



Stapled laparoscopic cystgastrostomy

A series with 15 cases

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Abstract

Background: The goal of this study was to assess the clinical outcome of patients undergoing laparoscopic stapled cystgastrostomy for pancreatic pseudocysts in contact with the posterior wall of the stomach.

Methods: We performed a case note review of all patients who have undergone stapled laparoscopic cystgastrostomy in Norwich, UK. The cystgastrostomy was fashioned through an anterior gastrotomy using a vascular ETS stapling device in all cases.

Results: Fifteen patients have undergone stapled laparoscopic cystgastrostomy. The procedure was completed successfully in 12 patients. Three procedures were converted to open surgery for technical reasons. There were no complications due to bleeding from the cystgastrostomy. Early complications included systemic sepsis (one), bleeding gastric ulcer (one) and pseudocyst recurrence due to partial closure of the cystgastrostomy (two). No late recurrences or other complications have been found at a median follow-up of 37 months.

Conclusion: Stapled laparoscopic cystgastrostomy is a safe and effective procedure for draining pancreatic pseudocysts in contact with the posterior wall of the stomach. The use of a hemostatic stapling device to fashion the cystgastrostomy may reduce the risk of catastrophic hemorrhage from the pseudocyst wall.

Key words: Laparoscopic cystgastrostomy — Pancreatic pseudocyst

Persistent or symptomatic pancreatic pseudocysts require drainage. For mature pseudocysts in contact with the posterior wall of the stomach, internal drainage by cystgastrostomy is the procedure of choice. Historically, open surgery was performed to fashion the cystga-

strostomy. Open surgery in this group of patients is associated with a significant complication rate and a protracted length of hospital stay [3, 5].

In an attempt to obviate the risks of open surgery, less invasive methods of pseudocyst drainage have been developed, including percutaneous and endoscopic drainage techniques. However, percutaneous drainage is associated with a significant risk of infection [15], whereas endoscopic drainage is associated high technical failure rate and bleeding [2]. Furthermore, both techniques are associated with a high recurrence rate [2, 7].

Recently, laparoscopic surgery has been used to achieve internal drainage of pancreatic pseudocysts. This technique theoretically combines the advantages of both open surgical and minimally invasive drainage techniques, allowing extensive drainage of the pseudocyst with fewer complications and a shortened hospital stay. A number of different laparoscopic techniques have been described [8, 13, 14, 16]. However, as with endoscopic drainage, significant bleeding from the cyst wall frequently complicates this procedure [9, 11]. In most case series, diathermy, with or without additional sutures, is used to fashion the cystgastrostomy. The use of this technique may explain the frequency of postoperative hemorrhage.

In Norwich, a laparoscopic drainage technique that mirrors open surgical cystgastrostomy is the procedure of choice for patients with persistent or symptomatic pancreatic pseudocysts in contact with the posterior wall of the stomach. In addition, a hemostatic stapling device is used to fashion the cystgastrostomy, which may reduce the incidence of bleeding from the cyst wall. The clinical outcome for all patients undergoing this procedure is presented.

Methods

Stapled laparoscopic cystgastrostomy has been the surgical drainage procedure of choice in Norwich since January 1997. The procedure is performed using a four-port extragastric technique. An anterior lon-

Table 1. Patient demographics, initial presentation, and preoperative intervention

Patient no.	Age (yrs)	Sex	Weight (kg)	Type of pancreatitis	IMRIE	Preoperative intervention	Pseudocyst size (cm)	Infected	ASA grade
1	79	F	56	Gallstone	4	No	12.6	No	3
2 ^a	53	M	57.6	ETOH	n/a	Percutaneous catheter drainage (therapeutic)	Large	Yes	3
3	75	F	60	Gallstone	6	No	14	No	3
4	79	F	71.8	Ideopathic	3	No	10	No	3
5	36	F	90	Gallstone	4	Laparoscopic cholecystectomy + POC	14	No	2
6	65	M	66	Hyperlipidemia	5	Percutaneous aspiration (diagnostic)	18	No	3
7	70	M	61.5	Gallstone	5	Percutaneous aspiration (diagnostic)	14.9	No	2
8	57	F	52	Gallstone	4	No	7	No	2
9	44	F	105	Gallstone	3	No	Large	No	4
10	62	F	n/a	Ideopathic	4	No	Large	No	2
11	26	F	90.9	Gallstone	3	No	12	No	1
12	62	M	91.1	ETOH	3	No	Large	No	3
13 ^a	44	M	75	ETOH	n/a	No	10	No	2
14	59	F	83.5	Hyperlipidemia	5	No	12.8	No	2
15	70	F	n/a	Gallstone	4	Percutaneous catheter drainage (therapeutic)	Large	No	2

F, Female; M, Male; n/a, not applicable; ETOH, alcohol; IMRIE, pancreatitis severity score; POC, perioperative cholangiogram

^a Patients transferred from smaller hospitals to the Norfolk and Norwich University Hospital

itudinal gastrotomy is fashioned using diathermy or harmonic scalpel. The pseudocyst is identified bulging into the posterior wall of the stomach. Laparoscopic ultrasound is used to locate the pseudocyst if it is not obvious visually. The pseudocyst is then punctured through the posterior wall of the stomach using diathermy or harmonic scalpel. The cystgastrostomy is enlarged to a 9-cm diameter using a vascular ETS stapling device (Ethicon Endo-Surgery, Cincinnati, OH, USA). The vascular stapler is initially applied for 30 s to squeeze out any edema within the stomach and pseudocyst wall, and a vascular cartridge is used to ensure hemostasis. The cyst fluid is aspirated, and a biopsy is taken from the cyst wall.

Fifteen patients with persistent or symptomatic pancreatic pseudocysts have undergone stapled laparoscopic cystgastrostomy (Table 1). The median age and weight of the patients were 62 years (range 26–79) and 71.8 kg (range, 52–105), respectively. Using the American Society of Anesthesiology (ASA) system, the median score of patient fitness at the time of cystgastrostomy was 2 (range, 1–4).

Our policy is to allow at least 12 weeks for pancreatic pseudocysts to resolve. In this series, early intervention before 12 weeks was needed in one patient for sepsis and in four patients for gastric compression causing repeated vomiting. The median time to surgery after the initial episode of acute pancreatitis was 16 weeks (range, 3–46), which reflects our conservative approach to intervention. In all cases the initial episode of acute pancreatitis was classified as severe [4]. The cause of pancreatitis was gallstones (eight patients), alcohol (three patients), hyperlipidemia (two patients), and ideopathic (two patients).

The median size of pancreatic pseudocysts was 12.8 cm (range, 7–18). Two patients had previously undergone percutaneous drainage procedures. Subsequent laparoscopic drainage was performed 159 and 5 days after the percutaneous procedure due to pseudocyst recurrence and pseudocyst infection, respectively.

Results

Stapled laparoscopic cystgastrostomy was completed successfully in 12 patients (Table 2). In all cases, the cystgastrostomy was fashioned using a vascular ETS stapling device. The stapler successfully divided the stomach and pseudocyst wall in all cases. Laparoscopic

ultrasound was used to locate the pseudocyst in six patients. Five patients had a laparoscopic cholecystectomy, and one had a pancreatic necrosectomy, at the same time as the cystgastrostomy.

Three procedures were converted to open procedures for technical reasons. One patient, who had previously undergone an attempted percutaneous drainage procedure and subsequently developed an infected pseudocyst, had dense peritoneal adhesions that precluded a laparoscopic approach to the stomach. Two patients had pseudocysts that were nonadherent to the posterior wall of the stomach, a feature that had not been demonstrated radiologically during the preoperative period. A minilaparotomy and formation of a sutured cystgastrostomy at open operation was performed in all three patients. One of the patients subsequently underwent open partial pancreatectomy and splenectomy after histological analysis of a cyst wall biopsy established a diagnosis of pancreatic serous cystadenoma. This patient is included in the series on the basis of the preoperative diagnosis and an intention to treat.

The median operating time was 82 min (range, 27–146), and the mean estimated blood loss for the procedure was 175 ml.

There were no complications due to bleeding from the cystgastrostomy. Early complications included systemic sepsis (one patient), bleeding gastric ulcer (one patient), and pseudocyst recurrence due to partial closure of the cystgastrostomy requiring subsequent laparotomy and open cystgastrostomy (two patients). The patient who developed systemic sepsis had a documented infected pseudocyst before the operation. Systemic sepsis developed after manipulation of the infected pseudocyst during surgery and responded to a course of intravenous antibiotics.

Table 2. Operative details and clinical outcome

Patient no.	Stapled laparoscopic cystgastrostomy completed successfully	Concurrent procedure	Operation time (min)	Blood loss (ml)	Hb drop (g/dL)	Early complications	IP stay (postop nights)	Follow-up (mg)	Recurrence	Action
1	Yes	Laparoscopic cholecystectomy	74	n/a	0.5	No	11	81	No	n/a
2	No—dense peritoneal adhesions	Pancreatic necrosectomy	82	250	0.5	Systemic sepsis	17	51	No	n/a
3	Yes	Laparoscopic cholecystectomy	146	n/a	4.5	No	5	82	No	n/a
4	Yes	No	60	n/a	n/a	No	7	54	No	n/a
5	Yes	No	27	0	1.7	No	6	32	Yes—15 days	Open cystgastrostomy
6	Yes	No	93	n/a	0	No	17	23	No	n/a
7	Yes	Laparoscopic cholecystectomy	116	n/a	0.7	No	8	47	No	n/a
8	Yes	No	87	n/a	2.7	Bleeding gastric ulcer	18	37	Yes—8 days	Open cystgastrostomy
9	Yes	Laparoscopic cholecystectomy	99	250	0.3	No	21	40	No	n/a
10	No—pseudocyst nonadherent to stomach	No	68	200	0	No	7	10	Histology revealed serous cystadenoma	Open partial pancreatectomy and splenectomy
11	No—pseudocyst nonadherent to stomach	Laparoscopic cholecystectomy	160	n/a	1.2	No	5	74	No	n/a
12	Yes	No	90	n/a	0	No	9	14	No	n/a
13	Yes	No	62	n/a	3.4	No	4	11	No	n/a
14	Yes	No	68	n/a	0	No	6	4	No	n/a
15	Yes	No	60	n/a	0	No	6	6	No	n/a

n/a, not applicable; IP, inpatient

The median hospital stay was 7 days (range, 4–21). No late recurrences or other complications have been found at follow-up (median, 37 months; range, 4–82).

Discussion

Stapled laparoscopic cystgastrostomy is a safe and effective technique for treating pancreatic pseudocysts in contact with the posterior wall of the stomach. In this series, the procedure was completed successfully in 12 of 15 patients (80%) with no mortality. The laparoscopic approach allowed wide drainage of the pseudocyst resulting in a low recurrence rate (13%) while facilitating a speedy discharge from the hospital (median hospital stay, 7 days). There were no immediate or early complications due to bleeding from the pseudocyst wall.

The clinical outcome for patients undergoing cystgastrostomy in this case series compares favorably with outcomes reported using other treatment modalities. Open surgical treatment options include internal and external pseudocyst drainage. Both techniques are associated with significant mortality and morbidity. In a collective review of 1,032 patients, Gumaste and Pitchumoni [6] reported a mortality rate of 5.8% and a complication rate of 24% following open internal drainage. Mortality and morbidity following open external drainage are higher still [3, 5].

Percutaneous methods for treating pseudocysts comprise aspiration and continuous catheter drainage. Despite the attraction of percutaneous aspiration as a minimally invasive treatment option, a combined review of 46 patients in five studies reported that this technique was associated with an unacceptably high failure rate (54%) and recurrence rate (63%) [5]. Continuous catheter drainage has a more favorable outcome. A review of seven studies including 195 patients reported a failure rate of 19% and a recurrence rate of 8% using this technique [5]. However, to achieve resolution of the pseudocyst, a lengthy period of drainage is required. The mean length of time for catheter drainage was 23 days [5]. If the pseudocyst communicates with the main pancreatic duct, a more prolonged period of catheter drainage is required [15]. Not surprisingly, the procedure is associated with a significant risk of infection. In a series of 101 patients who underwent continuous catheter drainage, VanSonnenberg et al. [15] reported an infection rate of 10%. In addition, the authors reported an 18% incidence of external fistula requiring surgery following percutaneous catheter drainage when the pseudocyst communicated with the main pancreatic duct [15].

Endoscopic drainage options include cystgastrostomy and cystoduodenostomy when the pseudocyst is in contact with the stomach and duodenum, respectively, and transpapillary cyst drainage when there is communication between the pseudocyst and the pancreatic ductal system. Beckingham et al. [2] reviewed the clinical outcome in a combined series of 50 patients undergoing endoscopic cystgastrostomy. The procedure was completed successfully in 82% of patients, with a recurrence rate of 18%. There were no deaths reported, but major

complications included bleeding (8%) and perforation (8%). All but one of the patients who bled required surgery to achieve hemostasis. Endoscopic cystoduodenostomy is reported to have a lower failure rate (11%) and recurrence rate (6%) than endoscopic cystgastrostomy [2]. Bleeding and perforation remain the important causes of morbidity and mortality. A combined review of 71 patients reported both complications occurred at a rate of 4% [4]. Failure and recurrence rates of 16 and 9%, respectively, have been reported in a combined series of 117 patients undergoing endoscopic transpapillary cyst drainage [2]. The technique was associated with an overall complication rate of 12%. Bleeding occurred in only one patient (1%). However, endoscopic transpapillary cyst drainage is only appropriate if there is communication between the pseudocyst and the pancreatic ductal system. This is more common in pseudocysts associated with chronic pancreatitis than those associated with acute pancreatitis [1]. The procedure therefore requires careful patient selection.

Recently, a number of centers have used laparoscopic techniques to treat pancreatic pseudocysts that require drainage. Theoretically, laparoscopic surgery proffers advantages of both open and minimally invasive drainage procedures. The laparoscopic approach allows wide drainage of the pseudocyst to prevent recurrence while reducing the high morbidity, mortality, and prolonged hospital stay associated with open surgical procedures. However, in the limited literature available relating to clinical outcome following laparoscopic drainage, bleeding remains a major complication.

Way et al. [16] described the first attempt at internal drainage of a pancreatic pseudocyst using a laparoscopic technique in 1994. The procedure involved a transgastric intraluminal approach and the cystgastrostomy was fashioned using diathermy. Eighteen patients have subsequently undergone this procedure [9]. Successful drainage was achieved in 77%, with a recurrence rate of 6%. There were no deaths, but significant bleeding requiring conversion to an open operation to obtain hemostasis occurred in 12%. Park et al. [11] reported a bleeding complication rate of 25% in a small series of four patients undergoing a similar laparoscopic technique.

Concern about bleeding from the cystgastrostomy has prompted some groups to use a linear hemostatic stapling device to fashion the anastomosis. The use of a linear stapling device to fashion a cystgastrostomy during a laparoscopic drainage procedure was first described in 1994 [8]. The approach to the pseudocyst was through a large anterior gastrotomy to facilitate the use of the stapler. Obermeyer et al. [10] used a similar technique in a series of six patients. The procedure was completed successfully in four patients, and two patients (33%) required conversion to an open operation for technical reasons. One of these patients subsequently bled. The authors do not comment on the site of the bleeding or state whether the linear stapler was used to fashion the cystgastrostomy in this case. A linear stapling device was also used to fashion the cystgastrostomy in a series of nine patients reported by Park and Heniford [12]. There were no reported complications due to bleeding.

In this series, the stapled cystgastrostomy was fashioned through an anterior gastrotomy using a vascular ETS stapling device in all cases. The procedure was completed successfully in 12 of 15 patients (80%), with a recurrence rate of 13% and no mortality. This is similar to the success and recurrence rates reported using other minimally invasive techniques.

There were no complications related to bleeding from the cystgastrostomy, the major complication reported in other series using endoscopic and laparoscopic techniques to fashion the anastomosis. The creation of an anterior gastrotomy to facilitate the use of the stapling device was not associated with any complications. In addition, use of an operative approach allowed definitive management of gallstone disease, the original cause of pancreatitis, by laparoscopic cholecystectomy in five patients. One patient also underwent pancreatic debridement. Concurrent management of related surgical disease is not possible if cystgastrostomy is performed by a nonsurgical technique.

Conclusion

Stapled laparoscopic cystgastrostomy is a safe and effective procedure for draining persistent or symptomatic pancreatic pseudocysts. The creation of an anterior gastrotomy to facilitate a transgastric stapled anastomosis is not associated with an increased complication rate. The use of a hemostatic stapling device to fashion the cystgastrostomy may reduce the risk of catastrophic hemorrhage from the pseudocyst wall, which is the major complication reported in other case series in which minimally invasive techniques have been used to perform cystgastrostomy.

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