

Original Research Article

A prospective study on surgical versus endoscopic cystoenterostomy

Krishnam Raju V., Supreeth Kumar Reddy*, Mayankkumar Gurjar, Rakesh R.,
Gurudutt P. Varty, Thirunavukkarasu S.

Department of Surgical Gastroenterology, Narayana Medical College, Nellore, Andhra Pradesh, India

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***Correspondence:**

Dr. Supreeth Kumar Reddy,

E-mail: research.nmch1@rediffmail.com

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ABSTRACT

Background: The aim of the present study was to compare endoscopic and surgical modalities in the treatment of pancreatic pseudocysts. Comparisons were based on clinical success, complication rate, recurrence and hospital stay.

Methods: This is a prospective comparative study, enrolling 24 patients, 13 in surgical group and 11 in endoscopic group. The duration of study was from December 2013 to September 2015. The minimum follow up was for at least 6 months.

Results: 13 (54%) of cases were managed surgically, 11 (46%) of cases were treated endoscopically. The clinical success of the endoscopic group was 72.7% versus 100% for the surgical group ($p=0.216$), with a complication rate of 36.4% and 15.3%, respectively ($p=0.659$). The hospital stay was lower for the endoscopic group was 9.82 days compared with 12.08 days in the surgical group. The two recurrences found in the endoscopic group were associated with main pancreatic duct stricture and disconnected pancreatic duct. The duration to oral intake post procedure was lower in endoscopic group 4.36 days ($p<0.001$). 18.2% of patients in endoscopic group required conversion to open surgery.

Conclusions: Non endoscopic ultra sound guided cystoenterostomy has to be phased out. 1/3rd of patients undergoing endoscopic cystoenterostomy require more than 6 months of stent placement. In patients with disruption of the main pancreatic duct, endoscopic intervention is more successful when combined with transpapillary ductal stent placement.

Keywords: Cystogastrostomy, Endoscopic retrograde cholangiopancreatography, Pancreatic pseudocyst, Laparoscopic cystogastrostomy

INTRODUCTION

A pancreatic pseudocyst is a localized collection of fluid rich in amylase, located within or adjacent to the pancreas and enclosed by a non-epithelial wall, which may develop as a consequence of pancreatic inflammation or injury. Pancreatic pseudocysts are the most common complication of acute or chronic pancreatitis.¹ The first description of a pancreatic pseudocyst is attributed to Morgagni in 1761.² Dentu reported the first attempt at percutaneous management of pseudocyst in 1865.³

Bowman described the first case treated operatively in 1882.⁴ Pancreatic pseudocysts constitute about 70-80% of all masses in the pancreas. Initial management is conservative, expecting spontaneous resolution. Most of the pseudocysts are asymptomatic and resolve spontaneously. Treatment is required only in the case of persisting pancreatic pseudocysts causing symptoms such as abdominal pain, complicated with infection or compression of the gastrointestinal tract, pancreatic duct or the common bile duct. The standard drainage procedure is cystogastrostomy by laparotomy. This is

associated with a significant morbidity like pain, ileus, prolonged hospital stay and late wound complications like incisional hernia.⁵⁻⁷ Minimal access techniques can reduce this morbidity. Radiological guided, laparoscopic and endoscopic drainage are minimal access techniques.^{5,6,8-10}

Endoscopic drainage is a minimally invasive alternative which may be performed by a trans-papillary or a transmural approach. Drainage of the cyst fluid by the transmural approach is achieved by inserting a stent between the pseudocyst and the gastric lumen (cystogastrostomy) or between the pseudocyst and the duodenal lumen (cystoduodenostomy). The drainage procedure may either be performed by endoscopy as a "semi-blind" procedure if an impression caused by the cyst is present or by direct endoscopic ultrasonography (EUS) guidance.

However these techniques need equipment, accessories and training. Therefore an evaluation of these techniques as compared to open surgery is required. Hence, current study designed to evaluate the efficacy, complications, recurrence and hospital stay in endoscopic and surgical modalities for the treatment of pancreatic pseudocysts.

METHODS

This is a prospective study conducted in the Department of Surgical and Medical Gastroenterology, Narayana Medical College, Nellore from December 2013 to September 2015. The study population is taken from the patients visiting the Departments of Surgical Gastroenterology and Medical Gastroenterology in Narayana Medical College and Hospital during this study period. Pancreatic pseudocyst was defined based on Revised Atlanta definition. All patients were evaluated routinely with a contrast-enhanced Computed tomography (CT) scan.

Inclusion criteria

Diagnosis of pancreatic pseudocyst was based on CT criteria. Pseudocyst measuring ≥ 6 cm in size. Persistent pancreatic pain requiring analgesics. Symptomatic gastric outlet or bile duct obstruction induced by the pseudocyst.

Exclusion criteria

Pseudocysts previously treated by percutaneous management. Age with >80 years were excluded from the study. Contraindications to surgery were ASA class IV, severe portal hypertension. Contraindication to endoscopic drainage was gastrectomy with Billroth II reconstruction, gastric bypass surgery and prior surgery for pancreas-related complications. Pregnancy associated pancreatic necrosis on CT and multiloculated pseudocyst.

Primary outcomes

Treatment success rate will be defined as radiological

disappearance of pancreatic pseudocyst and absence of clinical signs and symptoms.

Secondary outcomes

Recurrence rate, number of re-interventions, length of hospital stay, periprocedural complications and mortality.

Endoscopic intervention

All patients underwent the same procedure, endoscopic ultrasound guided cystogastrostomy, which was performed in the fluoroscopy suite. Informed consent was obtained from all patients.

The video endoscopes used in the procedure are FUJINON EG-430WR video endoscope and PENTAX EG-3870UTK ultrasound video endoscope.

The procedure was performed under total intravenous anaesthesia in the presence of a qualified anaesthetist and assistant. Intra procedural and post procedural broad spectrum antibiotics were given to all patients.

The steps of the procedure included using the video endoscopic function of the endoscope, gastroduodenoscopy was performed and the cystic lesion was identified as a bulge in the gastric lumen. The cystic lesion was examined ultrasonographically. The optimal puncture site was determined using the linear scanning function. Doppler assessment of the gastric wall at the puncture site was also obtained.

The parameters precluded the continuation of the procedure was presence of intervening vessels, gastric-pseudocyst wall interface at the puncture site greater than 10 mm and presence of debris or organized material in the cyst.

After determination of the optimal site for puncture, pancreatic pseudocyst was punctured with cystotome using the knife tip of the inner catheter and then entered with the inner catheter. Electrocautery was performed with needle knife settings (COAG power 25-30 W and autocut to 80-100 W). The metal part of the inner catheter was then withdrawn leaving the Teflon catheter in the pancreatic cyst. A sample of cyst contents was then aspirated and submitted for biochemical, cytological and tumor markers analysis. A 0.035 inch guidewire was passed through the inner catheter into the cyst cavity. The guidewire position was confirmed using fluoroscopy. The outer 10 Fr sheath of cystotome is equipped with a diathermy ring, it was advanced through the puncture site using electrocautery, with needle knife, settings (COAG power 25-30 W and autocut to 80-100 W), thus enlarging the puncture site. The cystotome was then removed leaving the guidewire in the cyst cavity. This was followed by dilatation of the puncture site with an 8 mm dilator balloon over-the-wire.

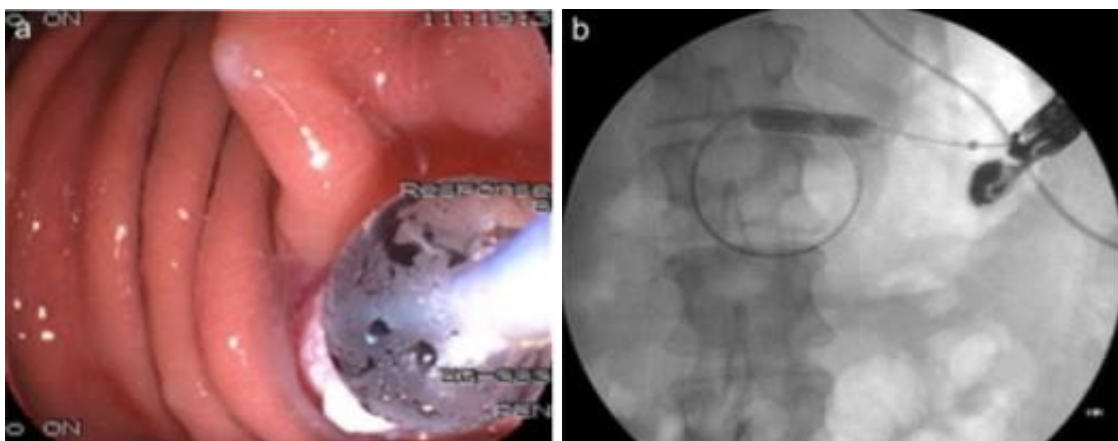


Figure 1: Endoscopic and fluoroscopic monitoring of balloon dilation of cystostomy; (a): endoscopic view and (b): fluoroscopic view.

A 10 Fr double pigtail stent was placed over-the-wire under endoscopic and fluoroscopic monitoring. The puncture site and the pancreatic pseudocyst were cannulated with a guidewire using a standard papillotome and then a second double pig tail stent was placed into

the cyst cavity under endoscopic and fluoroscopic control if deemed appropriate by the interventionist. Pancreatic pseudocyst was then reassessed endosonographically. A nasocystic drain was placed when deemed necessary by the interventionist. All patients were observed for 24-48 hours post procedure.

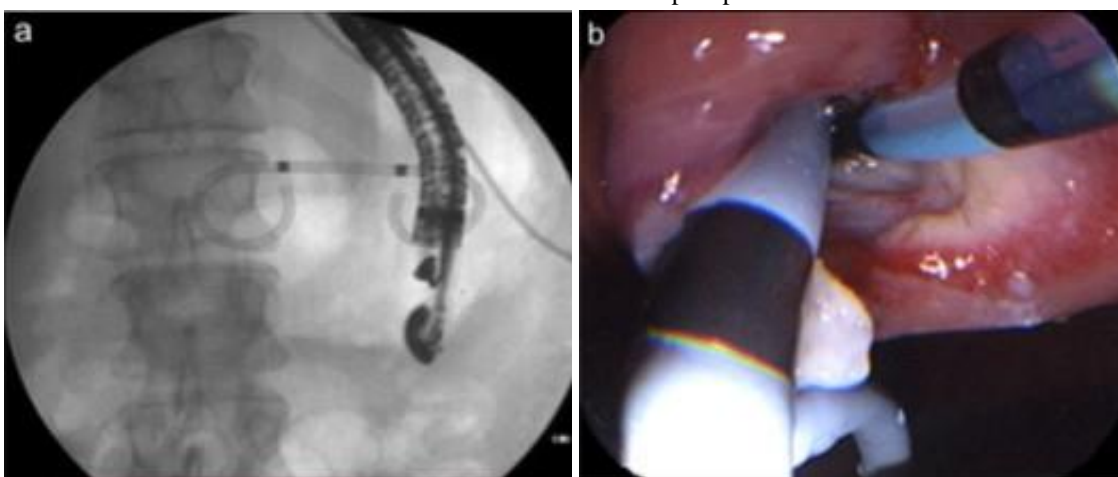


Figure 2 (a): Fluoroscopic view showing double pig tail 10 Fr stent placed in to the pancreatic pseudocyst and (b): cannulation of cystostomy using sphincterotome and guidewire.

All patients underwent re-assessment of pseudocyst size at the time of their discharge, at 6 weeks and at 6 months using ultrasound abdomen. The pigtail catheter was removed on follow up after resolution of the pseudocyst.

Technique of cystogastrostomy

All surgeries were performed by one pancreatic surgeon. After administration of intravenous cefoperazone sulbactam 1.5 g IV stat, an incision was made between the umbilicus to xiphoid process, to allow access to the abdomen. The anterior gastric wall was opened opposite the proposed opening in the posterior gastric-anterior pseudocyst wall. The posterior gastrostomy was within the area of inflammatory adherence to decrease tension on the sutured anastomosis between the posterior

stomach wall and the pseudocyst wall. Preoperative planning based on CT or other imaging data was taken into account. Factors such as location, bulge, wall thickness and the proximity of intervening structures were noted

After the anterior gastric wall is opened and prior to making an incision in the posterior gastric wall, aspiration with a syringe through the posterior wall into the pseudocyst was done. The needle is passed through the common wall into the pseudocyst. This assists in localization as well as predicts the thickness of the common wall.

Electrocautery is the used to make an elliptical excision in the combined wall along the longitudinal axis of the

stomach. The four quadrants of the cystogastrostomy are then secured with an interrupted full-thickness 2-0 synthetic absorbable suture. Then closely spaced (<1 cm) interrupted full-thickness sutures are placed, both to control bleeding from the cut edges and to ensure apposition and seal of the gastric and pseudocyst walls. The anterior gastrotomy is then closed.

Technique of cystojejunostomy

Cystojejunostomy was done with a Roux-en-Y limb of jejunum, when the pseudocyst presented bulging through the transverse mesocolon, drainage was carried out directly through the transverse mesocolon, taking care to avoid the middle colic vessels. If the pseudocyst is not readily accessible through the mesocolon and the stomach could not be used, it was approached through the lesser sac and the Roux-en-Y limb of jejunum was brought up through a window in the mesocolon. For the Roux limb, the jejunum was divided 20-30 cm from the duodenojejunal flexure and the blind end closed in two layers, inner continuous vicryl and outer interrupted silk. Sutures and staplers were not used during surgery.

An elliptical incision in the pseudo-cyst wall is made as long as possible and a transverse side-to-side anastomosis is constructed using a single layered technique. The single layer technique was preferred to decrease the number of sutures and needle passes through the pseudocyst wall. Mesenteric defects were closed, and a side-to-side jejunojejunosomy was created 30-40 cm distal to the cystojejunostomy using hand-sewn anastomosis. Drain was placed in the vicinity of the cystojejunal anastomosis.

RESULTS

In this study the upper limit of the age group was set at 80 years, the youngest patient was only 2 years old. The eldest patient was 58 years old. The mean age was 33.69 years in the surgical group. In the endoscopic group the mean age was 38.64 years. Most patients in this study presented with a pseudocyst in their 4th decade of life, with pancreatic pseudocyst being uncommon in the extremes of age.

The male to female ratio in this study was 7:1. In the surgical group 92.3% of patients were male; in the endoscopic group 81.8% of patients were male.

Overall, 87.5% of patients in this study were male compared to 12.5% female patients. Most studies have shown a male preponderance ranging between 60-85%.

Alcohol was the most common aetiological factor. Besides this, as far as aetiology of pancreatitis is concerned 6-36% of pseudocysts arise in gallstone-induced pancreatitis, 3-8% in post-surgical or traumatic pancreatitis, rarely after hyperlipidaemia-induced

pancreatitis and in 6-20% no cause is found (idiopathic pancreatitis).

The most common location of the pseudocyst was in the body of pancreas. This amounted to 58.3% of patients. The tail of pancreas (16.7%) was the second most common location, this was followed by the head of pancreas (12.5%).

While serum amylase levels have been consistently low in the study group, the serum lipase levels showed better sensitivity. More than 54% of patients showed a >3 times elevation of serum lipase. Only 8.3% of patients had a normal serum lipase level at the time of presentation with pseudocyst. Another 37.5% of patients showed a <3 times elevated lipase in their serum.

Pseudocyst of pancreas occurs as a sequela of acute or chronic pancreatitis. Incidence of pancreatic pseudocyst is significantly higher in males. Alcohol is a very important determinant in pseudocysts associated with pancreatitis. The mean duration of hospital stay was 3 days lesser in patients undergoing endoscopic cystogastrostomy. Serum lipase has a better correlation, compared to serum amylase in the evaluation of pseudocyst of pancreas. Size of the pseudocyst has no association with treatment outcome. Size of the pseudocyst is related with communication to the main pancreatic duct. The regression of the pseudocyst is earlier following surgery compared to endoscopic minimal interventions. Pseudocysts are more common in the body of pancreas, followed by tail and head of pancreas. Patients undergoing endoscopic interventions require more number of procedures compared to those undergoing surgery. All patients in the surgical group underwent internal drainage only. External drainage or pancreatic resection was not done for any patient in this study.

Hospital stay

The mean duration of hospital stay in surgical group was 12.08 days as compared to 9.82 days in endoscopic group. All patients in surgical group required more than 1 week admission, 45.45% of patients in endoscopic group were discharged within 1 week of hospital admission

The mean hospital stay in other comparative studies is mentioned in the table ranging from 2 days to 4 days.

Duration to oral intake

The mean duration to oral intake in the surgical group was 6.62 days as compared to 4.36 days in the endoscopic group, 72.7% of patients were able to tolerate oral feeds within 5 days of endoscopic intervention as compared to only 15.4 % of patients in the surgical group within the same duration. More than 60% of patients were able to tolerate feeds by 4th post procedure day. This difference was statistically significant with a p value <0.001.

Table 1: Comparison of clinical or biochemical parameters, symptoms, risk factors and post-surgical follow up of patients undergone surgical and endoscopic cystoenterostomy.

Group	Age (years)	Gender	Duration of hospital stay (days)	Alcohol intake N (%)	Serum amylase (U/l)	Serum lipase (U/l)	Pseudocyst location	Complete resolution of pseudocyst	Probable cause	Number of interventions	Recurrence
Surgical group	Range: 2-58	12:1 [M:F]	Range: 9-20	8 (61.5)	Range: 148-2555	36-944	Body or tail-4 Tail-2 Body-5 Head-1 Subdiaphragmatic and body-1	6 months- 4 6 weeks-9	CCP-1 AP-5 CP-5 ANP-1 Trauma-1	One time-11 Two times-2	Positive: 0
	Mean: 44.6		Mean: 10.3		Mean: 176.7	Mean: 230.6				0%	
	Range: 16-58	9:2 [M:F]	5-21	8 (72.7)	84-2331	250-4076	Body or tail-5 tail-2 Head or body-2 Head-2 Body-1	6 months-6 6 weeks-5 >6 months-2	AP-4 ANP-3 CCP-2 CP-2	One time- 6 Two times- 5	
Mean: 31.54		Mean: 5.67		Mean: 672.3	Mean: 1237.8				18.1		

ANP: Acute necrotising pancreatitis; AP: Acute pancreatitis; CCP: Chronic calcific pancreatitis; CP: Chronic pancreatitis.

The patients undergoing endoscopic interventions for pseudocyst management have a shorter interval to return to oral feeding. Pseudocysts associated with abnormalities of the main pancreatic duct such as non-stentable stricture or a disconnected pancreatic duct has a higher chance of treatment failure following endoscopic cystoenterostomy. 1/3rd of patients undergoing endoscopic cystoenterostomy require more than 6 months of stent placement.

In patients with disruption of the main pancreatic duct, endoscopic intervention is more successful when combined with transpapillary ductal stent placement.

Rate of regression

In this study the rate of regression of the size of pseudocyst is faster following surgical intervention as compared to endoscopic procedures. Only 30.8% of patients in the surgical group showed a persistent pseudocyst (size >2 × 2 cm) on repeat imaging as compared to 54.5% of patients in the endoscopic group.

2 patients in the surgical group and 5 patients in endoscopic group required more than 1 procedure during the course of their hospitalization.

Even though 45.5% of patients in the endoscopic group required a second procedure as compared to 23.1% in the surgical group. This difference did not attain statistical significance.

2 patients required additional stent placement, while 1 required coil embolization for a distal gastroduodenal artery bleeding aneurysm.

Both patients in surgical group that underwent an additional procedure did so for management of post-procedural bleeding. One patient, 31 year old male suffering from chronic pancreatitis had upper GI bleed post procedure, endoscopy revealed hemosuccus pancreaticus. This patient underwent a relaparotomy and ligation of gastroduodenal artery for hemostasis.

The second patient, a 34 year old male also with chronic pancreatitis, has undergone a Roux-en-Y cystojejunostomy for pseudocyst in head of pancreas, he had hematochezia 3 days post procedure. CT angiogram showed bleeding in the head of pancreas. Successful coil embolization of gastroduodenal artery was done for this patient.

Procedure related complications

A total of 4 late complications occurred in 3 patients in the endoscopic group. These included 1 post-procedural bleed, 2 patients with new onset fever and 1 patient who had persistent pain post procedure which was relieved by additional stent placement.

DISCUSSION

Management options available for pancreatic pseudocysts include endoscopic, radiologic (percutaneous), surgical (open surgery or laparoscopic drainage), and conservative (medical) treatment. The traditional treatment for pancreatic pseudocyst has been surgical which has proven to be therapeutically effective and was considered the gold standard.^{11,12} In recent years, there have been rapid gains in lesser invasive interventional techniques.

Endoscopic drainage is a recent intervention that provides continuous drainage via an endoprosthesis stent or a nasocystic tube placed in a fistulous tract between the upper GI tract and the pseudocyst. It was initially only applied in cases of well-defined compression resulting from the pseudocyst. If the pseudocyst involves the gastric wall (e.g., the mucosa in the prominence emerges with a dark colour or “mosaic” sign), this treatment will be even more efficient. However, because it is a blind procedure, the risk of complications remained high until the introduction of therapeutic EUS.

Our series compares between EUS guided endoscopic transmural drainage versus open cystogastrostomy or cystojejunostomy. Our study includes only one case of laparoscopic cystogastrostomy.

The highest incidence of pancreatic pseudocysts can be found in patients with chronic pancreatitis due to alcohol abuse. In a study of 97 patients with pseudocysts, alcohol consumption was found to be the causative factor in 64% of patients with chronic pancreatitis and in 26% of patients with acute pancreatitis.¹³

As in other studies, alcohol was the most common aetiological factor.^{14,15} In this study more than 66.7% of patients gave a positive history of alcohol intake, signifying the importance of alcohol as one of the most important determinants, if not an etiological factor for pancreatitis and pseudocyst formation.

In our study only one patient in the surgical group had associated gall stones for which laparoscopic cholecystectomy were done in the same sitting as cystogastrostomy. In our study the mean pseudocyst size in the endoscopic group was the highest compared to similar other studies. Pseudocysts in the head of the pancreas are amenable for cystoduodenostomy if they are <1cm from the duodenal lumen.

The incidence of pseudocysts ranges from 5-16% in acute pancreatitis, whereas in chronic pancreatitis the numbers are higher and incidence rates of 20-40% have been published even in cohorts where advanced imaging techniques were not employed.^{16,17}

In this study we have routinely sent serum amylase and serum lipase for all patients. Only 29.2% of patients with

pseudocyst showed a >3 times elevation of serum amylase levels at the time of presentation. Almost 41.7% of these patients had a normal serum amylase level, this shows the very low sensitivity of serum amylase in

detecting a pancreatic pseudocyst. This finding implicates that serum lipase has a much better sensitivity in detecting pancreatic pseudocyst than does serum amylase.

Table 2: Patient characteristics in comparative studies.^{18,19,21,22}

Author	Type	N	Male	Age	Pseudocyst size	Cause N (%)		
						GAL-ST	ALC	Others
Saul et al	Endoscopy	21	13 (61.9)	44±12	6.7	8 (38)	1 (4.8)	12 (57.1)
	Surgery	43	29 (67.4)	40±4.5	10	17 (39.5)	8 (18.6)	18 (41.9)
Varadarajulu et al	Endoscopy	20	12 (60)	48±14	10.5	6 (30)	11 (55)	3 (15)
	Surgery	20	16 (80)	51±17	11	10 (50)	4 (20)	6 (30)
Johnson	Endoscopy	24	--	52	9.5	5 (20.8)	8 (33)	11 (45.5)
	Surgery	30	--	49	9.1	8 (26.7)	8 (26.7)	14 (46.7)
Present study	Endoscopy	11	9 (81.8)	38.64	12	0	8 (72)	3 (27.2)
	Surgery	13	12 (92.3)	33.69	10.4	1 (7.6)	8 (61)	4 (30.7)

Table 3: Details of procedure.

	Saul et al	Varadarajulu et al 2013	Johnson et al	Melan et al	Varadarajulu et al 2008	Present study
Endoscopic (n)	TG (16)	CG (20)	CG (12)	CG (45)	CG (20)	CG (11)
	TD (5)		TP (6) Combined (6)			
Surgical (n)	Open drainage (13)	CG (20)	CG (14)	CG (22)	CG (10)	CJ (4)
	CG (10)		CJ (5)			
	CJ (8)		CD (4)			
	Other (12)		Other (7)			
EUS application	None	All	Partly	Partly	All	All

Endoscopic conventional transmural drainage

Conventional transmural drainage was the endoscopic procedure of choice to drain PFCs in the early era of endoscopic PFC management. This procedure consists of endoscopically visualizing the PFC bulge in the gastric wall, creating a fistulous tract between the pseudocyst cavity and the gastric lumen using a seldinger technique, advancing a guidewire into the pseudocyst cavity, dilating the tract and finally deploying one or more plastic stents to secure apposition and allow for continuous drainage.²⁰ None of the patients in this study underwent non EUS guided drainage of the pseudocyst.

Endoscopic EUS guided drainage

The use of EUS in pseudocyst drainage provides endoscopists with the ability to identify and avoid vascular structures between the cyst and the gastric lumen to measure the distance between the lumen and the cystic lesion and ensure that adequate apposition can be obtained to localize non-bulging pseudocysts that are

otherwise unidentifiable using endoscopy alone, and to confirm the lack of solid or necrotic components within the pseudocyst cavity.

Open surgery

All patients in the surgical group underwent internal drainage only. External drainage or pancreatic resection, was not done for any patient in this study. Controversy continues to animate discussion as to whether cystgastrostomy should be preferred to cystjejunostomy. There is no definitive answer from the review of the literature and in particular there is a lack of randomised controlled clinical trials. The proponents of cystgastrostomy argue that it is a relatively simple and quick procedure with a low infection rate.

One patient in endoscopic group had a prolonged recovery in the hospital due to multiple comorbidities, requiring more than 3 weeks of admission. The disparity in hospital stay in the endoscopic group in this study could be attributed to the high incidence of comorbidities in these patients.

Table 4: Comparison of current study procedure with various other's studies.

Saul et al		Varadaraulu et al 2013	Johnson et al	Melan et al	Varadarajulu et al 2008	Present study
Method to increase tract diameter	Needle	Balloon	Balloon	Balloon	Balloon	Balloon
	Knife					
Type of stent	2 double pigtail plastic stents	2 plastic stents	1 or 2 double pigtail stents	Double pigtail catheters	2 double pigtail plastic stents	1 or 2 double pigtail stents
Presence of disconnected duct	Endoscopy 13 (61.9) Surgery 7 (16.3)	Endoscopy 15 (75)	NM	NM	NM	Endoscopy 1
Placement of transpapillary stent	NM	Endoscopy 10 (50)	NM	NM	Endoscopic 12(60)	Endoscopy 1

Rate of regression

In this study the rate of regression of the size of pseudocyst is faster following surgical intervention as compared to endoscopic procedures. Only 30.8% of patients in the surgical group showed a persistent pseudocyst (size >2×2 cm) on repeat imaging as compared to 54.5% of patients in the endoscopic group.

None of the patients in the surgical group and 27.3% of patients in endoscopic group showed a persistent pseudocyst on imaging at 6 months post treatment.

In our study the stent could be removed within 6 months in 45.4% of patients, 27.3% of patients required stent for more than 6 months duration. 2 patients in the endoscopic group who required reintervention had their endoscopic stents removed at the time of open surgery. In one patient the stent could not be visualized at follow up upper GI endoscopy. In our study the rate of regression of pseudocyst at 6 months was better in surgical group. The statistical analysis for this was suggestive of significance (p=0.082).

Number of procedures

All patients in this study were admitted with the intent of undergoing only 1 intervention, either surgery or endoscopic procedure for the treatment of their pseudocyst. Follow up upper GI Endoscopy for stent removal was not considered as an additional procedure.

2 patients in the surgical group and 5 patients in endoscopic group required more than 1 procedure during the course of their hospitalization. Even though 45.5% of patients in the endoscopic group required a second procedure as compared to 23.1% in the surgical group. This difference did not attain statistical significance.

Endoscopic group

Two of these patients required conversion to open surgery due to pancreatic duct related abnormalities. One of these patients, a 58 year old female, had a persistent pseudocyst at 1 year post endoscopic cystogastrostomy. During follow up ERCP was done which showed a stricture in distal body of pancreas with dilatation of the main pancreatic duct. She subsequently underwent pancreaticojejunostomy which was successful in resolving the pseudocyst.

The other patient who required conversion to open surgery was a 40 year old male with chronic calcific pancreatitis, this patient also had persistent pseudocyst 6 months after endoscopic cystogastrostomy. He had an associated pancreas divisum for which minor duct papillotomy was done at the time of endoscopic cystogastrostomy. Follow up imaging after 6 months revealed a disconnected pancreatic duct for which he underwent a lateral pancreaticojejunostomy. 2 patients required additional stent placement, while 1 required coil embolization for a distal gastroduodenal artery bleeding aneurysm. There was no procedure related mortality in this study. All patients underwent a successful procedure in the first attempt in both the groups. None of the patients in either group had any early complication. 2 patients in the surgical group had post procedural bleed which was managed as mentioned previously. As mentioned previously, 2 patients (18.2%) in the endoscopic group required conversion to open surgery. Both of them had a persistent pseudocyst almost upto 1 year post procedure. Both of them had associated main pancreatic duct abnormalities, one with a stricture in body of pancreas and the other with a disconnected pancreatic duct. LPJ to a Roux-en-Y limb of jejunum was successful in both of them.

CONCLUSION

The mean duration of hospital stay was 3 days lesser in patients undergoing endoscopic cystogastrostomy. Pseudocysts are more common in the body of pancreas followed by tail and head of pancreas. Patients undergoing endoscopic interventions require more number of procedures compared to those undergoing surgery. The procedure related complications are more common following endoscopic interventions. The long term treatment success of endoscopic cystoenterostomy is inferior to that of surgery. The patients undergoing endoscopic interventions for pseudocyst management have a shorter interval to return to oral feeding. Non EUS guided cystoenterostomy has to be phased out 1/3rd of patients undergoing endoscopic cystoenterostomy require more than 6 months of stent placement. In patients with disruption of the main pancreatic duct, endoscopic intervention is more successful when combined with transpapillary ductal stent placement.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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