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The Role of Caudal Pancreatectomy in the Treatment of Traumatic Pancreatic Injuries: A Case Report

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Abstract **Case Report**

The role of caudal pancreatectomy in the treatment of traumatic pancreatic injuries is particularly important given the potential complications that can result from delayed intervention. The decision-making process regarding the extent of resection often depends on the patient's stability and the presence of associated injuries, highlighting the need for a personalized approach for each case. Pancreatic trauma is rare and can be life-threatening. The treatment of pancreatic trauma depends on the stage and extent of ductal involvement. MRI is a key examination for the diagnosis of ductal lesions in pancreatic trauma. Trauma to the left pancreas with ductal involvement can be treated by endoscopic drainage, but this can lead to fistula formation. Caudal pancreatectomy may be a better therapeutic option, with fewer cases of fistula and shorter hospital stays. We report the case of a 35-year-old patient admitted for pancreatic trauma with damage to the Wirsung duct who underwent caudal pancreatectomy with spleen preservation.

Keywords: Caudal pancreatectomy, pancreatic trauma, splenectomy.

INTRODUCTION

The pancreas is an organ located deep within the abdomen; it is a retroperitoneal organ surrounded and obscured by neighboring organs [1].

Pancreatic trauma is rare, accounting for 0.2 to 6% of all closed abdominal trauma; it can be severe and life-threatening [2], with a mortality rate ranging from 5 to 30% and a high morbidity rate of 50% [3].

Nevertheless, the rarity and severity of pancreatic trauma can be explained by certain characteristics, including:

- The deep, retroperitoneal location of this organ, making clinical presentation difficult and leading to delayed diagnosis;
- The risk of pancreatic necrosis, autodigestion of adjacent structures [vascular or visceral], and infections, the local and systemic consequences of which can be severe;
- The connection of the pancreas to the common bile duct and, above all, to the duodenum, damage to which alone can account for the full severity of the trauma.

The diagnosis may be masked by associated injuries and discovered late in the event of complications; pancreatic trauma is difficult to manage. In some cases, it occurs as part of multiple trauma, and the associated injuries often take precedence, requiring emergency treatment or even a short laparotomy in the event of uncontrolled bleeding [4]

The first-line imaging workup for a stable patient is CT, but this may show associated injuries and raise suspicion of pancreatic duct trauma. Pancreatic MRI is the gold standard for detecting ductal injury, allowing visualization of the entire Wirsung duct; however, its sensitivity is limited in the early post-traumatic phase due to the presence of fluid and blood around the pancreas and the undilated injured Wirsung duct. Therefore, endoscopic retrograde pancreatography [ERCP] is a diagnostic and therapeutic test; it allows visualization of a ductal lesion, and leakage of contrast medium during ERCP indicates rupture of the Wirsung duct, and in certain cases, treatment involves the placement of a stent [4], [5], [6,7].

THE LUCAS CLASSIFICATION [8]:
Grade I Pancreatic contusion or laceration with limited parenchymal injury. Wirsung duct intact. No duodenal injury
Grade II Laceration, perforation, or complete transection of the body and tail with involvement of the Wirsung duct. No duodenal injury
Grade III Crushing, perforation, or complete transection of the pancreatic head. No duodenal involvement.
Grade IVa Combined duodenopancreatic injury. Limited pancreatic injury
Grade IVb Combined duodenopancreatic injury. Severe pancreatic injury [rupture of the Wirsung duct].

Moore's Classification of Pancreatic Injuries [American Association for the Surgery of Trauma [AAST] [9].

Gradea	Hematoma	Laceration	AIS Score
I	Minor contusion without involvement of the Wirsung duct	Superficial laceration without involvement of the Wirsung duct	1
II	Major contusion without involvement of the Wirsung duct and without tissue loss	Major laceration without involvement of the Wirsung duct and without tissue loss	2
III		Distal transection of the Wirsung duct or parenchymal injury involving the Wirsung duct	3
IV		Proximal transection of the Wirsung duct or parenchymal injury involving the proximal Wirsung duct	4
V		Massive injury to the head of the pancreas	5

AIS: Abbreviated Injury Scale, a. Add a grade in cases of multiple lesions affecting the same organ, b. To the right of the superior mesenteric vein

Depending on the type of injury, treatment may involve surgical monitoring if there is no ductal involvement; an endoscopic intraductal prosthesis may be offered; and in case of failure, a left caudal pancreatectomy with or without splenectomy may be proposed for corpus-caudal lesions, and more often biliary drainage for cephalic lesions or a DPC [10].

Involvement of the main pancreatic duct determines the prognosis and guides management; furthermore, ductal injury or rupture leads to secondary infections, fistulas, and fluid collections if left undiagnosed [11].

Treatment options remain controversial; there are no standardized guidelines in the literature for the management of pancreatic trauma. Assessing pancreatic duct involvement and evaluating the type of injury remain key to treating pancreatic trauma; treatment may be non-surgical—namely, observation in cases of Grade I injury— II [i.e., in the absence of ductal involvement, treated medically as pancreatitis], endoscopic drainage, or stent placement in cases of ductal involvement [Grades III, IV, V]. Surgical treatment may be considered for ductal lesions [Grades III, IV, V], specifically DPC, caudal pancreatectomy with or without splenectomy; however, contact drainage as a conservative treatment may also be performed in cases of cephalic lesions. Among the various therapeutic options for caudal pancreatic trauma with ductal involvement, caudal pancreatectomy is associated with fewer complications than endoscopic drainage alone but requires careful assessment of the risks and benefits [12].

The most common complications of pancreatic trauma include sepsis with multi-organ failure, pancreatic fistula, pseudocyst, post-traumatic acute pancreatitis, hemorrhage, biliary tract stenosis, Wirsung duct stenosis, and duodenal fistula [3]

We report a case of a polytrauma patient with caudal pancreatic trauma who underwent a splenopreserving caudal pancreatectomy after conservative treatment had failed.

CASE PRESENTATION

We present the case of a 35-year-old patient admitted to our department for emergency care following multiple trauma with abdominal and thoracic impact sites. On physical examination, the patient was tachycardic [heart rate 100 bpm] and tachypneic, with generalized abdominal tenderness.

An emergency CT scan was performed upon admission, showing:

- A penetrating laceration through the body of the pancreas associated with a peripancreatic hematoma extending into the retrogastric space, classified as Grade III according to the AAST.
- Left renal trauma classified as Grade V according to the AAST
- Spleen trauma classified as Grade III according to the AAST
- Left adrenal hematoma
- Hemoperitoneum in the subhepatic region without identifiable liver injury

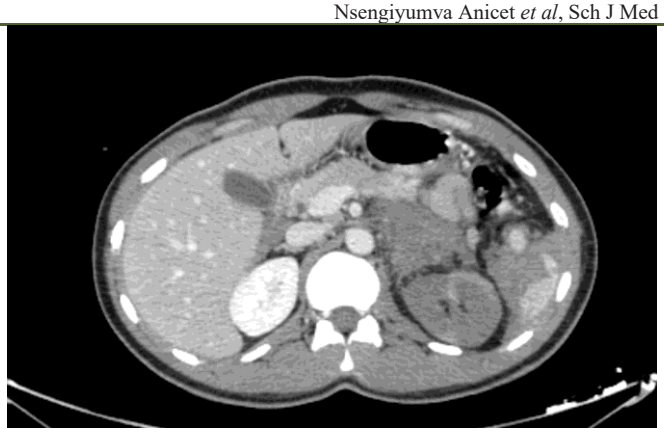

Figure 1: A penetrating laceration running through the body of the pancreas

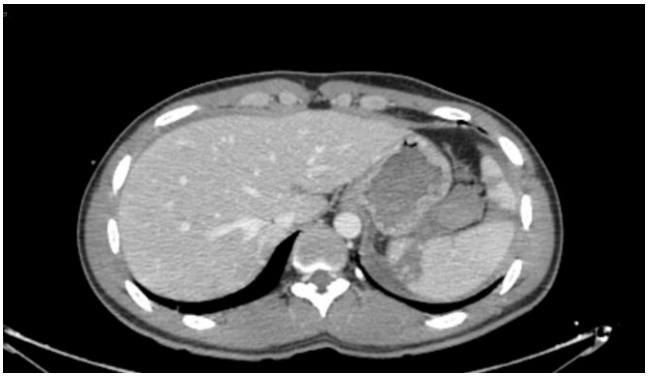

Figure 2: Grade III splenic trauma according to the AAS classification

Treatment

Admission to the ICU
Withdrawal of oral feeding
Parenteral nutrition
Rehydration
Analgesics
Double-dose PPIs [proton pump inhibitor]

On day 4 of hospitalization, a peripancreatic collection [a biloma] was noted, which was drained under radiological guidance; lipase and amylase levels in the drainage fluid were positive

A pancreatic MRI was ordered to assess ductal involvement

An abdominal MRI revealed:

- Pancreatic trauma classified as AAST Grade III with complete transection of the Wirsung duct, complicated by a peripancreatic collection containing biliary signal extending superiorly into the perigastric, perisplenic, and subcapsular hepatic spaces, consistent with a biloma.
- Splenic trauma, classified as AAST Grade III
- Left renal trauma, classified as AAST Grade V
- Massive intraperitoneal hemorrhage

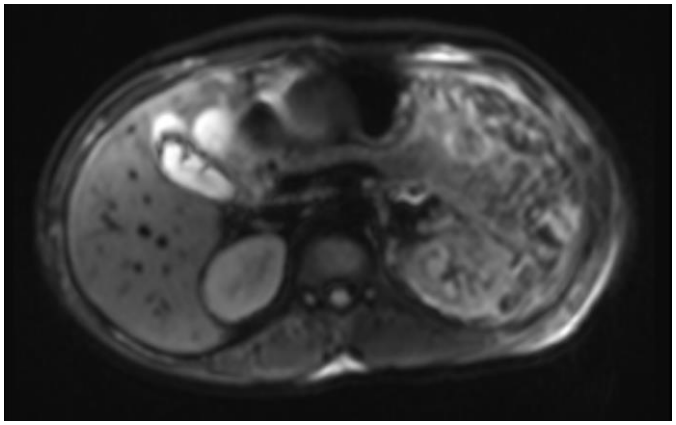

Figure 3: Cross-section of the Wirsung duct complicated by a peripancreatic collection

Given this ductal lesion identified on an MRI of the pancreas [complete transection of the Wirsung duct], endoscopic treatment was discussed with the gastroenterologists; however, the endoscopic treatment failed, leading to the decision to proceed with surgical treatment in the form of a cephalic pancreatectomy.

The postoperative course was uneventful; however, lipase and amylase levels in the drainage fluid on postoperative day 3 were positive, leading to the discontinuation of oral feeding and the initiation of parenteral nutrition, somatostatin, and rehydration. A follow-up on postoperative day 5 was also positive, confirming the presence of a fistula, and the CT scan performed on postoperative day 5 showed postoperative changes, notably a poorly defined collection adjacent to the pancreatectomy site containing air bubbles; on postoperative day 6, lipase and amylase levels returned to negative. The length of hospital stay following surgery was 8 days, with discharge on postoperative day 8

Discussion

Caudal pancreatectomy is a complex surgical procedure that requires expertise in visceral surgery. Indications for this procedure include pancreatic trauma, benign or malignant pancreatic tumors, and chronic pancreatitis.

Isolated pancreatic trauma is rare due to the severity of the trauma required to cause it; most often, it is associated with other injuries. In our patient, it was associated with trauma to the spleen, kidneys, and adrenal glands, a finding consistent with other authors who have reported associated injuries with pancreatic trauma in their series [3,10]

In cases of pancreatic trauma, treatment depends on involvement of the Wirsung duct; the extent of parenchymal injury and the location of the lesion; the patient's hemodynamic stability; and other associated injuries. Pancreatic trauma may be suspected either during a limited laparotomy in cases of patient hemodynamic instability due to associated injuries, or due to delayed diagnosis [13].

In the absence of Wirsung duct involvement [for stage I and II injuries], surgical monitoring is necessary.

In cases of left-sided Wirsung duct involvement, with failed or unavailable ERCP, a caudal pancreatectomy may be performed due to the risk of pseudocyst formation, which would require surgical drainage and prolonged hospitalization; spontaneous resolution of pseudocysts is less than 20%, and according to the literature, it is associated with a lower risk of postoperative morbidity compared to drainage alone; this pancreatectomy may be combined with a splenectomy depending on associated splenic involvement; however, this pancreatectomy reduces resistance to infection [decreases the patient's immunity] [10,14,15], it is recommended to perform a caudal pancreatectomy with spleen preservation if possible, which we performed for our patient, given the involvement of the Wirsung duct at the caudal level; for our patient, we performed a caudal pancreatectomy with a simple postoperative course; Lipase and amylase levels in the drain on day 3 were positive, so the patient was placed on a fasting regimen and octreotide, with rehydration and parenteral nutrition. The postoperative follow-up CT scan performed on Day 5 showed postoperative changes, notably a poorly defined collection adjacent to the pancreatectomy site containing air bubbles. On Day 6, lipase and amylase levels returned to normal, and the patient was discharged on Day 7. According to studies, fistula following pancreatectomy is treated with octreotide, and according to the literature, the incidence of prolonged fistula in cases of pancreatectomy is associated with the absence of adequate treatment, particularly octreotide and other analogs [16]. It should be noted that no clear factors are associated with the development of fistulas following pancreatectomy

Conclusion

Caudal pancreatectomy is an effective and first-line treatment option for trauma to the left pancreas with ductal involvement, but it requires careful assessment of risks and benefits. It carries a lower risk of fistula compared to endoscopic drainage alone and shortens hospital stays compared to conservative management. A multidisciplinary approach is essential to optimize outcomes.

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