Post - Traumatic Pancreatic Pseudocyst : Report of Two Cases with Review of Literature

Sunder Goyal¹, Sudhir Sachar², Ram Kumar Verma¹, Snigdha Goyal³

Abstract

A pseudopancreatic cyst is common after inflammation and is rarely due to trauma. Trauma is the main cause of pseudopancreatic cysts in children and the inflammation in adults. Various treatment modalities are percutaneous drainage, endoscopic drainage and surgical drainage and these are used accordingly. Teamwork between interventional radiologists, endoscopists and surgeons is essential for proper management. We report two cases of a post-traumatic pseudopancreatic cyst: a 14-year-old male child after a fall and a 40-year-old male who was hit by a tractor (agricultural vehicle).

Key words: Pseudopancreatic cyst, trauma, endoscopic drainage, percutaneous drainage.

Introduction

Due to the anatomical location, pancreatic trauma is quite rare; incidence is about 5% of patients with blunt abdominal trauma and 8% of patients with penetrating abdominal injuries [1]. Usual causes of blunt trauma are a direct abdominal blow, fall from a height, bicycle handle injury, road traffic accident, and tight seat belt. As other abdominal organs are also affected, the mortality rate is thus quite high (20-40%). The most common complication is a pseudopancreatic cyst, which occurs in about 40% of cases. Trauma is the main cause of pancreatic pseudocysts in children and about 3-8% in adults [2]. We are reporting two cases of a post-traumatic pancreatic pseudocyst: a 14-year-old child and a 40-year-old male. The child was managed by percutaneous drainage and the adult was managed surgically with good results.
Case Reports

Case 1

A 14-year-old boy presented with history of blunt abdominal trauma (BAT) due to falling from a rooftop as well as vomiting and respiratory distress. On examination, the patient was anemic with low blood pressure (80mmHg). The abdomen was distended (Figure 1). All blood investigations were normal except Hemoglobin (8gm %) and Serum amylase (765 U/L). The coagulation profile was normal. A normal Saline drip was started immediately to correct the low blood pressure. As the patient was anemic, a blood transfusion was given. After stabilizing the patient, Ultrasound (US) and Computed Tomography (CT) were done, which revealed a huge collection of fluid in the lesser sac (Figure 2,3). The patient was diagnosed as a case of a giant pseudo-pancreatic cyst (14 x 7 cm). As the patient was experiencing vomiting along with respiratory distress, ultrasound-guided aspiration was done with a 12 F pigtail catheter to relieve respiratory distress and about 1400 ml of serohemorrhagic fluid was collected in the bag immediately. The amylase level in drained fluid was 900 UI/L. The patient was also put on total parenteral nutrition and intravenous Octreotide (0.1 mg/day). When drainage stopped after 4 weeks, the pigtail catheter was removed. Ultrasound repeated after 3 months revealed complete resolution.

Case 2

A male patient of 40 years presented with a distended abdomen in the surgical outpatient department. He revealed that he had been hit by a vehicle 20 days back and had sustained BAT. He was admitted to a periph-
eral hospital with a painful abdomen and fever. He was treated there with intravenous fluids, analgesic and antibiotics. He developed distension of the abdomen after 8 days of injury (Figure 4) and was referred to us 20 days after injury. A clinical diagnosis of a pancreatic pseudocyst was made and was confirmed with the help of ultrasonography and a CT scan of the abdomen (Figure 5,6). CT revealed a hypodense pseudopancreatic cyst of about 20 x 18 x 15 cm in size. No intraluminal air, calcification or wall calcification was noted.

**Figure 5.** CECT showing axial view of pseudopancreatic cyst (case 2).

**Figure 6.** CECT showing sagittal view of pseudopancreatic cyst (case 2).

The patient was slightly anemic (Haemogram-9gm %) with normal serum amylase (82 IU/L). After completion of six weeks, cystogastrostomy was done without any complication.

**Discussion**

Pancreatic trauma is uncommon with an incidence of 5% of all BATS (Blunt Abdominal Traumas) [1]. BAT is frequent in children and adolescents and a pseudopancreatic cyst is the most frequent complication (40%) [2]. Blunt trauma to the pancreas occurs in motor vehicle, bicycle and pedestrian accidents and with direct blows to the epigastrium during assaults, in which case the pancreas is crushed against the vertebra. The part of the pancreas usually affected overlies (or is situated to the left of) the portal vein and superior mesenteric vessels. There may be associated injuries of the liver or proximal small bowel [3]. A pancreatic pseudocyst develops within the pancreas and around it and is surrounded by fibrous tissue. It is not lined by an epithelium lining. It usually appears several weeks after the onset of pancreatitis [3]. The median time of presentation of a pseudopancreatic cyst after trauma is 20 days, with the range being 8-360 days post-trauma.

Pancreatic pseudocysts are caused by a blockage or disruption of the pancreatic ductal system. In about two thirds of patients, the pancreatic duct is connected to pseudocysts; in the remaining one-third, the duct can get sealed due to an inflammatory reaction. Cysts are usually round in shape, benign in nature and its incidence is about 1 in 1,000 adults per year. Pseudopancreatic cysts are the most common pancreatic cystic lesions (about 75% to 80% of all pancreatic cystic lesions). Amylase, lipase, and trypsin enzymes are present in a large amount of fluid of pseudopancreatic cysts in early cases, but the amylase level may decrease in late cases.

A pancreatic pseudocyst is mostly single in cases of trauma and the size varies between 2 and 30 cm. BAT mostly injures the body of the pancreas due to its close relation to the spine; thus, a pseudocyst mostly affects the body of the pancreas. As pancreatitis is common in males, so is the male predominance in the incidence of pseudocysts. As pancreatitis can affect any age group, a pseudocyst can therefore develop in all age groups, but trauma is the main cause of pseudocysts in children. A pseudocyst should be differentiated from cystic neoplasm in elderly patients.

A clinical picture due to blunt trauma of the pancreas is not obvious as the pancreas is deeply located re-
troperitoneally. A pseudopancreatic cyst can be asymptomatic or can present with a variable clinical picture. Clinical features can vary from early symptoms of acute pancreatitis to abdominal mass, persistent pain in the abdomen, nausea, vomiting, abdominal bloating and/or with pressure symptoms due to pressure on nearby structures (as in our first case, where pressure was on the pyloric region with vomiting). Pseudocysts can be differentiated from tumors through analysis of cystic fluid. Always exclude tumors in patients who do not have a clear history of pancreatitis. This can be done by assessing the level of tumor markers like Carcinoembryonic antigen (CEA) and carcinoembryonic antigen-125 (CEA-125), which are low in pseudocysts and elevated in tumors. Viscosity of aspirated fluid is low in pseudocysts and elevated in tumors. Amylase is always high in pseudopancreatic cysts and low in tumors.

Ultrasound can miss early pancreatic injury due to gaseous distention of the stomach, but it is a brilliant, initial, non-invasive, radiation-free, diagnostic modality for diagnosis of pancreatic pseudocysts. It is an operator-dependent imaging modality.

An Abdominal Computed Tomography (CT) scan is the most important imaging modality for diagnosis of pancreatic pseudocysts. It has a sensitivity of 90-100% and is not operator-dependent. The CT scan can demonstrate cavitation in and around the pancreas, as well as calcification and bleeding in the cyst. The CT scan can help in planning of therapy by revealing the wall thickness of the pseudocyst. Magnetic Resonance Imaging (MRI) is not necessary when establishing a diagnosis of pseudocysts; rather it is an important modality that reveals the nature of content of the cyst [4].

Endoscopic retrograde cholangiopancreatography (ERCP) is 100% sensitive and is accurate in diagnosis of pancreatic ductal injury. ERCP is very useful in planning a drainage procedure. Endoscopic ultrasound (EUS) is not necessary to establish a diagnosis, but it is very important to decide the treatment, particularly if endoscopic drainage is planned. EUS may also be useful in detecting small portal collaterals, which enhance the risk of bleeding during transmural drainage. Table 1 shows pancreatographic grading system for pancreatic injury by Takishima et al.[5].

<table>
<thead>
<tr>
<th>Classification of injury</th>
<th>ERP findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Normal pancreatic duct, as evident on ERP</td>
</tr>
<tr>
<td>Class 2</td>
<td>Injury to branches of pancreatic duct on ERP</td>
</tr>
<tr>
<td>a</td>
<td>Contrast within pancreatic parenchyma</td>
</tr>
<tr>
<td>b</td>
<td>Contrast leaks into retroperitoneal space</td>
</tr>
<tr>
<td>Class 3</td>
<td>Injury to MPD on ERP</td>
</tr>
<tr>
<td>a</td>
<td>Injury to MPD in body or tail region†</td>
</tr>
<tr>
<td>b</td>
<td>Injury to MPD in the head</td>
</tr>
</tbody>
</table>

†Line to discriminate between classes 3a and 3b is the right margin of the superior mesenteric vein; ERP, endoscopic retrograde pancreatography; MPD, main pancreatic duct

Table 1. Pancreatographic grading system for pancreatic injury by Takishima et al.[5].

Pseudocysts having a wall thickness of more than 1 cm, which is more than 6 weeks old, and having pancreatic duct abnormalities, are multiple, located in the tail of the pancreas and increasing in size on follow-up examination; they usually do not resolve spontaneously and always require intervention [6].

The goal of therapy is avoidance of complications, like infection of cyst (about 10%), rupture of cyst and pressure of large cyst, and to rule out malignancy. Management of a pseudopancreatic cyst in paediatric and adolescent patients differs from that in adults because both children and their pancreas are in healthy states. A pancreatic pseudocyst in children can be treated conservatively in the form of total parenteral nutrition or by percutaneous drainage (as was done in our first case). Due to increased sensitivity of imaging modalities and improvement in the treatment methods, the question now arises as to which technique should be used to drain the cysts [7]. As the nature of fluid determines the therapeutic approach, it is therefore important to find the type of fluid in the pseudopancreatic cyst. The newly used terms “acute peripancreatic fluid collections”, “pancreatic pseudocyst”, “postnecrotic pancreatic/peripancreatic fluid collections”, and “walled-off pancreatic necrosis” are to be clearly understood in the interpretation of imaging studies. The choice of treatment depends on a correct diagnosis of the type of fluid collection [3].

Management of Pancreatic Pseudocyst

About 60% of pseudocysts usually resolve rapidly with conservative care within a year. Observation is the first line of therapy for non-infected, small pancreatic pseudocysts. Observation is done with the help of ultrasound, CT or MRI. Symptomatic pseudocysts or
large cysts that do not resolve under surveillance are drained percutaneously, endoscopically or surgically. Usually, larger cysts are more likely to be symptomatic, but the size of the cyst or duration of the cyst are poor predictors for the possible resolution of a pancreatic pseudocyst [7].

**Conservative Therapy**

The cumulative experience suggests that asymptomatic pseudocysts, which remain stable or which diminish in size, can be safely managed with a non-operative approach [8]. Non-operative treatment means intravenous fluids, antibiotics, painkillers and antiemetics. Total parenteral nutrition (TPN) or nasogastric or jejunal feeding is done in patients that cannot tolerate food orally. In patients who can tolerate orally, a low-fat diet is suggested. In cases of a pseudopancreatic cyst, no study has been done to compare these three approaches (percutaneous drainage, endoscopic drainage and surgical drainage) and the choice is based on availability and local preferences. As octreotide decreases pancreatic secretion, it can thusly be used as therapy to resolve the pseudocyst. Unluckily, this policy has not been meticulously tested to date in literature.

**Drainage Procedures**

The main indication for drainage is symptomatic pseudocysts. So far, no prospective controlled studies have directly compared percutaneous drainage, endoscopic drainage and surgical drainage. But these days, endoscopic drainage is becoming the favored technique because it has got minimum morbidity and no mortality.

**Percutaneous drainage**

Simple aspiration of a pseudocyst is associated with a recurrence rate of 70%, but percutaneous pigtail catheter drainage is successful in 50 to 90% of cases. This can be done under the guidance of ultrasound/computed tomography. A pigtail catheter, ideally 10-12 F, is inserted percutaneously into the cyst cavity to drain the fluid. Three-dimensional ultrasonography can avoid vessel injury while insertion of the catheter takes place. When drainage ceases completely, the catheter is removed. Progress of the cyst size is monitored with the help of ultrasonography. The main complication of this procedure is blockage of the catheter, infection of the cyst and the catheter potentially eroding the bowel if kept for more than four to six weeks. This procedure is successful in about 50 to 90% of cases. It is unsuccessful in the rest of cases where there is injury or blockage of the main pancreatic duct. Surgery is undoubtedly the treatment of choice if there is complete rupture of the pancreatic duct; however, Burnweit et al. [8] have reported that surgery should be done only where percutaneous drainage is not successful. The point of entry of a catheter varies. It can be placed through a gastrohepatic ligament, or between the stomach and spleen, or through a trans-gastric approach. The disadvantage of the trans-gastric approach is that the catheter can become dislodged due to respiratory movement and peristaltic movement of the stomach. But if the cyst is of a large size, a trans-gastric approach is more appropriate [8]. Catheter drainage along with sandostatin (somatostatin analogue) can be another recommended method of treatment because sandostatin decreases the basal and stimulated pancreatic secretion. Catheter drainage is contraindicated if the cyst has very thick contents, or has non-drainable necrotic material, or there is suspicion of malignancy, or there is a lack of safe entrée, or the cyst has an active hemorrhage, or there is presence of arterial pseudoaneurysms [6]. As there is no universally recommended scientific data, percutaneous drainage should probably be considered as a promising alternative technique and not a standard procedure for such cases [9]. Complications like infection (8%), pneumothorax (1%), pleural effusion (1%) and hemorrhage (3%) can occur due to percutaneous drainage.

**Endoscopic drainage**

Endoscopic drainage of pseudocysts is becoming the preferred therapeutic approach because it is less invasive, with minimum morbidity and no mortality. It also avoids the need for an external drain and has a high long-term success rate. It can be considered a first-choice alternative to surgical treatment, but possibility of endoscopic drainage depends on the anatomy and topography of the pseudocyst.

The post-traumatic pseudocysts with grade I to III pancreatic injuries can be successfully treated with percutaneous drainage, whereas those patients with grade IV injuries and a negotiable pancreatic duct on ERP can be treated with endoscopic pancreatic duct stenting. Successful healing of a post-traumatic pan-
creatic pseudocyst and fistulae can occur with the help of endoscopic transpapillary drainage by a stent or by Naso Pancreatic Drainage.[1] Endoscopic retrograde pancreatography and Takishima classification are useful in determining the best endoscopic approach [10]. Endoscopic ultrasound-guided transgastric drainage of a pancreatic pseudocyst is effective and safe in children [11]. All pancreatic injuries due to trauma can be managed effectively with an endoscopic technique [12].

Endoscopic drainage can be done either transpapillarily (via ERCP) or transmurally. Both modalities require careful patient selection to ensure success and safety. Transpapillary drainage is safer and more effective than transmural drainage, but the cyst should communicate with the pancreatic duct. In this technique, a guide wire is passed into the duct over which stenting is done through the pancreatic duct to the pseudocyst. It is quite challenging. The success rate is about 80%. The recurrence rate is 10-14. Common complications of stenting are exacerbation of pancreatitis (approximately 13%), stent occlusion or chronic pancreatitis.

Endoscopic transmural drainage is especially useful in situations where a complete cut-off of the pancreatic duct prevents endoscopic transpapillary drainage. This involves performing an endoscopy and finding a bulge within the wall of the stomach or duodenum caused by compression of the pseudocyst. The cyst is generally entered using a needle knife to cut through the gastric or duodenum wall. The pigtail stents are placed through the opening between the cyst and viscera. For endoscopic pancreatic pseudocyst drainage, the wall of the pseudocyst should be mature, there should be no pseudoaneurysms, portal hypertension and gastric varices, the cyst should be in close contact with the viscera, pancreatography should be done first, and the diagnosis of a pseudocyst should always be confirmed [13]. The method has an 82-89% success rate in expert hands. The recurrent rate is 6-18%. The complication rate is 20%, with the most feared complication being bleeding. One report suggests that the complication rate decreases and that efficacy increases with experience. Weckman reported an approximate 86% success rate with endoscopic drainage, with a 10% complication rate and a 14% failure rate [14].

Endoscopic transpapillary drainage should be attempted in patients with partial duct disruption, whereas endoscopic transmural drainage alone or in combination with transpapillary drainage may be attempted in patients with bulging pseudocysts and complete duct disruptions. With the availability of EUS (Endoscopic Ultrasonography), transmural drainage can also be performed for non-bulging pseudocysts. Advancement in endoscopic technology has led to successful endoscopic treatment of pancreatic fistulas with complete duct disruptions as well [7].

**Endoscopic Ablation**
In an effort to avoid a more invasive treatment and the associated complications, pancreatic cyst ablation has been tried. This technique is used in patients having a cyst size of 1 to 5 cm and who are unfit for major surgery. EUS-guided alcohol, or other ablative agents, is used for ablation of the wall of pseudopancreatic cysts. Ethanol has the advantages of being safe, inexpensive, readily available, and having the potential to rapidly ablate the entire cyst wall epithelium. A rising dose (5% to 80%) of ethanol is used for cyst cavity lavage for a duration of 3 to 5 minutes. Ethanol causes ablation of the lining of pseudocysts and thus results in fibrosis and resolution of cysts. Patients were observed and there were no complications at 2 hours, 72 hours, and 6–12 months following the process. Theoretical complications consist of acute pancreatitis, hemorrhage, intoxication, and abdominal pain. These preliminary data undoubtedly recommend that ethanol ablation is safe and feasible; still, prospective randomized trials with more patients with a longer follow-up are desirable. Saline lavage instead of alcohol has been used with comparable results [7]. EUS-guided ethanol lavage results in a greater decrease in pancreatic cyst size compared with saline solution lavage with a similar safety profile. Overall CT-defined complete pancreatic cyst ablation was 33.3%. [15,16].

**Surgical Drainage**
Surgical drainage of pseudocysts is accomplished by providing a communication between the pseudocyst cavity and the stomach or small bowel. This approach to drainage is often reserved for those patients that cannot tolerate or have failed percutaneous or endoscopic drainage. The surgical stoma should be placed in the most dependent portion of the cystic cavity in or-
der to maximize the chances of complete drainage. The stoma usually remains patent and functional for several months. An open surgical procedure carries a 10 to 30% morbidity rate, 1 to 5% mortality rate and a 10 to 20% rate of recurrence. Surgery can also be done with a minimally invasive technique. Laparoscopic surgery is safe, reliable, and is a minimally invasive treatment for managing pancreatic pseudocysts. Laparoscopic gastropseudocystostomy and jejunopseudocystostomy achieve adequate internal drainage, assist in debridement of necrotic tissue within pseudocysts, and accomplish good results with minimal morbidity. A randomized controlled trial that compares laparoscopic and endoscopic drainage of pseudocysts is required [17].

Despite there being no randomized studies for the management protocols for pancreatic pseudocysts, certain advice may still be given:

1. Always differentiate between acute and chronic pseudocysts for better management.
2. Always consider conservative treatment as the first line of management.
3. If intervention is needed, always consider a well-known procedure; the results of percutaneous or endoscopic drainage are probably more dependent on the experience of the treating doctor than the choice of process.
4. If surgery is needed, wait until an intern of anastomosis can hold sutures (if possible, for 6 weeks).

**Conclusion**

A post-traumatic pseudopancreatic cyst is a rare entity and should be kept in mind after blunt abdominal trauma. To fix the management protocols for pancreatic pseudocysts, there have been no randomized studies so far in the literature. Therefore, we have to currently rely on the best medical practice. The first option should be conservative treatment. However, if interference is needed, always use the well-known method. The results of percutaneous or endoscopic drainage are probably more dependent on the experience of the doctor than on the choice of method, and if surgery is needed, it should be done after 6 weeks when an intern of anastomosis can hold the sutures. The treating group should include endoscopists, interventional radiologists and surgeons.

**Conflict of interest statement**

The authors do not declare any conflict of interest or financial support in this study.

**References**


