

Laparoscopic Distal Pancreatectomy

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ABSTRACT

Background: Laparoscopic management of distal pancreatic malignancies has been slow to gain a foothold in all but high-volume tertiary referral centers. The aim of this study was to assess the safety and outcomes of laparoscopic distal pancreatectomy (LDP) performed in a low-volume community hospital by a diverse group of surgeons, none of whom have a specialized laparoscopic background.

Methods: We conducted a retrospective review of all patients who underwent open distal pancreatectomies (ODPs) and LDPs between August 2001 and June 2008. Data included type of surgery, open versus laparoscopy, demographics, operative time, blood loss, length of hospital stay, histopathologic diagnosis, postoperative complications, American Society of Anesthesiologists score, and mortality.

Results: Twenty-seven patients with pancreatic masses underwent distal pancreatic resection during the study period. Fifty-nine percent ($n = 16$) underwent LDP, and 41% ($n = 11$) underwent ODP. Mean patient age was 66 y (range, 40 to 86) for the LDP group and 62 (range, 40 to 84) for the ODP group. Mean operative time was 231 min (range, 195 to 305) for LDP and 240 (range, 150 to 210) for the ODP technique. Mean length of stay for LDP and ODP was 8 (range, 3 to 22) and 12 d (range, 5 to 2), respectively. Morbidity was 25% ($n = 4$) in the LDP group and 36% ($n = 4$) in the ODP group. None of the differences between the LDP and ODP groups were statistically significant. No mortalities occurred in either group.

Conclusion: This study supports the idea that LDP can be safely and effectively performed by any surgeon comfortable with basic laparoscopy and may not require specialized training or a specialized center. Further data are required to make more definitive conclusions.

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Key Words: Laparoscopy, Pancreatectomy, Pancreas, Distal Pancreatectomy, IPMN, Adenocarcinoma of the pancreas.

INTRODUCTION

Minimally invasive surgery has proved to be safe and effective and has largely replaced open surgery in a wide range of procedures. Despite this trend, laparoscopic pancreatic surgery has been slow to gain acceptance. Laparoscopic distal pancreatectomy (LDP), initially described by Gagner et al.¹ has been shown to have equivalent morbidity to open surgery, but a shorter hospital stay and less postoperative pain.²

Most data in the literature regarding LDP originate from high-volume centers and has led some to suggest that LDP should be preformed at these centers only.^{2,3} The aim of this retrospective review is to report our experience and assess the safety and outcomes of LDP performed in a low-volume community hospital by a diverse group of surgeons, none of whom have a specialized laparoscopic background.

PATIENTS AND METHODS

We conducted a retrospective review of all patients who underwent a distal pancreatectomy between August 2001 and June 2008 at our institution. Data included type of surgery, demographic factors, operative time, estimated blood loss (EBL), length of hospital stay (LOS), histopathologic diagnosis, postoperative complications, American Society of Anesthesiologists (ASA) score, and mortality.

This retrospective review was approved by the ethics board of our institution. $P < .05$ was considered significant.

RESULTS

Twenty-seven patients with pancreatic masses underwent distal pancreatic resection during the study period. Fifty-nine percent ($n = 16$) underwent LDP, and 41% ($n = 11$) underwent open distal pancreatectomy (ODP). Patients' characteristics are summarized in **Table 1**. Mean patient age was 66 y (range, 40 to 86) for the LDP group and 62 (range, 40 to 84) for the ODP group. Mean operative time

Table 1.
Demographic Characteristics

Demographics	ODP	LDP
Sex (%)		
M	5 (45)	6 (37.5)
F	6 (55)	10 (62.5)
Mean age, years	62	66
Preoperative albumin mean (range) mg/dL	4 (2.8–4.8)	3.9 (3–4.8)
ASA score (%)		
I	2 (18)	2 (13)
II	4 (36)	5 (31)
III	4 (36)	4 (25)
IV	1 (9)	5 (31)

was 231 min (range, 195 to 305) for LDP and 240 (range, 150 to 210) for the ODP technique. In the LDP group, 8 patients (50%) had spleen-conserving procedures, whereas the remaining 8 (50%) required splenectomy. With the open approach, 3 patients (18%) had spleen-conserving procedures, whereas 8 (72%) required splenectomy. Bleeding, adhesions from previous surgery, contiguous involvement of adjacent organs, and the need for oncologic margins were some of the indications for splenectomy. No patients in the LDP group required conversion to an open operation.

Mean LOS for LDP and ODP was 8 d (range, 3 to 22) and 12 d (range, 5 to 32), respectively. Morbidity was 25% (n = 4) in the LDP group and 36% (n = 4) in the ODP group. No early postoperative mortalities occurred, and all patients survived to 3 mo of follow-up. EBL was 333.3 mL (range, 60 to 600) for the laparoscopic approach and 295 mL (range, 50 to 700) for the open technique. None of these differences were statistically significant (**Table 2**).

Histopathological diagnoses for the laparoscopic and open approach are summarized in **Table 3**. Tumor size did not vary significantly between the LDP and ODP groups (3.12cm and 2.79cm, respectively; $P > .5$; Table 3), and on review of the preoperative imaging, none of these lesions were felt to be fixed to surrounding structures.

DISCUSSION

Minimally invasive techniques have permeated all surgical specialties and procedures, yet its application to pancreatic surgery has not been universally accepted.

The first laparoscopic exploration of the pancreas was described by BM Bernheim⁴ from John Hopkins University in 1911, whereas Soper et al.⁵ performed the first porcine LDP in 1994. Soon after, in 1996, Gagner et al.¹ reported on his series of spleen-preserving LDP with promising results.

In a review of the English literature, we were unable to find any randomized, controlled trials comparing the open and laparoscopic approach to distal pancreatic tumors. Multiple retrospective series, though, confirm the advantage of LDP over ODP in reporting reduced postoperative pain, shorter hospital stay, more rapid return to normal activity, and better cosmetic results.^{2,3,6–10}

Despite these encouraging data, laparoscopic pancreatic surgery has been slow to gain popularity, primarily because of the technical difficulty engendered by the liver's anatomic position, its relationship to major vessels, its complex physiology, and high operative complication rates.³ Despite the first case of LDP being reported 15 y ago, only several hundred cases have been documented in the literature. Abu Hilal et al.³ went further by recently suggesting that LDP should only be performed in specialized centers and by surgeons with extensive experience in pancreatic and laparoscopic surgery.

Table 2.
Morbidity

	ODP	LDP
Mean operative time, minutes (range)	240 (150–335)	231 (150–315)
EBL, mL (range)	295 (50–700)	333.3 (60–600)
Mean length of hospital stay, days (range)	12 (5–22)	8 (3–22)
Complications	Tear of the portal vein (1), abdominal collections (1), pneumonia (1), wound infection (1)	Abdominal collection (3), atrial fibrillation (1)

Table 3.
Pathologic Diagnosis

Pathologic Diagnosis	ODP	LDP
Cystadenoma		
Mucinous	3	4
Serous		2
Adenocarcinoma		
Mucinous	4	3
Serous		1
Pancreatitis/ pseudocyst	1	1
Neuroendocrine	1	2
Solid pseudopapillary tumor	2	
Intraductal papillary mucinous neoplasm		3
Tumor size, cm (mean)	3.12	2.79

Our study encompassed cases performed by 5 general surgeons over a 7-y period. Surgeon experience ranged from 1 y to 25 y in practice (mean 13.8 ± 10.28). None of the included surgeons have specialized training or routinely perform advanced laparoscopic surgery, yet they maintained excellent results comparable to results with open surgery. Also, their results were comparable to those reported by high-volume centers. Although the indications for choosing one approach over another was not available for review, tumor size and location did not seem to be factors.

The single most common complication in our series was the development of intraabdominal collections, occurring in 3 patients in the LDP group and 1 in the ODP group. Complication rates in our laparoscopic (25%) and open groups (36%) compare favorably to complication rates in similar series.^{2,11,12-14}

The primary shortcoming of this review is the relatively small number of cases in this series (16 and 11 patients in the LDP and ODP groups, respectively). Because this study is not adequately powered to identify small differences between the 2 groups, no definitive conclusions can be reached regarding the safety of LDP in community hospitals.

CONCLUSION

Although this study supports the idea that LDP can be safely and effectively performed by any surgeon comfortable with basic laparoscopy and may not require specialized training or a specialized center, the small retrospective nature of our data precludes definitive conclusions. This report should, however, serve as encouragement to

surgeons in low-volume centers to continue to provide cutting-edge techniques to their patients and to pool their data in a multicenter, prospective, randomized fashion.

References:

- Gagner M, Pomp A, Herrera MF. Early experience with laparoscopic resections of islet cell tumors. *Surgery*. 1996;120:1051-1054.
- Borja-Cacho D, Al-Refaie WB, Vickers SM, Tuttle TM, Jensen EH. Laparoscopic distal pancreatectomy. *J Am Coll Surg*. 2009;209:758-765; quiz, 800.
- Abu Hilal M, Jain G, Kasasbeh F, Zuccaro M, Elberm H. Laparoscopic distal pancreatectomy: critical analysis of preliminary experience from a tertiary referral center. *Surg Endosc*. 2009;23:2743-2747.
- Bernheim B. Organoscopy: cystoscopy of the abdominal cavity. *Ann Surg*. 1911;53:764-767.
- Soper NJ, Brunt LM, Dunnegan DL, Meininger TA. Laparoscopic distal pancreatectomy in the porcine model. *Surg Endosc*. 1994;8:57-60; discussion, 60-61.
- Takaori K, Tanigawa N. Laparoscopic pancreatic resection: the past, present, and future. *Surg Today*. 2007;37:535-545.
- Palanivelu C, Jani K, Senthilnathan P, Parthasarathi R, Rajapandian S, Madhankumar MV. Laparoscopic pancreaticoduodenectomy: technique and outcomes. *J Am Coll Surg*. 2007;205:222-230.
- Taylor C, O'Rourke N, Nathanson L, et al. Laparoscopic distal pancreatectomy: the Brisbane experience of forty-six cases. *HPB (Oxford)*. 2008;10:38-42.
- Fernández-Cruz L, Orduña D, Cesar-Borges G, López-Borlado MA. Distal pancreatectomy: en bloc splenectomy vs Spleen-preserving pancreatectomy. *HPB (Oxford)*. 2005;7:93-98.
- Sa Cunha A, Rault A, Beau C, Laurent C, Collet D, Masson B. A single-institution prospective study of laparoscopic pancreatic resection. *Arch Surg*. 2008;143:289-295; discussion, 295.
- Lillemoe KD, Kaushal S, Cameron JL, Sohn TA, Pitt HA, Yeo CJ. Distal pancreatectomy: indications and outcomes in 235 patients. *Ann Surg*. 1999;229:693-698; discussion, 698-700.
- Kleeff J, Diener MK, Z'graggen K, et al. Distal pancreatectomy: risk factors for surgical failure in 302 consecutive cases. *Ann Surg*. 2007;245:573-582.
- Bassi C, Dirvenis C, Butturini G, et al.; International Study Group on Pancreatic Fistula Definition. Postoperative pancreatic fistula: an international study group (ISGPF) definition. *Surgery*. 2005;138:8-13.
- Tagaya N, Kasama K, Suzuki N, et al. Laparoscopic resection of the pancreas and review of the literature. *Surg Endosc*. 2003;17:201-206.