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Laparoscopic-assisted pancreaticoduodenectomy for periampullary carcinoma: An experience of 50 cases from a single tertiary care center

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ABSTRACT

Objective: Laparoscopic-assisted pancreaticoduodenectomy (LAPD) is being performed in several centers worldwide. The proportion of minimally invasive pancreaticoduodenectomy for periampullary carcinoma (PAC) has recently increased, owing to its potential benefits. However, the safety and feasibility of LAPD have not yet been standardized. In this study, it was aimed to report our experience with LAPD in 50 patients.

Material and Methods: Fifty patients with resectable PAC who underwent LAPD between June 2021 and August 2023 were retrospectively analyzed.

Results: Mean age of the study group was 49.9 ± 12 years, and most were females (54%). Ampullary carcinoma was the most common type (58%). Mean operative time and estimated blood loss were 460 ± 40 minutes and 426 ± 156 mL, respectively. Four patients had suspected portal vein involvement, and two patients had hemorrhage during uncinate process dissection, resulting in conversion to open surgery. Severe post-operative morbidity was noted in 13 (26%) patients. Following surgery, Grade B post-operative pancreatic fistula was present in 26% of patients, whereas Grade B and C delayed gastric emptying was present in 18% and 2% of patients, respectively. Mean hospital stay was 9.4 ± 2.8 days. Mean number of lymph nodes harvested was 13.4 ± 4. All patients underwent R0 resection, and no mortality was noted during the 30-day follow-up period.

Conclusion: LAPD is a feasible procedure for resectable PAC offering good oncological outcomes and minimal complications. It can be performed effectively by experienced surgeons in specialized centers.

Keywords: Laparoscopic-assisted, pancreas, pancreaticoduodenectomy, periampullary carcinoma

INTRODUCTION

Periampullary carcinomas (PAC) are cancers affecting the pancreatic head (within two cm of the ampulla), duodenum, ampulla of Vater, and distal common bile duct (1). Open pancreaticoduodenectomy (OPD) has been the standard surgical treatment for PAC (2). The increasing incidence of these malignancies and improvements in laparoscopic surgery techniques have led to a reassessment of surgical techniques for treatment of PAC (3). Minimally invasive pancreaticoduodenectomy includes various approaches such as total laparoscopic pancreaticoduodenectomy (TLPD), laparoscopic-assisted pancreaticoduodenectomy (LAPD), and robotic assisted pancreaticoduodenectomy. Despite advances, TLPD remains one of the most complex operations owing to its intricate surgical approach, reconstructive techniques, and associated risks of morbidity and mortality. Specific complications such as post-operative pancreatic fistula (POPF) and post-pancreatoduodenectomy hemorrhage (PPH) can have severe outcomes (4,5). POPF is a crucial concern regarding the safety and effectiveness of TLPD. The safety and efficacy of laparoscopically performed pancreaticoenteric and bilioenteric anastomoses are constrained and debatable (6,7).

LAPD revolutionizes PAC management by offering reduced blood loss and diminished post-operative pain, including faster recovery and shorter hospital stays than the traditional open approach (8). Currently, the available data does not definitively establish a safety comparison between TLPD and OPD (9-11). However, LAPD is a hybrid technique combining laparoscopic dissection with an upper midline incision for anastomosis, reducing the risk of anastomotic leaks. This innovative technique aims to harness the advantages of minimally invasive surgery while addressing the challenges associated with pancreaticoduodenectomy (PD).

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Existing literature on LAPD is limited, and a comprehensive understanding of patient characteristics, hospital course, and short-term outcomes is essential for evaluating the efficacy and safety of this evolving surgical approach (12-16). This article aimed to provide insights into the existing body of knowledge regarding LAPD's effectiveness and safety in PAC and advance our understanding of LAPD as a viable alternative to OPD in bridging the learning curve of TLPD.

MATERIAL and METHODS

We performed a retrospective analysis of patients who underwent LAPD at a tertiary care center in the eastern India between June 2021 and August 2023. Patients with clinical and radiological suspicion of a periampullary mass or a histological diagnosis of PAC were included. Patients with locally advanced disease, previous upper abdominal surgery, or prior neoadjuvant therapy were excluded from the study. We initially performed 80 cases of OPD during the first three years and later transitioned to LAPD. Our center performs 80-90 PD procedures per year with surgeons who have extensive laparoscopic experience and have surpassed the learning curve. The study was conducted in accordance with the principles of the Declaration of Helsinki. After obtaining approval from the Institute's Ethical Committee review board (protocol code: IEC/2022/1043), we analyzed various parameters including patient demographics, comorbidities, pre-operative blood indices, the necessity for pre-operative biliary drainage, the duration of surgery after biliary drainage, intraoperative details, early post-operative outcomes, and histopathological data. Pre-operative biliary drainage [endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous transhepatic biliary drainage (PTBD)] was performed in patients presenting with cholangitis, intractable pruritus, and total bilirubin >7 mg/dL, according to our institute protocol. Most patients underwent surgery within four-six weeks of biliary drainage. Resectability criteria were assessed using a pre-operative pancreatic protocol computerized tomography scan, following the recommendations of the National Comprehensive Cancer Network 2023 (17). Data entry was performed using MS Excel 2016, and data analysis was conducted using IBM SPSS version 26.0.

Operative Details

Pre-operative

As part of the standardized pre-operative protocol, all patients underwent routine fasting with nil per oral instructions on the day before the operation. Intravenous fluids were administered to maintain hydration, along with prophylactic intravenous antibiotics administered one day before surgery, a practice especially emphasized in patients with stents at our institute. Routine antibiotic dosages were administered at the induction of general anesthesia. No somatostatin analogs were administered during the pre-operative period. Additionally, the standard pre-operative procedure includes placing indwelling urinary catheters and nasogastric tubes. Patients were placed in supine position with their legs apart to facilitate optimal access during the surgical procedure (Figure 1). The surgery involved the utilization of standard laparoscopic instruments, including the application of a LigaSure device (Medtronic), harmonic shears, and bipolar device (Ethicon). These instruments collectively contribute to efficient and precise surgery.

Intraoperative (Laparoscopic Resection)

Following the initial staging laparoscopy through a 10 mm port at the umbilicus, additional ports were strategically placed, as illustrated in Figure 2. A 10 mm supraumbilical trocar was used for pneumoperitoneum and camera insertion, with additional ports in the right midclavicular line (5 mm), left midclavicular line (12 mm), right lumbar quadrant (5 mm), and left lumbar quadrant (5 mm). The lesser sac was accessed by dividing the gastrocolic ligament, and the right gastroepiploic vessels were meticulously traced to their insertion into the gastrocolic trunk of Henle and subsequently divided between the Ligaclips. Mobilization ensued with the hepatic flexure and right colon, accompanied by extended kocherization of the duodenum, to expose the left renal vein.

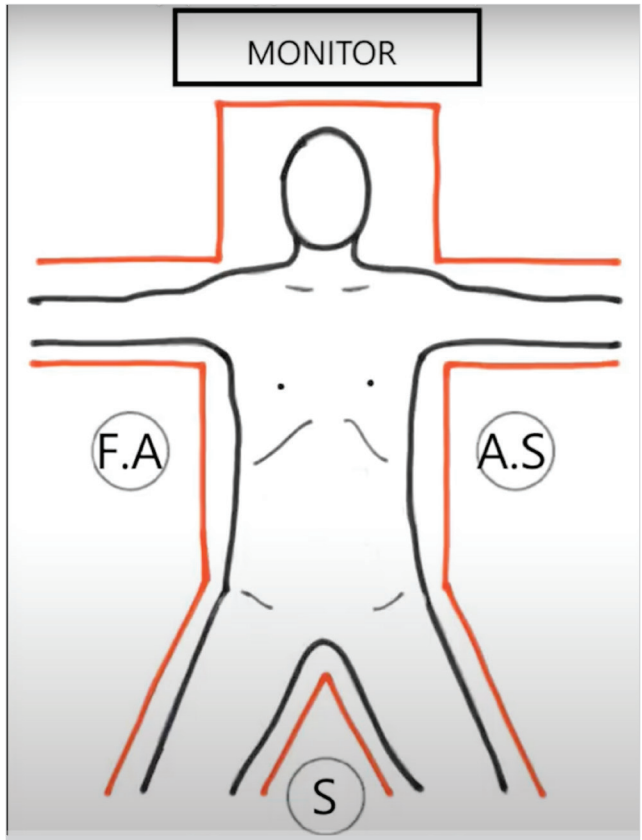

Figure 1. The patient is positioned supine with leg split (French position), surgeon stands in between the legs and assistants on either side of the patient.

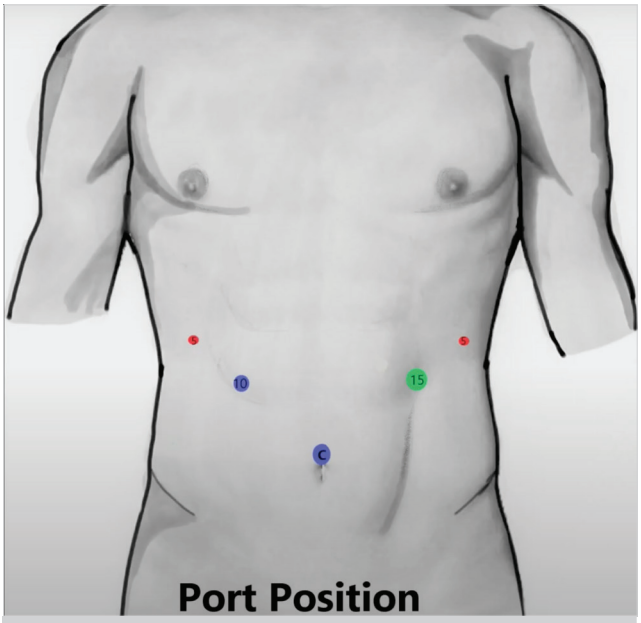

Figure 2. 10 mm supraumbilical port for pneumoperitoneum and camera access, left 15 mm and right 5 mm midclavicular as working ports, right and left lumbar 5 mm ports for retraction.

The superior mesenteric vein (SMV) course into the portal vein (PV) was identified, and the relationship between the tumor and the superior mesenteric artery (SMA) was assessed. Precise vision and blunt dissection created a tunnel between the neck of the pancreas and front of the SMV-PV (Figure 3). After PV, dissection continued cephalad toward the liver hilum, completing the porta-hepatis lymphadenectomy. The third and fourth parts of the duodenum were mobilized by dividing the ligament of Treitz. The proximal jejunum was then delivered into the supracolic compartment and divided using a linear cutting stapler, followed by division of the jejunojejunal vessels. The lymphatic tissue was cleared from the anterior surface of the aorta to trace the origin of the SMA. The stomach antrum was divided using a linear cutting stapler, followed by lymphadenectomy of the common hepatic artery, dissection, and division of the gastroduodenal artery between the ligaclips. The uncinate process of the pancreas was completely mobilized from the SMA. The pancreatic neck was then transacted using an ultrasonic harmonic device. Cholecystectomy was performed, followed by common hepatic duct transection, as the final step to fully mobilize the specimen (Figure 4). The specimen was retrieved through an upper midline laparotomy with a length of 6-7 cm, extending to the supraumbilical port.

Intraoperative (Open Reconstruction)

The stapled end of the jejunum was carefully brought through the retrocolic plane and navigated into the supracolic compartment. Depending on the condition of the pancreatic duct, a tailored approach is employed for pancreaticojejunostomy. A modified Blumgart-style end-to-side duct-to-mucosa pancreaticojejunostomy was performed in patients with a dilated pancreatic duct. Alternatively, for non-dilated ducts, an invagination/docking method was employed. To establish a secure connection between the hepatic duct and jejunum, an end-to-side duct-to-mucosa hepaticojejunostomy was performed using interrupted 4-0 polydioxanone sutures. The antecolic Hoffmeister method of side-to-side anastomosis was used for gastrojejunostomy. A single abdominal drain was placed into the right subhepatic space.

Outcomes & Definitions

Operative time was measured from the initial trocar insertion for LAPD until skin closure. Estimated blood loss was determined by calculating the total volume of fluids collected in the suction

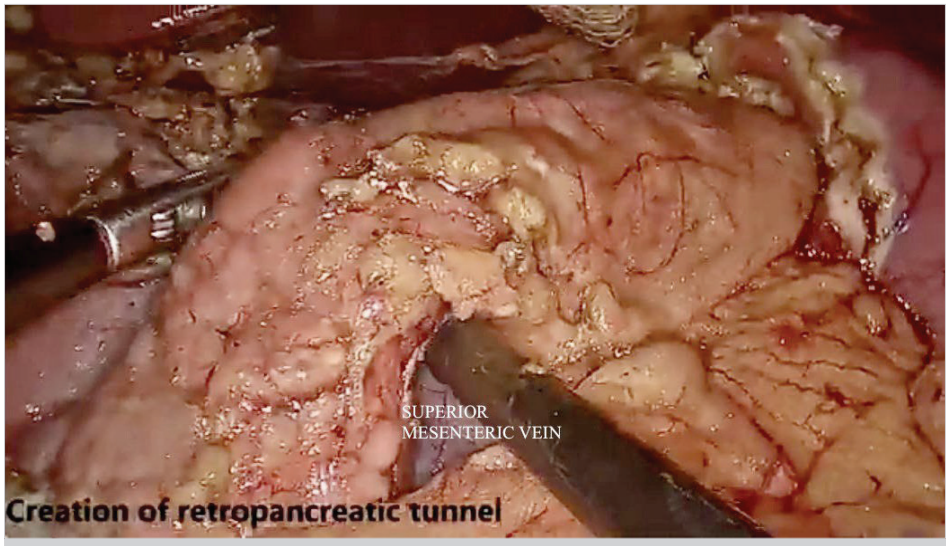

Figure 3. Blunt dissection under magnified vision used to create a tunnel behind the neck of pancreas.

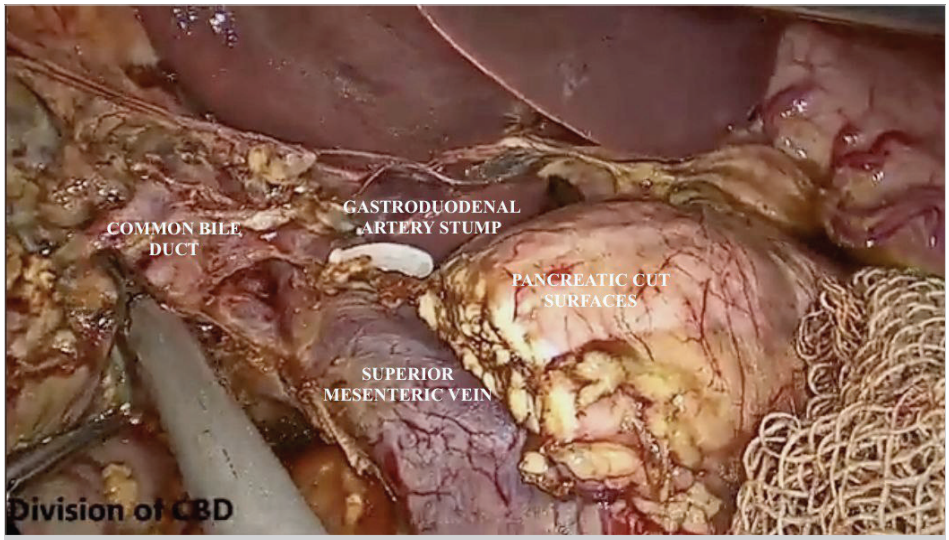

Figure 4. Common bile duct transection with exposed pancreatic cut surface, superior mesenteric vein and gastroduodenal artery stump.

device and the weight of the gauze and towels used during the procedure. Conversion from laparoscopic to open procedure was defined as the shift to laparotomy before reaching the dissection of the mid-pancreatic tissue, regardless of the specific laparotomy level. Post-operative complications (recorded for 30 days) were evaluated following the Clavien-Dindo classification and encompassed issues such as POPF, delayed gastric emptying (DGE), bile leaks, PPH, intra-abdominal collections, and surgical site infections. These complications were categorized into Grades A, B, and C, as outlined in the international study group of pancreatic surgery guidelines (18,19). Re-operation was defined as a subsequent surgical procedure necessitated within 30 days of LAPD owing to significant complications. Morbidity and mortality refer to adverse health outcomes or fatal outcomes that occur during or within 30 days after surgery. The final pathological diagnosis was established using the AJCC cancer staging manual, considering tumor size, grade, pathological type, lymphovascular invasion, perineural invasion, total number of lymph nodes inspected, and margin status. Surgical resection was categorized as R0 if cancer was undetected in any of the margins, R1 if cancer was discovered within 1 mm of the resected margins, and R2 if cancer persisted in any of the margins.

RESULTS

Mean age of the study population was 49.9 ± 12 years, and most were females (54%). The most common symptom was jaundice (86%), followed by pruritus (68%), and recurrent cholangitis (46%), with a mean BMI of 21 ± 1.7 kg/m^2. Most of the patients were ASA Grade 1 (64%). Diabetes mellitus was the most common comorbidity (26%) (Table 1).

Mean total bilirubin and direct bilirubin levels were 12.2 ± 7.6 mg/dL and 7.2 ± 4.5 mg/dL, respectively. Pre-operative Hb levels ranged between 10.1-12.5 gm/dL. Most patients (64%)

Table 1. Distribution of the study population based on demographic and clinical characteristics (n= 50)

Parameter	Frequency (n)	Percentage (%)
Age (in years)		
<60	41	82.0
≥60	9	18.0
Sex		
Female	27	54.0
Male	23	46.0
BMI		
Normal (18.5-22.9 kg/m^2)	48	96.0
Overweight (23.0-24 kg/m^2)	2	4.0
Obese (>25 kg/m^2)	0	0
ASA Grade		
I	32	64.0
II	17	34.0
III	1	2.0
Symptoms		
Jaundice	41	82.0
Weight loss	13	26.0
Vomiting	2	4.0
Recurrent cholangitis	23	46.0
Pruritus	34	68.0
Comorbidities		
Diabetes mellitus	13	26.0
Hypertension	9	18.0
COPD	3	6.0
Hypothyroidism	1	2.0
None	28	56.0

BMI: Body mass index, ASA: American society of anaesthesiologists, COPD: Chronic obstructive pulmonary disease.

Table 2. Distribution of the study population based on pre-operative parameters (n= 50)

Parameters	Mean ± SD	
Total bilirubin levels (mg/dL)	12.2 ± 7.6	
Direct bilirubin levels (mg/dL)	7.2 ± 4.5	
Prothrombin time (seconds)	14.5 ± 2.9	
Hemoglobin (g/dL)	10.8 ± 1.1	
Pancreatic duct diameter (mm)	5.05 ± 2.8	
	Frequency (n)	**Percentage (%)**
CA 19-9 (U/mL)		
<37	18	36.0
≥37	32	64.0
Albumin levels (g/dL)		
<3.4	31	62.0
3.4-5.4	19	38.0

had elevated (>37 U/mL) CA 19-9 levels (normal, <37 U/mL). Mean pancreatic duct diameter was 5.05 ± 2.8 mm (Table 2).

Endoscopic retrograde cholangiopancreatography and percutaneous transhepatic biliary drainage were performed in 33 patients presenting with cholangitis or bilirubin levels >7 mg/dL, as per our institute protocol, and mean duration of surgery following biliary drainage was four-six weeks. The average operative time was 460.7 ± 39.8 mins, and the estimated blood loss was 426 ± 156 mL. The pancreatic texture was soft in 50% of patients, whereas that of the other half had a firm texture. Conversion to open procedures was required in six patients (12%). Four cases had suspected PV involvement, and two had hemorrhage during uncinate dissection. Significant post-operative complications were noted in 13 patients (26%), of which one had a severe complication (≥Grade III of the Clavien–Dindo classification). Bleeding from a pancreatic cut surface was noted in one patient, requiring re-exploration on the second post-operative day. Grade B POPF was noted in 26% of the patients, and Grade C POPF was not reported in our study. Grade A DGE was observed in 20 cases (40%), Grade B in nine cases (18%), and Grade C in one case (2%). Ten cases of grades B and C had an intra-abdominal collection, requiring percutaneous ultrasound-guided pigtail catheter drainage. Three patients (6%) had bile leaks that resolved with conservative treatment. Surgical site wound infections were noted in 17 patients (34%). Most patients had superficial surgical site infections that required daily dressing and antibiotic coverage per culture pattern. No patient had a chyle leak. The median length of hospital stay was 9.4 ± 2.8 days. Three patients were readmitted in the first 30 days, two patients presented with DGE, managed conservatively with prokinetics, and one patient with hematemesis had a gastroduodenal stump blowout and underwent coil embolization on the 10th post-operative day. No mortality was observed during the 30-day follow-up period (Table 3).

Following oncological outcomes, the majority were ampullary lesions (58%), followed by distal cholangiocarcinoma (32%), duodenum (6%), and the pancreatic head (4%). Mean number of lymph nodes harvested was 13.4 ± 4. R0 resection was feasible in all 50 patients (100%). Perineural and lymphovascular invasions were noted in 20% and 18% of resected specimens, respectively. Other histopathological outcomes are presented in Table 4.

DISCUSSION

PD is a complex and intricate surgery that is primarily performed through an open technique in many centers. As technology and surgeons' expertise in laparoscopy have advanced, there has been a growing interest in adapting these minimally invasive pancreatic surgery methods. The first attempt at laparoscopic PD dates to 1994 by Gagner and Pomp (20). Over the years, various studies and case series have documented the progress of laparoscopic techniques in PD, demonstrating improvements in patient outcomes, reduced post-operative complications, and short hospital stays (21). TLPD is a highly complex procedure requiring advanced laparoscopic skills, expertise, and surgical proficiency, including strict adherence to oncologic principles, management of laparoscopic hemorrhage when significant vascular injuries occur, and demanding skills for pancreatic and biliary reconstruction. However, obesity, vascular involvement, and advanced disease can limit the suitability of the laparoscopic approach. This underscores the importance of careful patient selection to achieve optimal outcomes. Moreover, being a relatively novel approach, TLPD's long-term outcomes and safety profiles have not been as extensively studied as those of open procedures, and limited institutional experience may impact its widespread adoption. Continuous advancements and further research are essential to refine this technique and broaden its applicability. LAPD combines laparoscopic and open techniques, allowing surgeons to benefit from the advantages of minimally invasive surgery, while maintaining the precision and safety of pancreaticoenteric and bilioenteric anastomosis using an open technique. The present study described our experience with LAPD without imposing restrictive selection criteria.

We observed a long operative time at the beginning of the learning curve. The high-definition magnified views of the surgical field and accurate identification of anatomical structures and ligation of blood vessels reduced the need for time-consuming hemostasis, making the dissection and resection precise and efficient, and reducing surgery duration and blood loss in later cases. The feasibility of LAPD and the potential reduction in operative time may vary depending on the patient's specific condition, surgeon's expertise, and availability of advanced laparoscopic equipment. Increased operative time and rate of post-operative blood transfusions in the current study were similar to those reported in the existing

Table 3. Distribution of the study population based on intraoperative and post-operative findings (n= 50)

Parameter		Frequency (n)	Percentage (%)
		Mean ± SD	
Pre-operative biliary drainage			
ERCP		23	46.0
PTBD		10	20.0
None required		17	34.0
Operative time (minimum)		460.7 ± 39.8	
Estimated blood loss (mL)		380 ± 156	
Conversion to open surgery		6	12.0
Pancreas texture			
	Firm	25	50.0
	Soft	25	50.0
POPF grade			
	A	32	64.0
	B	13	26.0
	C	0	0
	Nil	5	10.0
DGE grade			
	A	20	40.0
	B	9	18.0
	C	1	2.0
	Nil	20	40.0
Post-operative haemorrhage		1	2.0
Bile leak		3	6.0
Respiratory complications		6	12.0
Intrabdominal collection		13	26.0
	Pelvis	1	2.0
	Peripancreatic	7	14.0
	Subdiaphragmatic	1	2.0
	Subhepatic	4	8.0
Time to passage of flatus (day) median (range)		4 (3-4)	
Time of oral intake (day) median (range)		5 (4-6)	
Post-operative ICU stay (day) median (range)		2 (1-3)	
Duration of hospital stay (day)		9.4 ± 2.8	
Wound infection		17	34.0
Superficial infections		13	26.0
Deep infections		4	8.0
Clavien-Dindo classification (grade)			
	I	36	72.0
	II	13	26.0
	≥III	1	2.0
Re-exploration		1	2.0
Re-admission (within 30 days)		3	6.0

ERCP: Endoscopic retrograde cholangiopancreatography, PTBD: Percutaneous transhepatic biliary drainage, POPF: Post-operative pancreatic fistula, DGE: Delayed gastric emptying.

Table 4. Distribution of the study population based on tumour characteristics (n= 50)

Characteristic		Frequency (n)	Percentage (%)
cTNM staging	T1N0	6	12.0
	T1N1	1	2.0
	T2N0	25	50.0
	T2N1	1	2.0
	T3N0	7	14.0
	T3N1	8	16.0
	T3N2	2	4.0
Tumour location	Distal common bile duct	16	32.0
	Duodenum	3	6.0
	Pancreatic head	2	4.0
	Ampulla	29	58.0
R0 resection		50	100.0
Perineural invasion		9	18.0
Lymphovascular invasion		10	20.0
Lymph nodes positive for malignancy		12	24.0
Number of lymph nodes harvested (mean ± SD)		13.4 ± 4.1	

literature (22). In a study by Son et al., the median operative time was 277.5 minutes (range, 258.7-330 min), with a median intraoperative estimated blood loss of 319.5 mL (range, 241.2-425 mL) (23). Tian et al. have noted that LAPD has a longer intraoperative time (372 min vs. 305 min) and lower blood loss (300 mL vs. 500 mL) than the open procedure (8). Pham et al. have reported a median total operative time of 370 min (365-442.5 min), with a median laparoscopic resection time of 253 min (240-315 min) (24).

Patients undergoing LAPD may experience reduced post-operative pain and early return of bowel function associated with LAPD contribution to faster recovery than the open approach (21). This positively impacts overall patient experience and satisfaction. Reduced wound-related issues, such as infections and hernias, contribute to smooth recovery. The assertion that post-operative complications are more common in LAPD than in the open approach is not supported by the existing literature. The outcomes of LAPD vary based on patient selection, surgeon expertise, and institutional practice. Post-operative complication rates reported in the literature vary greatly from 26% to 74% (21-24). POPF is a common concern after PD. Some studies have reported similar or slightly increased rates of POPF in LAPD, particularly during the early adoption of laparoscopic techniques (21). However, with increasing experience, surgeons often achieve comparable outcomes with increasing experience. The incidence of DGE after LAPD varies across studies, but significantly differs (14-16,21). Post-operative pneumonia is generally more related to patient factors and perioperative care than to the surgical approach itself. The choice between laparoscopic or open surgery alone may not be the primary determinant. The incidence of anastomotic, bile, and chyle leaks can vary based on the surgeon's experience and the specific technique used rather than being solely attributed to the choice of LAPD or OPD. It is important to note that LAPD is a technically challenging procedure with a steep learning curve. As surgeons gain more experience with laparoscopic techniques, complication rates often decrease (8). Patient selection, surgeon experience, and institutional practices are important in determining the outcomes. Our study described clinically relevant Grade B POPF in 13 patients (26%); Grades A, B, and C DGE in 20 (40%), nine (18%), and one (2%), respectively; PPH in one (2%); bile leak in three (6%); and respiratory complications in six (12%). The findings of other studies are consistent with those observed in the present study. Son et al. have reported 33.4% surgery-related morbidity, with bleeding and severe POPF affecting four patients, biliary fistula in one, DGE in two, and intestinal obstruction in one patient (23). In a study by Pham et al., DGE has been noted in 28% and POPF in 11% of the patients (24). In our study group of 50 patients, one patient required re-exploration on POD2 for post-operative hemorrhage from a pancreatic cut surface. Re-operation was necessary for one of 38 patients who underwent LAPD in the study by Tian et al. while it was 11% in the study by Pham et al (8,24).

The feasibility and safety of LAPD have been the subject of intense investigation and debate within the surgical community (8). As expertise grows, the feasibility of the LAPD increases, making it an option for appropriately selected cases. Successful LAPD relies heavily on meticulous selection of patients. Tumor size, vascular involvement, and overall patient

health influence the feasibility of the procedure. Patient characteristics must be carefully evaluated to identify suitable candidates for LAPD treatment. While early experiences with LAPD suggested higher complication rates than open surgery, advancements in techniques and increased surgeon expertise have reduced complication rates (23-25).

Conversion from LAPD to open surgery may be required in certain cases, such as when unexpected anatomical complexities or hemorrhage are encountered. In our study, six of the 50 cases required open conversion due to suspicious PV involvement (n= 4) and uncontrollable hemorrhage during uncinate dissection (n= 2). Conversion rate in laparoscopic PD varies from 0% to 40%, with an average of 9.1% (8,23,24,26,27). In a single-center experience of 21 cases by Al-Sadairi et al., the reported conversion rate was 19% (28). Inadequate exposure of the anatomical structures, suspicious tumor involvement to surrounding structures, vascular anomalies, hemorrhage during dissection, severe adhesions from chronic inflammation, and unexpected intraoperative complications are common reasons for open conversion. Ultimately, the surgeon's experience and judgment are important in the decision to switch from laparoscopic to open surgery. Nonetheless, the conversion should still be advocated for the patient's best interests.

Mean length of hospital stay in our study was 9.4 ± 2.8. The average length of hospital stay for LAPD in the literature ranges from seven to 23 days, with a weighted average of 13.6 days (8,23,24,28,29). These findings from previous studies are consistent with those observed in the present study although these parameters must be noted to vary among different hospitals due to variations in treatment protocols, operative techniques, post-operative complications, and cultural and organizational differences. The primary prognostic factors for PD include achieving an R0 resection margin and lymph node yield. Although numerous studies have documented 100% R0 resections, only a few have undertaken analyses specifically addressing the uncinate margin and SMV margin positivity. These aspects are crucial components of the pathological evaluation for achieving oncological radicality. The incidence of R1 resection after PD for PDAC has been reported to range from 2% to 75%, potentially attributable to variations in pathological protocols across studies (30). Notably, previous research on LAPD has indicated a low occurrence of R1 resection, often associated with a small diameter and early lesion inclusion. In our study, all cases in the LAPD group achieved R0 resection, and the median number of harvested lymph nodes in the resected specimens was 13.4 ± 4. The results of this study are consistent with those of Pham et al. wherein the median tumor size was 23 mm, with an 88% R0 resection rate and a median lymph node yield of 13 (11-15) (24). Tian F et al. have reported an R0 resection rate of 90.9 %, and ≥12 lymph nodes were resected in all patients with LAPD (8). In the largest matched-pair analysis comparing hybrid PD with open PD in 120 patients, there is a notable reduction in clinically relevant post-operative complications. Additionally, the hybrid technique demonstrates fast post-operative recovery while maintaining equivalent long-term oncologic outcomes (31). The successful implementation of LAPD in an institute depends on achieving ample procedural volume, expertise in advanced laparoscopic and pancreatic surgical techniques, and thorough training. In addition, it requires effective mentoring, supervision, and meticulous patient selection. The limitation of the current study is its single-center design, which may restrict the generalizability of the data to a wide population, and the relatively small sample size may hinder inferential statistical analysis.

CONCLUSION

We have observed several advantages of laparoscopy in our initial experience with 50 cases of LAPD, particularly during the resection phase due to enhanced visualization and magnification. This has contributed to precise dissection, resulting in decreased blood loss and the accomplishment of anastomosis through a small laparotomy incision. Further evidence, from the studies that compares different surgical techniques in terms of safety and feasibility, is warranted.

Ethics Committee Approval: This study was approved by All India Institute of Medical Science Ethics Committee (Decision no: IEC/2022/1043, Date: 01.05.2023).

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - BNS, RK, UA; Design - BNS; Supervision - RK, SN, KK; Fundings - SA, KK, SW; Materials - KP, KK; Data Collection and/or Processing - SA, UA, SW; Analysis and/or Interpretation - SA, BS; Literature Search - RK, UA; Writing Manuscript - KP, BS; Critical Reviews - KP, BS, BNS.

Conflict of Interest: The authors have no conflicts of interest to declare.

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ORİJİNAL ÇALIŞMA-ÖZET
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Periampuller karsinom için laparoskopi yardımlı pankreatikoduodenektomi: Tek bir üçüncü basamak bakım merkezinden 50 olgu deneyimi

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ÖZET

Giriş ve Amaç: Laparoskopi yardımlı pankreatikoduodenektomi (LAPD) dünya çapında birçok merkezde uygulanmaktadır. Periampuller karsinom (PAK) için minimal invaziv pankreatikoduodenektomi oranı, potansiyel faydaları nedeniyle son zamanlarda artmıştır. Bununla birlikte, LAPD'nin güvenliği ve uygulanabilirliği henüz standardize edilememiştir. Bu çalışmada, 50 hastada LAPD ile ilgili deneyimlerimizi sunduk.

Gereç ve Yöntem: Haziran 2021 ve Ağustos 2023 tarihleri arasında LAPD uygulanan rezektabl PAK'lı 50 hasta retrospektif olarak analiz edildi.

Bulgular: Çalışma grubunun ortalama yaşı 49,9 ± 12 yıl olup çoğunluğu kadındı (%54). Ampuller karsinom en sık görülen tipti (%58). Ortalama ameliyat süresi ve tahmini kan kaybı sırasıyla 460 ± 40 dakika ve 426 ± 156 mL idi. Dört hastada portal ven tutulumu şüphesi vardı ve iki hastada unsinat proses diseksiyonu sırasında kanama oldu ve açık cerrahiye geçildi. Ameliyat sonrası ciddi morbidite 13 (%26) hastada kaydedilmiştir. Ameliyat sonrasında hastaların %26'sında B derecesinde pankreatik fistül, %18'inde B ve C derecesinde mide boşalmasında gecikme ve %2'sinde mide boşalmasında gecikme görüldü. Ortalama hastanede kalış süresi 9,4 ± 2,8 gündü. Ortalama alınan lenf nodu sayısı 13,4 ± 4. Tüm hastalara R0 rezeksiyon uygulandı ve 30 günlük takip süresi boyunca mortalite görülmedi.

Sonuç: LAPD, rezektabl PAK için iyi onkolojik sonuçlar ve minimal komplikasyonlar sunan uygulanabilir bir prosedürdür. Uzmanlaşmış merkezlerde deneyimli cerrahlar tarafından etkili bir şekilde uygulanabilir.

Anahtar Kelimeler: Laparoskopi yardımlı, pankreas, pankreatikoduodenektomi, periampüller karsinom

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