

Pancreaticoduodenectomy as an option for treating a hemodynamically unstable traumatic pancreatic head injury with a pelvic bone fracture in Korea: a case report

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Received: October 4, 2022

Revised: November 18, 2022

Accepted: November 24, 2022

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Pancreatic trauma occurs in 0.2% of patients with blunt trauma and 5% of severe abdominal injuries, which are associated with high mortality rates (up to 60%). Traumatic pancreatoduodenectomy (PD) has significant morbidity and appreciable mortality owing to complicating factors, associated injuries, and shock. The initial reconstruction in patients with severe pancreatic injuries aggravates their status by causing hypothermia, coagulopathy, and acidosis, which increase the risk for early mortality. A staging operation in which PD follows damage control surgery is a good option for hemodynamically unstable patients. We report the case of a patient who was treated by staging PD for an injured pancreatic head.

Keywords: Pancreas head injury; Wounds and injuries; Staging operation; Pancreaticoduodenectomy; Case reports

INTRODUCTION

Pancreatic trauma occurs in 0.2% of blunt trauma patients and 5% of severe abdominal injuries, which are associated with high morbidity and mortality rates [1]. The American Association for the Surgery of Trauma (AAST) scale for pancreatic injuries was introduced in 1990; these guidelines divide pancreatic injuries into five stages, and pancreaticoduodenectomy (PD) is the procedure of choice for grades 4 and 5 [2]. Operating on the pancreatic head is technically challenging and requires delicate resection and complex reconstruction. Such a procedure necessitates exceptional surgical training and expertise [3]. The initial reconstruction in severely injured patients with complex pancreatic in-

juries worsens their initial status by causing hypothermia, coagulopathy, and acidosis, which increase the risk of early mortality [4]. The concept of damage control surgery has been established in recent decades [5], and hemodynamically unstable patients have an initial damage control operation followed by subsequent PD and reconstruction once they are stable [6]. We report the case of a patient who was treated by staging PD for a pancreatic head injury.

CASE REPORT

A previously healthy 30-year-old male sergeant was transferred to the Armed Forces Trauma Center by air-ambulance from a

community hospital. He had suffered a crush injury due to a military towing car accident. Contrast-enhanced abdominal-pelvic computed tomography (APCT) at the community hospital showed a pancreatic head injury, extensive hemoperitoneum, liver laceration (grade 2) (Fig. 1), and an open-book type pelvic bone fracture (Fig. 2A). The initial vital signs were a blood pressure of 80/60 mmHg, a heart rate of 112 beats/min, a respiratory rate of 18 breaths/min, and a temperature of 36.2 °C. Focused assessment with sonography for trauma showed positive results in the right flank area. Since the patient's vital signs were unstable, we decided to perform an exploratory laparotomy without hesitation with the traumatic orthopedic team.

Exploratory laparotomy was conducted with collaboration be-

tween the trauma team, hepato-biliary-pancreas (HBP) team, and orthopedics (OS) team. The grade 2 liver laceration was controlled with hemostatic gauze. Next, bleeding control was performed on the lateral side of the superior mesentery vein, the main pancreatic duct injury was identified, and the duodenal perforation site was repaired with primary sutures (Fig. 3). Two-branch indwelling Jackson-Pratt drains were placed around the pancreatic injury site to drain the pancreatic juices. During laparotomy, external screw fixation was simultaneously performed in the pelvic bone by the OS team (Fig. 2B). After damage control surgery was finished, the patient was sent to the trauma intensive care unit. At 24 hours postoperatively, the patient was resuscitated in the trauma intensive care unit and given a transfusion and

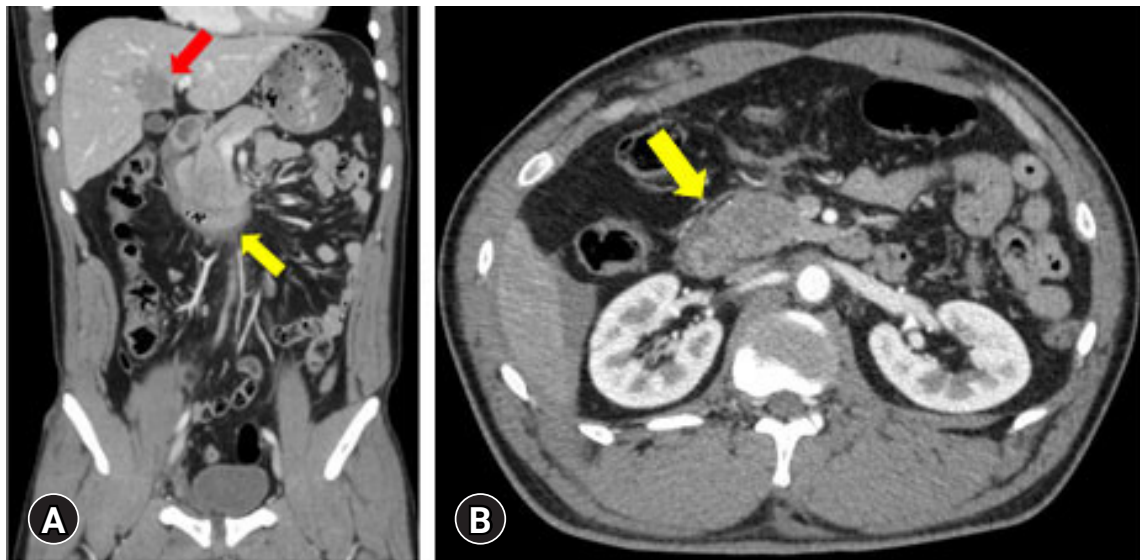


Fig. 1. Initial abdominal-pelvic computed tomography. (A) Coronal view shows liver laceration (red arrow) and pancreas head injury (yellow arrow). (B) Axial view shows the pancreas head injury (arrow).

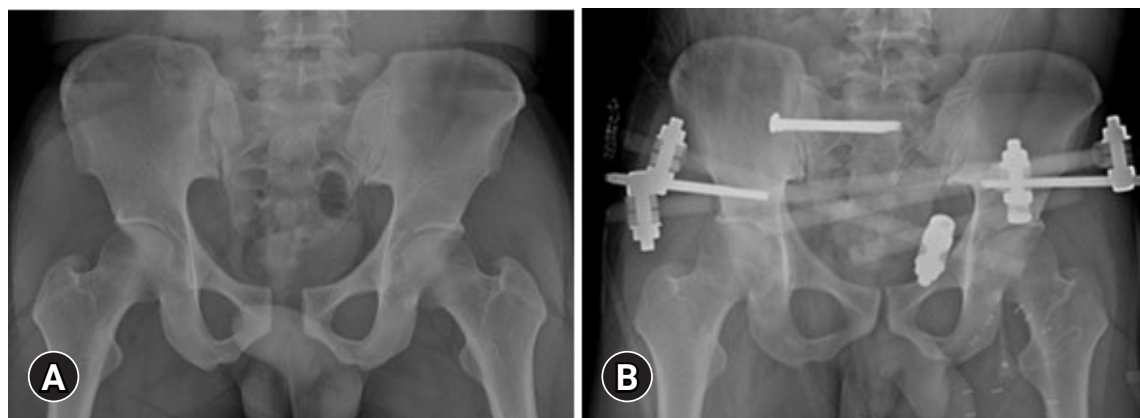


Fig. 2. Abdominal-pelvic computed tomography (A) at the trauma bay shows an open-book type pelvic bone fracture and (B) after the operation shows the external screw fixation state.

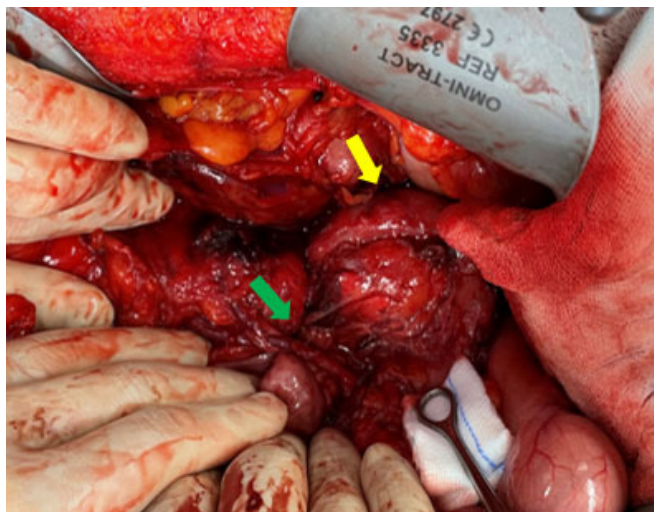


Fig. 3. Damage control surgery view. The green arrow shows the tearing site of the lateral side of superior mesenteric vein, and the yellow arrow shows the duodenum perforation site.

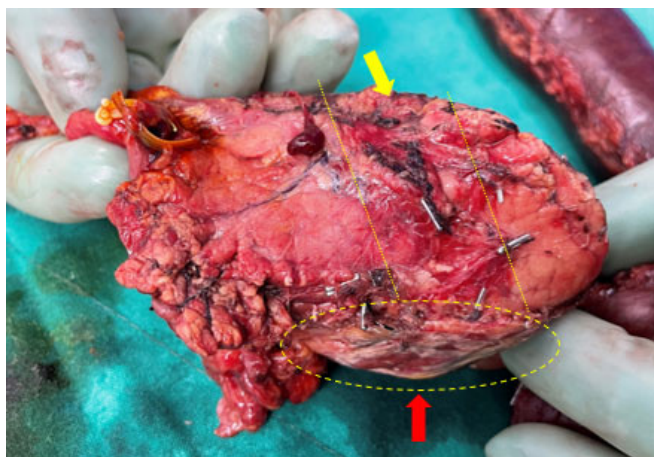


Fig. 4. Gross findings of the specimen. The yellow arrow and dotted line show a crushed pancreatic head, and the red arrow and the dotted circle show pancreatic juice leakage and necrotic tissue.

fluid therapy until vital signs were stabilized.

The PD operation began 24 hours after the initial damage control surgery. The pancreatic head was crushed, the main duct was disrupted, and pancreatic juice leakage was confirmed (Fig. 4). The pancreas was resected at the neck level to maintain a healthy main duct and avoid pancreaticojejunostomy site leakage. Duct-to-mucosa anastomosis at the pancreaticojejunostomy was performed with a short silicone catheter inserted through the site of anastomosis. The postoperative course went smoothly. APCT detected no complications at postoperative day (POD) 7 and POD 28. The patient was discharged in good condition on POD

42 with an injury severity score of 50 without complications. New-onset diabetes mellitus did not occur at postoperative 6 months.

Ethics statement

The study was approved by the Institutional Review Board of the Armed Forces Capital Hospital (No. AFCH IRB 2022-09-001). The Institutional Review Board waived the requirement for written informed consent. Our study was conducted in accordance with the Declaration of Helsinki.

DISCUSSION

Howell et al. (as cited in Israr et al. [7]) were the first to report PD for treating trauma patients in 1961. PD for trauma is seldom necessary and should be reserved for severe pancreatic head injuries that cannot be preserved otherwise [8]. There are specific indications for PD for trauma. First, there needs to be extensive devitalization of the head of the pancreas or duodenum with no prospect of repair. Second, there needs to be a ductal disruption in the pancreatic head with an AAST grade of 5 and injuries to the duodenum and distal common bile duct. Lastly, there needs to be an injury to the ampulla of Vater, with a disruption of the main pancreatic duct from the duodenum [6,9].

Operative mortality after blunt trauma to the pancreas has been reported in up to 60% of cases because of acute complications such as pancreatic juice leakage, pseudoaneurysm, and bile leakage. Moreover, despite trauma bay resuscitation, pancreatic injury patients have severe associated injuries and major blood loss, acidosis, coagulopathy, hypothermia, and persisting hypotension [4,9,10]. For these reasons, surgeons may face a dilemma regarding the need to perform damage control surgery followed by definite PD when encountering these patients. Additionally, the management of pancreatic injuries is complex and often requires a multidisciplinary approach. Experienced trauma and HBP surgeons, intensive care unit physicians, and radiologists should collaborate intensively to offer patients the best results. In our case, a multidisciplinary approach between the trauma, HBP, and OS teams started before the patient's arrival.

Numerous pancreatic injury patients are in a hemodynamically unstable condition, and since the introduction of the damage control strategy in 1983, staging PD has become an increasingly viable option that has decreased the high mortality rate of pancreatic injuries [11,12]. Our patient was hemodynamically unstable with hemoperitoneum and a pelvic bone fracture. For these reasons, our multidisciplinary hospital team decided on damage

control surgery followed by PD. The PD was conducted by an experienced HBP team, which reduced the risk of acute postoperative complications.

Our successful treatment of staging PD for a traumatic pancreatic injury demonstrates that PD after damage control surgery in hemodynamically unstable patients is a viable option.

ARTICLE INFORMATION

Author contributions

Conceptualization: all authors; Data curation: SYJ; Formal analysis: all authors; Methodology: all authors; Project administration: all authors; Visualization: SYJ; Writing—original draft: SYJ, HL; Writing—review & editing: all authors. All authors read and approved the final manuscript.

Conflicts of interest

The authors have no conflicts of interest to declare.

Funding

The authors did not receive any financial support for this study.

Data availability

Data sharing is not applicable as no new data were created or analyzed in this study.

Additional information

This study was presented at the 9th Pan-Pacific Trauma Congress (PPTC) in June 2022 in Gyeongju, Korea.

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