

High Grade Penetrating Pancreatic Trauma - Case Report and Review of the Literature

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Rezumat

Traumatism pancreatic penetrant de grad mare - prezentare de caz și analiza literaturii

Introducere: Traumatismele pancreatice, din fericire rar întâlnite, se asociază cu multiple leziuni intraabdominale și prezintă o morbiditate și o mortalitate semnificativă. Scopul acestui studiu este de sublinia morbiditatea semnificativă asociată traumatismelor pancreatice de grad crescut.

Prezentare de caz: Pacientă de sex feminin, 36 de ani, victima unui traumatism pancreatic penetrant secundar violenței domestice, se internează prin transfer de la un spital județean, unde au fost efectuate multiple laparotomii. În departamentul de urgență pacienta este instabilă hemodinamic și prezintă insuficiență multiplă de organe. Examenul clinic abdominal relevă eviscerație blocată, cu exteriorizarea masivă de suc pancreatic la nivelul plăgii postoperatorii și la nivelul plăgilor penetrante din flancul drept. Computer Tomografia de urgență a evidențiat multiple colecții intraabdominale, cu lăcerația ficatului și rinichiului drept. S-a decis relaparotomia. După visceroliză și lavaj peritoneal cu evacuarea colecțiilor intra-

peritoneale, explorarea a evidențiat o lăcerație profundă la nivelul capului pancreatic, cu exteriorizarea activă de lichid pancreatic, elemente ce se corelează cu o leziune de gradul IV. Intervenția s-a încheiat prin drenajul larg al bursei omentale și al cavității peritoneale mari. Evoluția postoperatorie a fost favorabilă, pacienta prezentând o fistula pancreatică externă managerizată conservator. Externarea s-a realizat la 35 de zile.

Concluzii: Traumatismele pancreatice de grad crescut se asociază cu o morbiditate semnificativă. Drenajul eficient al leziunilor pancreatice cefalice și managerizarea pacienților în centre cu volum crescut în chirurgie pancreatică crește semnificativ rata supraviețuirii.

Cuvinte cheie: politraumatism, penetrant, pancreas

Abstract

Introduction: The pancreatic injuries have fortunately a low frequency, but when present associate multiple intraabdominal lesions, and carry a significant morbidity and mortality. The aim of this study is to underline the significant morbidity associated with high grade pancreatic injuries.

Case report: Female patient, 36 years old, with penetrating abdominal trauma due to domestic violence was referred to our center from a regional county hospital, after multiple laparotomies, hemodynamically unstable, with multiple organ failure. Abdominal clinical exam revealed evisceration, with massive pancreatic leakage at the level of the median laparotomy and through the stabbing wounds from the right flank. Emergency

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Computed Tomography showed multiple intraabdominal collections, with laceration of the liver, right kidney and pancreatic head. Abdominal exploration was decided. After a thorough abdominal debridement was revealed a deep laceration of the pancreatic head, with active extravasation of pancreatic secretion, correlating with a grade IV injury. Peritoneal lavage and large drainage of the lesser and greater peritoneal cavity was performed. The postoperative recovery was uneventful, with progressive decrease in pancreatic fistula output and discharge after 35 days.

Conclusions: High grade pancreatic traumas associate a significant morbidity. Efficient drainage of the pancreatic head injuries and patients' management in high volume centers for pancreatic surgery maximize the survival rate.

Key words: polytrauma, penetrating injury, pancreas

Introduction

Pancreatic injuries have a low frequency, being found in 4% of all patients with abdominal injuries (1). The close relationships of the pancreas with major abdominal vessels explain the significant morbidity and mortality, of 23.4% and 30.2% respectively, associated with penetrating pancreatic injuries (2). Pancreatic lesions are usually associated with other abdominal traumas, the most common being the liver (19%), stomach (16%), spleen (11%), colon (8%) and duodenum (8%) (1). Less than 3% of penetrating injuries of the pancreas are isolated (3). Due to its posterior, retroperitoneal position, the diagnosis of pancreatic injury is difficult in the majority of the cases, even in penetrating wounds that require diagnostic laparotomy.

The aim of this study is to underline the significant morbidity of high grade penetrating pancreatic trauma.

Case report of a right flank penetrating injury, referred to our trauma center after multiple laparotomies in a county hospital. For review of the literature we used electronic search of the PubMed/Medline using as MeSH terms or truncated words in title and abstracts: "pancreas", "trauma", "injury", "penetrating".

Case report

Female patient, 36 years old, victim of domestic violence, with a penetrating trauma into the right flank, was referred to our hospital, after 17 days, from a regional county hospital, after multiple laparotomies, with severe sepsis and multiple organ failure. At the referring hospital, during initial emergency laparotomy, was found a grade II AAST (American Association for the Surgery of Trauma) penetrating injury of the segment 6 of the liver; grade II AAST renal injury, penetrating injury of the pancreatic head and a grade III AAST small bowel injury. Was performed a small bowel suture and peritoneal drainage. Two

more unplanned laparotomies were performed for intra-abdominal collections.

The clinical examination of the patient in the emergency room revealed a systolic blood pressure of 110 mm Hg and an increased respiratory frequency. The abdominal clinical exam revealed evisceration, with massive pancreatic leakage at the level of the midline laparotomy wound and of the right flank stab wound. Blood samples showed white blood cells of 20480/mm³ and a hemoglobin value of 6.7.g/dl. The calculated Marshall multiple organ dysfunction score was five. (Fig. 1)

Emergency Computed Tomography (CT) confirmed the segment 6 liver injury, the right kidney injury, free peritoneal fluid and multiple intrabdominal collections. (Fig. 2, 3)

Abdominal exploration was decided. After a thorough abdominal debridement was revealed a grade IV AAST pancreatic penetrating injury, with partial transection of the main pancreatic duct. (Fig. 4)

After extensive lavage, was performed wide peritoneal drainage of the lesser and greater peritoneal cavity.

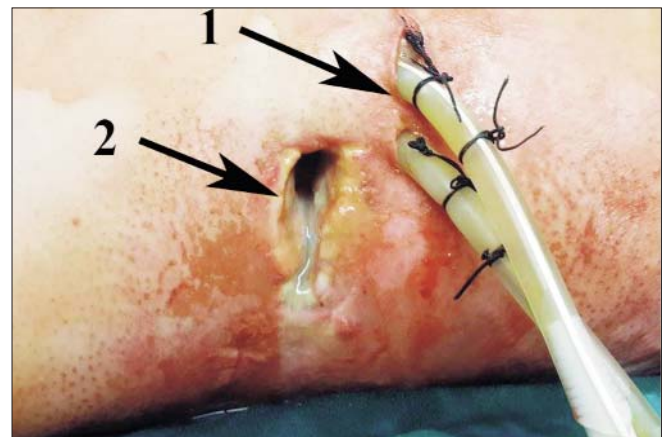


Figure 1. Clinical examination at admission. 1- peritoneal drainage tubes. Can be observed at the level of the right flank the penetrating wound (2) with leakage of clear pancreatic juice and significant erythema of the skin

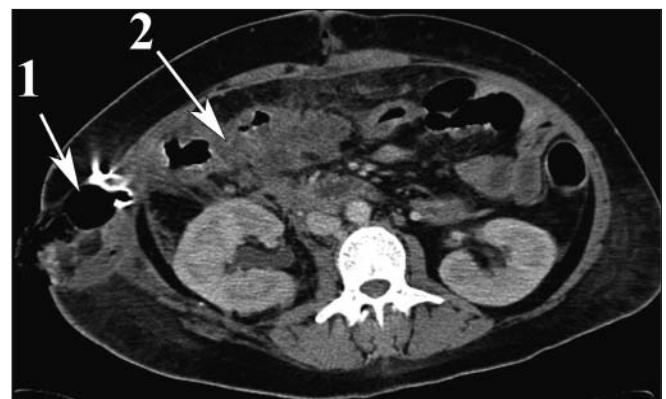


Figure 2. Computed Tomography on admission. Can be observed the defect of the right postero-lateral abdominal wall (1) and intraabdominal fluid collections (2)

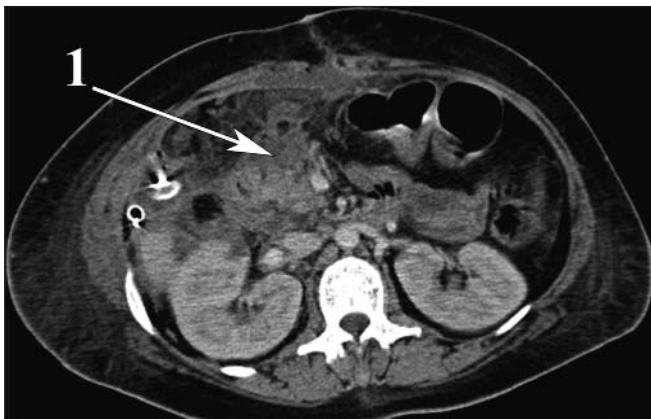


Figure 3. Computed Tomography on admission. 1 – fluid collections anterior to the pancreatic head

The postoperative course was favorable. The patient developed an external pancreatic fistula, during the first postoperative days the drainage being 2900 ml per 24 hours of clear pancreatic juice. The debit of the pancreatic leakage progressively decreased under conservative management. (Fig. 5)

The patient was discharged after 35 days.

The Computed Tomography exam at four months after the injury revealed no intraabdominal residual collections. (Fig. 6)

Discussions

We present the case of a young female, with high grade penetrating pancreatic injury, successfully managed by conservative surgery after referral in a level I trauma center, despite significant morbidity of previous laparotomies.

The surgical challenges of such lesions and their associated morbidity and mortality is very well expressed by Hirshberg and Mattox, who considered this area as the “wounded surgical soul” (4,5). Patients with pancreatic injuries represent a highly heterogeneous group, therefore profound exploration of the abdominal cavity should be routinely done to evaluate the

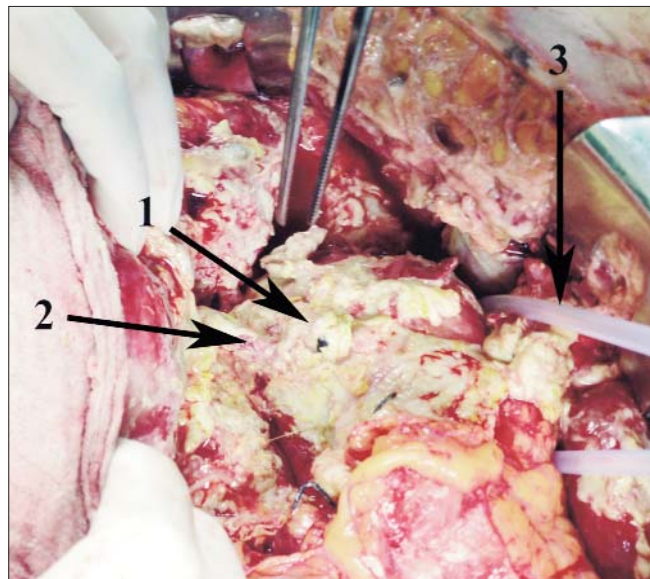


Figure 4. Intraoperative aspect of the duodeno-pancreatic area, seen from the left side of the patient. 1 – anterior surface of the pancreatic head. 2 – anterior surface of the superior mesenteric vein. 3 – tourniquet on the hepatic pedicle

pancreatic injury (6,7). Raised serum amylase after 3 hours from injury might indicate pancreatic injury. One of the most important prognostic factors in pancreatic trauma is represented by the pancreatic duct injury (8,9). Phelan et al. published the result of a multicenter study which evaluated the sensitivity/specificity of multidetector Computed Tomography (MDCT) for the identification of pancreatic ductal injury (PDI) (10). 20 centers enrolled 206 patients with pancreatic injury, 71 presenting PDI. 89% were blunt trauma. The sensitivity of 16-MDCT for pancreatic injury was 60.1%, whereas of 64-MDCT was 47.2%. For PDI, the sensitivity and specificity of 16-MDCT was 54% and 94.8%, respectively, and of the 64-MDCT was 52.4% and 90.3%, respectively. The conclusion of the authors was that 16- and 64-MDCT have a low sensitivity for pancreatic injury

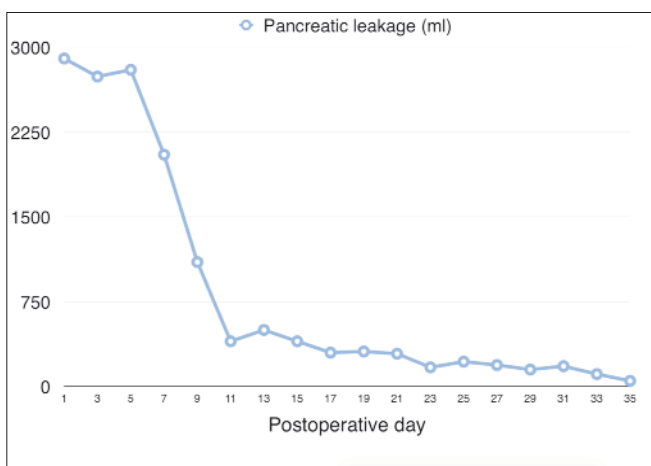


Figure 5. Graphical aspect of the external pancreatic leakage



Figure 6. Computed Tomography at three months after the injury.

and pancreatic ductal injury, while exhibiting a high specificity of PDI (10). For pancreatic ductal injury there are MDCT signs highly sensitive but unspecific, with 100% sensitivity and 4.9% specificity for low attenuation peripancreatic fluid, 50% sensitivity and 95.1% specificity for pancreatic laceration involving >50% of the parenchymal width (11).

The current guidelines recommend nonoperative management of grade I and II blunt injuries, and operative management (resection or drainage) for grade III or higher injuries (12). However, there is no place for nonoperative management in penetrating pancreatic injuries (13). Limited pancreatic injuries can be successfully managed by closed drainage system, with drain serum amylase monitoring (14,15).

In patients with grade III injury, distal pancreatectomy is usually required, spleen saving procedures unnecessarily prolonging the operative time (8). Simple lavage and drainage of the peritoneal cavity is recommended even in severe injuries (grade IV, V) if ampulla and duodenal lesions are excluded (16).

Grade V injuries usually results as a consequence of high energy impacts that can lead to complex pancreatic head injuries that requires pancreaticoduodenectomy (15,17). Asensio et al. published a retrospective 126-month study of all patients with pancreaticoduodenectomy for trauma (6). They included 18 patients, with a penetrating injury in 94% of cases and a mean Injury Severity Score of 27 ± 8 . Indications for resection were: uncontrollable retropancreatic injury (72%), and a massive unreconstructable injury (100%). The mean estimated blood loss was $6,888 \pm 7,866$ mL, and the overall survival was 67% (6). Krige et al. found 19 pancreaticoduodenectomies for trauma during an analysis of 22 years, 12 due to gunshot, 6 due to blunt trauma and 1 through stab wound (18). Nine patients had inferior vena cava or portal vein injuries. Five patients had an initial damage control procedure and a definitive repair at a median of 15 h (11-92). All the 16 survivors had postoperative complications: grade I (1), grade II (7), grade IIIa (2), grade IVa (6) according to Clavien-Dindo scale (18).

Pancreatic surgery, once needed, represents a complex and difficult surgical gesture even in the hands of experienced surgeons (7), therefore an hepatobiliary-pancreatic surgeon, as a member of the surgical team is recommended. On the other hand should be noted the experience coming from Heidelberg regarding emergency pancreatic surgery (19). They analyzed 23 emergency pancreatic operation, only one being performed for a blunt trauma. They reported a mean ICU stay of 21.3 (1-80) days, an overall surgical morbidity of 52.2% and an in-hospital mortality of 34.8% (19).

Single staged surgery represents the predominant way of management for the patients with delabrating pancreatic and duodenal injuries. Some authors show good results with damage control type surgery in smaller hospitals followed by delayed reconstruction in a specialized center (20). Seamon et al. investigated the place of pancreatic resection during initial damage control laparotomies (21). They found 42 patients with

damage control laparotomies and pancreatic injuries, in 71.5% by penetrating trauma. There were 11 distal resections and a pancreaticoduodenectomy with late reconstruction. The mortality was 70% in packing only group, 25% in packing with drainage, 55% in distal pancreatectomy and 0% in pancreaticoduodenectomy (21).

A very large experience with penetrating pancreatic injuries came from Cape Town, South Africa (22). Publishing their 30 years experience with 432 penetrating pancreatic injuries, Krige et al. found a mortality of 15.7% and a morbidity of 66%. The multivariate logistic regression revealed the AAST grade of pancreatic injury and repeat laparotomy as predictors of morbidity, while predictors of mortality were age, shock, median number of units of blood transfused and the presence of complications (22).

The same group from Cape Town presented 78 patients with penetrating pancreatic injuries managed between 1982 – 2011, out of which 16 were in the head and 2 in the neck of the pancreas (23). 65 had grade I and II, while 13 had grade III-V lesions. 84.6% of patients had drainage only, six had distal resections and one had a pancreaticoduodenectomy. 10.3% were damage control interventions. 10.2% of patients developed pancreatic fistula and 5.1% died. The conclusion of the authors was that although the mortality was low, the morbidity was high. Significant predictors for complications were an increased AAST grade of injury, a high Revised Trauma Score, shock on admission to hospital, need for blood transfusion and repeat laparotomy (23).

Akhrass et al. published a ten year multi-institutional experience, out of 16,188 trauma admissions 72 patients presenting pancreatic trauma (24). The pancreas was involved in 1.1% of patients with blunt trauma, and in 0.2% of patients with penetrating injuries (24). Young et al. analyzed 62 patients with penetrating pancreatic trauma managed during eight years in three level I trauma centers (25). They reported a mortality of 22.6%, 16.1% within 48 hours due to associated vascular injuries. In the 52 patients surviving over 48 hours, 19 had main pancreatic duct injuries. Significant pancreatic fistula developed in five cases, three managed by drainage.

Vasquez et al. presented 62 cases of penetrating pancreatic injuries during an 11 year period (15). 17 patients died, most of them within one hour after admission due to associated vascular lesions. The most frequent used procedure was simple drainage. The pancreatic related complications were found in 12 out of 47 patients who survived over 48 hours, in seven cases being abscesses due to colonic lesions and in five cases pancreatic fistula (15).

Patton et al. published the results of 134 patients with pancreatic trauma (16). The overall mortality was 13%, with a pancreatic-related mortality of 2%. 37 proximal injuries were treated with drainage alone, with a pancreatic morbidity of 11%. Out of 87 distal pancreatic injuries, the status of the pancreatic duct was indeterminate in 54 cases. 24 had a high probability for ductal injuries, and were managed by distal resection and 30 with a low probability were drained. The pancreatic morbidity was not different between these groups (16).

Conclusions

High grade pancreatic traumas associate a significant morbidity. In cases with integrity of the ampulla and partial transection of the main pancreatic duct, efficient drainage of the pancreatic head injuries and patients' management in high volume centers for pancreatic surgery maximize the survival rate.

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Contribution of authors

All authors have equally contributed to this study.

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