

Case Series of Drainage of Pancreatic Pseudocysts Guided by Echoendoscopy without Fluoroscopy

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Abstract

Introduction: Pancreatic pseudocysts can be drained by surgical, laparoscopic, percutaneous, and endoscopic methods. Endoscopic methods have become the most widely accepted nowadays since they are simpler and generate less morbidity and mortality. They have always been associated with the use of fluoroscopy, which adds complexity. This study presents our drainage technique which is guided by echoendoscopy rather than fluoroscopy. **Materials and methods:** The objective of this study is to describe a technique for drainage of pancreatic pseudocysts which does not use fluoroscopy to guide the endoscope. Instead, echoendoscopy guides the instrument. We report a case series of 10 patients who underwent transgastric drainage and describe the technique, complications and results during follow-up. **Results:** Ten consecutive patients, five women and five men, were included in this study. Ninety percent were cases in which the body of the pancreas had been compromised. Cystogastrostomy was successfully performed in nine patients. It consisted of implantation of a transmural metallic stent under single endoscopic guidance. In one patient the stent was not released and aspiration drainage was performed. The nine patients who had stents implanted have presented no recurrences, but the patient who underwent aspiration drainage presented recurrence in the body of the pancreas. The main complication was migration of the stent into the pseudocyst cavity which occurred in one patient and which required a second endoscopic procedure to remove the stent. **Conclusions:** Transmural drainage of pancreatic pseudocysts through placement of stents is a safe, effective and minimally invasive technique for the treatment of pancreatic pseudocysts.

Keywords

Pancreatitis, pseudocysts, echoendoscopy, drainage.

INTRODUCTION

A pancreatic pseudocyst is defined as a collection of liquid rather than solids that is surrounded by a well-defined wall and which is located in the tissue of the pancreas or the tissue surrounding it. (1) Pancreatic pseudocysts are local complications caused by ruptures of the pancreatic duct in acute or chronic pancreatitis, by trauma or by obstruction of the pancreatic duct. Damage to the duct leads to accumulation of pancreatic juice which is then enclosed by a non-epithelial wall over four to six weeks thus forming a pseudocyst. (2)

Most pancreatic pseudocysts are asymptomatic, but symptoms can occur during the clinical course of the condition. They are associated with complications and present with abdominal pain, fever, jaundice, early satiety, weight loss, bleeding and emesis. (3)

Indications for drainage of pseudocysts are persistent pain, gastric obstruction, duodenal obstruction, biliary obstruction, ascites, pleural effusion, progressive enlargement during imaging follow-up, signs of infection or bleeding, possible malignancy and sizes larger than 6 cm. Nevertheless, when pseudocysts are large, there are diver-

gent opinions. If they are completely asymptomatic, they do not merit treatment. (4)

Pancreatic pseudocysts can be drained by surgical, laparoscopic, percutaneous, and endoscopic methods. (5-7) Traditionally, surgical management was the treatment of choice, but because of the recent development of endoscopic techniques management has evolved towards minimally invasive approaches. (8) Pancreatic pseudocysts can be drained endoscopically using either a transpapillary or transmural approach since the pancreas is connected to the main pancreatic duct. Sometimes the combination of both methods may be necessary. (2, 8) Transmural drainage is achieved by inserting a stent between the pancreatic pseudocyst and the gastric lumen (cystogastrostomy) or the duodenal lumen (cystoduodenostomy). It can be performed by a direct but half-blind endoscopic procedure if there is a gastric or duodenal bulge produced by the cyst, or it can be performed using echoendoscopy to guide the procedure. This has significantly higher rates of success. (4, 9-11) Transmural drainage guided by echoendoscopy can also be performed in combination with fluoroscopy. Echoendoscopy is necessary to guide the needle into the cystic cavity and fluoroscopy is necessary to confirm access into the cystic cavity by injection of contrast medium for rolling up the hydrophilic guidewire in the cavity while releasing the stent. The technique starts by locating the pseudocyst by echoendoscopy, puncturing it with a 19ga endoscopic needle, removing the stylet, and applying contrast medium through the needle. This allows full identification of the cyst with fluoroscopy. Then a 4.5 mm hydrophilic guidewire is inserted into the cavity of the cyst. It is best to use several turns to ensure access. The puncture needle is removed and a 7 French bile dilator with a pneumatic pistol is passed over the guidewire. The balloon is inflated and the pathway between cyst and the gastric wall is dilated by the stent. A self-expanding metallic stent or a double-pigtail plastic stent may be used. (12-15). The stent is removed after six to eight weeks once a computerized axial tomography (CT) scan of the abdomen verifies that there is no residual collection of liquid. (13)

This series of cases reports the experience of our group with pancreatic pseudocyst drainage using a new technique guided by endoscopic ultrasonography without the need for fluoroscopy and without dilatation of the gastric wall.

MATERIALS AND METHODS

This paper presents a consecutive series of patients who were diagnosed with symptomatic pancreatic pseudocysts and treated between December 2013 and July 2015.

The procedures were performed under sedation guided by an anesthesiologist with a combination of propofol and remifentanyl in the gastroenterology room of El Tunal

Hospital. All drains were transmural and were guided by a Pentax brand echoendoscope with linear endosonography and performed by an endoscopist with experience in interventional procedures. In all cases, partially or totally coated self-expanding metal stents (SEMS) were implanted, but in some cases a double-pigtail stent was also placed inside the metal stent to prevent migration.

Follow-up examinations were performed with contrast abdominal CT scans six weeks after the procedure to evaluate the evolution of the pancreatic pseudocyst. Once the pseudocyst had resolved, upper digestive endoscopy was performed to remove the transmural stent.

Description of the Technique

We used and evaluated the following technique in this study.

- Once the pseudocyst has been located with the linear echoendoscope, 7.5 MHz Doppler is applied to the wall that separates the cyst from the stomach in order to rule out the presence of any important vessels.
- Then, the cyst is punctured with a 19ga puncture needle (Expect, Boston Scientific).
- The needle-lock is set, and the fluid is aspirated.
- A sample is sent for Gram staining and culturing whenever needed.
- The stylet is removed and the guide is advanced three to four 4 turns inside the cyst.
- The lock is reset so that the sheath of the needle can be released, and the cyst is punctured again, but only with the sheath (leaving the lock at a setting that allows the needle to move.) This allows the opening in the cyst to be extended for needle removal.
- Once the needle is removed, the guidewire is removed and the rubber stopper is placed in the working channel to prevent any escape of air which can make the procedure difficult.
- The self-expanding metal stent (10 mm x 60 mm or 10 mm x 80 mm) is mounted on the guidewire, then released after using ultrasound to observe how the distal end opens.
- The endoscopic image then shows how the proximal end is released.

RESULTS

We included 10 patients diagnosed with pancreatic pseudocysts (Figure 1) who had undergone transmural echoendoscopic drainage. The most important demographic variables are presented in Table 1.

Five patients (50%) were women. Ages at presentation were between 11 and 68 years of age. The average diameter was 10.6 cm (5cm to 22 cm). Ninety percent of the cases

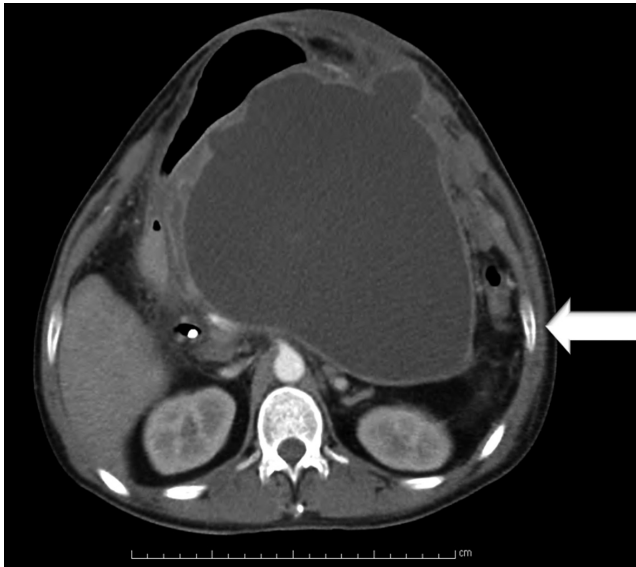


Figure 1. Abdominal CT scan with contrast. The arrow points to the pancreatic pseudocyst.

compromised the body of the pancreas. A transmural stent (cystogastrostomy) was successfully implanted in 9 patients (90%) (Figure 2). Only partially or totally covered self-expanding metal stents were placed in six patients, but metal stents with 10 Fr double-pigtail plastic stents inside were placed in three patients. Drainage of one patient was performed by aspiration with a resolution of 95% of the lesion size since the pseudocyst was 5 cm. During the procedure

on one patient, the metallic stent was released into the cavity of the pseudocyst which required the placement of another metallic stent and at a second endoscopic procedure. Forty-eight hours later, the stent was removed and repositioned by entering the cavity with a pediatric endoscope.

According to the echoendoscopic findings, 80% of the lesions corresponded to pancreatic pseudocysts and 20% to collections of liquid with walled-off pancreatic necrosis. There were no deaths associated with the procedure. Abdominal CT scans were performed 6 weeks after the procedure (Figure 3). Complete resolution of the pseudocyst without complications was evident in 90% of the cases. The lesions of all patients who underwent cyst gastrostomies completely resolved, the patient who underwent aspiration drainage suffered recurrence of the pseudocyst in the pancreatic body four weeks later.

DISCUSSION

Transmural drainage (cystogastrostomy) of pancreatic pseudocysts is a minimally invasive endoscopic procedure. As experience in therapeutic echoendoscopy has increased, drainage of pancreatic pseudocysts using this method has also increased. It is not the first line of treatment for symptomatic pancreatic liquid collections and has replaced the surgical and percutaneous approaches. (16)

The 90% rate of success and the recurrence rate of our study are similar to those found in previously published studies of drainage using only one endoscopic procedure. (17-19)

Table 1. Demographic variables of patients

Patient	Gender (M/F)	Age (years)	Indication	Location	Size (cm)	Finding	Stent	Complication
1	M	59	PP	Body	12	PWN	FCS 10 x 60 mm	None
2	M	49	PP	Body	22	PP	FCS 10 x 60 mm	None
3	F	26	PP	Tail	10	PP	FCS 10 x 80 mm	None
4	F	61	PP	Body	6	PP	FCS 10 x 60 mm y DPT 10 Fr x 10 cm	None
5	M	52	PP	Body	20	PP	FCS 10 x 80 mm	None
6	F	60	PP	Body and Tail	6	PP	FCS 10 x 60 mm y DPT 10 Fr x 10cm	None
7	M	62	PP	Body	8	PP	FCS #2 10 x 60 mm	Failure to release stent in pseudocyst
8	F	51	PP	Body	5	PP	Aspiration	None
9	M	11	PP	Body	10	PP	FCS 10 x 60 mm y DPT 10 Fr x 10 cm	None
10	F	68	PP	Body	7	PWN	PCS 10 x 60 mm	None

DPT: Double pig-tail stent; F: female; M: male; PCS: partially coated SEMS; FCS: fully coated SEMS; PWN: pancreatic wall necrosis; PP: pancreatic pseudocyst.



Figure 2. Contrast abdominal CT scan at one week follow-up on patient shown in Figure 1. Pancreatic pseudocyst with transmural drainage. The short arrow points to the gastric cavity, the thin arrow points to the stent between the gastric and pancreatic cavities, and the long arrow points to the cavity of the pancreatic pseudocyst.

Complications most frequently associated with this procedure are bleeding, infections, pneumoperitoneum, air embolisms and perforations, (17, 20-22) but none of these occurred in our series. The complication that presented in our series was release of a metal stent within the pseudocyst. However, no surgical procedure was required to remove it. It occurred because ultrasound guided release was not coordinated with endoscopic vision.

The advantages of the technique described by our group are that:

1. It does not require the use of fluoroscopy. This not only reduces costs but also avoids exposure of the patient and the medical group to dangerous radiation.
2. There is no need to use a dilatation balloon to widen the tract between the wall and the cyst. This reduces procedure time and expense, since the cost of the accessory is not negligible.

The disadvantages of the technique described by our group are that:



Figure 3. Contrast abdominal CT scan at six week follow-up of patient in Figure 1. Pancreatic pseudocyst with transmural drainage. The short arrow points to the gastric cavity in which contrast medium is observed and the long arrow points to the drained pancreatic pseudocyst.

1. It requires training and experience in echoendoscopy to identify the accessories and the opening of the metal stent.
2. It requires greater coordination of equipment to release the accessories since fluoroscopic guidance is not available.

There is a debate in the literature about which accessory is best for drainage of pseudocysts. Some groups, such as that of Varadarajulu et al., prefer to use only two double-pigtail plastic stents. This method has shown good results and low migration rates because the stent tails are wound within the cyst. Other groups, such as ours, prefer to use metal stents even though they are more expensive. SEMS are easier to place, allow a larger drainage diameter (10 mm for metal stents vs. 3 mm for double-pigtail plastic stents) which results in better and faster drainage of the collection. SEMS have higher risks of migration, but this can be avoided by placing a double-pigtail plastic stents inside the SEMS. (5, 10, 23).

This series, like all other series that have used metallic stents, had an excellent resolution rate of 90% without any relapses by the six month follow-up examination. With very few adverse events, we consider this to be the current method of choice for drainage.

The literature contains various recommendations about the ideal moment for stent removal. In our series the transmural stents were removed at six weeks. Nevertheless,

recent studies suggest early withdrawal at three weeks. This has not yet been evaluated by our group because we have considered this to be premature because the fistula has not yet matured, and there is a high risk of relapse. (24)

Many authors have used fluoroscopic control to optimize access to pseudocysts, but fluoroscopic guidance was not used in this series because of the efficacy, safety, and reported benefits of echoendoscopy guided drainage. (25)

In conclusion, transmural drainage guided by echoendoscopy without fluoroscopy is a minimally invasive, effective and safe technique for treatment of symptomatic pancreatic pseudocysts as has been demonstrated by this series. Nevertheless, given the small sample size larger, studies are required to confirm these results.

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