Original Research Article

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Artery first versus traditional approach in pancreatoduodenectomy for pancreatic head cancer

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ABSTRACT

Background: Artery first approach pancreatoduodenectomy (AFAPD) technique is one of the many modifications of the standard whipple procedure (sPD) thus enabling a complete dissection of the right side of this artery and of the portal vein, as well as a complete excision of the retroportal pancreatic lamina. Objective was to evaluate the clinical, perioperative and oncological outcomes of "artery first" approach compared with those of the traditional approach. **Methods:** Between 2010 and 2019, The present study includes two groups of patients. A first group of 28 patients

Methods: Between 2010 and 2019, The present study includes two groups of patients. A first group of 28 patients with PD by "artery first" and a second group including 28 matched patients with PD by TAPD. Demographic characteristics (sex, age), intraoperative data (approach type, operative time, blood loss, intraoperative complications, need for vascular resections), histological diagnosis and pathology data (tumor location, TNM staging, tumor grading, tumor vascular invasion) and patient outcomes (postoperative length of stay, in-hospital postoperative mortality and morbidity, survival time) were collected.

Results: There were no significant differences between the two groups regarding: total operative time (422 vs. 460.min, p=0.19), estimated blood loss (p=0.67), median length of stay (14 days in both groups) (p=0. 0.39), complication rates (32.1% and 35.7%) (p=0. 1.00), lymph node yield (22 and 21) and R0 resection rate (75% and 67.9%).

Conclusions: We concluded that artery first" offers similar operative time, intraoperative blood loss, R0 resection rates, lymph node yield and long-term survival as TAPD.

Keywords: Artery-first approach, Traditional approach, Pancreatoduodenectomy, Whipple

INTRODUCTION

After Whipple et al proposed the operation of pancreaticoduodenectomy (PD) in 1935, this procedure has become the standard procedure for the treatment of pancreatic head cancer. PD is one of the most extensive abdominal surgeries, associated with high postoperative morbidity and mortality rates because of its involvement with multiple organs, complex surgical procedures, and long surgical duration. Since the first PD performed by Whipple, more than 70 technical improvements have

been made, the posterior approach to SMA by Kocherization of the duodenum was described by Pessaux et al in 2003. It was not until 2010 that the 'artery first' term was first used when describing the uncinate first approach to the SMA. Since then there have been four more 'artery first' approaches described.^{3,4}

The concept of the artery-first approach is to start from the dissection of the connective tissues around the SMA during PD. The aimed of this approach were (i) early determination of the resectability status before

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committing an irreversible step during operation, (ii) reduction of intraoperative blood loss by early control of blood inflow into the pancreatic head (iii) increase of R0 rates by complete dissection of the connective tissues around the SMA.5 Moreover, a replaced right hepatic artery that occurs in 9.8%-21% of cases can be easily detected, and the unblock resection of the portal vein (PV)/superior mesenteric vein (SMV) is facilitated. It is nowadays considered a safe procedure accounting for 15-70% of duodenopancreatectomies using the "no-touch" technique.⁶

Since the limited involvement of SMV-PV complex is no longer considered unresectable disease, the respectability is now assessed by whether or not the SMA is involved.³ Sanjay et al described 6 different approaches "arteryfirst" which can improve disease free survival.7 Mesopancreas was first recognized by German scholars Gockel et al in which refers to the perineural lymphatic layer located dorsally to the pancreas and reaching beyond the mesenteric vessels. Meso pancreas is a critical structure associated with incomplete removal and local recurrence of tumor, and total meso pancreas excision (TMpE) gives clinicians a total new understanding of the R0 resection of pancreatic head carcinoma. Adham et al described the concept of "the mesopancreas triangle" for the first time. Kawabata et al., then proposed the concept of "total mesopancreatoduodenum excision (tMPDe)" on the basis of the above theory.8 The mesopancreas was reported to be the only site of infiltration in 51.5% of R1 specimens.9

Clearance of the peripancreatic nerve plexus can significantly improve the radical rate of pancreatic cancer and relieve the intractable pain resulting from the invasion of plexus.⁸ The role of an extended lymphadenectomy on the long-term survival of patients with pancreatic cancer after a PD has been extensively debated.¹⁰ Since Gagner and colleagues reported the first case of laparoscopic PD in the world in 1994, MIS was associated with a reduction in intraoperative blood loss, significantly higher retrieval of lymph nodes and significantly reduced hospital stay. Postoperative complications rates were comparable, but with longer operative times.⁸ The recent development of new neo-adjuvant treatment regimens associated with a higher success rate of down-staging.¹¹

In the present study, we aim to evaluate the clinical, perioperative and oncological outcomes of this "artery first" approach (AFAPD) compared with those of the traditional approach (TAPD).

METHODS

Between January 2010 and December 2019, 56 patients were recruited, including 28 patients in the "AFAPD" approach group and 28 patients in the TAPD group, at south Egypt Cancer Institute, Assiut University. The following parameters: age, gender, and administration of

neoadjuvant therapy, clinicopathological features, surgical outcomes and oncological outcomes were compared between the two groups. Multi-phasic CT examination and MRI of the abdomen, chest x-ray examination, serum CA19-9 level was done for all cases.

Ethical approval

All procedures were carried out in accordance with the ethical standards of the institutional committee and with the 1964 Declaration of Helsinki. The study received the approval of ethical committee of South Egypt Cancer Institute, Assiut University. The aim and steps of the study were explained to the parturient and written informed consent were obtained from them.

Sample size and sampling technique

We start our study by traditional resection and by time we had experience in artery first approach so that traditional approach had long time to follow up and many cases actual while artery first approach only 28 cases so to so extend we design our study to be near equal number.

Selection criteria

The tumor in head of pancreases operable, fit.

Exclusion criteria

We excluded cases with surgical findings of invasion to adjacent structures, distant metastasis, positive washing cytology, or peritonitis carcinomatosa, as well as those with other organ resection except for adjacent organ operative cardiovascular risk, severe liver disease (child B or C) and renal dysfunction, and no consent to participate in the study, we excluded those whose pathology was negative for adenocarcinoma (three cases, i.e., high-grade dysplasia).

The clinical data of the patients were retrospectively collected, including intra-operative evaluation parameters (operative time, intra-operative blood loss), postoperative complications (pancreatic fistula, delayed gastric emptying (DGE), postoperative bleeding, biliary fistula (BF). infection, diarrhea and intra-abdominal hemorrhage), mortality rates within 90 days after surgery, long term survival and recurrence pattern. We investigated rates of R0 and R1 resections, the number of harvested lymph nodes and metastatic lymph nodes. The patient's LN ratio was defined according to the total number of positive LNs divided by the total number of LNs harvested.

Surgical technique

The abdominal cavity is carefully explored in order to establish the presence of liver or peritoneal metastasis (these findings preclude any resection).

Group A "AFAPD"

The right colon, hepatic flexure, and the right portion of the transverse mesocolon are mobilized. Extensive "Kocherization" allows a good exposure of the aortocaval region; the presence of enlarged lymphadenopathy reported as positive by frozen section examination preclude any curative resection. Then, wide mobilization of the duodenum and the head of the pancreas from the retroperitoneal adhesions with partial resection of the prerenal fascia and full exposition of anterior aspect of the vena cava and left renal vein is performed. The connective tissue between the inferior vena cava and the abdominal aorta should be carefully dissected (Figure 1A). The origin of the superior mesenteric artery (SMA) is where the left renal vein crosses the aorta; the SMA was suspended with a vascular tape and the adventitial plane is dissected and removed "step-by-step" to the junction of the third and fourth parts of the duodenum. At this point it is possible identify the tumor involvement of the SMA, resulting in ending of the procedure and conversion to a palliative surgery (Figure 1B).

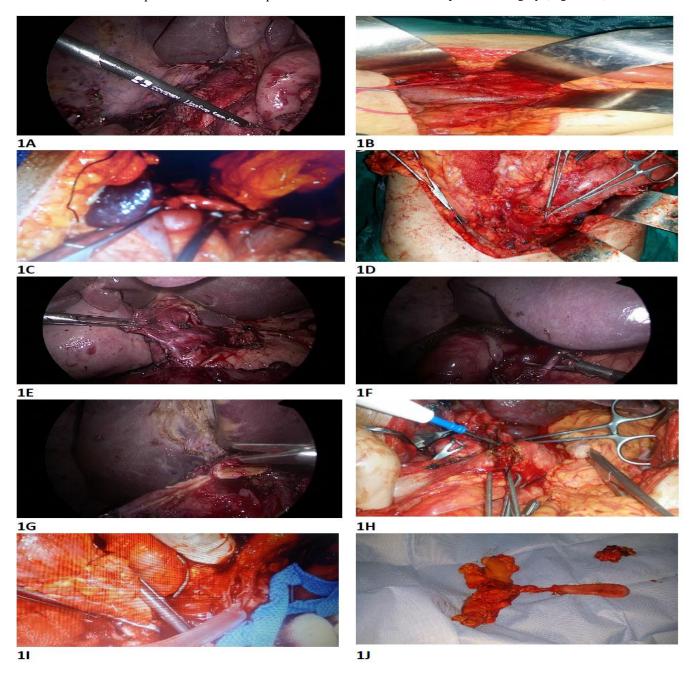


Figure 1 (A-J): Operative technique.

Subsequently, the artery is separated from the pancreatic tissue and PV, and the inferior and posterior pancreaticoduodenal arteries are divided. The first jejunal

artery, the lymph nodes and the lymphatic tissue between the PV and SMA are dissected. During this process, attention is paid to the right hepatic artery that may originate from the SMA. If the SMA was not invaded by the tumor, the pancreatic mesangium attached to the SMA could be cut, the tissues such as fat and lymph in front of the SMA and the right side were cleaned, the connective tissue between the SMA and the superior mesenteric vein (SMV) was swept, and the posterior wall of the SMV was exposed. The tissues overlying the artery anteriorly are divided and the dissection is carefully carried down the lateral wall of the artery, skeletonizing it, The MCA was exposed arising from the anterior side of the SMA, and this artery was usually divided (Figure 1C).

Thus, the anterior portion of the mesopancreas was completely divided, and the head of the pancreas and pancreas uncinate process were still connected with the posterior portion of the mesopancreas Resection of the posterior portion of the mesopancreas. The attachments of the uncinate process, including the arterial branches, are then taken sequentially along the lateral margin of the superior mesenteric artery. The final step in removal of the specimen is to divide the venous tributaries of the uncinate process to the portal and mesenteric veins and to dissect along the lateral margin of the superior mesenteric artery, taking both the arterial branches and the anterolateral periarterial soft tissues, which include both lymphatics and nerve plexuses that can contain tumor The plane between the pancreas and the mesenteric vessels is opened by retracting the specimen to the right and the mesenteric vein to the left (Figure 1D).

The lesser sac is then entered: the anterior surface of the SMV is identified. After dividing the right gastroepiploic vein, anterior branch of the inferior pancreaticoduodenal vein and middle colic vein, the anterior surface of the SMV and then PV is carefully dissected from the posterior part of the pancreatic neck, common hepatic and proper hepatic arteries and the common bile duct are identified., skeletonize the hepatoduodenal ligament, and then expose and ligate the right gastric artery at the proximal end along the proper hepatic artery the common hepatic artery was skeletal, the lymph nodes were cleaned (Figure 1E). The common hepatic artery is then carefully dissected, and the gastroduodenal artery is identified, ligated (Figure 1F). The cholecystectomy is performed, the hepatic duct was transected, (Figure 1G). cleared the upper edge of the pancreas and the connective tissue behind the PV, and then completed the lymph node dissection. The jejunum was cut 10-15 cm from the ligament of Treitz.

The anterior wall of PV and SMV at the upper and lower edges of the pancreas was exposed, transect the pancreas using monopolar diathermy and manage bleeding with bipolar diathermy. The pancreas head was abraded from the PV. Finally, the bundle tissues, including nerve plexus, lymph node, and vessels, between the celiac axis and the dorsal surface of the pancreas head were dissected (Figure 1H). If the SMV and PV were not invaded by the tumor, the branches of the PV and SMV

can be ligated from the top to the bottom of the pancreatic head and from the right to the left. If the SMV and PV were suspected to be invaded, concomitant resection was carried out immediately before the specimen was removed and reconstruction of PV/SMV (Figure 1I) and the whole PD specimen has been completely removed (Figure 1J). Finally, Reconstruction Phase the pancreas remnant after PD, two main methods of anastomosis have been described: pancreatogastrostomy and pancreatojejunostomy (Figure 2A), gastrointestinal anastomosis (Figure 2B), and hepaticojejunostomy were performed (Figure 2C).

Traditional PD

Open the lesser sac by dividing the gastrocolic ligament 2 cm distal from the gastroepiploic vessels. Free the stomach from the pancreas and let the assistant retract the stomach anteriorly. Mobilize the hepatic flexure. Thereafter, the left assistant retracts the duodenum to the patient's left side, while the right assistant pushes the colon caudo-medially with gauze. Perform a wide Kocher maneuver, exposing the inferior caval vein, and the ligament of Treitz. Expose also the superior mesenteric vein (SMV) and its confluence with the gastroepiploic vein. and the third and fourth part of the duodenum is reflected, (Fig. 2D) the distal stomach and A standard lymphadenectomy plus resection of lymph nodes to the right of the coeliac trunk, hepatic artery and hepatoduodenal ligament were carried, the common hepatic artery were dissected, the gastric duodenal artery was isolated, ligated, and the duodenal artery was removed, and then the gallbladder, the common hepatic duct, and the hepatoduodenal ligament were separated. The cholecystectomy is performed, and after that, the common bile duct is ligated and divided.

The bile duct is dissected free from the adjacent portal structures and divided above the cystic duct entry across the common hepatic duct. Dissect the gallbladder hilum and the cystic artery and then divide the duct between clips (Figure 2E). The superior mesenteric vein (SMV) is early isolated below the pancreas, where it passes over the third duodenum and is dissected free from the pancreas and uncinate process with ligation of the right gastroepiploic and inferior pancreaticoduodenal veins and Pancreatic Tunnel early creation of a tunnel between pancreas and portomesenteric axis towards the hepatic pedicle (Figure 2F). We performed ligation. disconnection of the pancreatic neck, ligation. disconnection of the pancreatic head and pancreatic uncinate process and the vein branch between PV and SMV, cut the jejunum 10-15 cm from the flexor ligament. At this time, only the uncinate part of the pancreas was connected with the SMA, (Figure 1D).

In case of venous invasion, the PV or SMV might be resected in accordance with invasion extent: After complete detachment of the PV from the posterior surface of the pancreatic neck, the transection of the pancreas is

made. The pancreas is divided with electrocautery, and additional bleeding points on the cut margins are controlled while retracting the SMV medially to expose the SMA. The next step is dissection of the hepatoduodenal ligament with exposure of the PV. The PV is traced down to the level of the pancreatic neck by ligating and dividing the surrounding tissues; this completely exposes the peripancreatic PV. The dissection of the PV is continued down by inferomedial traction of the duodenum and pancreatic head. The posterolateral side of the PV is carefully dissected, ligating the tributaries (Figure 2G). The pancreatic head along with distal common bile duct, duodenum (±distal stomach), and first jejunal loop (after mobilization of Treitz's angle) is dissected from the right side of the PV and SMV, and the operative specimen is removed. All patients received postoperative adjuvant chemotherapy, except for those in poor condition or who refused chemotherapy.

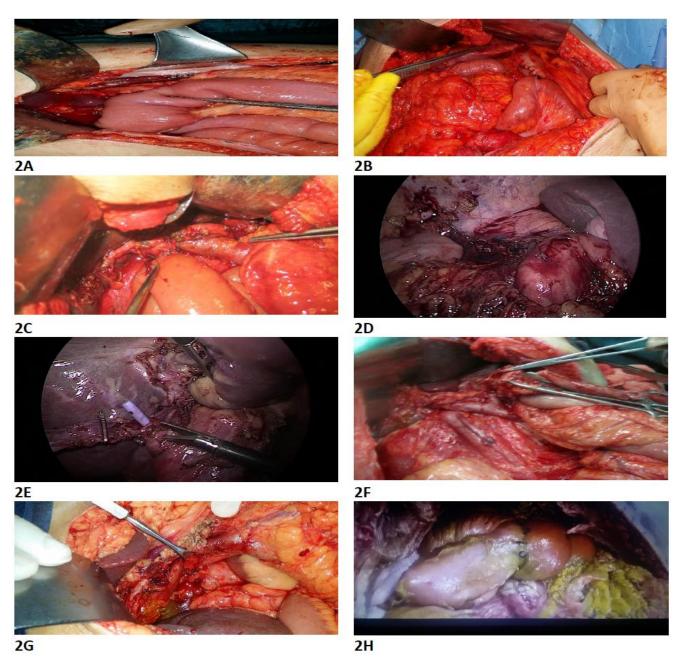


Figure 2(A-H): Operative technique and post-operative complications.

Follow-up

Patients were followed postoperatively as follows; were examined at the third, sixth, and 12th months. Every 6months, upper abdominal computed tomography scan and CA19-9 was observed. Recurrence was defined as convincing radiographic evidence of disease during postoperative follow up. Regional recurrence was defined as recurrence in the soft tissues or lymph nodes beyond the pancreatic bed or within the peritoneal cavity

(including ascites and/or wound implants). Distant recurrence was defined as recurrence in the liver, lungs, or other distant organs.

Statistical methods

SPSS version 25.0 was used in data management. Mean and standard deviation or median and range were used for numerical data description. Chi-square test and Fisher exact tests were used for testing proportion independence. Disease free survival was defined from date of surgery to date of recurrence (local recurrence and distant metastasis). Kaplan Meier method estimated survival and

log rank test compared curves. P value was always two tailed and significant at 0.05 level.

RESULTS

A total of 56 pancreatic cancer patients underwent pancreaticoduodenectomy between January 2010 and December 2019. 28 patients underwent AFAPD and 28 patients underwent TAPD. There were 33 (59%) male patients and 23 (41%) female patients (P=0.786). The mean age was 56.11±5.84 years in group A and 62.75±7.63 years in group B (P=0.001).

Table 1: Patient characteristics among two types of approaches.

Variables		Study group				
		AFAPD	AFAPD		TAPD	
		Count	%	Count	%	
	F	12	42.9	11	39.3	
Sex	M	16	57.1	17	60.7	0.786
	Total	28	100.0	28	100.0	
	Cardiovascular	6	21.4	5	17.9	
	Diabetes	4	14.3	3	10.7	
A my comoubidity	Hypertension	4	14.3	5	17.9	1.00
Any comorbidity	No	13	46.4	13	46.4	
	Pulmonary disease	1	3.6	2	7.1	
	Total	28	100.0	28	100.0	
т •	L	3	10.7	4	14.3	
Laparoscopic:	0	25	89.3	24	85.7	1.00
open surgery	Total	28	100.0	28	100.0	
Portal vein resection	No	25	89.3	26	92.9	
	Yes	3	10.7	2	7.1	1.00
	Total	28	100.0	28	100.0	

Table 2: Operative characteristics among two types of approaches.

	Study group					
Variables	AFAPD		TAPD		P value	
	Mean	Std. Deviation	Mean	Std. Deviation		
Age (year)	56.11	5.84	62.75	7.63	0.001	
Operative time, min	422.86	84.01	460.25	97.90	0.190	
Estimated blood loss, mL	1054.82	618.69	1085.00	564.24	0.658	
Length of stay (day)	14.11	5.43	15.61	6.76	0.397	

The mean operative time was shorter in group A (422.86 ± 84.01) min vs. (460.25 ± 97.90) in group B. There was no significant difference in operation time between the two groups (P=0.190). The mean blood loss was lower in the group A $(1054.82\pm618.69 \text{ ml})$ vs. group B $(1085.00\pm564.24 \text{ ml})$. In both groups, there was no significant intraoperative incident (P=0.658). The mean length of stay was $(14.11\pm5.43 \text{ d})$ in group A vs. $(15.61\pm6.76\text{d})$ in group B. There was no significant difference regarding the postoperative length of

hospitalization between the two groups (P=0.397) (Table 2).

Pathology data: there are no significant differences in the two groups regarding TNM stage and grade of differentiation. Rate of R0 resection was higher in AFAPD (75.0%) than TAPD (67.9%) despite insignificant difference between the two groups (P=0.554 NS). Rates of R1 occur in 25 % in AFAPD vs. 32.1% in TAPD. There was no significant difference in Resection margin involvement (P=0.115, NS) (Table 3).

Table 3: Pathologic characteristic among two types of approaches.

		Study gro	oup			
Variables		AFAPD		TAPD		P value
		Count	%	Count	%	varue
	T1	2	7.1	1	3.6	
	T2	5	17.9	6	21.4	
T. category	T3	19	67.9	19	67.9	1.00
	T4	2	7.1	2	7.1	
	Total	28	100.0	28	100.0	
	N0	10	35.7	10	35.7	
N. category	N1	18	64.3	18	64.3	1.00
	Total	28	100.0	28	100.0	
	_ II A	12	42.9	11	39.3	
TNM stage	II B	12	42.9	9	32.1	
1 Mil Stage	III	4	14.3	8	28.6	0.405
	Total	28	100.0	28	100.0	
	Moderately differentiated	8	28.6	9	32.1	
Grade	Poorly differentiated	14	50.0	15	53.6	
Graue	Well differentiated	6	21.4	4	14.3	0.781
	Total	28	100.0	28	100.0	
	_R1	7	25.0	9	32.1	
Resection	R0	21	75.0	19	67.9	0.554
	Total	28	100.0	28	100.0	•
	BDM bile duct margin	1	14.3	0	0.0	
Resection margin involvement	PNM pancreatic neck margin	2	28.6	0	0.0	
	PUPM (posterior surface of the uncinate	0	0.0	4	44.4	
	process margin)	· ·		<u> </u>	· · · · · · · · · · · · · · · · · · ·	•
	SMAM superior mesenteric artery margin	3	42.9	3	33.3	0.115
	SMVM superior mesenteric vein margin	1	14.3	2	22.2	
	Total	7	100.0	9	100.0	

Table 4: Lymph nodes excised and ratio of positivity among two types of approaches.

Variables	Study group AFAPD TAPD						P
	Mean± SD	Median	Range	Mean± SD	Median	Range	value
Lymph nodes retrieved	22.29±13.518	18.00	10-56	21.00±12.009	19.0	7-64	0.863
Lymph nodes positive	2.64±3.033	1.50	0-8	2.79±3.083	2.0	0-9	0.775
Lymph node ratio	0.149±0.171	0.087	0-0.54	0.136±0.147	0.1	047	0.993

The median number of lymph nodes harvested for AFAPD was 18 (10-56) vs. 19 (7-64) in TAPD (P=0.863, NS). Mean number of positive lymph node was 2.64 in AFAPD vs. 2.79 in TAPD (P=0.775, NS) (Table 4). Postoperative complications were encountered in 9 patients (32.1%) in AFAPD and 10 patients (35.7%) in TAPD. There was no significant difference between the two groups (P=1.00, NS). Pancreatic fistula (PF) was recorded in one patient in AFAPD and one patient in TAPD, (P=1.00, NS). Biliary fistula (BF) (Figure 2H) occurred in one patient (3.6%) in the two groups.

Delayed gastric emptying (DGE) occur in two patients 7.1% in each group (Table 5).

Local recurrence occurs in 5 Patients (17.9%) AFAPD and 9 patients (32.1%) in TAPD, while Distant recurrence in 9 patients (32.1%) In each group. There was no statistically significant difference between the two groups, P value=0.405 (Table 6).

The mean overall survival (OS) rate in the AFAPD group was 26.9 months (± 7.78) vs 24.8 months (± 9.48) in

TAPD. The median disease-free survival (DFS) among AFAPD group was 25.0±8.7 months vs 17.0±4.5 months

in TAPD. There were no significant differences of both OS and DFS (P=0.350, NS) (Figure 3).

Table 5: Comparison of postoperative complications between the two groups of patients.

		Study group				
Variables		AFAPD		TAPD		P value
		Count	%	Count	%	
	No	27	96.4	27	96.4	_
Pancreatic fistula	Yes	1	3.6	1	3.6	1.00
	Total	28	100.0	28	100.0	
	No	27	96.4	27	96.4	_
Biliary fistulae	Yes	1	3.6	1	3.6	1.00
	Total	28	100.0	28	100.0	
	No	27	96.4	27	96.4	_
Abdominal bleeding	Yes	1	3.6	1	3.6	1.00
	Total	28	100.0	28	100.0	
	No	26	92.9	26	92.9	
Delayed gastric emptying	Yes	2	7.1	2	7.1	1.00
	Total	28	100.0	28	100.0	
	No	26	92.9	27	96.4	
Diarrhea	Yes	2	7.1	1	3.6	1.00
	Total	28	100.0	28	100.0	_
	No	27	96.4	26	92.9	
Infection	Yes	1	3.6	2	7.1	1.00
	Total	28	100.0	28	100.0	
	No	28	100.0	27	96.4	
Re-admission	Yes	0	0.0	1	3.6	1.00
	Total	28	100.0	28	100.0	
	No	27	96.4	26	92.9	
Intra-abdominal abscess	Yes	1	3.6	2	7.1	1.00
	Total	28	100.0	28	100.0	_
	No	27	96.4	27	96.4	
Mortality	Yes	1	3.6	1	3.6	1.00
	Total	28	100.0	28	100.0	

Table 6: Postoperative tumor recurrence and treatment.

Variables		Count	%
	No	24	42.9
Recurrence	Local	14	25.0
Recurrence	Distant	18	32.1
	Total	56	100.0
	Liver	7	12.5
	Local	14	25.0
Site of recurrence	Lung	4	7.1
Site of recurrence	No	24	42.9
	Peritoneum	7	12.5
	Total	56	100.0
	No	47	83.9
Neoadjuvant therapy	Yes	9	16.1
	Total	56	100.0
	No	18	32.1
Adjuvant therapy within 8 weeks after surgery	Yes	38	67.9
	Total	56	100.0

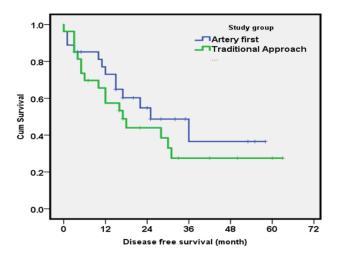


Figure 3: Kaplan-Meier survival curves for both groups.

DISCUSSION

It is clear that there is mounting evidence that AFAPD can improve R0 resection rates, increase lymph node yield, reduce intraoperative blood loss, and prolong longterm survival.4 In our study, the mean length of stay was 14.11 day in AFAPD vs 15.61 day in TAPD with no significant difference between two groups (P=0.397). Some author also reported that hospital stay was shorter in the mesenteric group.⁵ In a study conducted by Gagner et al the median hospital stay was 18 days. 12 In some studies, operative time was longer in the mesenteric group than in the conventional group. This may be associated with the learning curve of operation.⁵ However, in the present study, the mean operative time was shorter in AFAPD (422.86±84.01 min) than TAPD (460.25±97.90) with no significant difference between both groups (P=0.190). Several studies comparing AFAPD (where there is early ligation of inferior pancreaticoduodenal artery, thus reducing the congestion into the pancreatic head, along with gastroduodenal artery and portal vein tributaries ligation) to standard PD have demonstrated a lower intraoperative blood loss and transfusion requirements with AFAPD (mean ranging between 700 and 1,500 ml).^{4,6} In the present study, the mean blood loss was also lesser in the AFAPD (1054.82±618.69 ml) than TAPD (1085.00±564.24 ml), but this does not reach significant difference (P= 0.658).

In the present study, laparoscopy-assisted pancreaticoduodenectomy in 7 patients (12.5%) while open pancreaticoduodenectomy in 49 patients (87.5%), (P=1.00). Rooij et al concluded that laparoscopic pancreaticoduodenectomy (LPD) a safe and effective associated with a reduction in estimated blood loss, delayed gastric emptying, and a shorter hospital stay. Long learning curves and increased duration of surgery are often invoked as drawbacks. ¹⁴

Advances in surgical techniques have led to a decrease in the mortality rate of pancreaticoduodenectomy, which has currently fallen to less than 5%. However, the complication rate remains as high as 25-70%. 1,2 Recent studies have shown that AFAPD is associated with reduced overall morbidity compared to standard PD.⁴ The most common complications include delayed gastric emptying, pancreatic fistula, postoperative bleeding, and infectious complications.¹³ Pancreatic fistula was reported up to 30%, while delayed gastric emptying was 21%.14 According to Cameron et al local ischemia, nerve damage, and spasm of the pylorus after pyloruspreserving PD are important causes. 13 In our study, the frequency of postoperative complications was similar in both groups (32.1 vs 35.7 %, P=1.00). Both pancreatic fistula (PF) and biliary fistula (BF) was recorded in one patient (3.6%). Delayed gastric emptying (DGE) occur in two patients (7.1%) in each group (P=1.00).

AFAPD is better than TAPD in early assessment of SMA tumor infiltration, thus avoiding unnecessary resections. In a study conducted by Kawabata et al the R0 resection rates were 66% for AFAPD compared with 7% for a standard PD.4 Other study reported 93% R0 rates for AFAPD vs. 60% for TAPD. Total mesopancreatic excision is defined as removal of all small vessels, nerves, and lymphatic nodes and networks within the retroperitoneal adipose tissue, increases the rate of negative resection margins, thus reducing the local recurrence rate and improving the survival.³ The medial and posterior margins are most commonly involved margins.⁶ The overall R1 resection rate was 35%, whereas the retroperitoneal resection margin was involved in 80% of the specimens. In our series, the rate of R0 resection was insignificant between two groups (75.0% vs 67.9%, P=0.554).

Lymphadenectomy in pancreatic cancer is a controversial topic. However, several randomized trials have shown no benefit to extended lymphadenectomy compared to standard lymphadenectomy. Huebner et al suggested that adequate staging of pancreatic cancer required more than 11 lymph nodes. Eskander et al confirmed that no increased benefit was achieved beyond 30 lymph nodes. Aimoto et al have recently shown that AFAPD increased he lymph node yield. Tomlinson et al found that OS was extended for patients with 15 or more nodes examined. The number of resected lymph nodes in our series is comparable with that of previous reports. The median number of lymph nodes harvested for AFAPD was 18 (10–56) vs. 19 (7-64) for TAPD (P=0.863).

Venous involvement should not be a contraindication for surgical resection 1. A long-term survival similar to that observed after radical resection without venous involvement can be achieved if R0 resection is gained by venous resection.³ In our series tumoral infiltration of the portal vein was evidenced; partial resection of the vein and its reconstruction and 5 patients (17.9%) had vascular resections, 3 patients (10.7) in AFAPD vs. 2 patients

(7.1%) in TAPD (P=1.00). Recent data has suggested that AFAPD is associated with higher R0 resection rates, lower blood loss, postoperative morbidity, fewer recurrences (10 vs. 37%; p=0.006) and improved survival compared to the standard PD [1- and 3-year survival rates 90 and 53% (AFA) versus 80 and 16% (standard PD); p=0.004].⁴ In our study, local recurrence occurs in 5 Patients (17.9%) in AFAPD and 9 patients (32.1%) in TAPD. The mean overall survival (OS) rate in the AFAPD group was 26.9 months (±7.78) and 24.8 months (±9.48) in TAPD. The median disease-free survival (DFS) among AFAPD group 25.0±8.7 month vs. TAPD 17.0±4.5 month. There were no significant differences of both OS and DFS (P=0.350).

Limitations

There were some limitations in this study. First, this is a retrospective analysis. Second, there might be a selection bias as a result of comparing these nonrandomized groups to a retrospective profile. All this need to be evaluated in future studies. The clinical trial was performed only in a single Assuit hospital. Recently, a prospective multicenter designed by our center is ongoing.

CONCLUSION

AFAPD is a safe, effective and feasible surgical method for the treatment of pancreatic head cancer. There is no significant difference between the AFAPD group and traditional group regarding operation time, intraoperative blood loss, lymph node yield, the overall survival rate, recurrence rate, R0 resection rate, operation time, intraoperative blood loss, lymph node yield, early postoperative mortality and morbidity rates.

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