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• Case Report •

Isolated Traumatic Injury of the Pancreatic Head: A Case Report

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Isolated injury to the pancreas after abdominal trauma is uncommon, and a delay in diagnosis and treatment can increase the morbidity and mortality. Therapeutic decisions with respect to pancreatic trauma are usually made based on the site of injury and the status of the pancreatic ductal system. In this report, we describe the surgical management of pancreatic head transection as an isolated injury following blunt abdominal trauma. A 55-year-old man presented with epigastric pain that radiated to the back. Abdominal computed tomography revealed a hematoma in the pancreatic head and upstream dilatation of the main pancreatic duct. Endoscopic retrograde cholangiopancreatography showed complete disruption of and contrast leakage from the main pancreatic duct in the pancreatic head region with a nonenhanced upstream duct. Emergency pancreaticoduodenectomy was successfully performed, and the patient was discharged on postoperative day 9 without any complications. [J Trauma Inj 2016; 29: 51-55]

Key Words: Isolated injury, Blunt trauma, Pancreas, Pancreaticoduodenectomy

I. Introduction

Traumatic injuries of the pancreas occur in 3–12% of all abdominal trauma cases, and most (50–98%) of these are associated with injuries to other adjacent organs and major vessels.(1) The morbidity and mortality rates associated with a pancreatic injury are high.(1,2) On the other hand, isolated injuries of the pancreas are rare and occur in less than 1% of patients with abdominal trauma. The non-specific symptoms and signs that are usually seen at the initial presentation of an isolated pancreatic injury could delay diagnosis and treatment, resulting in high morbidity and mortality.(3)

The therapeutic decisions for pancreatic trauma vary based on the site of injury and the status of the pancreatic ductal system, and no definitive guidelines exist. In addition to surgical treatment of pancreatic trauma, conservative management by endoscopic pancreatic stent placement has recently been attempted.(4) Isolated pancreatic injuries are often hemodynamically stable, and thus, endoscopic management for locations that are difficult to surgically manage, such as the pancreatic head, should be considered. However, aggressive surgical treatment of pancreatic injury is necessary when endoscopic treatment is not feasible.

Herein, we describe a case of isolated blunt injury of the pancreatic head, which was successfully treated with surgical resection after the evaluation of the pancreatic ductal system with endoscopic pancreatography.

II. Case

A 55-year-old man presented to the emergency

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room with epigastric pain radiating to the back that had appeared the same day. He had a habit of drinking (he had been drinking heavily the day before admission) and smoking (40 pack-years), and he had been diagnosed with pulmonary tuberculosis 10 years ago. He was admitted 5 months earlier for gastric ulcer, gastroesophageal reflux disease, and chronic obstructive pulmonary disease and was treated with pharmacotherapy. On admission to our hospital, he was alert and his vital signs were as follows: blood pressure, 168/120 mmHg; pulse, 104/min; respiratory rate, 20/min; and body temperature 36.6°C. Physical examination of the abdomen showed severe tenderness in the epigastrium, no rebound tenderness, and diminished bowel sounds. There were no external wounds or visible bleeding. Laboratory findings were as follows: hemoglobin, 16.1 g/dL; aspartate transaminase/alanine transaminase, 62/28 IU/L; total bilirubin, 0.8 mg/dL; amylase/lipase, 141/431 IU/L; creatinine kinase, 242 IU/L; and serum osmolarity, 299 mOsm/kg. Follow-up laboratory tests performed on the day after admission showed an increase in serum amylase/lipase (321/868 IU/L). His electrocardiogram showed a normal rhythm.

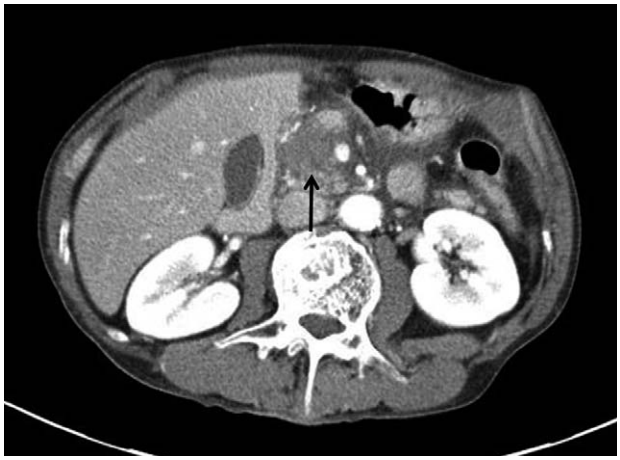

Fig. 1. Initial abdominal computed tomography showing a hematoma (black arrow) in the pancreatic head adjacent to the superior mesenteric vein, with a retroperitoneal hematoma.

Abdominal computed tomography (CT) revealed a hematoma (diameter, 3.5 cm) in the pancreatic head with upstream dilatation of the main pancreatic duct and a surrounding retroperitoneal hematoma without active bleeding (Fig. 1). Besides, the pancreatic injury, no other solid organ injury or free air was observed. Magnetic resonance cholangiopancreatography (MRCP), performed the day after admission, showed a segmental defect of the main pancreatic duct, with upstream duct dilatation in the head and

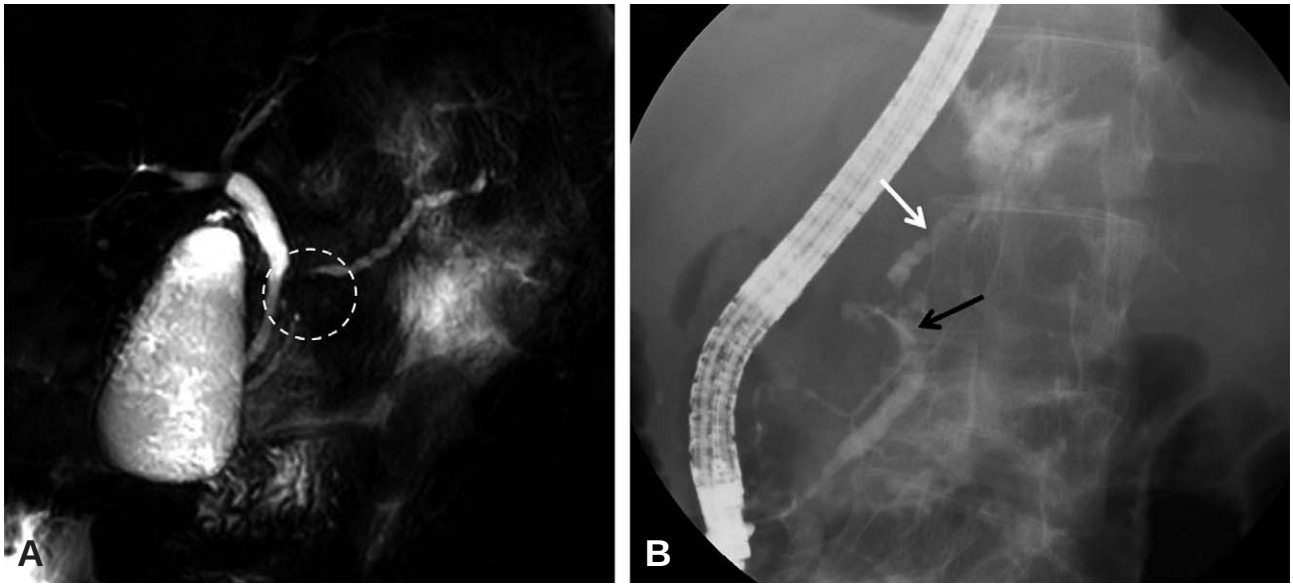

Fig. 2. Main pancreatic duct transection. (**A**) Magnetic resonance cholangiopancreatography revealing a segmental defect of the main pancreatic duct (white circle) in the head and neck of the pancreas, with upstream duct dilatation. (**B**) Disruption of the main pancreatic duct (black arrow) in the pancreatic head with extrapancreatic contrast leakage (white arrow). An invisible upstream duct can be seen on endoscopic retrograde cholangiopancreatography.

neck of the pancreas (Fig. 2A). Subsequently, endoscopic retrograde cholangiopancreatography (ERCP) showed disruption of the main pancreatic duct in the pancreatic head, with contrast extravasation and a nonenhanced upstream pancreatic duct (Fig. 2B). Thus, endoscopic pancreatic stent placement could not be performed, because guide wire did not go through upstream pancreatic duct.

The patient's history was taken again to review the possible reasons for trauma, and he informed us about a physical altercation with his coworker the day before admission. Consequently, the medical practitioner consulted the trauma surgery team for the traumatic transection of the pancreatic head. Surgical treatment was performed on hospital day 3 (due to the delay by the patient in providing informed consent. Before operation, his vital signs were as follows: blood pressure, 135/87 mmHg; pulse, 78/min; respiratory rate, 20/min; and body temperature, 36.8°C. Intraoperatively, there was underlying serous ascites in the entire abdominal cavity and severe inflammatory adhesions around the pancreatic head. The hematoma in the pancreatic head was tightly adherent to the junctional region of the superior mesenteric vein (SMV) and portal vein (Fig. 3). There were no other organ or peripancreatic vessel injuries. While dissecting between the hematoma and the SMV, laceration at the lateral border of the SMV occurred, which was immediately repaired primarily. Also, since the hematoma in the pancreatic head was accompanied with severe inflammation around entire pancreatic head, proximal pancreatic duct in the right side of hematoma was not able to be explored for the risk of distal bile duct injury. Consequently, a pylorus-preserving pancreaticoduodenectomy was performed. We divided the pancreas at the intact parenchyma of the pancreatic neck, just above the SMV. The diameter of the main pancreatic duct in the resection margin of the pancreas was 4 mm, and duct-to-mucosa pancreaticojejunostomy with an internal pancreatic stent was performed. Subsequently, hepaticojejunostomy and duodenojejunostomy were performed. The operation was completed with peritoneal irrigation and placement of a Jackson-Pratt drain around the pancreaticojejunostomy. The total operation time was 425 minutes; the estimated blood loss was approximately 1000 mL, and 4 units of packed red blood cells and 3 units of fresh frozen plasma were transfused during the operation.

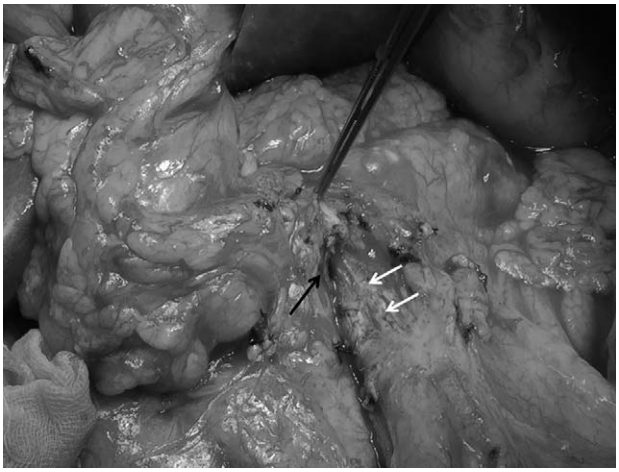

Fig. 3. Operative field prior to pancreas resection showing a hematoma (black arrow) in the pancreatic head adjacent to the superior mesenteric vein (white arrows) and portal vein with severe inflammation.

Postoperative vital signs indicated hemodynamic stability, and the epigastric pain improved. Serum and drain amylase levels were normalized (Table 1);

Table 1. Serial measurements of serum and drain amylase

	*Preop 2	Preop 1	†Op day	‡POD 1	POD 2	POD 3	POD 4	POD 5
Serum amylase (IU/L)	141	321	-	97	55	42	-	44
§Drain 1 amylase (IU/L)				78	125	53	-	-
Drain 1 volume (mL)				24	22	9	-	-
Drain 2 amylase (IU/L)				86	58	27	19	22
Drain 2 volume (mL)				38	161	110	50	62

* Preop: preoperative day
† Op day: operation day
‡ POD: postoperative day
§ Drain: operative drain

the drain was removed on postoperative day 3, and the patient resumed oral intake the same day. Follow-up abdominal CT on postoperative day 7 showed a small fluid collection around the pancreatic resection site but no pancreatic fistula or pseudoaneurysm. The patient was discharged on postoperative day 9 without any complications.

III. Discussion

Since the pancreas is located in the retroperitoneum and is adjacent to several major vessels and organs, pancreatic trauma is associated with a number of other injuries; isolated pancreatic injury is rare. Furthermore, as pancreatic injury usually occurs in blunt abdominal traumas, extensive injuries are likely to occur according to the force to the abdomen between the anterior intraperitoneal organs and the posterior lumbar vertebral body. Therefore, isolated pancreatic injury would be expected to have low morbidity and mortality rather than associated injury with other organs; however, there are few reports related to its prognosis due to the low incidence.(5,6) Recently, Krige et al.(3) described that the mortality and postoperative complication rate of 49 patients with isolated pancreatic injuries in a single institute were 4% and 55%, respectively. In a Korean study, Chi et al.(7) reported that the morbidity and mortality of 20 isolated pancreatic injuries were 65 and 0%, respectively. Furthermore, several papers have identified that isolated blunt pancreatic injuries (92%) occur more often than penetrating injuries.(3,5-8)

On initial presentation of the pancreatic injury, peritoneal signs are not definite (due to the anatomical location of the pancreas) and the sensitivity of the serum amylase activity is low; thus, diagnosis is often delayed, precluding timely treatment. While a penetrating pancreatic injury is diagnosed at a relatively early stage, obscure clinical signs, laboratory tests, and the radiological view of a blunt pancreatic injury can make the diagnosis more difficult.(2) As in the present case, the patient's symptoms were presented late and the trauma history was missed in the emergency department; thus, a wrong diagnosis of general pancreatitis was initially made. Consequently, proper diagnostic tools for pancreatic injury should be prepared. CT performed generally for the initial diagnosis is a non-invasive and easily available radiological modality. However, CT performed within 24 hours after the injury may miss a significant pancreatic injury because of the absence of inflammatory changes caused by leakage of pancreatic secretions.(9) Thus, CT has limitations with respect to reflecting the injury severity of the pancreas and indicating whether or not there is an injury of the main pancreatic duct. Although ERCP is the most useful procedure for the diagnosis of pancreatic ductal injury,(10) it cannot be applied to unstable trauma patients. In trauma situations that are inaccessible with ERCP, the use of MRCP is recommended in hemodynamically stable patients.(11) In the present case with a hemodynamically stable status, main pancreatic duct injury was identified using MRCP.

Therapeutic decisions for pancreatic trauma are based on the site of injury and the status of the pancreatic ductal system. Several surgical treatments for pancreatic duct injuries have been introduced in the treatment guidelines of the American Association for the Surgery of Trauma (AAST).(12,13) Recently, endoscopic stent placement for pancreatic duct injury, including AAST grade III or IV injury, in hemodynamically stable patients has been shown to be effective therapy that can preserve the exocrine and endocrine functions of the pancreas and avoid more invasive surgical therapy, which has high morbidity and mortality rates.(3,4,10) Although there is no definitive consensus for endoscopic treatment of pancreatic injury, Okamoto and Fujii (14) have suggested that incomplete disruption of the main pancreatic duct or complete disruption with contrast-enhanced upstream duct or without duct obstruction in ERCP could be the best candidate for pancreatic duct stent therapy. However, if endoscopic stent insertion is not indicated or has failed, surgery should be considered without further delay to prevent increased morbidity.(8,13) In the present case, ERCP showed a nonenhanced upstream pancreatic duct and transection, so we decided to perform operative intervention rather than endoscopic intervention.

Several operative methods for main pancreatic duct injury may be considered, based on the injury site. For an AAST grade IV injury, such as that in the present case, proximal repair with debridement and distal Roux-en-Y pancreaticojejunostomy, duodenal diversion surgery, pyloric exclusion, and pancreaticoduodenectomy are all indicated according to the intraoperative findings and status of the pancreatic parenchyma.(12) At the early stage of injury, the abovementioned organ-preserving operations are considered; however, at a later stage, when peripancreatic inflammation has progressed and the anatomy of the pancreatic head is disrupted, pancreaticoduodenectomy may be the best choice of treatment, even if it is merely 3 days after the injury, as in the present case. Pancreaticoduodenectomy in not commonly performed for pancreatic trauma; indeed, only 23 such cases have been reported in our country.(2) Lassidini et al.(15) reported that the postoperative complication rate and mortality following emergency pancreaticoduodenectomy were 80% and 40%, respectively. Our patient recovered without postoperative complications, such as pancreatic fistula and diabetes mellitus. If patients with traumatic pancreatic injury are hemodynamically unstable, treatment should be performed as a two-stage procedure: after the initial damage control surgery with temporary bleeding control and external drainage, definitive surgery with anastomoses can be completed during a second surgery when the patient is stable.

Isolated pancreatic injury is uncommon and difficult to diagnose. Because delayed treatments can increase morbidity and mortality, prompt and appropriate initial diagnosis and aggressive treatment for main pancreatic duct is important. When patients with isolated pancreatic injury are hemodynamically stable, endoscopic pancreatic stent insertion can be attempted. If endoscopic treatment is not indicated or has failed, operative treatment should be performed without further delay to maintain the best chance of survival. Emergency pancreaticoduodenectomy is a formidable life-saving operation; however, it presents with a high morbidity and mortality rate. Nevertheless, it can be a successful treatment in selected patients. If necessary, it should be implemented with assistance from surgeons with a high level of experience in hepatobiliary and pancreatic surgery.

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