



Percutaneous drainage for isolated pancreatic injury: A minimally invasive solution

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ABSTRACT

Isolated traumatic rupture of the pancreas is an uncommon presentation with a rate of less than 5% of cases of major abdominal trauma. The proper management of peripancreatic fluid collections following pancreatic trauma is still uncertain. We present a patient with isolated pancreatic injury that was managed with percutaneous drainage. A 22-year-old male patient, who had fallen from a tree 3 days previously, was admitted to our clinic with symptoms of vomiting and abdominal distention. Laboratory results demonstrated leucocytosis (20.100/mm³) and elevated amylase levels (754 IU/L, n = 25-100 IU/L). Radiological diagnosis of a pancreatic injury associated with multiple peripancreatic fluid collections (the largest with a diameter of 100 mm × 40 mm × 75 mm) was established using ultrasonography (US). Computed tomography (CT) confirmed pancreatic transection. Conservative treatment, including somatostatin, was administered and 5 days later percutaneous drainage catheters were placed under US guidance due to enlargement of the cystic collections (170 mm × 85 mm × 65 mm) and clinical progression. Seventeen days later, after confirming the regression of the fluid collections by US, the catheters were removed. No morbidity was observed and the control CT was normal. In hemodynamically stable patients, the percutaneous drainage procedure is one of the easiest and simplest ways to treat posttraumatic pancreatic fluid collections with less morbidity.

Key words: Blunt abdominal trauma, pancreatic injury, percutaneous drainage

Introduction

Pancreatic injury occurs in <5% of cases of major abdominal trauma [1]. Because of its safe location in the abdomen, pancreatic injury is usually associated with high-energy trauma and concomitant injury to other intra-abdominal organs. Isolated pancreatic injury is an uncommon entity.

An early diagnosis of pancreatic trauma is important, as it can lead to various complications. Neverthe-

less, in blunt abdominal trauma, early diagnosis is difficult because there is no correlation between clinical and imaging findings and the severity of trauma. Moreover, morbidity and mortality increases with associated injury to intra-abdominal organs and delays in diagnosis.

The best treatment approach to pancreatic trauma is still controversial. Recent studies on this issue have demonstrated that non-operative treatment modalities have more successful outcomes than surgical pro-

cedures. The course of treatment is also dependent on the location of the injury. While a peripheral duct injury may resolve spontaneously, those associated with distal duct injuries need to be treated by percutaneous aspiration or catheter drainage. Proximal duct injuries, however, require surgical intervention [2]. We present a patient with delayed diagnosis of isolated pancreatic rupture following blunt abdominal trauma and a successful non-operative approach for peripancreatic fluid collection.

Case Report

A 22-year-old male patient presented who had fallen from a tree 3 days previously. He was initially evaluated in the emergency department. Abdominal computed tomography (CT) performed on the first admission showed no evidence of any visceral injury. Nevertheless, he complained of pain in the epigastrium and exhibited vomiting and a gradually increasing distension of the abdomen at the periumbilical and epigastric region. He was hemodynamically stable. Hematological and biochemical investigations were normal apart from leucocytosis (20.100/mm³) and a high serum amylase level of 754 U/L (25-100 U/L). Chest and abdominal X-rays were normal.

Abdominal ultrasonography (US) revealed multiple collections located in the superior aspect of the pancreatic head, just anterior to the pancreatic body and left of the pancreatic tail measuring 100 mm × 40 mm × 75 mm, 75 mm × 28 mm × 30 mm, and 58 mm × 17 mm × 20 mm in size, respectively. He was taken

into the hospital and parenteral nutrition was initiated. Somatostatin (3.5 µg/kg/h) was administered intravenously. The patient did well initially, but 3 days later, he developed intolerance to oral intake, abdominal distension and vomiting. Clinically, his abdomen was distended. His serum amylase was 362 U/L and his white blood cell count was mildly elevated (11.200/mm³). CT showed multiple cysts, with the largest, 170 mm × 85 mm × 65 mm in diameter, located just next to the tail of pancreas. CT of abdomen showed a fracture of the body of the pancreas near the tail with a hypodense large collection in the lesser sac (Figure 1a-b). A third cyst (64 mm × 78 mm × 102 mm) located at the head of pancreas pushed on the left lobe of the liver and caused a mass effect on the adjacent hepatic parenchyma. An increase in the diameter of all cysts was detected. Other intra-abdominal organs were normal. We diagnosed a post-traumatic, isolated, type III pancreatic rupture according to an injury scale of the pancreas [3]. On day five, percutaneous drainage under US guidance using two 12 Fr pigtail catheters was performed. The two largest cysts were drained and initially, 1100 and 950 ml of brownish fluid rich in amylase (12075 IU/L) was aspirated. This fluid was shown to be sterile by a subsequent microbiological study.

The procedure was successfully performed without any procedural complications. The catheter was left to gravity drainage without flushing. After 17 days, as the drainage was minimal for the last 4 consecutive days, an US was performed, which demonstrated only a small

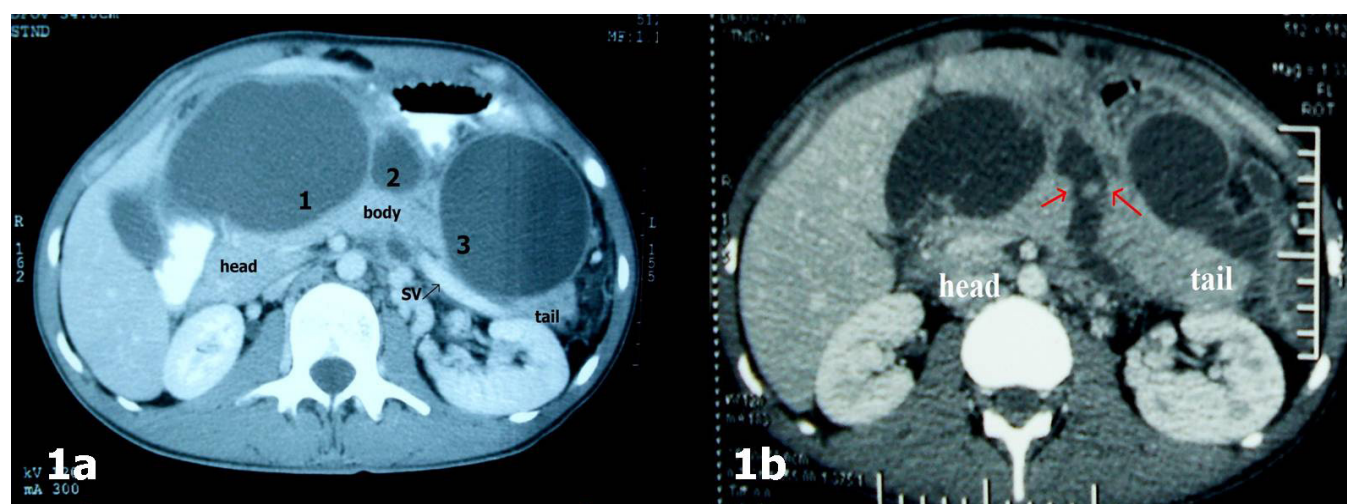


Figure 1. (a-b) Enhanced transverse computed tomography scan shows a large lobulated, peripancreatic fluid collection. Also, note the hypodense tract through the pancreatic body, which is consistent with pancreatic fracture (red arrows). The splenic vein and other adjacent vascular structures appear intact.



Figure 2. After drainage procedure there were no recurrent cystic collection around the pancreas, only some free air bubbles can be seen in the place of removed catheter.

(<2 cm) cyst at the region of the head of the pancreas. Because contrast injection into the catheter showed no filling into the residual cyst or main pancreatic duct, the drainage catheters were removed. The percutaneous drainage was not associated with any complications, such as infection, hemorrhage or fistula formation.

A follow-up CT scan taken 15 days after removing the catheters demonstrated no progression in the cyst size. Complete resolution of the cyst was demonstrated by CT scan 45 days after discharge (Figure 2). In a 6-month follow-up period, there was no recurrence or fistula formation.

Discussion

Although less common than other intra-abdominal organ injuries, pancreatic trauma should be suspected in patients with penetrating trauma to the trunk or following blunt compression of the upper abdomen. The deep and retroperitoneal location protects it from injury, but makes pancreatic trauma a diagnostic challenge as well. The physical findings may be absent or minimal. Pancreatic duct injury may be overlooked within an intact capsule. A CT scan, which is the easiest and simplest diagnostic modality of a blunt pancreatic injury, can miss about 20-40% of these injuries [2,4]. Accurate recognition of pancreatic injury is essential because any delay in the diagnosis, as well as associated vascular complication, leads to high mortality and morbidity. Magnetic resonance cholangiopancreatography is another non-invasive diagnostic tool that may enable the detection of pancreatic duct injury. In addition, endoscopic retrograde cholangiopancreatography (ERCP) is both a diagnostic and therapeutic option in patients with pancreatic injury [5,6]. Complications

of pancreatic injury include pancreatic pseudo-cyst, bleeding, pancreatic abscess, recurrent pancreatitis, fistula formation, thrombosis and pseudoaneurysm. None of these were observed in our case. However, the delay to diagnosis was very short, only 3 days, probably due to the high grade of injury and rapid enlargement of cystic collections. In the published literature, the median time of presentation of delayed pancreatic injury is 20 days, with a range between 8 and 360 days [2].

According to the organ injury scale proposed by the American Association for the Surgery of Trauma [3], our case is type III pancreatic trauma in which the pancreatic duct system was injured. The indications for drainage in our case were gastric outlet obstruction, as evident by vomiting, food intolerance and epigastric fullness. Other indications for drainage are infection, rupture, colon obstruction and common bile duct obstruction [7].

The thickness of the wall of the cyst can be measured using ultrasound or CT scan, and cysts greater than 1 cm in thickness will not resolve spontaneously. Fortunately, in this case, as was seen in CT, cysts were not well capsulated and had very thin walls. Although a simple aspiration procedure is associated with a high (70%) recurrence rate, percutaneous catheter drainage under US or CT guidance has a success rate of 90% [7]. Catheters can be removed when there is no more drainage and after the cyst resolution. In our case, after 4 days under close clinical observation, the drainage of pancreatic fluid decreased. Further evaluation with US demonstrated resolution of the cyst and the catheter was removed on day 17. In patients undergoing percutaneous treatment, there is a higher risk of recurrence and cutaneous fistula formation compared to surgery. On the other hand, these patients still have the option of surgical treatment. There are a number of alternative procedures, including duodenal diversion, pyloric exclusion, the Whipple procedure, or simple drainage [8]. Damage control surgery is also another treatment option and the two-step procedure is essential in patients with unstable hemodynamic status.

Recent reports reiterated that treatment options depend on the clinical or radiological features of the fluid collections around the pancreas [9,10]. Although surgical drainage has been the only option available for

many years, especially when there is disruption of the main pancreatic duct [11], a non-operative approach involving endoscopic stenting of the pancreatic duct [12] or percutaneous drainage, as we performed in our case, has recently become popular among surgeons. Percutaneous drainage can be beneficial for critically ill patients and high surgical risk groups [7]. The current approach is that, in hemodynamically stable patients and in the absence of other associated injuries, blunt injuries to the pancreas should be managed conservatively with close monitoring. However, initial non-operative management of injuries of the proximal pancreatic duct provides formation and drainage of a pseudocyst, rather than the risks of more radical interventions, such as stent insertion. Stent insertion may result in post-ERCP pancreatitis (with a rate of 3-14%) and lesser sac contamination [12,13]. Furthermore, pancreatic stent placement is not risk free as the ductal stricture is a major complication in the long-term and may require surgical repair.

To summarize, epigastric pain and distention following blunt injury should raise a concern about pancreatic injury, and observation with further radiological examination of the pancreas may be helpful in the diagnosis of the main problem. This paper reinforces the importance of percutaneous drainage treatment even in high-grade pancreatic injury (Grade III-V) following blunt abdominal trauma, especially in isolated pancreatic injuries.

Conflict of interest statement

The authors have no conflicts of interest to declare.

References

1. Craig MH, Talton DS, Hauser CJ, Poole GV. Pancreatic injuries from blunt trauma. *Am Surg* 1995;61:125-8.
2. Lewis G, Krige JE, Bornman PC, Terblanche J. Traumatic pancreatic pseudocysts. *Br J Surg* 1993;80:89-93.
3. Moore EE, Cogbill TH, Malangoni MA, Jurkovich GJ, Champion HR, Gennarelli TA, et al. Organ injury scaling, II: Pancreas, duodenum, small bowel, colon, and rectum. *J Trauma* 1990;30:1427-9.
4. Leppäniemi A, Haapiainen R, Kiviluoto T, Lempinen M. Pancreatic trauma: Acute and late manifestations. *Br J Surg* 1988;75:165-7.
5. Fulcher AS, Turner MA, Yelon JA, McClain LC, Broderick T, Ivatury RR, et al. Magnetic resonance cholangiopancreatography (MRCP) in the assessment of pancreatic duct trauma and its sequelae: Preliminary findings. *J Trauma* 2000;48:1001-7.
6. Kim HS, Lee DK, Kim IW, Baik SK, Kwon SO, Park JW, et al. The role of endoscopic retrograde pancreatography in the treatment of traumatic pancreatic duct injury. *Gastrointest Endosc* 2001;54:49-55.
7. Grace PA, Williamson RC. Modern management of pancreatic pseudocysts. *Br J Surg* 1993;80:573-81.
8. Chrysos E, Athanasakis E, Xynos E. Pancreatic trauma in the adult: Current knowledge in diagnosis and management. *Pancreatology* 2002;2:365-78.
9. Brun A, Agarwal N, Pitchumoni CS. Fluid collections in and around the pancreas in acute pancreatitis. *J Clin Gastroenterol* 2011;45:614-25.
10. Thoeni RF. The revised Atlanta classification of acute pancreatitis: Its importance for the radiologist and its effect on treatment. *Radiology* 2012;262:751-64.
11. Bradley EL 3rd, Young PR Jr, Chang MC, Allen JE, Baker CC, Meredith W, et al. Diagnosis and initial management of blunt pancreatic trauma: Guidelines from a multiinstitutional review. *Ann Surg* 1998;227:861-9.
12. Lin BC, Fang JF, Wong YC, Liu NJ. Blunt pancreatic trauma and pseudocyst: Management of major pancreatic duct injury. *Injury* 2007;38:588-93.
13. Abe T, Nagai T, Murakami K, Anan J, Uchida M, Ono H, et al. Pancreatic injury successfully treated with endoscopic stenting for major pancreatic duct disruption. *Intern Med* 2009;48:1889-92.