

Radiological and surgical management of bleeding pancreatic pseudocyst in a pediatric patient

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ABSTRACT

Introduction. The pancreas is the fourth most frequently involved solid organ in pediatric abdominal trauma. We present the case of a giant pancreatic pseudocyst secondary to trauma and how it was radiologically and surgically managed.

Clinical case. This is the case of a 13-year-old male patient admitted as a result of a grade IV pancreatic lesion, which turned into a 170x86x180 mm pancreatic pseudocyst. Intracystic bleeding required radiological embolization of the proximal gastroduodenal artery. Subsequent abdominal compartment syndrome, biliary leak, and chemical peritonitis required laparotomy and collection drainage. Pancreatitis and duct fistula had a slow but favorable progression.

Discussion. The presence of duct damage is a failure predictor in the conservative treatment of pancreatic trauma. Surgical management could be indicated in recurrent, multiple, or giant (> 200 mm) pseudocysts. Intracystic bleeding is rare but potentially fatal. Selective angiogram could be a useful tool for improved prognosis.

KEY WORDS: Pancreatic pseudocyst; Pancreatitis; Peritonitis; Biliary fistula; Therapeutic embolization.

MANEJO RADIOLÓGICO Y QUIRÚRGICO DEL PSEUDOQUISTE PANCREÁTICO HEMORRÁGICO EN EL PACIENTE PEDIÁTRICO

RESUMEN

Introducción. El páncreas es el cuarto órgano sólido más afectado en el traumatismo abdominal infantil. Presentamos la complicación de un pseudoquiste pancreático gigante secundario a traumatismo y su manejo radiológico y quirúrgico.

Caso clínico. Varón de 13 años que ingresa por lesión pancreática grado IV, que evoluciona desarrollando un pseudoquiste pancreático de 170x86x180 mm. Un sangrado intraquístico requirió embolización radiológica de la arteria gastroduodenal proximal. El posterior síndrome

compartimental abdominal, fuga biliar y peritonitis química obligaron a realizar una laparotomía y drenaje de colecciones. La pancreatitis y fístula ductal tuvieron una progresión lenta pero favorable.

Comentarios. La presencia de daño ductal es un predictor de fracaso del tratamiento conservador en el traumatismo pancreático. El manejo quirúrgico podría indicarse en pseudoquistes recurrentes, múltiples o gigantes (> 200 mm). El sangrado intraquístico es raro pero potencialmente letal, pudiendo ser la angiografía selectiva una herramienta útil en la mejora del pronóstico.

PALABRAS CLAVE: Pseudoquiste pancreático; Pancreatitis; Peritonitis; Fístula biliar; Embolización terapéutica.

INTRODUCTION

Pancreatic lesions are the fourth most common solid organ lesions in blunt abdominal trauma in pediatric patients, after splenic, hepatic, and renal lesions. Pancreatic pseudocyst (PPC) is a relatively rare complication⁽¹⁾, and according to the 2012 Atlanta classification, it typically occurs after 4 weeks in the context of pancreatitis. Potential complications of PPC include infection, bleeding, obstruction, and rupture⁽²⁾. Intracystic bleeding, which is rare but potentially fatal, is caused by the erosion of the arterial walls in contact with the pseudocyst, primarily as a result of the action of the pancreatic enzymes present in the liquid within. The splenic artery is the most frequently involved (30-50%), followed by the gastroduodenal artery (17%) and the pancreaticoduodenal artery (11%)⁽³⁾.

We present the case of a bleeding pancreatic pseudocyst secondary to trauma, and explain how it was radiologically and surgically managed.

CLINICAL CASE

This is the case of a 13-year-old male patient admitted at our institution with blunt abdominal trauma as a result of the handlebar of his bike hitting the epigastric region.

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Figure 1. A) CT-scan carried out on day 14 demonstrating Moore grade IV pancreatic trauma and uncomplicated 170x86x180 mm PPC (*red arrow*). B) CT-scan showing intracystic bleeding and increase in PPC size up to 205x100x196 mm (*white asterisk*). C) CT-scan revealing various large collections in the context of chemical peritonitis, PPC with intracystic hematoma (*white asterisk*), and hydro-aerial levels.



Figure 2. A) Angiogram demonstrating the branch of the posterior pancreaticoduodenal artery suspected to have caused intracystic bleeding (*arrow*). B) Selective radiological embolization 1.5 cm away from the origin of the gastroduodenal artery using two microcoils (*arrow*).

He had no head trauma, with a Glasgow coma scale (GCS) of 15. Exploration demonstrated diffuse abdominal pain at palpation. Blood count and blood chemistry at admission showed normal values of lipase, amylase, hepatic enzymes, and hemoglobin (13 g/dl). An abdominal ultrasonography was carried out, which showed little free liquid and no further alterations. CT-scan revealed a grade IV pancreatic lesion according to the American Association for the Surgery of Trauma (AAST), with disjunction between the pancreatic head and the pancreatic isthmus.

Hospitalization and conservative management with analgesia, intravenous fluid therapy, and parenteral nutrition were decided upon. The patient progressively developed distension, diffuse abdominal pain, and increase in serum amylase up to 316 IU. A new control CT-scan was performed on hospitalization day 14, which revealed the presence of a large 170x86x180 mm PPC (Fig. 1A). Two

days later, the patient had clinical worsening and decreased hemoglobin levels down to 8.5 g/dl. A new CT-scan showed acute, massive intracystic bleeding as a result of the erosion of the posterior pancreaticoduodenal artery (Fig. 1B). A diagnostic and therapeutic angiogram was decided upon. Under general anesthesia, and using a right transfemoral approach, a 4Fr introducer was passed to the celiac trunk, which allowed diagnosis to be confirmed. Selective radiological embolization was then carried out 1.5 cm away from the origin of the gastroduodenal artery using two platinum microcoils and synthetic fiber (7 cm x 5 mm and 2.6 cm x 4-3 mm, respectively). The procedure was uneventful (Fig. 2). Even though embolization was successful and no vasoactive drugs or blood product transfusion were required, the patient developed abdominal compartment syndrome secondary to pancreatic leak and chemical peritonitis (Fig. 1C). This meant all collections



Figure 3. Intraoperative image of the abdominal laparotomy showing the anterior wall of the giant PPC.

had to be evacuated through laparotomy, with 4 Blake drainages being placed (Fig. 3). The patient was admitted at the ICU, where he remained for 4 days for vital sign monitoring and liquid balance management purposes.

Pancreatitis and duct fistula had a slow but favorable progression, with no further surgeries being required. The patient was discharged 10 weeks later, with follow-up being performed at external consultations.

DISCUSSION

In the presence of abdominal trauma, CT-scan is mandatory as long as the patient remains hemodynamically stable. If the CT-scan is carried out too early, pancreatic lesion signs are likely not to be found, which means it will probably have to be conducted again in case of persisting or worsening symptoms⁽⁴⁾. From the blood count point of view, serum amylase levels have little specificity and sensitivity when it comes to predicting pancreatic lesions, since they may remain normal in the first 3 hours. However, progressive or sustained increase is highly suggestive of pancreatic damage.

Complications of pancreatic trauma include pseudocyst, which occurs in 0-69% of cases^(5,6). Healing can be spontaneous, especially in < 5 cm pseudocysts^(7,8).

In the last years, conservative management – whenever possible – has gained traction in solid organ lesions, including pancreatic lesions. It has also been documented in pediatric patients with PPC as a first instance, with medical treatment, using octreotide for pseudocyst healing or size reduction purposes.

Severe damage of the pancreatic head, as it was the case in this patient, may be expectantly managed, with PPC drainage if symptomatic or > 50 mm⁽⁹⁾.

Surgical treatment could be indicated in recurrent, multiple, or giant PPC (> 200 mm)⁽¹⁰⁾. On the other hand,

the presence of duct damage, as in this case, is a failure predictor of non- surgical treatment⁽¹¹⁾.

When PPC does not heal spontaneously, it can be drained, either externally (ultrasonography- or tomography-guided) or internally. Morbidity and recurrence rates of PPC drainage are variable (33-80% in both cases), and according to some studies, this technique has not been demonstrated to allow for shorter hospital stays as compared to surgical treatment. However, external drainage using a percutaneous technique does reduce the morbidity and mortality rates associated with laparotomy⁽¹²⁾.

Internal drainage can be endoscopic or surgical. Endoscopic diversion allows the PPC to be put in contact with the stomach by means of a 1-2 cm cystogastrostomy, or with the duodenum by means of a cystoduodenostomy, while leaving a double J stent in place for a mean of 2 weeks. This technique has a success rate of 71%, with failure being associated with > 1 cm thick walls, pancreatic tail locations, and concomitant necrotizing pancreatitis.

Many authors like to perform an early endoscopic retrograde cholangiopancreatography (ERCP) and to place stents in the pancreatic duct – in those cases where the pseudocyst is in contact the latter. However, there are limited reports on late use success rates, which means further studies and a greater number of cases are required to assess the long-term effect of such stents⁽¹³⁾.

In cases of failed endoscopic management, partial pancreatectomy or various pancreatojejunostomy techniques are a feasible option. On average, surgical treatment has a morbidity rate of 7% and a mortality rate of 0-2%.

Finally, intracystic bleeding is rare but potentially fatal, with a mortality rate of 40%. It is seemingly associated with the occurrence of pseudoaneurysm, which in turn can be caused by the erosion of the arterial walls in contact with the pseudocyst, and the development of an arterial lesion secondary to great pseudocyst distension⁽¹⁴⁾. The splenic artery is the most frequently involved, but there also instances of gastroduodenal and pancreaticoduodenal artery involvement – as it was the case in this patient.

The pseudocyst can occasionally be in contact with the duodenum, with bleeding presenting as a high digestive bleeding. When bleeding causes the rupture of the pseudocyst towards the pancreatic duct, the peritoneum, the retroperitoneum or the biliary tract, it can give rise to hemosuccus pancreaticus (bleeding through the Wirsung duct and exteriorization through the ampulla of Vater), hemoperitoneum, retroperitoneal hematoma, hemobilia, or retroperitoneal bleeding, respectively⁽¹⁵⁾.

The imaging studies used when a bleeding PPC is suspected include CT-scan with intravenous contrast, abdominal Doppler ultrasonography, and arteriography of the celiac trunk and the mesenteric artery⁽¹⁶⁾.

Various surgical procedures to control bleeding PPCs have been described, primarily in adult patients. These include pseudoaneurysm resection followed by arteriorrha-

phy, partial pancreatectomy, splenectomy, bleeding vessel ligation, and pseudocyst drainage. However, the morbidity rates associated with these surgical procedures are high as compared to percutaneous arterial embolization⁽¹⁶⁾.

In the literature, bleeding PPC cases in pediatric patients are extremely rare, which means there is no protocol established. We advocate the use of percutaneous arterial embolization in hemodynamically stable patients – such as the case reported –, and the use of surgery when dealing with active bleeding, failed embolization, hemodynamically unstable patients, and concomitant complications such as infection or significant extrinsic compression.

In conclusion, angiogram and arterial embolization should be considered for the treatment of bleeding complications in pediatric patients with pancreatic pseudocyst. In expert hands, this technique allows bleeding to be controlled in most cases, which means it stands as a good option as a preliminary (before surgery) or definitive procedure.

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