

Laparoscopic Drainage Procedures for Pancreatic Pseudocyst: A Review Article

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Abstract

Cystogastrostomy for pseudopancreatic cyst can be performed laparoscopically getting all the benefits of minimal invasive surgery.

This is however an advance laparoscopic surgery requiring experience and upmost skills for safe outcome.

Nowadays it is gaining popularity as it is now standardized and surgeons are gaining more and more experience.

Aim: To evaluate the benefits of laparoscopic procedures for pancreatic pseudocyst over open surgery based on these parameters:

- Selection of patient
- Time and technique of surgery
- Postoperative pain and use of analgesics
- Recovery and hospital stay
- Complications
- Quality of life
- Cost effectiveness

Keywords: Pseudopancreatic cyst, internal drainage, laparoscopic cystogastrostomy, cystojejunostomy, acute pancreatitis.

INTRODUCTION

Pseudocyst of pancreas is collection of fluid in the lesser sac due to pancreatic inflammation and is rich in pancreatic enzymes, necrotic material and serosanguinous fluid.¹

Its wall is made up of granulation tissue so it is called Pseudo (false) cyst as all the true cysts are lined by endothelium.

It occurs as sequelae of acute pancreatitis or acute/progressive pancreatic ductal obstruction in chronic pancreatitis.

Causes of acute pancreatitis are mainly alcohol and gallstones in 75-80% cases, other causes are trauma, drugs, etc.

About 70-80% of all masses in pancreas are pseudocysts.^{2,3}

Pseudocysts can be single or multiple, small or large, outside or within the pancreas.

It takes about 4-6 weeks for the maturation of the wall after acute attack of pancreatitis, many of them can resolve during this period.^{2,4}

Many of the pseudocysts are asymptomatic but they commonly presents as pain and heaviness in upper abdomen, feeling of indigestion and belching. Sometimes presents with complications like infection leading to abscess, bleeding due to erosion of artery, or compression of intestine or stomach.

Asymptomatic cysts are managed conservatively by observation and repeated radiological follow-up by ultrasonography or CT scans.⁵ If the pseudocyst persists for more than 6 weeks or the size is more than 5 cm then they are less likely to resolve spontaneously and there are more chances of complications like infection, bleeding, obstruction, pseudoaneurism and needs decompression to prevent the complications.⁴

It is treated either by internal or external drainage by percutaneous, endoscopic, laparoscopic, or by open surgical procedure.¹

MATERIAL AND METHODS

Articles were searched from Internet of the relevant study (pseudopancreatic cyst) using Yahoo, Highpower Press, Google, Springerlink, Pubmed at Laparoscopy Hospital, New Delhi and analysis done.

PATHOGENESIS

A pseudopancreatic cyst is fluid collection around pancreas, it has pancreatic juice which was leaked out of damaged duct or from cells of inflamed pancreas.¹

These secretions are rich in enzymes which results in digestion of adjacent tissues.⁴

Fluid in pseudocyst contains pancreatic enzymes, hemolyzed blood and necrotic debris.² It may resolve spontaneously or become organized with thick wall of granulation tissue and fibrosis over weeks forming pseudocyst.⁵

ETIOLOGY

Causes of acute pancreatitis are mainly alcohol and gallstones in 75-80% cases, other causes are trauma (blunt or penetrating), drugs, etc.

Chronic pancreatitis as a result of acute exacerbation or due to progressive ductal obstruction.

CLINICAL PRESENTATION

Most of them are asymptomatic.^{2,4}

Clinical symptoms may differ from patient to patient and may mimic any other medical condition. Symptoms occur due to expansion of cyst, Intra-abdominal bleed, fistula formation, obstruction, pleural effusion and infection.

Symptoms includes:

- a. Abdominal pain—vague upper abdomen
- b. Nausea and vomiting
- c. Loss of appetite
- d. Flatulent dyspepsia or belching
- e. Fever
- f. Weight loss
- g. Lump in abdomen
- h. Ascites
- i. Pleural effusion causing difficulty in breathing.

DIAGNOSIS

After detail medical history and examination following diagnostic tests are carried out.

- a. Routine blood test including S amylase and liver function tests
- b. Abdominal ultrasound
- c. CT scan (90-100%) sensitive⁵ information regarding site of pseudocyst, size, type of material or necrotic debris, pseudoaneurism, pseudocyst wall thickness, etc.
- d. MRCP
- e. Endoscopic ultrasound-EUS more useful when endoscopic drainage is also planned
- f. Endoscopic retrograde cholangio pancreatography (ERCP) helpful in recurrent, chronic pseudocyst or suspected ampullary obstruction.

MANAGEMENT

There are various types of treatment available, as treatment is complex it should be performed in an institution where multidisciplinary team of surgeon, radiologist, gastroenterologist and physician work together.¹

Treatment modalities are:

1. Conservative treatment
 2. Percutaneous drainage
 3. Endoscopic drainage
 4. Open surgical drainage
 5. Laparoscopic internal drainage
1. *Conservative treatment:* In asymptomatic patients on regular follow-up with ultrasonography or CT scan for serial monitoring.

It takes 4-6 weeks for pseudocyst to mature and it may resolve during this period.⁴

Complications increases by 50% after 6 weeks which includes bleeding, infection, pseudoaneurism and obstruction.⁴⁻⁶

Asymptomatic cysts of less than 5 cm can be treated conservatively with regular follow-ups and serial monitoring.⁴

2. *Percutaneous drainage:* Usually performed by Interventional radiologist under sonology or CT guided and aspiration of the cyst is done by a 8-14F catheter .

It has significant numbers of complications such as introduction of Infection, hemorrhage and high recurrence rate (70%) as it is not possible to drain the necrotic material.^{1,6}

3. *Endoscopic drainage:* In this gastroenterologist creates a small opening between posterior wall of stomach and cyst endoscopically after passing guide wire, dilating the tract and putting a stent in between. This can be performed through transpapillary approach.

This method is gaining popularity and is highly successful in cysts without much necrotic material.^{8,9}

The disadvantage is that it is not possible to remove necrotic material and in such cases or in large pseudocysts recurrence rate is high.

4. *Open internal drainage:* Open internal drainage is Conventional method for treating symptomatic pseudocyst more than 5 cm size.¹⁰

It can be performed depending on the site of cyst with stomach, jejunum, or duodenum.

Cystogastrostomy is most commonly performed as most of the cysts are retrogastric in lesser sac.^{2,10}

Open procedures includes:

- a. Cystogastrostomy
- b. Roux-en-Y cystojejunostomy
- c. Cystoduodenostomy
- d. Distal pancreatectomy

Indications includes infection, pseudoaneurism, necrosis, need for concomitant drainage for obstruction, distal stricture, etc and if surgeon is not confident for laparoscopic internal drainage.

5. *Laparoscopic internal drainage:* In 1994, J Petelin, Kansas; USA performed first laparoscopic cystogastrostomy.^{2,10}

Laparoscopic intraluminal cystogastrostomy was first described by Gagner and Way et al.^{2,11,12}

Like open internal drainage, pseudopancreatic cyst can be drained into stomach, jejunum, or duodenum depending upon the location of the cyst.

OPERATIVE TECHNIQUE

In intraluminal cystogastrostomy 5 mm trocars are inserted in radially expanding fashion into stomach allowing introduction of 5 mm laparoscopic instruments.^{2,11,12}

Laparoscopic anterior cystogastrostomy was initially described by Meltzer and Amaral and later reported by Holeczy and Danis and is preferred method for mature pseudocyst.^{2,13,14}

Morino et al and later Park et al described posterior cystogastrostomy using endoscopic linear staplers through lesser sac.^{2,15-17}

Laparoscopic anterior transgastric cystogastrostomy is described here for treatment of retrogastric pseudocysts.

Patients Position and Team

Patient is put in modified lithotomy position.

Surgeon stands in between the legs, 1st assistant and nurse on right side and 2nd assistant on left side of patient.

Steps of Surgery

Pneumoperitoneum is created by open or Verres needle technique.

A 10 mm 30° telescope is placed at umbilicus, a right 5 mm and left 10 mm midclavicular ports placed as working ports. A 5 mm subxiphoid port is placed for retracting left lobe of liver if necessary.

Body of stomach was displaced laterally and about 7 cm long anterior gastrotomy was performed by diathermy scissors or monopolar hook or harmonic scalpel.

Position of the cyst was confirmed by needle aspiration and aspirate is sent for biochemical and cytological analysis.

With the help of harmonic or monopolar hook or diathermy scissors, circumferential incision of not less than 4 cm is made taking full thickness of posterior wall of stomach together with cyst wall.

Scope is then introduced into the cyst cavity and debridement performed to remove all the necrotic material followed by thorough cleansing with normal saline.

Hemostasis was secured and interrupted or continuous intracorporeal suturing done between posterior stomach wall and cyst wall.

Nasogastric tube is placed into cyst cavity.

Closure of anterior wall of stomach is performed in one or two layers by intracorporeal suturing or by linear stapling devices.

Peritoneum is lavaged and a drain is placed at Morrison's pouch.

Trocars are removed under vision and large ports are closed.^{1,2}

REVIEW OF ARTICLES

a. In a study by Andrian E. Park and Todd Heniford B, of North Carolina, in 2002, out of 29 patients selected for laparoscopic pancreatic pseudocyst (LPP) surgery, LPP was completely successful in 28 while the procedure aborted in one patient due to extensive gastric varices that were encountered.¹⁸ Laparoscopic distal pancreatectomy (LDP) was attempted in 25 patients and was successfully performed in 23 patients. The mean operating time was 2.8 hours and the mean postoperative hospital stay was 4.4 days.

No major complications were reported in this study.

b. A case note review of all 15 patients who had undergone stapled LCG in Norwich, UK was performed by Hindmarsh, A. et al in 2004.¹⁹ Three procedures were converted to open due to technical problems. Early complications recorded included systemic sepsis in one patient, bleeding gastric ulcer in 2 patients and a pseudocyst recurrence due to partial closure of the CG in two patients. No late recurrences or other complications were noted after a median follow-up of 37 months.

c. At GEM Hospital, India, in 2007, Chinnusamy Palanivelu et al evaluated 108 cases with PP managed laparoscopically.²⁰ LCG was performed in 90 cases (83.4%), LCJ in 8 cases (7.4%), open CG in 2 cases (1.8%), and laparoscopic external drainage in 8 cases (7.4%). The mean operating time was 95 minutes and mean hospital stay was 5.6 days. All operations were successful without any significant intraoperative complications. Two patients were reoperated for bleeding and gastric outlet obstruction while another patient had a late recurrence due to inadequate stoma size and was managed by open CG later. No mortality was reported in the postoperative period.

d. In the UK, Aljarabar, M and Ammori; B, J in 2007, reviewed a total of 118 and 569 patients in 19 and 25 reports respectively, who underwent 118 and 583 laparoscopic and endoscopic drainage procedures, respectively and compared the two groups.²¹

Success rates of achieving resolution of PPs in the laparoscopic and endoscopic series were 98.3% and 80.8% respectively, with morbidity rates of 4.2% and 12%, and mortality rates of 0% and 0.4%, respectively. During follow-up period with a mean of 13 and 24 months, respectively, recurrence rates of 2.5% in the laparoscopic group and 14.4% in the endoscopic group were observed with reintervention rates of 0.9% and 11.8%, respectively.

e. Alejandro Oria et al of a tertiary referral center in Argentina evaluated 10 consecutive patients with giant pancreatic pseudocysts measuring 10 cm or more in diameter in the year 2000.²² Video-assisted pancreatic necrosectomy was performed and a Roux-Y jejunostomy performed. Complete necrosectomy was successful in all the cases with no postoperative retroperitoneal complications or mortality. The mean hospital stay was 8.2 days and no recurrence at a mean follow-up period of 6.9 months.

f. Hauters P, et al of Belgium, in 2004, evaluated 12 patients with pancreatic pseudocyst and operated on by laparoscopic cystogastrostomy (LCG) between 1997 and 2002.²³

The median operating time was 90 minutes (range: 60-140) and a median postoperative hospital stay of 6 days (range: 4-24). One patient developed a postoperative port hematoma and no mortality was recorded. One other patient was readmitted on the 20th postoperative day with cyst infection

due to partial closure of the cystogastrostomy and was treated by endoscopic stenting. No recurrence of pseudocyst was reported.

- g. Ramachandran; C, S. et al performed 5 LCGs for PPs between 1998 and 2001.²⁴ The mean operating time was 110 minutes (range: 92-128) and the mean hospital stay was 4 days. There were no postoperative complications and a postoperative follow-up with ultrasound for over 1 year revealed complete resolution of the cysts in all the patients.
- h. In another series of 17 patients with PP and managed laparoscopically between 1996 and 2001 by Hauters P et al, he observed that 15 patients developed PP after acute pancreatitis and 2 patients had an associated chronic pancreatitis.²⁵ LCG was performed in 10 patients while LCJ was performed in the rest. LPP surgery was successful in 16 patients with a median operative time of 100 minutes (range: 80-300) with no mortality or immediate morbidity recorded and a median postoperative hospital stay of 6 days. There were two patients readmitted within the first 3 weeks with secondary PP infection the first one due to an early closure of the CG who was managed with a stent inserted endoscopically while the second patient who had a large right retrocolic abscess after LCJ was treated by percutaneous drainage. After a median of 12 months (range: 6-36), no recurrence of PP was observed in 16 patients since 1 patient was lost for follow-up.
- i. Teixeira J et al of New York, USA, reported their experience with 8 Roux-en-Y LCJs in 2003 where 6 had alcoholic pancreatitis and two had gallstone pancreatitis patients.²⁶ The mean operating time was 150 minutes (range: 100-215 minutes), mean EBL of 78 cc and a minor complication rate of 20%. No major complications or mortality was reported.

DISCUSSION

Pancreatic pseudocyst has been treated mainly by open surgery by most of the surgeons however with changing trends towards minimal access surgery, it is slowly gaining momentum towards laparoscopic cystogastrostomy which offers all the benefits of minimal access surgery.

As it is an advanced laparoscopic procedure requiring adequate training and experience in intracorporal suturing technique.

It is advisable to carry out this procedure in a multispecialty setup with all the facilities available.

As discussed above many articles are cited with good number of cases for laparoscopic cystogastrostomy at various centers all over the world.

Most surgeon performs cystogastrostomy as it is safe and easy to perform.

Laparoscopic cystojejunostomy and cystoduodenostomy are more difficult and are less commonly performed.

Operating time in most of articles in cystogastrostomy was 90-120 minutes and 150 minutes in cystojejunostomy.

The authors of various studies have not found any significantly high rates of mortality or morbidity.

The average duration of hospital stay was about 5.5 days ranging from 4-8 days but the recovery rate and postoperative pain and use of analgesics was minimal as compared with open surgery.

Most of the articles shows follow-up from 6 to 36 months, in few cases recurrence was reported mainly due to inadequate stoma formation.

CONCLUSION

Laparoscopic surgery for internal drainage of pseudocyst of pancreas is a safe procedure but needs expert skills.

It offers all the benefits of minimal invasive surgery.

As this is an advance laparoscopic surgery careful patient selection and good experience in laparoscopic procedures is necessary.

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