



Efficacy of stent and drainage for blunt pancreatic injury

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1. Introduction

While pancreatic injury during childhood is uncommon, its sequelae can be severe. Pancreatic injury is a significant cause of morbidity and, rarely, mortality. Among abdominal traumatic injury, splenic injury is the most common, accounting for up to 45% of all visceral injuries. The liver, kidneys, and bowel/mesentery represent the next most common injuries; pancreatic injury is the 5th most common abdominal injury [1]. The incidence of pancreatic injury during childhood ranges from 0.3 to 0.7% of all abdominal injuries in North American trauma centers [2–4].

The diagnosis of pancreatic injury can be challenging and requires a high level of suspicion, due to the retroperitoneal location of the pancreas and protection provided by the lumbar vertebral column [5]. In reality, the diagnosis of pancreatic injury relies on the combinations of high serum amylase or lipase levels and abdominal computed tomography (CT) or ultrasound findings, as previously reported [6,7]. Management of pancreatic injury is also challenging and controversial. Distal resection of the pancreas is indicated in cases of pancreatic transection or severe injury with duct disruption [8]. Non-operative management (NOM) is acceptable for minor pancreatic injury. The management of severe pancreatic injuries with capsular, ductal, or parenchymal disruption in pediatric patients remains controversial [4,5,9–13].

There are few reports regarding children undergoing NOM with endoscopic retrograde pancreatography (ERP), although it has been used in adults to diagnose pancreatic injuries [14–16].

This report presents two cases of pediatric pancreatic injury with ductal disruption treated with NOM using ductal stenting and endoscopic drainage.

Informed consent was acquired from the parents in both cases.

2. Case 1

A 13-year-old boy presented to the emergency department (ED) at a community hospital. He complained of epigastric pain due to being “kneaded” in the epigastrium by his friend. In the ED, he vomited and showed epigastric tenderness. CT revealed severe pancreatic injury. He was transported to our critical care center for treatment. Laboratory findings showed an amylase level of 453 mg/dl and lipase level of

1256 mg/dl. Enhanced CT in our hospital showed parenchymal laceration of the pancreatic body and main duct injury. However, magnetic resonance cholangiography did not reveal pancreatic ductal injury. On the second day of admission, we performed ERP and detected incomplete ductal injury, demonstrated by leakage of contrast agent from pancreatic duct flowing to the dorsal stomach. Placement of a ductal stent to the pancreatic duct was unsuccessful because the guide wire could not be inserted into the pancreatic duct due to edema. His symptoms were not severe, and leakage was localized around the pancreas during the initial 48 h of hospitalization.

He was treated with antibiotics, octreotide acetate, and total parenteral nutrition (TPN) for pancreatitis. On the 9th hospital day, an encapsulated pseudocyst measuring 10 cm was detected on follow-up CT. The patient developed a high fever and severe abdominal pain on the 12th hospital day. Endoscopic drainage was performed on the 15th hospital day due to enlargement of the pseudocyst. Two drainage stents were placed; one internal drainage stent by the transmural approach (pig tail catheter, 7 Fr, 7 cm) and one external drainage stent by the naso-gastric-cystic approach (endoscopic naso-pancreatic drainage (ENPD) tube, 7 Fr). After endoscopic drainage, his symptoms resolved. He continued to report abdominal pain after every attempted feeding, and started oral intake on the 22nd hospital day, after this symptom was improved. After drainage decreased, the external drainage tube was removed on the 23rd hospital day. On the 31st hospital day, ERP was performed again to evaluate the pancreatic duct. At this time, a ductal stent was placed successfully (endoscopic nasobiliary drainage tube, 13 cm, 5 Fr). He was discharged from the hospital on the 38th hospital day, and the ductal stent was removed 3 months later. He has had no sequelae after three years. Fig. 1 shows the CT and endoscopic drainage of case 1.

3. Case 2

A 10-year-old boy was transported to our critical care center from a community hospital due to grade III pancreatic injury. He was injured by the handlebar of a bike striking the epigastrium. On examination, his vital signs were stable, and the imprint of the handlebar was visible on the epigastrium, although he denied severe abdominal pain. Ultrasound demonstrated fluid in the rectovesical pouch. Laboratory findings showed an amylase level of 1865 mg/dl and lipase level of 3147 mg/dl.

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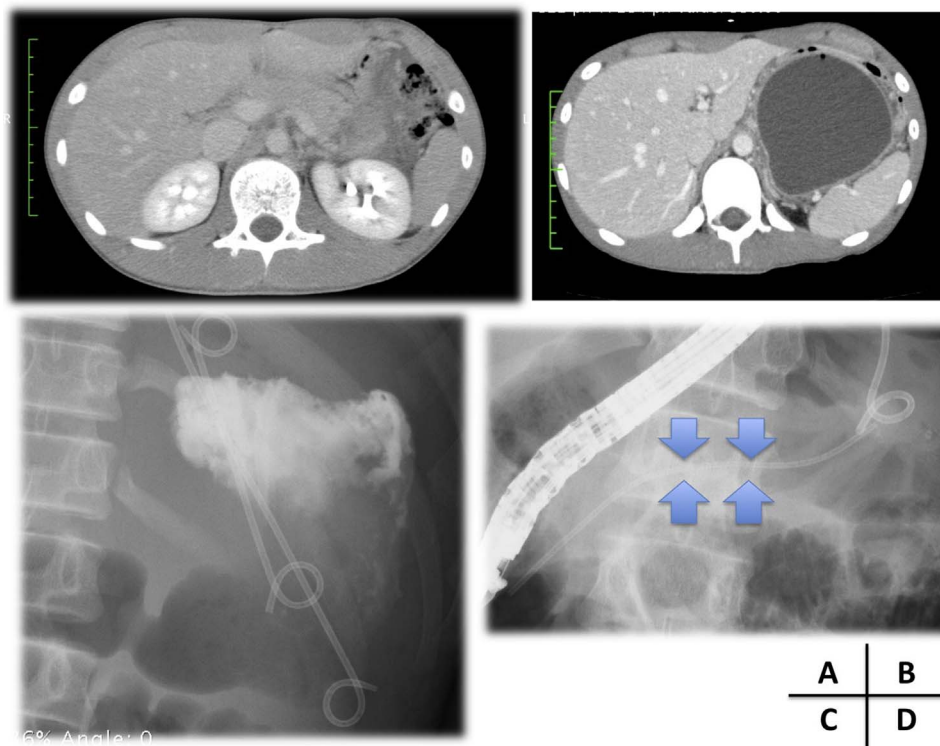


Fig. 1. A: CT scan on day1 shows ductal injury at caudal portion. 1-B: CT scan on day 9 shows formation of pseudocyst which size is 100 mm. 1-C: On the day 15, two drainage stent was placed. One was internal drainage by transmural approach (7Fr, 7 cm), the other external drainage stent was naso-cystic approach (7Fr ENPD tube). 1-D: On day 3, ERP was performed again to evaluate the pancreatic duct and ductal stent was tried to place at the pancreatic duct (5Fr PNBD tube cut 13 cm). The edge of the stent was at the duodenum. It was showed with light blue allows. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

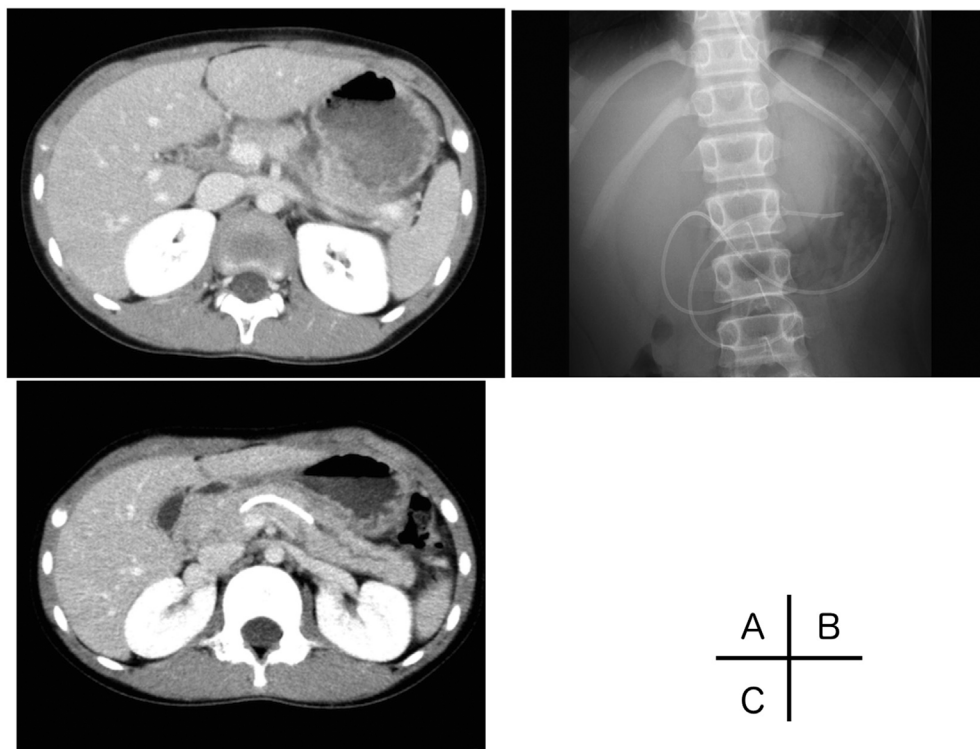


Fig. 2. A: CT scan on day 1 shows pancreatic injury at body portion. 1-B: ERP was performed and ENPD tube (5fr) was placed. 1-C, D: X-ray and CT scan on day 26. ERP was performed and ductal stent was placed. (5Fr, 12 cm).

First, ERP was performed. Complete laceration of the main pancreatic duct was detected at the pancreatic body and without involvement of the distal segment. However, contrast agent flowed into the retroperitoneum. We placed an ENPD tube (5 Fr) in the pancreatic duct. His abdominal tenderness improved after stenting. He was treated with antibiotics, nafamostat mesilate, and TPN. Oral feeding was started on the 21st hospital day, because his abdominal pain was not resolved. On the 26th hospital day, ERP was repeated to place a ductal stent (5 Fr,

12 cm); the procedure was successful. He was discharged on the 36th hospital day. He has had no sequelae after three years. Fig. 2 shows CT and endoscopic drainage of case 2.

4. Discussion

Pancreatic injury is rare in children. For pediatric patients, there is limited literature concerning the management of severe pancreatic

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