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Laparoscopic surgery combined with preservation of the spleen for distal pancreatic tumors

A. Vezakis, D. Davides, M. Larvin, M. J. McMahon

Leeds Institute for Minimally Invasive Surgery, and the Centre for Digestive Diseases, the General Infirmary at Leeds Great Gorge Street, Leeds, England LS1 3EX

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Abstract

Background: Laparoscopic distal pancreatectomy combined with spleen salvage by preservation of the splenic vessels has been described in selected patients with islet cell tumors.
Methods: Laparoscopic resection of the left side of the pancreas with spleen preservation on the vasa brevia was attempted in six consecutive patients.
Results: Four distal pancreatectomies with spleen preservation were completed laparoscopically. There were two conversions to laparotomy. The median operating time was 300 min (range, 240–360). There was no mortality, but two patients developed a pancreatic fistula. The median postoperative hospital stay was 34.5 days (range, 5–60). All the patients remain well at a median follow-up of 30 months (range, 22–41).
Conclusions: Minimally invasive surgery for distal pancreatic tumors is feasible and appropriate for most benign tumors. The spleen can be safely preserved laparoscopically on its blood supply from the short gastric vessels. The operative technique and especially the closure of the pancreatic stump need further study.

Key words: Laparoscopic distal pancreatectomy — Pancreas — Spleen — Islet cell tumors

Gagner et al. [7] have reported five cases of laparoscopic resection of the left side of the pancreas for islet cell tumors with spleen preservation by dissection of the splenic artery and vein from the pancreas. In addition, Cuschieri et al. [3] have described laparoscopic distal pancreatectomy with splenectomy in five patients with chronic pancreatitis. In our own department, during traditional left pancreatectomy, the splenic artery and vein is ligated and removed with the left pancreas, and the spleen is preserved with blood supply from the short gastric vessels.

In this report, we present our initial experience with laparoscopic resection of distal pancreatic tumors, combined with preservation of the spleen, in six unselected and consecutive patients.

Patients and methods

Between November 1993 and June 1997, laparoscopic resection was attempted in six consecutive patients with tumors of the body or tail of the pancreas. All the patients were female; their median age was 62.5 years (range, 30–83). The indications for surgery were cystadenoma (three patients), insulinoma (one), adenocarcinoma (one), and von Hippel–Lindau disease (one). Patient details are shown in Table 1. Spiral computed tomography (CT) had localized the tumor preoperatively in all patients. Insufflation was carried out in each patient using a Veress needle. The cannulation sites are shown in Fig. 1.

The operation was commenced with the patient flat, but access was helped, if necessary, by rotating to the right, combined with the reverse Tredelenburg position. A 0° laparoscope was used for most of the procedure, and a 45° scope was available for use when necessary.

A thorough examination of the abdominal cavity was performed before dissection. The lesser sac was entered through the gastrocolic omentum. The Harmonic scalpel (Ethicon Ltd., Edinburgh, Scotland) was used for dissection and hemostasis. The pancreas was inspected and the tumor identified using laparoscopic ultrasound (Aloka; Keymed Ltd., Southend, England) in three patients. In the patient with the insulinoma, enucleation of the tumor was considered first as an option but discarded because of the location of the tumor in the tail of the pancreas.

After visualization of the pancreas, its inferior border was mobilized by opening the fatty tissue in the root of the mesentery of the transverse colon with the Harmonic scalpel. This enabled the superior mesenteric and the splenic veins to be identified. The fatty areolar tissue along the superior aspect of neck and body of the pancreas was then divided to enable the origin of the splenic artery to be identified in its course between the celiac axis and the body of the pancreas. The artery was mobilized at this site and divided between four locking polydioxanone suture (PDS) clips (Absolok; Ethicon Ltd.) (Fig. 2).

A plane behind the neck of the pancreas and in front of the superior mesenteric and portal vein was gently developed with blunt forceps (Tip-Top; Surgical Innovations Ltd., Leeds, England). The ends of a sling placed around the neck were brought out through the abdominal wall, using a grasping device (Endoclaw; Surgical Innovations Ltd.), so that the neck of the gland could be held up, away from the veins (Fig. 3). The splenic vein was divided using Absolok clips as it passed behind the pancreatic tail

Correspondence to: A. Vezakis

Table 1. Patient details

Patient no.	Sex	Age (yr)	ASA	Diagnosis	Tumor size (cm)
1	F	83	2	Insulinoma	0.7
2	F	62	2	Cystadenoma	0.6
3	F	63	3	Cystadenoma	6.0
4	F	42	1	Cystadenoma	3.0
5	F	64	2	Adenocarcinoma	3.5
6	F	30	2	Nonfunctioning neuroendocrine tumor (von Hippel–Lindau syndrome)	5.0

and just before its junction with the superior mesenteric vein. The neck of the pancreas was divided using an Endo-GIA stapler (Autosuture Company, Elancourt, France) in five patients and the Harmonic scalpel and then oversewn in one.

The left pancreas was then lifted up and mobilized posteriorly with the splenic artery and vein. The latter were clipped and divided as they emerged from the pancreatic tail to enter the hilum of the spleen. The spleen was left in situ supplied solely from the short gastric vessels. This technique avoids the need to divide the numerous small vessels that connect the splenic artery and vein to the body and tail of the pancreas. The pancreatic tail was fully mobilized and placed in a bag (Albert; Vernon-Carus Ltd., Preston, England). Atraumatic grasping forceps (Tip-Top; Surgical Innovations Ltd.) were used for all manipulations in order to minimize damage to the pancreas and adjacent tissues and to prevent inadvertent major bleeding.

Result

The procedures performed are shown in detail in Table 2. The operation was completed laparoscopically in four patients (66%) and converted to laparotomy in two. The reason for conversion was that the tumor was adherent to the celiac axis in one patient and was too bulky to obtain a view of the proximal splenic artery in another. The spleen was preserved in all patients except the patient with the adenocarcinoma. The median operating time was 300 min (range, 240–360). There were no intraoperative complications and only two patients needed blood transfusion (2 units each). Oral fluids were started in the first 24 h. The drains were removed on the 2nd postoperative day.

Two patients with distal pancreatectomy developed a pancreatic leak. They both needed CT-guided drainage of peripancreatic collections. The fistulas were healed conservatively, but total parenteral nutrition and prolonged hospitalisation were required. These two patients increased the median postoperative stay of our patients to 34.5 days, with a range of 5–60 days. The patients in whom the operation was converted did not develop any complication and were discharged on the 8th and 12th days, respectively. All the laparoscopically treated patients remain well at a median follow up of 30 months (range, 22–41).

Discussion

The pancreas is a deeply placed and rather inaccessible organ. Traditional access to it usually requires an extensive abdominal incision. Pain and discomfort may be considerable postoperatively. In addition, there is a risk of wound infection and incisional herniation. Thus, a successful laparoscopic approach to the pancreas has the potential to spare

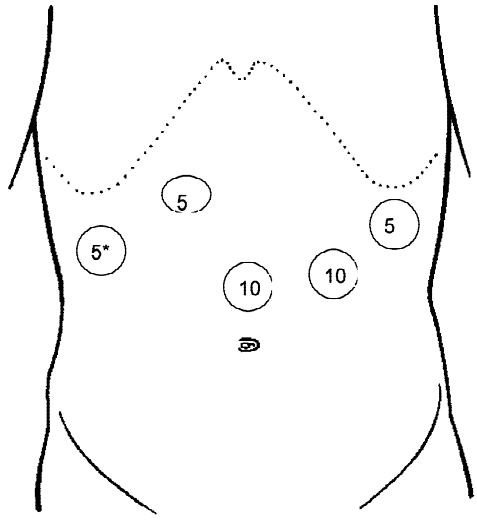


Fig. 1. Cannulation sites. Four cannulae are routine, but an additional cannula may be used to retract the stomach upwards (*).

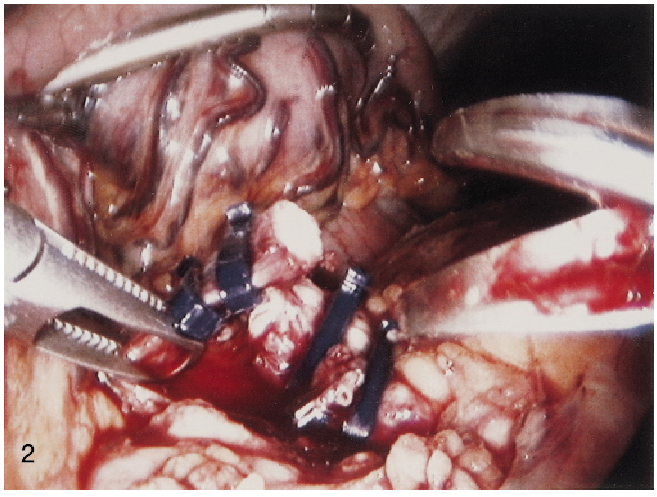
the patient a great deal of discomfort and disability, as well as other complications such as wound infection.

The spleen is an important organ for the immunological defense system, so its preservation during left pancreatectomy is worthwhile if it can be achieved safely [2]. Aldridge and Williamson [1] described distal pancreatectomy with spleen salvage in 35 patients for a variety of pancreatic conditions, including chronic pancreatitis. The splenic vessels were dissected from the pancreas by securing the small branches of the splenic artery and vein. However, these patients were selected, and in cases with severe chronic pancreatitis or malignant tumors, splenectomy was performed because fibrosis or tumor invasion encased the splenic vessels alongside the pancreatic tail.

Warshaw [9] described a technique of distal pancreatectomy where the pancreas is separated from the spleen by dividing the splenic artery and vein proximally and distal to the tail of the pancreas and the spleen survives on the short gastric vessels. The technique was successful in 22 of 25 consecutive patients, including cases of severe chronic pancreatitis and adenocarcinoma.

Laparoscopic distal pancreatectomy with spleen preservation by dissection of the splenic vessels has been described in selected patients with islet cell tumors [7] or with splenectomy in patients with chronic pancreatitis [3]. For our study, we decided to treat six consecutive patients with distal pancreatic tumors by laparoscopic resection rather than laparotomy.

Insulinomas are usually small and benign tumors (<2 cm), and there is a great disproportion between the size of the incision required and the specimen to be removed, the former being large and the latter being small. In cases where an insulinoma has been localized, by imaging techniques, to the body or tail of the pancreas, laparoscopic resection either by enucleation or distal pancreatectomy is a viable treatment option. In a recent study [10], localization of islet cell tumors was achieved in 82% of patients by using combined CT and angiography. When a tumor has not been localized, but there is a firm diagnosis on the basis of clinical presentation



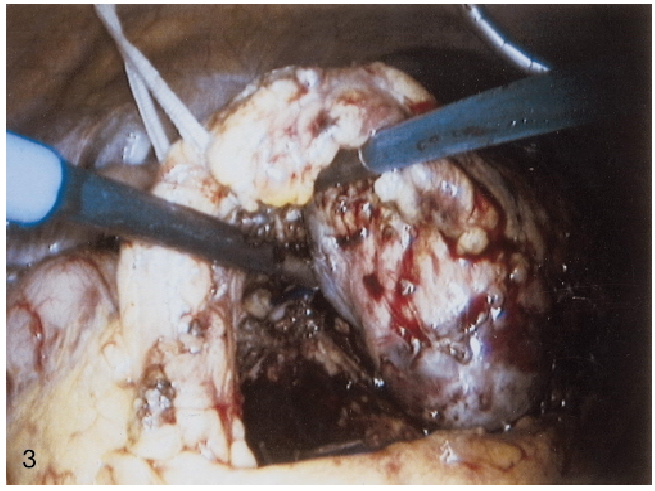


Fig. 2. The splenic artery is divided between four interlocking PDS clips.
Fig. 3. The pancreas neck is held away from the veins.

Table 2. Operations and outcome

Patient no.	Operation	Operating time (min)	Complications	Postop stay (days)	Follow-up (mo)
1	DP	300	—	14	41
2	DP	360	—	5	37
3	DP	240	Pancreatic leak	60	23
4	DP	240	Pancreatic leak	55	22
5	DP (converted)	300	—	12	12
6	DP (converted)	360	—	8	10

DP, distal pancreatectomy

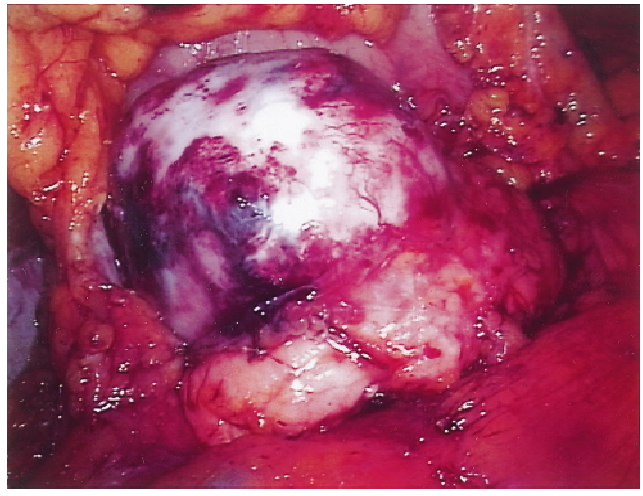


Fig. 4. Large tumor masses may limit access to the splenic artery.

and biochemical tests, laparoscopy combined with laparoscopic ultrasound is an alternative to open exploration.

Cystic tumors of the pancreas require aggressive surgical therapy because, even though they are usually benign, a definite diagnosis and exclusion of malignancy can only be confirmed histologically. Unlike islet cell tumors, the majority of these lesions can be detected using CT. For tumors located in the body or tail, laparoscopic distal pancreatectomy is a feasible technique. Difficulty may be encountered in large tumors, because the large mass may limit access to the splenic artery (Fig. 4); this was the reason for conversion in one of our patients. Pancreatoduodenectomy has been performed laparoscopically for tumors of the head of the pancreas [6], but it is a long and complex operation; with current technology, it may lie beyond the limit of practical feasibility.

Patients with adenocarcinoma of the body and tail of the pancreas have a poor prognosis because they present late in their disease. Only ~10% will be suitable for resection [8], and these patients will survive for a median of only 10 months [4]. We undertook a laparoscopic resection of the left pancreas with spleen salvage in a patient with adenocarcinoma who was obese and not medically fit. While there may be concerns about the presence of nodes in the splenic hilum, we believe that in most patients with adenocarcinoma of the body or tail of the pancreas, this is a minor consideration compared to the role of local spread at the site of the tumor. The operation was converted and completed through a small transverse incision after division of the pancreas, because the tumor was adherent to the celiac axis. Laparoscopic surgery for malignant tumors remains controversial. Even palliative resection seems demanding, because dissection is difficult and dangerous in invasive tumors.

Conventional resection of distal pancreatic tumors carries a low morbidity and mortality rate [5], and it is important that the use of laparoscopic surgery for the management of these tumors does not place the patient at risk of serious or life-threatening complications. In our small series, we had no mortality. Two patients developed pancreatic leak after distal pancreatectomy, but it was healed conservatively and no surgical reintervention was required. The pancreas in these patients was divided using the Endo-GIA alone, and the stump was not oversewn. It is now our practice to oversew the pancreatic stump with 3/0 polysorb suture (Autosuture Company, Elancourt, France).

The spleen was preserved in all patients except the one with the adenocarcinoma. The spleen survives on its blood supply from the vasa brevia, and its preservation during laparoscopic left pancreatectomy is feasible.

All patients in whom the operation was completed laparoscopically remain well after a median follow-up of 30 months.

In summary, the laparoscopic approach seems appropriate for most benign distal pancreatic tumors. The patient is spared the large incision required for conventional surgery, and the specimen is often not large. A small amount of suturing is necessary, but no anastomosis is required. Spleen preservation on the vasa brevia is feasible laparoscopically. Technical difficulty is encountered with large tumors, and the closure of the pancreatic stump needs further study. The wisdom of palliative resection in malignant tumors remains questionable.

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