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Laparoscopic versus Open Distal Pancreatectomy: Comparative Analysis of Clinical Outcomes at a Single Institution

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Abstract

Background: Distal pancreatectomy (DP) is a standard operation for many pancreatic diseases located to the left of the superior mesenteric vein. Advances in technology have made laparoscopic distal pancreatectomy (LDP) a safe and feasible procedure. In this study, we reviewed our experience with LDP and compared with open distal pancreatectomy (ODP) for the management of benign and malignant lesions.

Materials and Methods: A retrospective review of medical records of 93 patients subjected to a DP (ODP=36; LDP=57) for pancreatic tumors between 2001-2015 in the Department of Digestive Surgery of Pontificia Universidad Católica de Chile. In each patient clinical and surgical characteristic, postoperative evolution and histopathologic examination was analyzed.

Results: LDP was associated with significantly less operative blood loss (300 ml *vs.* 50 ml; p=0.007), higher spleen preservation rate (52.6% *vs.* 19.2%; p=0.002) and shorter hospital stay (5 days *vs.* 8 days; p<0.001). There were no significant differences in the incidence of postoperative complications between the two groups

Conclusions: LDP is a safe and feasible procedure for DP resections. LDP offers advantages over ODP in terms of reduction of operative blood loss, higher spleen preservation rate and shorter hospital stay.

Keywords: Pancreatic tumor; Open distal pancreatectomy; Laparoscopic distal pancreatectomy

Introduction

Distal pancreatectomy (DP) is a standard operation for many pancreatic diseases located to the left of the superior mesenteric vein. Current indications for DP include malignant and benign lesions of the pancreas corpus and tail as well as chronic pancreatitis and trauma.

Advances in technology have made laparoscopic distal pancreatectomy (LDP) a safe and feasible procedure [1-4]. Several studies have shown the advantages of LDP of shorter hospital stay and operative time, faster recovery and higher spleen-preserving rate as compared with open distal pancreatectomy (ODP) [3,5-7].

In this study, we reviewed our experience with LDP and compared with ODP for the management of benign and malignant lesions.

Materials and Methods

A retrospective review of medical records of 93 patients subjected to a DP for pancreatic tumors between 2001-2015 in the Department of Digestive Surgery of Pontificia Universidad Católica de Chile. Clinical and surgical characteristic, postoperative evolution and histopathologic examination was analyzed.

Surgical technique

The patient was placed in the lithotomy position, with the surgeon positioned between the patient's legs. Resection was then performed through four or five ports, with initial access in a supraumbilical position. The dissection of the pancreatic and peripancreatic tissue was performed using a harmonic scalpel. The splenic flexure was mobilized medially and the lesser sac was opened to reveal the anterior distal portion of the pancreas. Division of the inferior short gastric vessels and the gastrocolic ligament for mobilization of the transverse colon was performed for adequate exposure. For tumor location and margins assessment, intraoperative ultrasound was used. Subsequently, the inferior edge of the pancreas extending to the lower pole of the spleen was mobilized to better recognize the plane leading to the splenic vein. When splenic preservation was not performed, the splenic vein and artery were isolated and divided using vascular clips. For spleen-preserving procedures, in most cases splenic vein and artery were divided using vascular clips, preserving short gastric vessels following Warshaw's technique; in five cases an attempt to spare the splenic artery and vein was made. Transection of the pancreatic parenchyma was performed using harmonic scalpel or a 60 mm stapler. Then, the pancreatic stump was sutured laparoscopically using silk or polypropylene when transection was made using harmonic scalpel. The resected specimen was placed in a plastic bag and externalized through a Pfannenstiel incision in the suprapubic region. Operative drains were placed close to the pancreatic stump.

For the open cases, patients were placed in the supine position. A single incision was used, either upper vertical midline or left subcostal, depending on individual surgeon's preference. Division of the short gastric vessels and mobilization of the splenic flexure and inferior border of the pancreas were then performed. After mobilization and isolation of the portion of pancreas to be transected, the splenic artery and vein were isolated as well and ligated. The same variety of techniques used to transect the pancreatic parenchyma and to control the pancreatic stump in the laparoscopic approach also was employed in the open setting. Operative drains were also placed neat the stump.

The severity of pancreatic fistula was defined according to the classification of International Study Group of Pancreatic Fistulae (ISGPF) [8]. Surgical complications were classified according Clavien-Dindo score [9,10].

Statistical analysis

Continuous variables are expressed as medians and ranges, and categorical variables are expressed as absolute numbers and percentages. A Chi-square test and Fisher's exact test for categorical variables and Student's t test for numerical variables, with $p<0.05$ regarded as significant to compare between groups. All statistical analyses were performed using SPSS (version 20.0-Mac; SPSS Inc.; Chicago, IL) software.

Results

Patient characteristics

A total of 93 patients underwent DP, 69 (74.2%) were female and 24 (25.8%) were male. 57 (61.3%) patients underwent LDP and 36 (38.7%) underwent ODP. The ASA I patients corresponded to 36.1% in open surgery and 31.6% in laparoscopic surgery, ASA II were 61.1% and 68.4% respectively (Table 1).

	LDP	**ODP**	
Characteristics	(n=57)	(n=36)	p-value
Age (years)	49 (13-82)	53 (14-74)	0.528
Gender (female/male)	44/13	25-Nov	0.469
ASA			
I	18 (31.6%)	13 (36.1%)	
II	39 (68.4%)	22 (61.1%)	0.387
III	0 (0%)	1 (2.8%)	

Table 1: Patients characteristics.

Perioperative data

Mean operative time was 180 (range, 120-300) minutes in ODP and 210 (range, 90-360) minutes in LDP. The estimated blood loss was 300 ml in ODP and 50 ml in LDP (p=0.007). The rate of spleen preservation was significantly higher in the LDP group than in the ODP group (52.6% *vs.* 19.2%; p=0.002). In 3 patients (5.3 %), a laparoscopic procedure was converted to laparotomy (for dense abdominal adhesions). The median duration of hospital stay was 8 days (range, 5-77 days) in the ODP group and 5 days (range, 4-12 days) in the LDP group (p<0.001) (Table 2).

Characteristics	**LDP (n=57)**	**ODP (n=36)**	**p-value**
Operation time (minutes)	210 (90-360)	180 (120-300)	0.473
Blood loss (ml)	50 (20-1500)	300 (20-1000)	0.007*
Spleen preservation: n (%)	30 (52,6)	7 (19.4%)	0.002*
Postoperative hospital stay (days)	5 (4-12)	8 (5-77)	<0.001*

Table 2: Perioperative data.

Postoperative complications

There were no significant differences in the incidence of postoperative generals complications between the two groups (48.6% ODP *vs.* 47.4% LDP, p=1.00). The incidence of pancreatic fistula grades B-C after ODP was 19.4 % in comparison to 17.5% after performing LDP.

Reoperation was required in 4 patients underwent to LDP (three for intra-abdominal abscess and one for peritonitis secondary a pancreatic fistula).

The hospital mortality was 5.6% after ODP (2/36) and none after LDP (p=0.147) (Table 3).

	LDP	**ODP**	
Characteristics	**(n=57)**	**(n=36)**	**p-value**
Generals complications	27 (47.4%)	17 (48.6%)	1
Major complications	5 (8.8%)	2 (5.7%)	0.71
Fistula			
Total	33 (57.9%)	13 (36.1%)	
A	23 (40.4%)	6 (16.7%)	0.135
B/C	10 (17.5%)	7 (19.4%)	
Collection	8 (14%)	6 (17.1%)	0.768
Reoperation	4 (7%)	0(0%)	0.155
Hospital mortality	0 (0%)	2 (5.6%)	0.147

Table 3: Complications.

Pathological study

The proportion of benign tumors was 54.4% in LDP and 44.4% in ODP. The proportion of malignant tumors in ODP was not significantly different compared with LDP (55.6% *vs.* 45.6%) (p=0.35). There was not difference in regards of total lymph node count; 9 (0-36) with ODP compared to 3 (0-31) with LDP in malignant tumors (p=0.074) (Table 4).

	LDP	ODP	
Characteristics	**(n=57)**	**(n=36)**	**p-value**
Tipe Benign Malignant	31 (54.4%) 26 (45.6%)	16 (44.4%) 20 (55.6%)	0.35
Lymph node count (malignant tumors)	3 (0-31)	9 (0-36)	0.074
Tumor size (cm)	3.45 (0.7-10.5)	4 (0.8-21.5)	0.18
Histology (n)			
Neuroendocrine	14	4	
Serous cystadenoma	6	4	
Mucinous cystadenoma	6	5	
Adenocarcinoma	9	11	
Pseudopapilar tumor	13	3	
Others	9	9	

Table 4: Pathological characteristics.

Discussion

Since Gagner et al. reported in 1996 for the first time LDP [11], the number of procedures has increased significantly, now being a safe and reproducible technique in many centers. In this study, 57 of 93 patients underwent LDP.

The median operative time was lower in ODP than LDP group, which is consistent with other reported series [6,7]. This study showed than blood loss was significantly lower in the LDP group than in the ODP. The decrease in blood loss in the LDP group may be related to the less invasive nature of the operation.

Splenectomy is usually performed during ODP, but many authors have advocated splenic preservation whenever possible [12-14]. In this study the preservation of the spleen was significantly higher in patients subjected to LDP, probably related to the better view of the splenic hilum and short gastric vessels preservation.

We reported general complication rate similar in both groups. Although there was a higher incidence of major complications in LDP than in ODP, this difference was not statistically significant. Pancreatic fistula represents a major problem following pancreatic surgery, which resulted in serious consequences such as intra- abdominal collections, sepsis, extended hospital stay and poor quality life. The reported incidence of pancreatic fistula after DP varies in the surgical literature [1,12,15]. This variation is mostly due to differences in the definition used for pancreatic fistula [5,16,17]. The ISGPF defined pancreatic fistula as a drainage of any measurable volume of fluid on or after postoperative day 3 with an amylase content greater than 3 times the serum amylase activity [8]. Three different grades (A,B,C) are defined according to the clinical impact on the patient's hospital course. In the present study was not significant difference in the incidence of pancreatic fistula between ODP and LDP groups.

We reported similar pathological characteristics between ODP and LDP groups. We postulate that laparoscopic approach is a feasible option no matter tumor size, or malignant origin of this lesion.

This study confirms that the laparoscopic surgery was associated with a significantly shorter hospital stay compared with open surgery. The reason for this substantial difference may be related to the lower wound pain and analgesic requirements, the shorter time to oral intake and return of bowel function.

Conclusion

We conclude that LDP is a safe and feasible procedure for DP resections. LDP offers advantages over ODP in terms of reduction of operative blood loss, higher spleen preservation rate, and shorter hospital stay.

References

1. Melotti G, Butturini G, Piccoli M, Casetti L, Bassi C, et al. (2007) Laparoscopic distal pancreatectomy: results on a consecutive series of 58 patients. Ann Surg 246: 77-82.
2. Aly MY, Tsutsumi K, Nakamura M, Sato N, Takahata S, et al. (2010) Comparative study of laparoscopic and open distal pancreatectomy. Journal of Laparoendoscopic & Advanced Surgical Techniques 20: 435-440.
3. Mehta SS, Doumane G, Mura T, Nocca D, Fabre JM (2012) Laparoscopic versus open distal pancreatectomy: a single-institution case-control study. Surg Endosc 26: 402-407.
4. Kim SC, Park KT, Hwang JW, Shin HC, Lee SS, et al. (2008) Comparative analysis of clinical outcomes for laparoscopic distal pancreatic resection and open distal pancreatic resection at a single institution. Surgical endoscopy, 22: 2261-2268.
5. Xie K, Zhu YP, Xu XW, Chen K, Yan JF, et al. (2012) Laparoscopic distal pancreatectomy is as safe and feasible as open procedure: a meta-analysis. World J Gastroenterol 18: 1959-1967.
6. Jin T, Altaf K, Xiong JJ, Huang W, Javed MA, et al. (2012) A systematic review and meta-analysis of studies comparing laparoscopic and open distal pancreatectomy. HPB (Oxford) 14: 711-724.
7. Jusoh AC, Ammori BJ (2012) Laparoscopic versus open distal pancreatectomy: a systematic review of comparative studies. Surg Endosc 26: 904-913.
8. Bassi C, Dervenis C, Butturini G, Fingerhut A, Yeo C, et al (2005) International Study Group on Pancreatic Fistula. Definition Postoperative pancreatic fistula: an international study group (ISGPF) definition. Surgery 138: 8-13.
9. Dindo D, Demartines N, Clavien PA (2004) Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 240: 205-213.
10. Clavien PA, Barkun J, de Oliveira ML, Vauthey JN, Dindo D, et al. (2009) The Clavien-Dindo classification of surgical complications: five-year experience. Ann Surg 250: 187-196.
11. Gagner M, Pomp A, Herrera MF (1996) Early experience with laparoscopic resections of islet cell tumors. Surgery 120: 1051-1054.
12. Yan JF, Xu XW, Jin WW, Huang CJ, Chen K, et al. (2014) Laparoscopic spleen-preserving distal pancreatectomy for pancreatic neoplasms: a retrospective study. World J Gastroenterol 20: 13966-13972.
13. Shoup M, Brennan MF, McWhite K, Leung DH, Klimstra D, et al. (2002) The value of splenic preservation with distal pancreatectomy. Arch Surg 137: 164-168.
14. Palanivelu C, Shetty R, Jani K, Sendhilkumar K, Rajan PS, et al. (2007) Laparoscopic distal pancreatectomy. Surgical endoscopy, 21: 373-377.

15. Finan KR, Cannon EE, Kim EJ, Wesley MM, Arnoletti PJ, et al. (2009) Laparoscopic and open distal pancreatectomy: a comparison of outcomes. Am Surg 75: 671-679.
16. Butte JM, Torres J, Jarufe N, Martinez J, Duarte I, et al. (2007) PancreatectomÃa distal: indicaciones y resultados quirrgicos inmediatos. Revista chilena de cirugÃa 59: 360-365.
17. Venkat R, Edil BH, Schulick RD, Lidor AO, Makary MA, et al. (2012) Laparoscopic distal pancreatectomy is associated with significantly less overall morbidity compared to the open technique: a systematic review and meta-analysis. Annals of surgery 255: 1048-1059.
18. Warshaw AL (2010) Distal pancreatectomy with preservation of the spleen. J Hepatobiliary Pancreat Sci 17: 808-812.