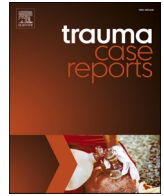




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Case Report

From the borders edge to the brink of death: A case of a traumatic pancreatic injury and Whipple procedure in the Rio Grande Valley[☆]

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ABSTRACT

The traumatic pancreatoduodenectomy, also known as the traumatic Whipple, is a specialized surgical procedure often reserved for extreme cases in which an individual suffers traumatic injuries to the pancreas, duodenum, or periampullary structures. Traditionally, a Whipple procedure is a complex surgery involving the removal of the head of the pancreas, duodenum, and a portion of both the bile duct and stomach, for the management of pancreatic head cancer. In underserved communities where limited access to healthcare is coupled with a higher incidence of trauma, the lack of specialized and supportive care for patients suffering from pancreatic injuries may lead to an increased morbidity and mortality rate. This case report aims to provide a detailed analysis of a patient who underwent a traumatic pancreatoduodenectomy in a medically underserved region in South Texas, while discussing the rarity of the procedure, its incidence and mortality rates, as well as the subsequent outcomes faced by individuals in this patient population.

Background

Traumatic abdominal injuries affecting the pancreas are fairly uncommon with the incidence ranging from 0.2 to 12 % of all traumatic abdominal injuries [1]. When certain pancreatic injuries are deemed high-grade, it may be necessary to perform a multitude of highly invasive lifesaving procedures. The traumatic pancreatoduodenectomy, also known as the traumatic Whipple, is a specialized surgical procedure that is often reserved for cases in which a patient has suffered a traumatic injury to the pancreas, duodenum, or other upper abdominal organs surrounding the ampulla of Vater [2]. Traditionally, a Whipple procedure is a complex surgery involving the removal of the head of the pancreas, duodenum, and a portion of the bile duct and stomach, typically reserved for the treatment of pancreatic head cancer [2]. When the pancreas and periampullary structures have been critically damaged, this procedure may be deemed necessary as a means of salvaging a patient's life. In underserved communities where limited access to healthcare is coupled with a higher incidence of trauma, the lack of specialized and supportive care for patients suffering from pancreatic injuries may lead to an increased morbidity and mortality rate, negatively impacting long-term patient outcomes [3]. This case report aims to provide a

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detailed analysis of a patient who underwent a traumatic pancreatoduodenectomy in a medically underserved region in South Texas, discussing the rarity of the procedure, its incidence and mortality rates, as well as the subsequent long-term outcomes faced by individuals in this patient population.

Case description

A 42-year-old male presented to the emergency department via ambulance as a level 1 trauma activation following multiple gunshot wounds. Upon arrival, a primary survey was done revealing a hypotensive individual with a Glasgow Coma Scale of 7, warranting the need for rapid-sequence-intubation. The hospital's massive transfusion protocol was then activated, and a succinct secondary survey revealed penetrating injuries to the right upper quadrant, left testicle, left upper extremity, and bilateral lower extremities. Based on these findings the patient was emergently taken to the operating room for a damage control exploratory laparotomy. Continued resuscitation efforts within the operating room provided the patient with a total of nine units of packed red blood cells, six units of fresh frozen plasma, two units of cryoprecipitate, and two units of pooled platelets. On entry into the patient's abdominal cavity two liters of blood were initially suctioned, revealing Grade V pancreatic and duodenal injuries, as well as a Grade II liver injury (Fig. 1). Further exploration revealed both retroperitoneal and mesenteric hematomas, penetrating damage to the transverse colon, and a grade V testicular injury. Due to the high degree of intrabdominal organ injury and limited tissue viability, it was determined that a two-part staged Whipple procedure would be done on this patient. The primary operation included a pancreatic head and duodenal resection, partial gastrectomy, choledochotomy, resection of the transverse colon, and hemorrhagic control of the liver. During the operation pancreatic and biliary drains were placed, and retroperitoneal exploration, packing, irrigation, and wound debridement was performed. The patient was then transferred to the surgical intensive care unit with an open abdominal negative pressure device in place. During the re-exploratory phase, the second stage of the classic Whipple procedure was performed, as well as

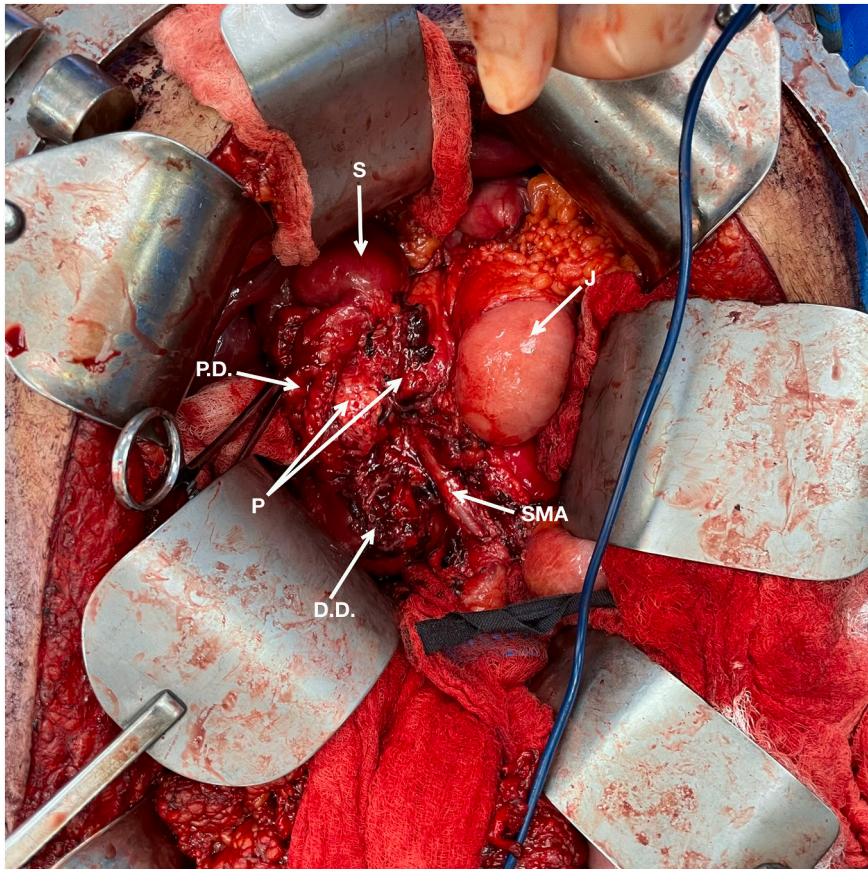


Fig. 1. Intraoperative view of the penetrating injury to the pancreatoduodenal junction.

S: Stomach.

PD: Proximal duodenum.

P: Avulsed and devitalized pancreatic head and neck.

DD: Distal duodenum.

SMA: Superior mesenteric artery.

J: Jejunum.

a left orchiectomy due to a high-grade testicular injury. Additionally the patient required hepatic wound debridement and coagulation, as well as an end colostomy with feeding tube placement. Throughout the course of treatment, the patient experienced complications due to the acute inflammatory response seen in his post-traumatic state. These collateral issues include: acute respiratory failure leading to ventilator dependence and tracheostomy placement, an abdominal fascial dehiscence necessitating a hernia repair with mesh, as well as a right flank abscess and uroma required incision and drainage with nephrostomy tube placement. These complications eventually resolved, allowing for decannulation of the tracheostomy, removal of the pancreatic and right flank drains, and the exchange of the nephrostomy tube for a nephroureteral stent.

Discussion

Due to its infrequency, the incidence and prevalence of traumatic Whipple procedures are not well documented; however, they have been shown to be used in <5 % of cases for severe pancreatic or duodenal injuries [2]. The morbidity and mortality rates associated with this procedure can vary based on several factors, including the patient's overall health, the severity of the injury, and the timing of the surgery. Based on our patient's presentation, we calculated their Mechanism of injury, GCS, Age, and SBP (MGAP) Score as well as their Injury Severity Score (ISS) to be 15 and 66 respectively [4,5]. The patient met the scoring criteria placing him in the high-risk group when using the physiologically based MGAP score, predicting an overall mortality rate of 48 % [4]. The predictive measurement found within the MGAP score was coupled with the anatomically based ISS, which provided a prognosis correlating linearly with both mortality and morbidity, as well as hospital stay [4,5]. These two scoring systems allowed us to fully depict the severity of how our patient presented when first arriving at our hospital. Our patient's surgical candidacy was based on factors surrounding the severity of his abdominal injuries, including damage to the head of the pancreas, duodenum, as well as bile ducts. Injuries surrounding the area of interest for our patient were classified using the American Association for the Surgery of Trauma (AAST) organ injury scale as Grade V for both the pancreas and duodenum and Grade II for the liver laceration [6,7]. A study done by Ragulin-Coyne et al. reviewing data from over 27,000 patients from the National Inpatient Sample (NIS) data bank showed that the morbidity and mortality rates for pancreaticoduodenal injuries were 47 % and 11.5 % respectively, with certain cohort studies showing respective rates as high as 80 % and 50 % [2,8]. In general, traumatic Whipple procedures are associated with a higher risk of complications compared to the elective form, with studies showing patients who underwent more complex trauma-related surgical procedures having a higher correlation with morbidity and mortality rates than those who underwent less complex procedures [2,10].

Conclusion

The traumatic pancreaticoduodenectomy, or a Whipple procedure, is a complex and major surgical intervention that is typically reserved for the treatment of pancreatic cancer and other conditions affecting the pancreas and upper gastrointestinal tract [2]. While the procedure is relatively rare, it is even more uncommon in the setting of trauma, with some studies estimating an incidence of <0.1 % of all trauma-related pancreatic injuries [9]. The patient in this case required a pancreaticoduodenectomy due to high-grade injuries sustained from multiple gunshot wounds. Despite the severity of his injuries, our patient received the appropriate care needed to adequately achieve hemodynamic stability via both emergent resuscitation and rapid surgical interventions. The patient experienced complications during his hospitalization; however, through effective coordination of a multidisciplinary team and diligent management of these issues, the patient was able to make a substantial prognostic recovery and was eventually discharged home to the care and support of his family. Overall, this case illustrates the importance of prompt and effective treatment in a patient suffering severe traumatic injuries, as well as the complexity and infrequency of Whipple procedures in the setting of trauma in South Texas and the Rio Grande Valley.

Case summary

The case presented demonstrates a procedure rarely done in the setting of trauma, especially outside of large urban trauma centers. During the initial surgery, the patient was noted to have Grade V pancreatic and duodenal injuries, a Grade II liver injury, and a Grade V testicular injury. The blood products the patient received during the initial operation included 9 units of packed red blood cells, 6 units of fresh frozen plasma, 2 units of cryoprecipitate, and 2 units of pooled platelets. Due to the degree of his injuries, this patient had an extensive hospital length of stay of 121 days, with 45 of those days being spent in the ICU. Although the patient initially required a two-staged operation for both damage control and completion of the Whipple procedure, he ended up having a total of 5 operative procedures during his inpatient stay. The patient suffered from multiple sequelae secondary to his traumatic state, including acute respiratory failure, abdominal fascial dehiscence, and a right flank abscess and uroma, all of which ultimately resolved prior to his discharge. The patient was unable to maintain long-term follow-up with a primary care provider due to being undocumented and without insurance, but he continues to have scheduled follow-up visits at the local trauma center's outpatient clinic.

Declaration of competing interest

There are no known conflicts of interest associated with this publication and there has been no financial support for this work that could have influenced its outcome.

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