



and Other Interventional Techniques

Distal pancreas surgery: outcome for 19 cases managed with a laparoscopic approach

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Abstract

Background: In the past decade, laparoscopy has shown its efficacy also for advanced surgery. In this report, the authors retrospectively review their experience with the distal pancreas.

Methods: From April 1999 to October 2004, 19 patients underwent a laparoscopic procedure for pathologies of the distal pancreas. The authors performed one distal pancreatectomy (DP) with conservation of the spleen and section of the splenic vessels, four distal splenopancreatectomies (DSP), one DSP plus a left adrenalectomy, two enucleations, seven DPs with conservation of the spleen and the splenic vessels, and four cystojejunostomies.

Results: One procedure was converted to open surgery because of a hemorrhagic complication. No other significant intraoperative complications occurred. The postoperative course was characterized by one bleed managed conservatively, two pancreatic fistulas (one requiring a second operation), one abscess drained under echographic view, and one reactive pancreatitis. The mean postoperative stay was 8.5 days. The histologic report showed 16 benign diseases and 3 malignant tumors. The mean follow-up period was of 42 months. The patient who had DP spleen preservation with section of the splenic vessels reported mild pain in the left hypochondrium, probably attributable to chronic splenic ischemia, during the first 3 postoperative months. One incisional hernia occurred in the patient who underwent conversion to an open procedure, and one patient affected by adenocarcinoma died 10 months after the operation.

Conclusions: The authors can affirm that laparoscopy for the distal pancreas is a successful procedure in terms of results and surgical feasibility. Prospective studies are necessary to confirm their positive impression.

Key words: Laparoscopic pancreatectomy – Distal pancreatectomy – Pancreatic adenocarcinoma – Insulinoma – Pancreatic cystic lesion – Pancreatic pseudocyst

Laparoscopic pancreatic surgery has undergone significant development in the past 10 years. It was used initially for diagnostic explorations, staging, palliation of advanced tumors, and drainage of pseudocysts [2, 3, 8, 14, 17]. Currently, laparoscopic pancreatic surgery has not yet achieved worldwide acceptance, but some authors have reported their experience using distal pancreatectomy (DP) with and without splenectomy and tumor enucleation for cystic and solid lesions [4, 10, 15].

In this article, the authors retrospectively review their experience with the distal pancreas, evaluating the surgical feasibility, the results, and the complications of the laparoscopic approach.

Materials and methods

From April 1999 to October 2004, 19 patients, ages 26 to 68 years (average, 50.7 years), underwent a laparoscopic procedure for pathologies of the distal pancreas. Most of the patients were referred to our clinic with reports of bloating, unspecific abdominal discomfort, and pain. One case was transferred from a medical ward in which the patient had been investigated for hypoglycemia. All the patients had a preoperative ultrasound scan and a computed tomography (CT) scan of the abdomen. Preoperative diagnosis resulted in one 2-cm insulinoma in the tail of the pancreas, two solid neoplasms respectively 2.5 and 5 cm in size, five pseudocysts 5 to 12 cm (average, 7.1 cm) in size, and eleven cystic tumors 3 to 10 cm (average, 6 cm) in size (Table 1).

The following operations were performed: one DP with conservation of the spleen and section of the splenic vessels, four distal splenopancreatectomies (DSP), one DSP plus a left adrenalectomy, two enucleations, seven DPs with conservation of the spleen and the splenic vessels, and four cystojejunostomies (Table 2).

All the procedures except the DSP with a left adrenalectomy were performed with the patient in a supine position, with divaricated legs, the right arm by the side of the body, and the left arm at 90° in a mild anti-Trendelenburg inclination. Two monitors were used. The surgeon

Table 1. Preoperative indications

Indications for surgery	No. of patients	Size (cm)
Insulinoma	1	2
Solid neoplasm	2	2.5–5
Pseudocysts	5	5–12
Cystic tumor	11	3–10

Table 2. Operations performed

Type of operation	No. of patients
DP spleen-preservation with section of the splenic vessels	1
DSP + left adrenalectomy	1
DSP	4
Enucleation	2
Cystojejunostomy	4
DP spleen preservation	7

DP, distal pancreatectomy; DSP, distal splenopancreatectomy

stood between the legs of the patient, with the first assistant on his right and the second assistant on his left.

The pneumoperitoneum was made with an open Veress needle-assisted technique, and four trocars (3–10 mm and 1–5 mm) were introduced into the abdomen. A 35° optic and an ultrasound scalpel were routinely used. The operations always began with a laparoscopic ultrasound exploration to evaluate the extension of the lesion, the distance with the main pancreatic duct, its relations to the surrounding organs, and, in cases of malignancies, the involvement of the vascular structures.

For all the procedures except the DSP plus a left adrenalectomy, the first step was sectioning of the gastrocolic ligament and opening of the lesser sac. After sectioning of the splenocolic ligament and some short gastric vessels if necessary, the gland was exposed by retracting the stomach medially. The lower margin of the pancreas then was mobilized, and the dissection continued on the posterior surface upward to mobilize the distal part of the pancreas from the retroperitoneum. In the case of the DP without splenectomy and with section of both the splenic vein and artery, all the short gastric vessels were preserved.

At the end of the procedure, the spleen was observed for 30 min to evaluate the efficacy of the blood supply. The splenic vessels were isolated on the superior edge of the gland and preserved, if necessary. The pancreatic branches were interrupted with metallic clips. The splenic vein and artery were ligated using large metallic clips, except in one patient, for whom we preferred to use a vascular endo-GIA because of the splenic vein diameter.

In all cases except the three enucleations, the section of the pancreas was made with a 45-mm endo-GIA. To perform the enucleations, we used radiofrequency forceps and an ultrasound scalpel. In every case, the pancreatic stump was treated with the apposition of fibrin glue.

In the case involving DSP plus a left adrenalectomy, the patient was in a right lateral decubitus position [9]. We tried to ensure a complete mobilization of the spleen, allowing it to fall medially in the operating field until the prerenal fat tissue, the adrenal compartment, and the left crus of the diaphragm were well exposed. The left renal vein, the adrenal vein, and the splenic vessels were individualized. The distal pancreas was dissected from the retroperitoneum, and an en block resection was performed. All the specimens were removed from the abdominal cavity in an endobag through a suprapubic incision of approximately 5 cm.

Four pseudocysts were treated with a cystojejunostomy. The lesion was exposed, and its contents were aspirated for biochemical, bacteriologic, and cytologic examinations, with a small portion of the wall sent for histologic examination. After that, a transmesocolic loop was prepared, and a side-to-side anastomosis was made using a 45-mm endo-GIA. In all 19 patients, one or two abdominal drains were inserted.

Table 3. Total postoperative complications

Type of complication	No. of patients	Rate (%)
High-output pancreatic fistula	1	5.2
Low-output pancreatic fistula	1	5.2
Pancreatitis	1	5.2
Bleeding	1	5.2
Abdominal abscess	1	5.2
Postoperative morbidity	5	26.3

Table 4. Histologic findings

Histology	Size (cm)	No. of patients
Insulinoma	2	1
Adenocarcinoma	2.5–5	2
Malignant mucinous cystic adenocarcinoma	7	1
Serous cyst	3–5	2
Pseudocyst	5–12	5
Benign mucinous cyst	3.5–9	8

Results

No mortality was recorded. One DP spleen-preserving procedure was converted to open surgery (conversion rate, 5.5%) because of hemorrhagic complication during isolation of the splenic vein, which required a blood transfusion of 2 units. The patient had a large cystadenoma measuring 9 cm in diameter. During the early postoperative period, a high-output pancreatic fistula (700 ml/day) developed in this patient, which necessitated a second operation for a pancreaticojejunal anastomosis with the pancreatic stump. The postoperative course was further complicated by pleural fluid collection, urinary tract infection, acute renal failure, and a sacrococcygeal bed sore. The patient then was transferred to a medical ward after 45 postoperative days for hyperbaric therapy and physical rehabilitation.

The remaining 18 cases were managed successfully using the laparoscopic method, with a mean operative time of 130 min (range, 90–200 min). One case involving internal drainage of a pseudocyst was complicated by dense adhesions because the patient had undergone an open cholecystectomy. No other intraoperative complications occurred. The intraoperative blood loss was minimal. The postoperative course was characterized by one bleed managed conservatively with a blood transfusion of 2 units and infusive therapy; one low-output pancreatic fistula (80 ml/day), which successfully closed up after 12 days of TPN and conservative management; one reactive pancreatitis with accompanying left pleuric fluid collection, which was treated with antibiotics, TPN, and transthoracic drainage of the collection; and one abdominal abscess drained under ultrasound view (Table 3). The mean postoperative stay was 8.5 days (range, 5–45 days). The histologic report showed one insulinoma, two adenocarcinomas, two serous cysts, five pseudocysts, eight benign mucinous cysts, and one malignant mucinous cystic adenocarcinoma (Table 4).

We achieved a mean follow-up period of 42 months (range, 6–72 months). The patient undergoing DP

Table 5. Mean follow-up period of 42 months (range, 6–72 months)

Operation	Event	Months
DP spleen preservation with section of the splenic vessels	Postoperative left hypochondrium pain	3
DSP + left adrenalectomy (adenocarcinoma)	Dead (metastases)	10
DP spleen preservation (converted in open surgery)	Incisional hernia	8

DP, distal pancreatectomy; DSP, distal splenopancreatectomy

spleen preservation with section of the splenic vessels reported mild pain in the left hypochondrium, probably attributable to chronic splenic ischemia, during the first 3 postoperative months. Strict echographic monitoring was performed to rule out any signs of acute splenic infarction until the symptom resolved spontaneously. The patient, who underwent conversion to open surgery, experienced an incisional hernia at 8 months. The patient who had a DSP plus a left adrenalectomy for a primitive adenocarcinoma infiltrating the adrenal gland died with metastatic spread 10 months after the operation (Table 5). The remaining patients were well at the follow-up evaluation.

Discussion

Laparoscopic surgery has proved to be a gold-standard for several pathologies, and day by day is gaining a more extensive scientific consent. For the treatment of pancreatic disease, particularly those pathologies that require a pancreatic resection, the laparoscopic approach has not yet been accepted worldwide. The reason for this is the complexity of the procedures and the experience required for pancreatic surgery and advanced laparoscopic surgery [4, 7].

The use of laparoscopic ultrasound integrated with the preoperative studies must be considered mandatory [1, 4, 12]. Thanks to its routine use, we always have been able to identify the exact extension of the lesion, and thus tailor the pancreatic resection.

Pancreatic fistula occurred in two patients (11%), but only one patient required a surgical intervention. The other fistula was a low-output pancreatic fistula controlled easily with medical therapy. Our results could be considered satisfactory compared with pancreatic fistula rates of 15% to 26% reported by other studies [5, 6, 11].

In all cases, the pancreas was divided using a linear stapler. In every case, the pancreatic stump was treated with hemostatic sutures and apposition of fibrin glue. An interesting study published by Sheehan et al. [13] concluded that the incidence of pancreatic fistula formation was not related to the method of pancreatic remnant closure, nor to the underlying pathologic process.

Spleen-preserving distal resection of the pancreas must be considered the method of choice for cases of benign pathologies. The procedure is safe and technically feasible, with no more complications than DSP, and it is associated with a better perioperative outcome [4, 16]. In one case, the spleen was preserved without division of the short gastric vessels or the splenic vessels. In all the remaining seven cases, the splenic artery and

vein were isolated. The blood supply from the short gastric vessels is theoretically sufficient, especially if an extensive dissection of the spleen is avoided. A follow-up ultrasound scan is necessary to exclude splenic infarction. We did not preserve the spleen for oncologic reasons in three cases (2 adenocarcinomas and 1 malignant mucinous cystic adenocarcinoma), and because of difficulties with the surgical dissection due to the dimension of the lesions in two cases (9- and 12-cm benign cystic lesions, respectively).

The hospital stay in our experience was skewed by a case of prolonged recovery, but the postoperative course of the remaining patients was characterized by all the advantages that minimally invasive surgery offers: less postoperative pain, faster oral intake, and faster mobilization and return to normal life.

In conclusion, although our experience and that of other retrospective studies [4, 11, 15] have shown that laparoscopic surgery provides for faster postoperative recovery and morbidity rates comparable with those of open surgery, this will need to be proven by a randomized controlled trial. The positive results observed suggest a question: Could the laparoscopic approach become a new gold standard for both benign and malignant pathologies of the distal pancreas?

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