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Laparoscopic Roux-en-Y Drainage of a Pancreatic Pseudocyst

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Abstract Minimal changes have been made in regard to management of pancreatic pseudocysts, and drainage remains the treatment of choice for large (more than 6 cm), symptomatic, and persistent pseudocysts. Laparoscopic techniques have been increasingly employed with success and continue to be favored when possible. Laparoscopic Roux-en-Y cystjejunostomy is an appropriate and effective drainage procedure, especially when cystgastrostomy cannot be performed. We review the literature and describe the technique in this review.

Keywords Pancreatic pseudocyst · Pancreas · Laparoscopic surgery · Roux-en-Y cystjejunostomy · Drainage · Postoperative care · Follow-up care

Introduction

Pancreatic pseudocysts have classically been described as organized collections of enzyme-rich fluid that persist after an episode of acute pancreatitis, an exacerbation of chronic pancreatitis, or pancreatic trauma. In 1979, Bradley et al. [1] published the first study examining the natural history of pancreatic pseudocysts and found that in 54 patients under serial observation, the risk of complications from an untreated pseudocyst increased significantly after a 7-week period of observation. This risk of complications, such as cyst rupture, abscess formation, jaundice, and hemorrhage from untreated pseudocysts, was far greater than the risk of operative treatment. Therefore, for the next decade, pseudocysts that had not resolved by 6 weeks underwent operative therapy with the goal of performing internal drainage. However, surgical outcomes during this period of enteric-pseudocyst drainage remained relatively high, with an overall mortality of 7 % and morbidity exceeding 40 % [2].

Enteric-pancreatic drainage for any pseudocyst was the dominant treatment until the early 1990s, when two studies suggested that the risk of complication from a pseudocyst was related directly to the size of the lesion. Pseudocysts at that time were identified and followed by computer tomography, and Yeo et al. [3] as well as Vitas and Sarr [4] found that the observation of asymptomatic pseudocysts less than 6 cm in size infrequently resulted in complications. In the study of Vitas and Sarr, seven patients with pseudocysts larger than 10 cm were successfully managed by observation. As a result of these studies, an expectant approach to the management of asymptomatic, small pancreatic pseudocysts was adopted. However, a general observation was that a large pseudocyst (more than 6 cm) that persisted beyond 4–6 weeks after an episode of pancreatitis would remain symptomatic and unlikely resolve in the absence of intervention [5]. Studies have shown that large pseudocysts (more than 6 cm) may be associated with abdominal pain, nausea, vomiting, bloating, and infections. Moreover, pseudocysts may cause complications that result in a myriad of clinical presentations, such as gastroduodenal obstruction, biliary obstruction with jaundice, cholangitis, and gastrointestinal bleeding [6].

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When pancreatic pseudocysts are symptomatic, multiple surgical techniques are at a surgeon's disposal, including cystgastrostomy, cystduodenostomy, cystjejunostomy, and Roux-en-Y cystjejunostomy. Advances in minimally invasive surgical techniques allow treatment of pancreatic pseudocysts by any of these approaches, including endoscopic cystgastrostomy. In fact, a number of successful case studies suggest that the laparoscopic approach is safe [7], with lower morbidity, and efficacy that is comparable to that of traditional open surgery [8]. One such approach includes laparoscopic cystjejunostomy, either directly to the jejunum or to a Roux limb as first described by Bacca and colleagues and Mouiel and Crafa, respectively [9]. In their series of eight patients having undergone the latter procedure, Texeira et al. [10] demonstrated no conversions, no septic or bleeding complications, and no residual or recurrent pseudocysts, with a mean follow-up of 2 years. Although Roux-en-Y cystjejunostomies are more technically demanding owing to the addition of the entero–enteric anastomosis, they may be preferable because there is flexibility in positioning of the Roux limb to the most dependent part of the pseudocyst. Factors determining the surgical approach and the time of intervention are (a) the location of the cyst, (b) the maturity of the cyst wall when the patient presents with symptoms, (c) the presence of comorbidities such as varices, and (d) the availability of surgical expertise and experience [11].

Procedure

The technique used for a Roux-en-Y cystjejunostomy involves placement of four ports positioned along the mid abdomen. One of these ports should at least be 12 mm if a laparoscopic stapler is to be used (Fig. 1). The cyst can be approached via an opening through the transverse mesocolon just left of the middle colic vessels above the ligament of Treitz or through the gastrocolic omentum (Fig. 2). Adhesions can be divided and the omentum and the transverse colon are reflected cephalad to expose the transverse mesocolon. If necessary, intraoperative ultrasonography and needle aspiration can be used to confirm the location of the cyst. The proximal jejunum is then divided approximately 25–30 cm from the ligament of Treitz using a laparoscopic stapler. A side-to-side jejunojejunostomy is created 40 cm distal to the cut end of the Roux limb with an additional linear stapler. The common enterotomy can be closed with a continuous suture or a linear stapler. Any

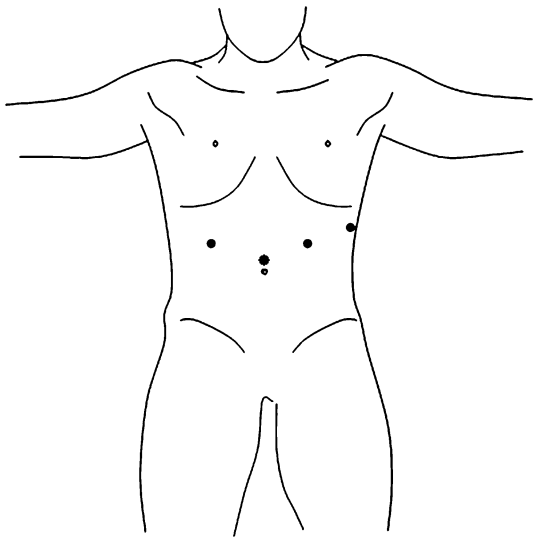

Fig. 1 Port placement for cystjejunostomy: supraumbilical camera port; two 12-mm operating ports; one 5-mm left lateral assistant port

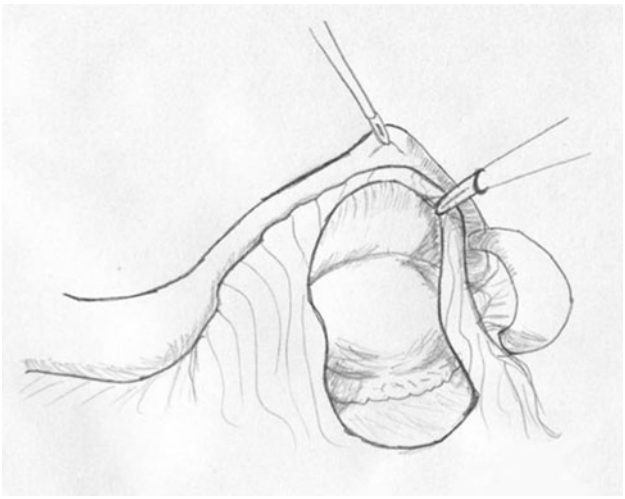

Fig. 2 View of the lesser sac through the gastrocolic omentum showing a pancreatic pseudocyst

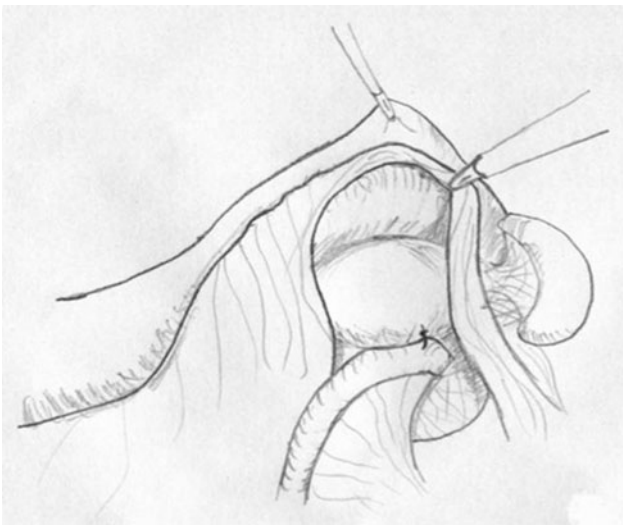

Fig. 3 Anchoring of the Roux limb to a pseudocyst

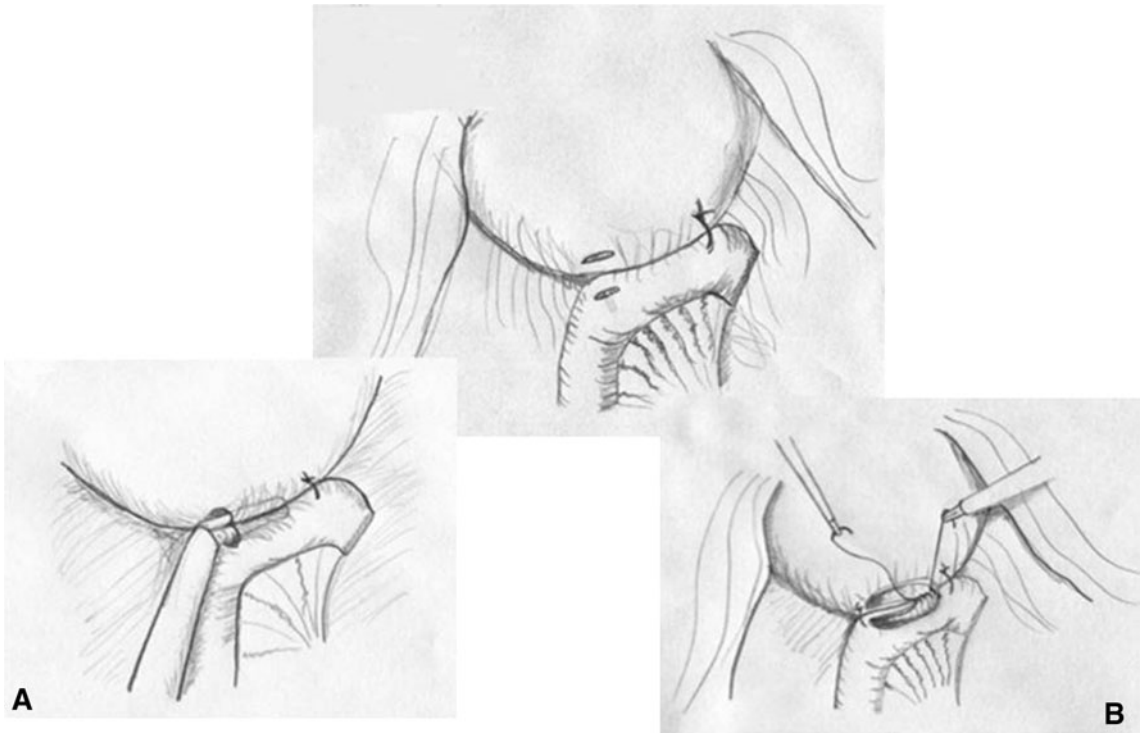

Fig. 4 Creation of the cystjejunostomy, stapled anastomosis (*A*), and sutured anastomosis (*B*)

Table 1 Laparoscopic Roux-en-Y cystjejunostomy

Study	Patients	Operative time (min)	Conversion	Morbidity	Mortality	Postoperative stay (days)	Follow-up period (months)	Recurrences
Hamza and Ammori [12]	4	135 (85–240)	0	0	0	1.5 [1, 2]	17 (8–26)	0
Park and Heniford [13]	3	234	1	2	1	6	–	0
Davila-Cervantes et al. [14]	4	–	0	1	0	–	28 (18–54)	1
Palanivelu et al. [11]	8	126 (mean)	0	1	0	–	–	–
Texeira et al [10]	8	150 (100–215)	0	2	0	4 [2–10]	24 (12–48)	0

mesenteric defect can be closed with continuous suture. After its fluid contents have been sampled with a needle, the pseudocyst is opened and its contents are evacuated. A part of the cyst wall is also sent for pathological assessment to rule out malignancy. The proximal aspect of the Roux limb is placed in a side-to-side fashion (Fig. 3). The cystjejunostomy can be formed with a laparoscopic stapler or by running sutures.

In a stapling technique, a cystotomy and an enterotomy are made using any energy device. A bowel stapler is used to form the anastomosis. The opening of the cystjejunostomy is then closed using running absorbable sutures. If a sutured cystjejunostomy is preferred, a 3–4-cm transverse cystotomy and a 3–4-cm longitudinal enterotomy are made at the proximal end of the Roux limb. The jejunum is sewed to the cyst with a running Vicryl 2–0 suture in one layer. Reinforcement second-layer interrupted sutures may be placed if necessary (Fig. 4). The use of abdominal drains is at the surgeon's discretion.

Postoperative and Follow-up Care

Prophylactic antibiotic coverage is continued for less than 24 h after surgery. Patients receive a liquid diet on the first or second postoperative day depending on their clinical progress. The nasogastric tube is usually removed on the first postoperative day. Patients are discharged from the

hospital when they are adequately mobile, tolerating liquid diet, and their pain is satisfactorily controlled. Diets are advanced as tolerated. Patients are followed up in an outpatient clinic with an abdominal CT scan at 3–6 months after surgery.

Table 1 summarizes the operative and postoperative experience from published groups that have performed laparoscopic cystjejunostomies.

Conclusions

Minimally invasive techniques used in the treatment of pancreatic pseudocysts have undergone a number of modifications. Although there is occasional debate about appropriate applications of laparoscopic procedures for pseudocysts, the clinical evidence supports decreased morbidity and comparable efficacy with respect to traditional open surgery [2]. A Roux-en-Y cystjejunostomy is ideal for flexible positioning of the jejunum to achieve effective dependent drainage. On occasion, a loop jejunostomy can be performed. However, this does not allow for effective diversion from the alimentary system, predisposes to leaks, and may lead to delays in diet advancement. A Roux-en-Y jejunostomy prevents food particles from interfering with drainage and potentially causing infection. Roux-en-Y cystjejunostomy leaks can also be managed more effectively as the Roux-en-Y cystjejunostomy is not in direct continuity with the alimentary limb. The minimally invasive technique is not a new way of treating pancreatic pseudocysts, but is rather a way of performing the same standard operations using minimally invasive techniques. The advantages of minimally invasive techniques are already well described.

Disclosure Ankit D. Patel, Nathaniel W. Lytle, and Juan M. Sarmiento declare no conflict of interest.

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