



EVALUATING THE LAPAROSCOPIC DUODENUM-PRESERVING PANCREATIC HEAD RESECTION EFFICACY AND TRANSIENT MEDICAL RESULT FOR THE TREATMENT OF CYSTIC NEOPLASMS

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Abstract:

Objective: In order to treat cystic neoplasms in the pancreatic head, our research looked at the immediate clinical outcomes of the LDPPHR surgical operation.

Methods: Between September 2020 and April 2023, 60 patients at Mayo Hospital had therapy for cystic neoplasms of the pancreatic head. Their medical records were examined. We reviewed their clinical history, imaging tests, and outcomes after treatment.

Results: In this research comparing two pancreaticoduodenectomy surgical methods, no significant differences were found between the baseline and pathological features of the patient population. A shorter postoperative exhaust time (2-4 days) was observed in patients who underwent laparoscopic distal pancreatectomy with preservation of the spleen and splenic vessels (LDPPHR) as opposed to those who underwent laparoscopic pancreaticoduodenectomy (LPD), with a statistical significance of P-value = 0.003. With regard to operating time, anticipated blood loss, intraoperative transfusion, postoperative complications, reoperation, and 30-day readmission, there were no significant differences between the two groups (P-value > 0.05). No conversions or 90-day mortality occurred in any group. In comparison to the LPD group, the LDPPHR group had greater total cholesterol (TG), postoperative nutritional index (PNI), body mass index (BMI), and total cholesterol (TG) after 3 months (P-value < 0.05).

Conclusions: In comparison to LPD, LDPPHR improves instantaneous post-surgical nutrient intake, reduces postoperative exhaustion time for patients, and does not compromise preoperative protection.

Keywords: laparoscopy, surgery, bmi

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Introduction:

The prevalence of pancreatic cystic tumours has grown as a result of individuals being more aware of the need for regular health exams and the development of advanced diagnostic imaging equipment. Nearly 2-45% of the population has pancreatic cysts [1]. Almost 13.5% of pancreatic cysts are found by MRI [2]. Cysts in the pancreas may either be non-neoplastic or cancerous. Neoplastic pancreatic cysts, sometimes referred to as pancreatic cystic tumours, are mostly made up of neuroendocrine tumours, intraductal papillary mucinous tumours, solid

pseudopapillary tumours, and serous cystadenoma [3, 4]. The best course of action for treating possibly cancerous pancreatic cystic tumours is surgical excision [5]. The typical course of therapy for cystic tumours found on the pancreatic head is pancreaticoduodenectomy (PD). Initially used to treat inflammatory masses discovered in the pancreatic head [6, 7], duodenum-preserving pancreatic head resection (DPPHR) has since been expanded to treat cystic tumours found on the pancreatic head [8–10]. In contrast to PD, DPPHR preserves the both exocrine and exocrine functions of the pancreas [11–13].

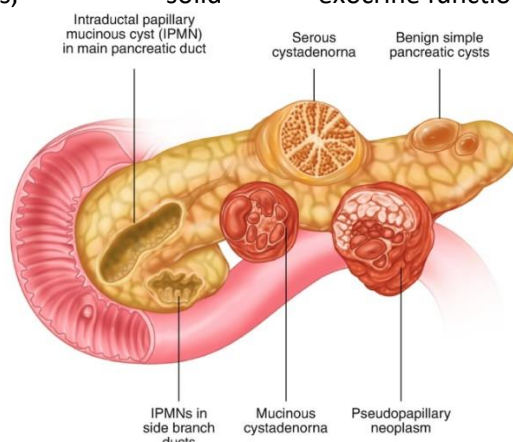


Figure 1: Pancreatic Cystic Lesions

It also maintains the continued existence of the gastroduodenal. LDPPHR is becoming more and more common as laparoscopic technology advances. This is due to the widespread use of laparoscopic pancreaticoduodenectomy (LPD) at major medical centres. A retrospective analysis of medical records from sixty individuals who had been hospitalised at Mayo Hospital between September 2020 and April 2023 for cystic tumours of the pancreatic head was done in this study. We want to learn more about the pancreatic head cystic tumour treatment effectiveness with LDPPHR in the short term.

Methods:

Study Design: The goal of the study was to look at the clinical information of 60 patients who

had therapy at Mayo Hospital for pancreatic-head cystic neoplasms between September 2020 and April 2023. 29 received LPD, and 31 of these patients underwent LDPPHR. The patients were chosen based on their preoperative medical histories, the findings of tumour imaging and tumour markers, and the postoperative diagnosis of a cystic tumour in the head of the pancreas. These tumours include solid pseudopapillary tumours, intraductal papillary mucinous tumours, serous cystic tumours, mucinous tumours, and G1/G2 pancreatic neuroendocrine tumours. The patients had to have healthy cardiopulmonary function before treatment and be free of any other diseases that would limit their capacity to undertake the procedure. Comprehensive

medical information was also required for study enrollment. Patients who were 80 years of age or older, had pathological diagnoses made during or after surgery that indicated malignancy or had insufficient medical records were eliminated from the study.

Statistical Analysis:The researchers ran statistical analyses on their data using the SPSS 26.0 programme. When the data was found to be normally distributed, they used the t-test to compare the groups. They utilised the Mann-Whitney U-test to compare groups and, if the data were skewed, they gave the median value along with the 25th and 75th percentiles. To compare the frequency of certain occurrences or features across groups, they employed Fisher's exact test and Chi-squared test, and the findings were presented as percentages.

They regarded a p-value of less than 0.05 as statistically significant, indicating that there was

a lower than 5% likelihood that the outcomes were the product of pure chance. These techniques allowed the researchers to thoroughly compare, examine, and analyse their data in order to reach insightful findings.

Results:

For the LDP-PHR and LPD groups, respectively, this research examined the medical results of individuals who had laparoscopic distal pancreatectomy with or without retention of the splenic and spleen arteries. Gender, age, complications before surgery, abdominal surgery history, ASA score, BMI, before surgery haemoglobin, before surgery overall bilirubin, before surgery albumin, before surgery direct bilirubin, postoperative CA19-9 stages, pathological evaluation, and injury size were all discovered to be non-significantly different between the two groups in the study as the P-value found to be greater than 0.05. (Table 1)

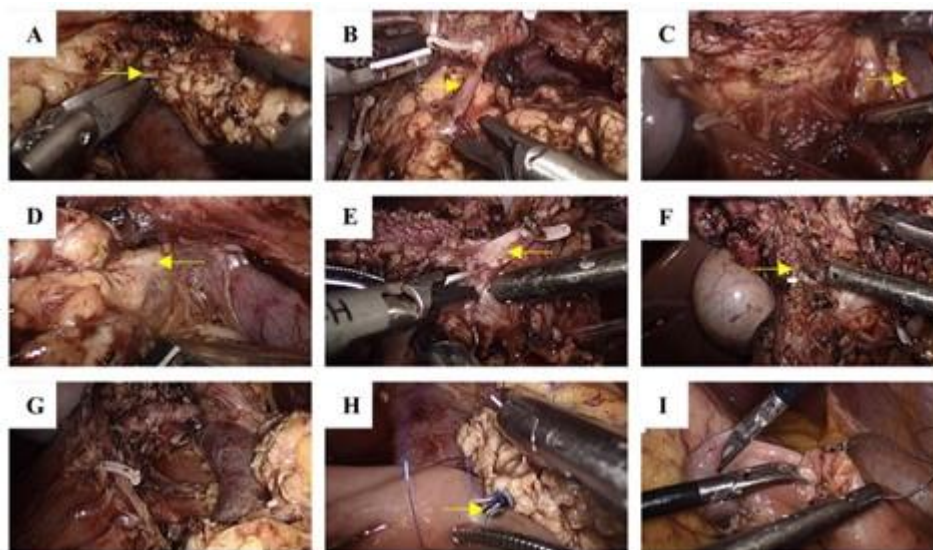


Figure 2: Different surgical fields

The postoperative exhaust time for the LDP-PHR group was substantially lower than for the LPD group (p-value = 0.003). The results of the study revealed that there were no significant differences between the two groups for a number of surgical outcomes, including operating room time, anticipated blood loss, the need for transfusions during surgery, haemoglobin levels the day after surgery, total

and direct bilirubin levels before release, hospital stay after surgery, pancreas fistula after surgery, fluid leaking, gastrointestinal disease, haemorrhage, and abdominal effusion. The 90 days after the procedure, neither group saw any conversion to open surgery or deaths. Table 2 displays the short-term surgical results of the trial.

In comparison to the LPD group, the LDPPHR group showed statistically significant differences in the 3-month protein-energy malnutrition index (PNI), 6-month triceps skinfold thickness (TG), and 6-month body mass index (BMI). Three months following the operation, the research found no discernible difference between the two groups in terms of their total cholesterol, triglycerides, body mass index (BMI), and other variables. Six months following the procedure, there was a clear difference between the two groups in terms of their postoperative Prognostic Nutritional Index (PNI).

PNI is a measurement of a patient's immune system and nutritional condition, to elaborate. The findings imply that although there was no

variation in the first stage of recovery, the nutritional condition of the two groups was different six months after the operation. This would suggest that one group had superior immunological and postoperative nutrition versus the other group. In conclusion, this emphasizes the need of taking PNI into account as a gauge of postoperative healing and assessing the long-term effects of surgical procedures on patients' nutritional condition. In Table 3, the study's patients' short-term nutritional indicators are shown.

In terms of a shorter postoperative exhaust time and better short-term nutritional indicators, the research indicated that LDP-PHR had an edge over LPD. But in terms of other clinical outcomes, there was no discernible distinction between the two groups.

Table 1: Demographic information of the participants included in the study

Parameter	LPD				LDPPHR				p
	n	%	Mean	SD/Range	n	%	Mean	SD/Range	
Age			52.3	11.9			48.4	15.8	0.29
Gender									
female	15	51.7			23	74.2			0.07
male	14	48.3			8	25.8			
Comorbidities before surgery									
Bronchial Asthma	0				1	3.2			1
anemia	0				2	6.5			0.49
diabetes	2	6.9			3	9.7			1
hypertension	4	13.8			7	22.6			0.51
History of Abdominal surgery	6	20.7			4	12.9			1
ASA									
BMI			23.9	2.9			24.9	4	0.26
I	19	65.5			16	51.6			0.64
II	9	31			14	45.2			
III	1	3.4			1	3.2			
CA19-9			11.1	6.0,16.5			9.7	7.1,13.4	0.89
Albumin			40.8	4.1			40.1	2.9	0.41
Direct bilirubin			2.3	1.8,3.1			2.1	1.5,2.7	0.1
Total bilirubin			12.4	10.1,16.5			11.4	8.1,12.9	0.06
Hhemoglobin			133.7	16.3			127.6	18.2	0.18



Pathological diagnosis									
IPMN	8	27.6			8	25.8			0.16
SPN	8	27.6			7	22.6			
MCN	6	20.7			1	3.2			
SCA	4	13.8			9	29			
PENT(G1/G2)	2	6.9			5	16.1			
Vesicular transformation	0				1	3.2			
Benign cystic lesions	1	3.4			0				
Lesion diameter			3.5	2.5,4.7			2.8	1.6,5.0	0.32

Table 2: The participants' groups' short-term surgery results

Parameter	LPD group				LDPPHR				P
	n	%	Mean	SD/Range	n	%	Mean	SD/Range	
Operative time			350	270, 390			315	250, 445	0.5
EBL			100	50, 150			100	50, 200	0.77
Deaths within 90 days	0				0				
thirty-day readmission	1	3.4			1	3.2			1
Reoperation	0				0				
Interventional embolization hemostasis	1	3.4			2	6.5			1
DGE	4	13.8			3	9.7			0.7
Abdominal infection	3	10.3			2	6.5			0.67
Peritoneal effusion	3	10.3			4	12.9			0.54
Hemorrhage	1	3.4			3	9.7			0.61
Bile leakage	5	17.2			3	9.7			0.47
grade C	0				1	3.2			
grade B	7	24.1			8	25.8			
Leaking of biochemicals/non-biochemical	22	75.9			22	71			1
Pancreatic fistula following surgery									
Hospital stay after surgery			11	8, 17			11	8, 18	0.8
Exhaustion after surgery			4	3, 5			2	2, 4	0.003
Before discharge, direct bilirubin			4.2	2.7, 7.4			3.5	2.3, 5.5	0.23
Before discharge, total bilirubin			13.1	11.0,19.8			13.5	9.7,19.0	0.86
Following surgery 1st day's hemoglobin			119.5	17.3			121.8	17.2	0.6
Conversion	0				0				



Transfusions during surgery	0					4	12.90%	0.11
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Table 3: Two groups' postoperative short-term nutritional markers

Parameter	Time (Months)	LDPPHR		LPD		P
		Mean	SD	Mean	SD	
BMI	6	24.8	2.1	23.3	2.6	0.02
BMI	3	24.3	2.5	23.1	2.8	0.12
TG	6	1.63	0.24	1.48	0.21	0.01
TG	3	1.51	0.2	1.47	0.18	0.34
TCH	6	4.8	0.35	4.63	0.28	0.05
TCH	3	4.57	0.34	4.46	0.26	0.18
PNI	6	50.1	1.8	49.3	2.9	0.21
PNI	3	49.5	1.9	47.4	2.5	0.001

Discussions:

Given the available medical knowledge and case histories, LDPPHR has hitherto only been described in a few investigations. According to research, 12 individuals had LDPPHR for the management of normal and mild tumours of the head of the pancreas. This revealed a less invasive method for using LDPPHR to treat these tumours. [16] In this study, we found a postoperative exhaust time difference between the LPD group and the LDPPHR group that was statistically significant. According to this, LDPPHR may protect the duodenum and biliary tract's integrity in comparison to the outcomes of LPD; as a consequence, patients' restoring the digestive system after surgery is less. Early surgical exhaust reduces the pain of bloating and lessens the negative feelings that might arise during hospitalisation. An indication of a patient's post-operative recovery is the length of time it takes for surgical exhaust, which is the removal of gas from the abdomen. According to a study, patients who underwent laparoscopic distal pancreatectomy with preservation of the left adrenal gland and splenic vessels (LDPPHR) had better outcomes in terms of their nutritional status, weight gain, and overall recovery than those who underwent

laparoscopic distal pancreatectomy (LPD). [14] The LDPPHR group specifically had higher postoperative protein nutritional index (PNI) values at three months, triglyceride levels after six months, and body mass index (BMI) at six months. The LPD group's results were less favourable in contrast. Similar results were seen in another research, where patients who received LDPPHR had substantially higher BMIs than those who underwent standard PD (p-value less than 0.001). [15] Comparatively, postoperative nutritional recovery is a benefit of LDP- PHR. Malnutrition was identified as the root cause of NAFLD after PD by the research [16]. According to a previous study, the DPPHR group's serum albumin levels were considerably higher than those of the PD group. In regards to digestive system recovery following surgery and nutritional condition, LDPPHR gives greater benefits than LPD because it can better preserve the ongoing functioning of the stomach-duodenum-bile duct. [17] The pancreaticoduodenal area has intricate blood vessel architecture. In the LDPPHR group, there was postoperative bleeding in 3 patients, 2 of whom received successful celiac arteriography embolisation. The stump of the ASPDA was identified as bleeding vascular by



intraoperative angiography. For LDPHR surgery, we typically opt to reduce the ASPDA to reduce the possibility of inadequate exposure in the operating room. It may be more challenging for the GDA stump in LPD to resist pancreatic juice degradation. The stump will bleed beneath the deposition of the pancreatic fluid if a gastrointestinal duct develops after the operation and its flow is not uniform. Another big problem is preventing the end of ASPDA from rupturing.

During LDPHR, the typical bile duct and the pancreatic gland have a unique path and anatomical location that makes it important to expose and protect them. However, this may sometimes result in common bile duct damage. The triangle formed by the shared bile duct was suggested throughout the study. The possibility of during surgery common bile duct damage may be reduced by using immediate form indocyanine fluorescent green imaging during endoscopic surgery [18,19,20]. The posterior papilla is the level at which PSPDA re-passes after moving forward via the distal bile duct and descending the bile ducts right edge [21]. The posterior artery of the upper duodenum may be damaged during LDPHR if pancreatic tissue is excessively separated from the bile ducts and duodenum. This will impair how well the bile ducts and duodenum get blood flow. We often do 3D reconstruction prior to surgery to make it simpler for the surgeon to evaluate the lesion area's spatial closeness to the common bile duct during surgery. The surgical team ensures that the common bile duct is not too exposed in order to preserve the pancreatic tissue on the right rear and ventral side of the digestive system throughout the procedure.

The LDPHR technique is quicker than LPD, with an average operation time of 295 minutes for the LDPHR group and 357 minutes for the LPD group, according to a prior study. [22] Although the LDPHR group's surgery took an average of 315 minutes and the LPD group's an average of 350 minutes in this study, the difference was not statistically significant. Neither a

gastrointestinal anastomosis nor a biliary-enteric anastomosis is necessary for the LDPHR surgery since just the top portion of the pancreas is removed. The operation is still difficult, however, since the pancreatic head must be entirely removed but the pancreaticoduodenal artery arch, which is situated close to its back, must be preserved structurally. It should be emphasized that the hospital's leading surgeons who oversee the LDPHR program have previously attained the required knowledge and expertise in LPD. Based on their level of LPD proficiency, the LDPHR program is put into place.

The development of LDPHR remains in its infancy everywhere in the globe. The study only comprised a small number of instances, thus more research using a bigger cohort and data from many centres would be necessary to confirm the findings. This research only compared LDPHR with LPD over a short period of time.; hence, further follow-up research is necessary to determine the corresponding long-term effectiveness.

Conclusions:

In comparison to LPD, LDPHR improves immediate after-surgery dietary status, reduces postoperative exhaustion time for patients, and does not compromise perioperative safety.

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