mortality rates are now common. Morbidity and length of stay have also been reduced. Cardiac and pulmonary complications have been markedly reduced. Modifications of the procedure have been introduced to improve long-term outcome of pancreatic cancer and to lessen digestive sequelae. 5-year survival rates of 22% are now reported by several centers for periampullary tumors, 10 year survival rates for periampullary tumours are approximately 14%. (Seppänen *et al.*, 2016)¹.

Indications for Whipple's procedure are

1. Cancer of ampulla of Vater incidence (0.9 %) (Kimura & Ohtsubo, 1988) (Panzeri *et al.*, 2015)^{2,3}
2. Adenocarcinoma of 2nd part of duodenum (comprise 55 % of adenocarcinomas of the small bowel) (Cloyd, George, & Visser, 2016)⁴
3. Cholangiocarcinoma of lower 1/3 CBD.
4. Cancer of head of pancreas (4.5 per 100,000) (Zhang *et al.*, 2016)⁵
5. Chronic pancreatitis with dominant head mass.

Obstructive jaundice is the most common presenting symptom of ampullary cancer (85%) (Neoptolemos *et al.*, 1987) (Walsh, Eckhauser, Cronewett, Turcotte, & Lindenauer, 1982).^{8,9} Serum CA 19-9 is elevated in 86.4% of ampullary carcinoma patient. (Chen *et al.*, 1989).¹⁰

Diagnosis of periampullary cancers based on MDCT and EUS GUIDED FNAC but definitive tissue diagnosis not always required as negative biopsy or FNAC will not alter the decision of exploration. Recent MDCT techniques enable the production of three-dimensional images, which make clear the anatomical relationship (the presence or absence of invasion) of a tumour with the bile duct and vessels. EUS is an excellent procedure to determine pancreatic invasion and to evaluate for vascular invasion. Definitive treatment for periampullary carcinomas at our centre is Pancreaticoduodenectomy (PD). PD, either with conventional or pylorus-preserving approach (PPPD), is considered the standard of care. A recent meta-analysis of six randomized trials showed no significant differences in mortality and morbidity between the two procedures, although operating time and intraoperative blood loss are reduced in the PPPD group (Diener *et al.*, 2011).¹¹ The rate of potentially curative resection has increased up to 90% (Howe, Klimstra, Moccia, Conlon, & Brennan, 1998) (Diener *et al.*, 2011) (Talamini *et al.*, 1997) (Yeo *et al.*, 1998).^{12,13,14} However, significant complications occur in 20%-40% of patients, including pancreatic fistula, pneumonia, intra-abdominal infection, anastomotic leak and delayed gastric emptying.

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Aim and Objectives

Retrospective study of operated cases of Whipple’s surgery: clinical presentation, diagnosis and management at tertiary health care centre

1. To study clinical presentation of patient undergoing Whipple’s surgery
2. To study various diagnostic modalities and their accuracy
3. To study surgical management
4. Outcome in terms of morbidity and mortality

Parameters

1. Percentage of patient presenting with symptoms of obstructive jaundice.
2. Percentage of patient presenting with symptoms of weight loss
3. Operability and resectability based on radiological and endoscopic studies
4. Percentage of patients having postoperative pancreatic fistula(POPF)
5. Percentage of patients having hepaticojejunostomy or gastrojejunostomy site leak
6. Percentage of Line of management to be followed for management of postoperative complication conservative vs re-exploration
7. Percentage of patients requiring long hospital stay due to midline wound sepsis and delayed gastric emptying.

MATERIALS AND METHODS

Study design

Observational Retrospective study

Study setting

Data will be collected from general surgery department of a tertiary care hospital (Seth G.S. Medical College and K.E.M Hospital)

Study duration

January 2007 to January 2017

Study population

All patients admitted in KEMH department of general surgery

Sample size

50 patients

Data recording

Information recorded in predesigned case record proforma from medical records of general surgery department

Inclusion Criteria

1. All patient 40-65years of age
2. Patient presented with pain in upper abdomen, fever, jaundice
3. Patient presented with clinical features of obstructive jaundice, cholangitis
4. Patient presenting with chronic pain in abdomen but diagnosed radiologically or endoscopically.

Exclusion criteria

1. Patient presented with pain, fever, jaundice but not diagnosed radiologically or endoscopic biopsy
2. Metastatic disease

Study protocol

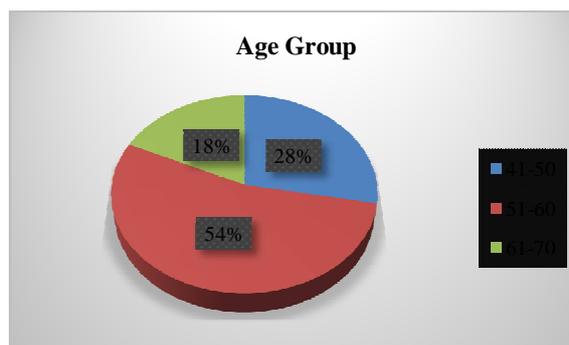
All cases will be studied in term of clinical presentation on admission, radiological investigations, operative findings and postoperative course. Data will be collected from medical record department and indoor patient records. Case record form detailing all data will be gathered during course of study is appended. Basic epidemiological information will be collected in every patient. Detailed note of entire hospital stay in terms of preoperative presentation, operative procedure, intraoperative findings and postoperative complications will be made. Finally a measured note of morbidity and mortality will be made.

Statistical Evaluation

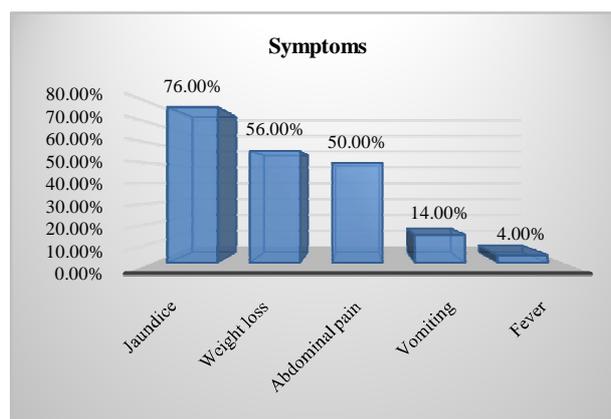
As this is an observational study no inferential statistics will be applied the data will be analysed using mean, median, mode or average whichever is applicable

Results and statistical evaluation

Age and sex distribution



Clinical features



Diagnosis and preoperative evaluation

Contrast enhanced CT abdomen and pelvis

CECT	N	%
Malignant pancreatic head mass	32	64.0%
Periampullary carcinoma	11	22.0%
Distal cbd cholangiocarcinoma	6	12.0%
Chronic pancreatic head mass	1	2.0%
Total	50	100.0%

Endoscopic evaluation and intervention

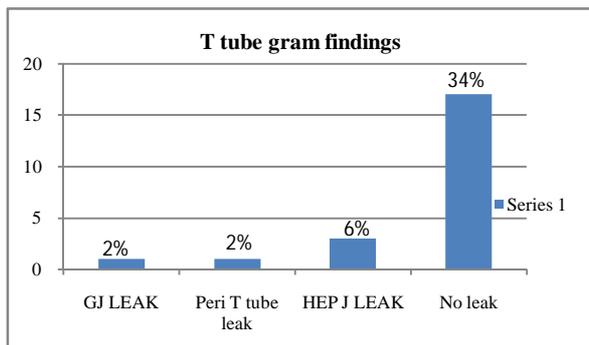
ERCP guided CBD Stenting	N	%
NO	16	32.0%
YES	34	68.0%
Total	50	100.0%

Operative details

Procedure	N	%
Pancreatico-jejunostomy (duct to mucosa)	45	90.0%
Pancreatico-gastrostomy	5	10.0%
Total	50	100.0%

Hepatico-Jejunostomy With T Tube	N	%
NO	28	56.0%
YES	22	44.0%
TOTAL	50	100.0%

Postoperative management



Day of T Tube Removal	N	%
14	17	34.0%
21	3	6.0%
28	1	2.0%
Not removed	1	2.0%

Complication and management

Complication	N	%
Midline Wound Sepsis	34	68.0%
Fever	22	44.0%
Pancreatic Fistula Grade B	15	30.0%
Delayed Gastric Emptying	14	28.0%
Intra-abdominal Abscess	14	28.0%
Chest infection	9	18.0%
Hepaticojejunostomy leak	3	6.0%
Gastrojejunostomy leak	2	4.0%
GJ site bleeding	2	4.0%
Pancreatic Fistula Grade C	1	2.0%

Incidence of midline wound sepsis in CBD stented patients

ERCP Stenting	Midline Wound Sepsis		Total
	No	Yes	
No	11	5	16
	68.8%	31.3%	100.0%
Yes	1	33	34
	2.9%	97.1%	100.0%
Total	12	38	50
	24.0%	76.0%	100.0%

p- value <0.01

Incidence of midline wound sepsis in patients with postoperative pancreatic fistula

Pancreatic Fistula	Midline Wound Sepsis		Total
	No	Yes	
No	12	22	34
	35.3%	64.7%	100.0%
Yes	0	16	16
	0.0%	100.0%	100.0%
Total	12	38	50
	24.0%	76.0%	100.0%

p- value <0.01

Mortality

In our study two patients (4%) who undergone re-exploration for the anastomotic dehiscence of pancreaticojejunostomy and gastrojejunostomy respectively succumb death within 30 days postoperatively.

DISCUSSION

Age and sex distribution

The most patients presented to us in 6th decade of life. The mean age of presentation being 55 years in our study. The incidence ratio in our study for male:female is 1.6:1 with slight male preponderance. In study performed by Qiubo Zhang and colleagues the incidence of PC increases with age, with a slow increase before the age of 50. The median age at diagnosis is 71 years in the United States and 72 years in England. An epidemiological study of China in 2012 showed that 6572,700 had PC diagnosed and about 538,900(0.8%) had a diagnosis made before the age of 50. (Zhang *et al.*, 2016).⁴¹

Clinical features

Jaundice being the commonest complaint with which the patient presented to us. out of 50 patients 38 (76%) patients presented with complaint of jaundice. Weight loss being 2nd most complaint with which patient presented. Out of 50 patients 28(56%) patients presented with complaint of weight loss. Abdominal pain in epigastric region radiating to back presented as 3rd most common symptom. Out of 50 patients 25(50%) patients presented with symptom of epigastric pain radiating to back. In study perform by Talamini and colleagues the presenting symptoms are identical to our study with jaundice (71%), weight loss (61%), and abdominal or back pain (46%) (Talamini *et al.*, 1997)² Vomiting due to the tumour occluding duodenal lumen can be seen in few patients in our study 5 patient (14%) of patient had this feature which is consistent with previous study by Winter and colleagues. (Winter *et al.*, 2006)³ Pallor being inconsistent feature present in 15(30%) and icterus present in 38(76%) patients. Palpable gall bladder present in 22 patients (44%) due to distended gall bladder called as Courvoisier sign due to slow progressive occlusion by other causes, including tumours, was more likely to result in ectasia of the organ not seen in CBD stones due to shrunken and fibrotic gall bladder. Diagnosis and preoperative evaluation Preoperative evaluation of patients consisting of routine investigations like Haemoglobin, WBC counts, liver function test. In our study of 50 patients the mean value of haemoglobin is 10.4 gm/dl with standard deviation of 1.3. The liver function tests all patients have raised alkaline phosphatase levels with mean value of 484 u/l. The mean value for SGOT and SGPT are 71u/l and 59u/l. Direct Bilirubin levels are raised in 39 patients (78%) who presented with features of obstructive jaundice mean value being 4.3 mg%. In our study Serum albumin mean value of 3.3 gm% seen in study population. Favourable outcome of surgery seen in patients with haemoglobin above 10 gm% and serum albumin levels above 3.5 gm%. Patients with serum albumin <3.5 gm% have significant morbidity.

Radiological investigations

The radiological investigation of choice to diagnose patient and deciding plan of management in our study is contrast

enhanced CT scan of abdomen and pelvis. Vascular structures, such as the portal and superior mesenteric veins, as well as the superior mesenteric artery and celiac axis with three-dimensional reconstructions of these vessels aid in visualizing the anatomic relationships between the vessels and the mass, the presence of tissue planes and the degree of circumferential involvement can be determined. Information on the presence of distant metastatic disease can be evaluated at the same setting with entire abdominal and thoracic cavities are scanned. The presence of ascites, seen most readily in pelvic cuts, is usually an ominous sign. In our study out of 50 patients 32(64%) patient had malignant pancreatic head mass, 11(22%) patient had periampullary growth, 6 (12%) patient had distal CBD growth, 1(2%) patient of chronic pancreatitis diagnosed having chronic pancreatic head mass. In all these patients there were no evident metastasis, tissue planes between vessels are preserved, no evidence of ascites. The Contrast Enhanced CT with 3mm cuts has sensitivity of 85% in diagnosing these tumor.²⁵

Endoscopic studies and intervention

Endoscopic retrograde cholangiopancreatography (ERCP) to decompress an obstructed biliary tree that is causing sepsis. On ERCP long, irregular stricture in the pancreatic duct with distal dilation or a cut-off of both the genu of the pancreatic duct and the distal bile duct is pathognomonic of pancreatic cancer. In our study 34 (68%) patient required CBD stenting for relief of symptoms and 16(32%) patients doesn't required CBD stenting. In the same setting of ERCP endoscopic ultrasonography and FNAC of lesion has been taken. All patients included in our study has tissue plane preserved between the superior mesenteric vessels and growth which confirms the resectability of lesion. FNAC taken in same setting in our study proven to be pancreatic ductal adenocarcinoma in 31 (62%) patients, Ampullary adenocarcinoma in 12 (24%) patients, distal CBD adenocarcinoma in 6(12%) patients and chronic pancreatitis in 1 (2%) patient. EUS guided FNAC has sensitivity of up to 95%.²⁵ In study performed by Yeo CJ and colleagues the following findings were present on pathologic examination of resected pancreaticoduodenectomy specimens reveals that approximately 40% to 60% was having adenocarcinoma of the pancreas, 10% to 20% was having adenocarcinoma of the ampulla, 10% was having bile duct adenocarcinoma, 5% to 10% having duodenal adenocarcinoma, and 10% to 20% of specimens contain only benign disease.^{23,24}

Operative details

Vertical midline Incision is the preferred incision for Whipple's surgery in our institute. Other approaches include bilateral subcostal incision (chevron incision) and Royal free incision. Chevron incision is excellent in fatty patients. After opening peritoneal cavity peritoneum and liver found normal with no evidence of metastasis in study population also there was no evidence of ascites. In our study we had 45 (90%) patients who undergone classic pancreaticoduodenectomy and 5(10%) patients undergone pylorus preserving pancreaticoduodenectomy. Pancreaticojejunostomy (PJ) duct to mucosa fashion done in 45 (90%) patients and pancreaticogastrostomy (PG) done in 5 (10%) patients. Hepaticojejunostomy (HEPJ) over the T tube done in 22 (44%) of patients while 28 (56%) patients undergone hepaticojejunostomy without T tube. Feeding jejunostomy

done in 41 (82%) patients and feeds via nasojejunal tube given in 9 (18%) of patients. In meta-analytical studies performed by Menahem B *et al*, Hallet J *et al*, Que W *et al*, Liu FB *et al* in 2015 the incidence of postoperative pancreatic fistula found to be low in patients undergoing pancreaticogastrostomy as compared to pancreaticojejunostomy hence pancreaticogastrostomy found superior to pancreaticojejunostomy. The pancreaticogastrostomy beneficial because of pancreatic enzyme inactivation due to gastric secretions and absence of enterokinase, tension-free anastomosis due to anatomical collocation, excellent blood supply and the thick stomach wall is less likely to dehiscence, early detection of bleeding from the pancreatic remnant by routine postoperative gastric decompression, direct examination of the anastomosis by endoscopy if necessary; and easy exploration of the anastomosis without disassembling the pancreatic anastomosis by opening the anterior wall of stomach if bleeding occurs. (Wang, Chen, Shyr, & Shyr, 2016)⁴⁴ In studies performed by Hui Qiu *et al* and colleagues the hepaticojejunostomy leak not affected by not placing intraluminal T-tube across anastomosis. In preoperatively poor nutritional status (serum albumin levels <3.5 gm%) of patient leads to oedema at anastomotic site causing hepaticojejunostomy leak. (Qiu *et al.*, 2016)⁴⁵. In our study 4 patients having hepaticojejunostomy leak preoperatively had low serum albumin levels of below 3.5. For enteral feedings at our centre feeding jejunostomy is most preferred procedure. However in 9 patients feeding with nasojejunal tube which was placed beyond gastrojejunal anastomosis have been tried. Earliest feeding started as soon as the peristalsis resumes which was 3 days in both the cases. The most common complication with nasojejunal (NJ) feeding is dislodgement of NJ tube accidentally. No such complication with feeding jejunostomy seen in our study population. Total parenteral nutrition given in 5 (10%) patients who have surgical complication like anastomotic leak associated with central line catheter related complication, fever (Gerritsen *et al.*, 2012).^{46,47}

Postoperative management

In our study postoperatively patient kept NBM for two days with starting of oral sips on POD3 after removal of ryle's tube. As soon as peristalsis resumes jejunostomy or nasojejunal feeds started on POD3 in 31 (62%), POD5 in 18 (36%) of patients. In one patient feeding not started because patient had features of peritonitis due to pancreaticojejunostomy anastomotic leak. Regarding the resume of patient to adequate oral intake in our study 33 (66%) patients resumed oral intake by POD10 (median 10). The patients who resumed oral intake beyond POD10 days have complications like delayed gastric emptying in 14 (28%), Pancreatic fistula 15 (30%), gastrojejunostomy leak 2 (4%), hepaticojejunostomy leak 4 (8%). The median period for starting orals in study performed by Arja Gerritsen and colleagues is by POD11. (Gerritsen *et al.*, 2014).⁴⁷ Removal of Morrison pouch drain which is placed near pancreaticojejunal anastomosis in our study depend on the drain output. As the drain output decreases to < 50ml pancreatic drain can be removed. The median period of Morrison pouch drain removal in our study is POD7. In 12 patients drain removed on POD5, in 15 patients drain removed on POD7, in 18 patients drain removed on POD10 and in 3 patients drain

removed on POD14. In study performed by Daniel J and colleagues demonstrates that the degree to which the amylase is elevated and the volume of drain output on any particular post-operative day is not necessarily an accurate way to predict which patients will develop a clinically significant postoperative pancreatic fistula. It is useful to define the presence of a chemical POPF but the severity can only be determined by clinical outcomes.⁴⁸ In another recent study performed by kawai and colleagues demonstrated to remove abdominal drains as soon as possible because drains insitu for more than 8 days has increased rates of intraabdominal abscess and pancreatic fistula. (Resection, 2006)⁴⁹ Considering above studies we have followed removal of drains early in postoperative course. T tube which place across hepaticojejunostomy anastomosis is useful for evaluation of pancreaticojejunal, hepaticojejunal and gastrojejunal anastomosis by T tube cholangiogram with diluted conray. With t-tube cholangiogram done on POD 5 or POD 7 gastrojejunostomy leak found in one (2%) patient, hepaticojejunostomy leak found in 3 (6%) patients. Removal of T tube done on POD14 in 17(34%) patients. Patients having hepaticojejunostomy site leak or peri-T tubal leak left with T tube beyond 2nd week to divert bile so as to prevent biliary peritonitis (4 patients 8%).

Complications and management

In our study the most common complication following surgery is midline wound sepsis seen in about 34 (68%) patients. The incidence of midline wound sepsis being higher in patients who had undergone CBD stenting and patients with pancreatic fistula. Based on Southampton scoring system 26 (76%) had grade I surgical site infection (SSI) and 8(24%) patients had grade II SSI. In our study patients who were not CBD stented have lower incidence of midline wound sepsis. Out of 16 patients only 5(31%) patients developed midline wound sepsis. (p value <0.01). In study performed by Stephan and colleagues found Preoperative biliary drainage, but not preoperative biliary instrumentation alone, is associated with increased morbidity. (Liu *et al.*, 2015)¹⁴ Also incidence of midline wound sepsis is higher in patients with pancreatic fistula. In our Study 16 patients having pancreatic fistula all presented with midline wound sepsis (p value <0.01) In studies performed by Daniel J and colleagues also found increased rate of midline wound sepsis in patients with pancreatic fistula. (Moskovic *et al.*, 2010)⁴⁸ The pancreatic fistula in our study is seen in 16 patients about 32% of which 15(30%) patients have GRADE B pancreatic fistula and only one patient (2%) had GRADE C pancreatic fistula. Patients with GRADE B fistula doesn't require surgical re-exploration and managed conservatively with injection somatostatin, antibiotics, and percutaneous drainage. In our study out of 15 patients with GRADE B pancreatic fistula 8 patients required percutaneous drainage of collection and rest of the patients managed conservatively with IV antibiotics and injection octreotide. One patient with GRADE C pancreatic fistula required re exploration for Pancreaticojejunal (PJ) anastomotic dehiscence.

According to study by Daniel J and colleagues and international study group of pancreatic fistula (ISGPF) classification all GRADE B pancreatic can be managed conservatively and GRADE C fistula requires surgery. (Moskovic *et al.*, 2010)⁴⁸ In our study p value for the incidence of pancreatic fistula in patients who have undergone

pancreaticojejunostomy or pancreaticogastrostomy was not significant. (p value 1.0) In prospective study performed by Yeo and colleagues demonstrated there is no difference in incidence of pancreatic fistula after PG or PJ (Yeo *et al.*, 1995)⁵¹ The incidence of delayed gastric emptying (DGE) range from 6-50%^{30, 31, 32}. Incidence of Delayed gastric emptying in our study present in 14 (28%) patients however the p value for DGE in patients who have undergone classic Whipple's or pylorus preserving pancreaticoduodenectomy is insignificant. The DGE also indicates the patient having intraabdominal source of infection due to intraabdominal abscess of anastomotic dehiscence. In prospective study performed by Yeo and colleagues demonstrated there is no difference in incidence of DGE after PG or PJ (Yeo *et al.*, 1995)⁵¹ 3(6%) patients presented with Hepaticojejunostomy leak which was controlled leak and managed conservatively. In 2 patients already having T tube in situ serves the purpose of diversion of bile while in one patient required percutaneous transhepatic biliary drainage catheter inserted to divert bile from anastomotic site. Poor nutritional status (serum albumin <3.5) was the main cause in hepaticojejunostomy leak. Gastrojejunostomy leak present In 2 (4%) patients, out of which one patient required re-exploration and revision of gastrojejunostomy anastomosis and one patient who was having controlled leak (<200ml/24hr) managed conservatively. Incidence of intra-abdominal abscess in our study is 28%(14 patients). Patients with intraabdominal abscess either managed with antibiotics or if the collection is radiologically approachable then pigtail of the collection done with USG or CT guidance. Patients with intraabdominal abscess have increased rates of midline wound sepsis all 14 patients in our study who was having intraabdominal collection presented with midline wound sepsis.³⁹ Other complications like fever (22 patients 44%) and chest infection (9 patients 18%). these complications are mostly related to late immobilization of patient, indwelling drains and catheter, central line.³⁹ Persistent low haemoglobin and malena was present in 2 patients (4%) due to bleeding from gastrojejunostomy (GJ) site. managed by digital subtraction angiography (DSA) and fluoroscopy guided vascular embolization of bleeding vessel. The mortality rate in our study is 4% (2 patients). The mortality was due to anastomotic dehiscence of pancreaticojejunostomy and gastrojejunal anastomosis respectively. These patients have poor nutritional status preoperatively with low haemoglobin and serum albumin <3.5 gm%.

SUMMARY AND CONCLUSION

The summary of statistical evaluation of "Retrospective study of Whipple's procedure done at a tertiary health care centre" are as follows

- The peak age group of presentation of disease is 6th decade of life.
- the male to female ratio is 1.6:1
- The most common clinical feature of disease are jaundice (76%) weight loss (56%) and abdominal pain in epigastrium radiating to back.
- The most common sign icterus present in about (76%) followed by palpable gall bladder and pallor being an inconsistent sign
- Serum albumin levels above 3.5 gm % and haemoglobin above 10 gm% has favourable outcome.

- CECT abdomen and pelvis is investigation of choice for evaluation (sensitivity 85%) and plan of management of these patients.
- ERCP guided CBD decompression is reserved for the patient who have intractable jaundice or cholangitis and not done routinely as it increases incidence of midline wound sepsis.
- Endoscopic ultrasound has dual value being able to retrieve tissue sample for diagnosis it can also give information about the involvement of SMA and SMV sensitivity (95%).
- Whipple's surgery done for pancreatic ductal adenocarcinoma in 31 (62%) patients, Ampullary adenocarcinoma in 12 (24%) patients, distal CBD adenocarcinoma in 6 (12%) patients and chronic pancreatitis in 1 (2%) patient.
- For enteral feeding feeding jejunostomy is most preferred method in our study as nasojejunal tube has common problem of dislodgement
- Most of the patient in our study started on enteral feed by POD3/POD5
- Total parenteral nutrition should be avoided as far as possible as it increases the incidence of infection
- The median time for resuming adequate oral intake is by POD10 in our study
- The abdominal drains should be removed as soon as possible preferably before POD7 as drain in situ for more than 8 days itself causes increased rate of abdominal infection.
- The drain fluid amylase levels or volume of drain on any postoperative day is not accurate way to predict postoperative pancreatic fistula
- Most common complication after Whipple's surgery in our institute found to be midline wound sepsis.
- The incidence of midline wound sepsis is higher in patients undergone ERCP guided stenting.
- The incidence of postoperative pancreatic fistula in our study is 32%. all GRADE B pancreatic fistula managed conservatively and GRADE C pancreatic fistula requires surgical management
- Pancreatic fistula causes increased rate of midline wound sepsis.
- Pancreaticogastrostomy (PG) has similar complication rate of pancreatic fistula that of pancreaticojejunostomy (PJ)
- Incidence of delayed gastric emptying in our study is 28%.
- T-tube has additional advantage of biliary diversion if the patient presents with hepaticojejunostomy site leak
- Intraabdominal abscess found in 28% (14 out of 50) of patient in our study all managed conservatively.
- Overall morbidity of Whipple's procedure in our study due to various complications is 74%.
- Overall mortality after Whipple's procedure at our centre is 4% (n=2)

CONCLUSION

Pancreatic cancer is 4th most common cause of death worldwide males being affected more as compared to females. Whipple's procedure is curative surgery should be done at tertiary health care centres because of its morbidity and associated complication which requires multimodal approach

to reduce postoperative mortality associated with the surgery. With this approach the mortality in today's era reduced to 1-3%. The study proves in accordance with previously conducted studies to minimize the endoscopic interventions as it increases morbidity and to use them in patients with features of cholangitis in whom surgery is yet to be planned. Also the rate of morbidity associated with surgery decreases in experienced hand. The complications like pancreatic fistula rarely require surgical exploration can be managed conservatively in tertiary health care centres by radiological intervention. Complications like post-pancreatectomy haemorrhage managed successfully with vascular interventional radiological modalities improving patient survival rate and decreases mortality.

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