



## Case report

## Case report of an isolated pancreatic transection from low impact blunt abdominal trauma necessitating resective surgery

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## ABSTRACT

**Introduction and importance:** Isolated pancreatic injury from blunt force trauma is an extremely rare entity accounting for less than 1 % of trauma presentations. This case highlights the diagnostic difficulties of identifying a ductal injury and presents a rare instance of an isolated pancreatic transection from a relatively low-impact blunt abdominal trauma.

**Case presentation:** A 30 year old lady presented to the emergency department 24 h following a low impact abdominal trauma. CT scan showed a complete pancreatic transection with significant peripancreatic free fluid. MRCP showed the main pancreatic duct to be in alignment on either side of the transection plane, however given the significant surrounding free fluid she was taken to the operating theatre for exploration and resective surgery. Intraoperative findings were that of a complete pancreatic transection involving the main pancreatic duct.

**Discussion:** Current management guidelines focus on the correct evaluation of main pancreatic duct integrity. Timely intervention is essential for improving mortality and morbidity outcomes. Reported sensitivity and specificity for imaging modalities vary between studies, likely reflecting inherent challenges in accurately identifying pancreatic duct injuries. Multi-modal assessment is recommended to reach a timely diagnosis and hence, institute the appropriate therapy.

**Conclusion:** Low-energy trauma can result in isolated injuries of the pancreas. Multi-modal imaging should be encouraged for evaluation of main pancreatic duct integrity. This will facilitate timely decision making regarding the need for definitive surgery.

## 1. Introduction and importance

Pancreatic injury from blunt force trauma is a rare entity and is involved in less than 1 % of trauma presentations [1,2]. They frequently occur in the context of multi-trauma, most commonly from motor vehicle collisions, falls and bicycle accidents [3]. Because of its proximity to other structures and the high energy required to cause pancreatic injuries, other structures are commonly also damaged including the duodenum, transverse colon and the kidney [1,3]. Hence, they rarely occur in isolation. The presence of a high grade pancreatic injury is associated with significant morbidity and mortality (12.3–16.6 %) [1,2] Detection and management of such injuries remains challenging and delays in intervention for those who require surgical intervention has also been shown to increase morbidity and mortality [4].

We present a case of an isolated complete pancreatic transection from a relatively low impact blunt abdominal trauma necessitating

resective surgery. Moreover, this case highlights the atypical location of the injury considering the force, the challenges in the diagnostic evaluation and in the decision making process when considering operative versus non-operative management. This case report has been written in concordance with the SCARE guidelines [5].

## 2. Case presentation

A 30 year old lady presented to the emergency department 24 h following abdominal trauma where her partner inadvertently fell onto her epigastrium and chest with his knees. She had been experiencing worsening epigastric and left upper quadrant pain since the initial insult. She also complained of nausea, anorexia and had experienced several episodes of non-bilious, non-haemorrhagic vomiting. She had no past medical or surgical history. Given the nature of the injury, the possibility to domestic partner violence was considered. On thorough review by the social worker and the treating medical team, it was deemed domestic

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violence was highly unlikely.

On examination, her abdomen was rigid and exquisitely tender in the epigastrium and left upper quadrant with rebound tenderness present in these regions. Her vital signs were within normal limits. There was no evidence of flank or periumbilical bruising (Gray-turner and Cullen's sign respectively) and no abdominal distension.

Complete blood count showed an elevated white cell count ( $20.4 \times 10^9/L$ ), a normal haemoglobin level (145 g/L) and a normal platelet count ( $352 \times 10^9/L$ ). Her electrolyte levels, urea and creatinine were all within normal ranges. Her liver function tests were normal. She had elevated lipase (835 U/L) and amylase levels (1603 U/L). Her C-reactive protein was elevated to 166 mg/L. Her urinalysis showed microscopic haematuria.

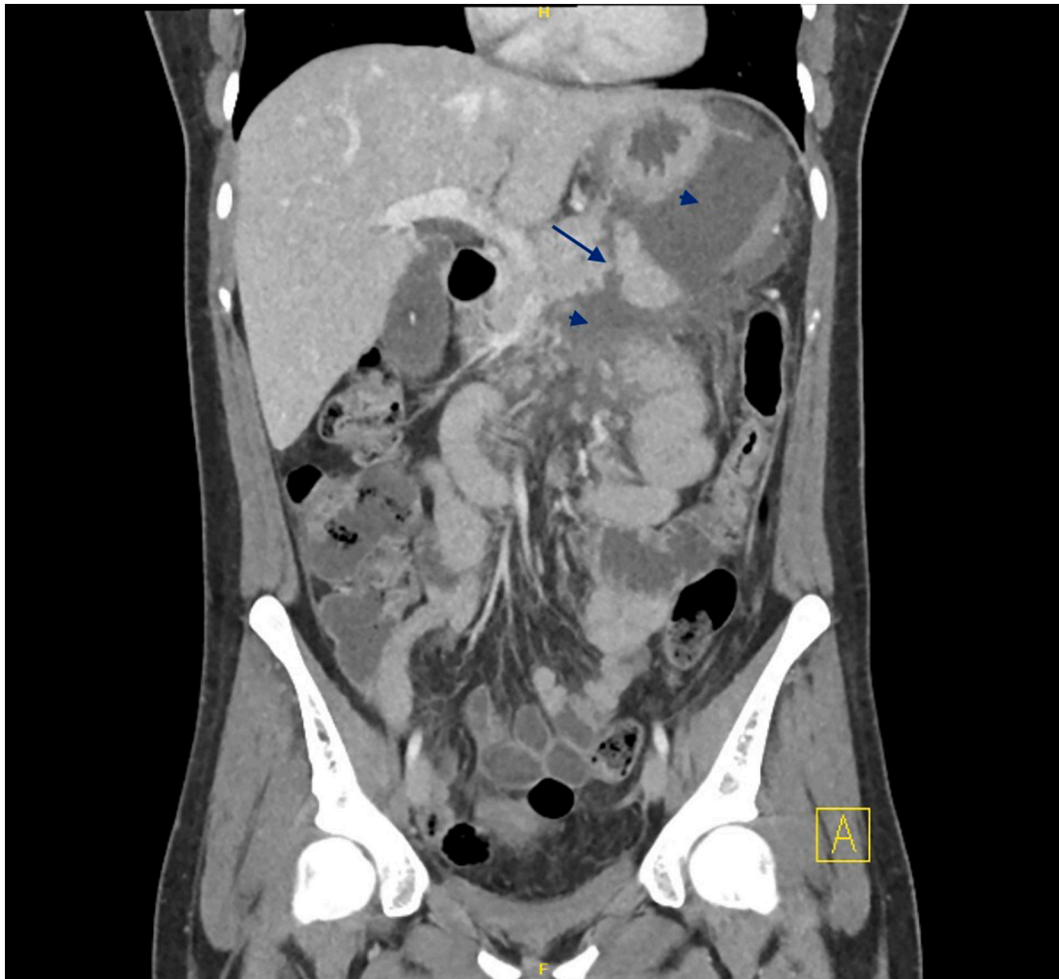
A CT scan of the abdomen showed a large retroperitoneal fluid collection surrounding an area of pancreatic transection at the level of the mid body (Figs. 1, 2). There was no evidence of injury to any of the surrounding structures including both renal arteries, veins and the kidneys. The branches of the coeliac trunk and the entirety of the portal venous system were intact.

Given the isolated nature of the injury and the implications of a major operation, a MRCP was performed to determine the integrity of the main pancreatic duct. MRCP showed a small amount of pancreatic tissue that remained intact despite the CT suggesting complete transection. On review by an experienced, senior radiologist, the main pancreatic duct also appeared to be in alignment on either side of the plane of transection (Fig. 3). However, given the significant surrounding

fluid collection and the extent of the parenchymal injury, a complete transection of the pancreas including the main pancreatic duct was presumed, consistent with an AAST grade III pancreatic injury (WSES class II) [6,7]. Upon discussion with the gastroenterologist regarding the possibility of a pancreatic duct stent across the transection, it was deemed not technically feasible given the high likelihood of a complete transection. A decision was made for surgical intervention.

The patient was taken to the operating theatre for resective surgery (within 36 h of the initial injury) performed by a consultant FRACS surgeon. Operative findings were of a large volume retroperitoneal cloudy fluid collection centred around a transected pancreas with necrosis of the transected edges (Fig. 4). The fluid was contained within the retroperitoneum with no intraperitoneal free fluid. There was minimal haematoma. On inspection a complete transection of the pancreas and the pancreatic duct was noted at the level of the mid-body, lateral to the midline. The splenic artery and vein were intact. There was no evidence of any other vascular or visceral injury. The pancreatic tail and spleen were resected en-block. The pancreatic duct was closed with a figure-of-eight stitch, haemolocked and reinforced with an omental patch. A single drain was placed in the retroperitoneum and the laparotomy wound was closed in layers. Rectus sheath catheters were placed for post-operative analgesia.

The patient was admitted to the intensive care unit (ICU) following the procedure. DVT prophylaxis was commenced within 4 h of the operation. She was commenced on a clear fluid diet the following morning. By post-operative day 2 her pain had improved and outputs



**Fig. 1.** CT abdomen portal venous phase (Coronal view). Arrowhead showing the site of pancreatic transection. Arrow showing the large retroperitoneal fluid collection.



Fig. 2. CT abdomen portal venous phase (Axial view). Arrowhead showing the site of pancreatic transection.

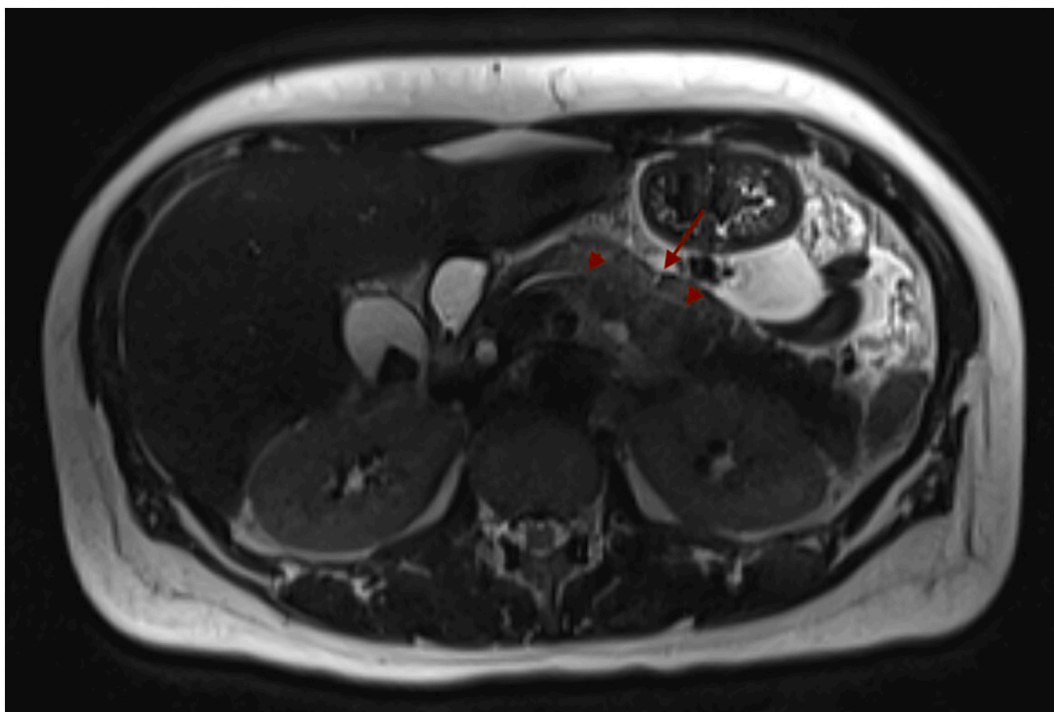


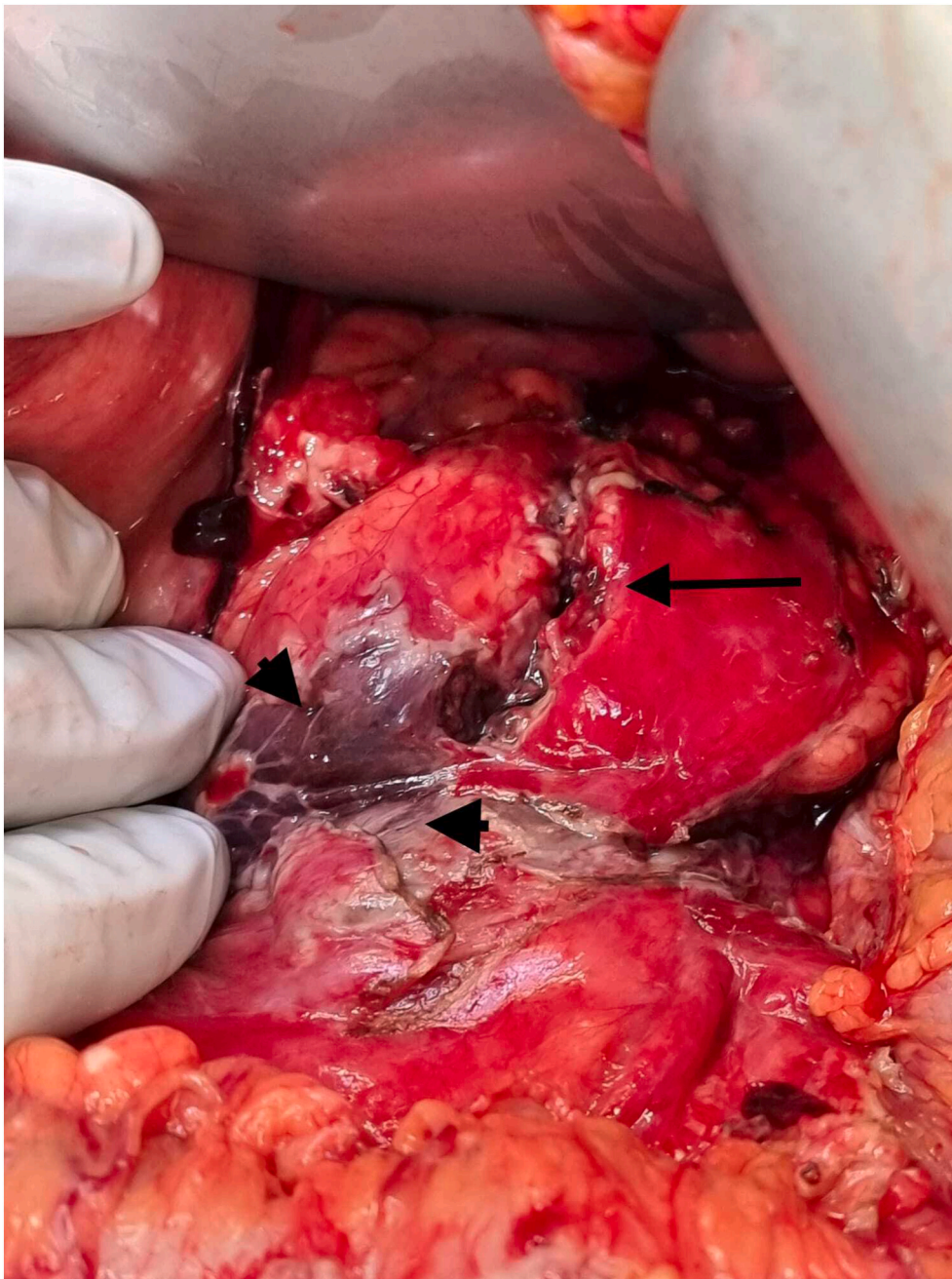
Fig. 3. MRCP – T2 Haste (Axial view). Arrowhead showing the site of pancreatic transection. Arrows showing the main pancreatic duct on either side of the transection plane.

from her drain had reduced. She was haemodynamically stable throughout and was discharged from the ICU on post-operative day 2. Serial drain fluid lipase monitoring showed a gradual reduction of the drain fluid lipase concentrations. Her diet was upgraded and she was tolerating a full diet by post-operative day 3. A progress CT scan organised on day 5 post-op showed non-specific stranding with no collections. She was weaned off opioid analgesia and the retroperitoneal

drain removed prior to discharge on post-operative day 6. She remains well and symptom free 6 months post-operatively during follow up.

### 3. Clinical discussion

The most widely adopted grading system for traumatic pancreatic injury is the Organ Injury Scale (OIS) first published in 1990 by the



**Fig. 4.** Intraoperative findings. Arrow showing the site of pancreatic transection. Arrowhead showing pancreatic necrosis.

American Association for the Surgery of Trauma (AAST) [6]. Using this grading schema, pancreatic injuries can be broadly divided into low grade (AAST grade I and II) and high grade (AAST grade III and above). Diagnosis and grading of the pancreatic injury is usually made with computed tomography (CT) and can be supplemented with magnetic resonance cholangio-pancreatography (MRCP) and endoscopic retrograde cholangio-pancreatography (ERCP) [8]. High grade pancreatic injuries are distinguished by the involvement of the main pancreatic duct and current management guidelines focus on the correct identification of the presence or absence of such an injury [7,9,10]. Large scale retrospective analyses have identified that delayed diagnosis (and therefore management) of transected pancreatic ducts are associated with significantly worse outcomes compared to when they are managed early with resectional (or other definitive) surgery [4]. It is therefore imperative that diagnostic modalities have sufficient sensitivity and

specificity in identifying these injuries in a timely manner.

Case series evaluation of the diagnostic utility of CT and MRCP have shown that both modalities have comparable sensitivity in correctly identifying the presence of duct injuries (91.7 % and 92.86 % respectively), with MRCP being particularly useful in adding qualitative information and increased diagnostic confidence in 58.8 % of patients [11]. Both modalities rely heavily on secondary features of pancreatic duct disruption, for example the presence of peri-pancreatic or intra-abdominal fluid collections [12]. In fact, the interpretation of the imaging modalities of this case relied heavily (and correctly so) on secondary features of ductal injury instead of relying solely on the positive identification of the main pancreatic duct on MRCP (Fig. 3).

Equally important is correctly identifying the integrity of the main pancreatic duct to avoid the risks associated with what could be an unnecessary operation. ERCP has been shown to be diagnostically useful

in cases of more subtle injury to the ducts that were not identified on CT or MRCP. Moreover, it may be used intra- or pre-operatively to guide surgical treatment and can itself provide therapeutic intervention in the form of stenting, obviating the need for a potentially high-risk resectional surgery [13].

This case offers some insights into the field of pancreatic trauma. Firstly, the mechanism of injury was relatively low-impact compared to cases currently reported in the literature. Moreover, the pancreas was injured in an isolated manner. This implies that perhaps the direction of the force vector is an equally if not a more important aetiological factor for an isolated pancreatic injury. Indeed, case reports of isolated pancreatic transections often occur in the context of handlebar injuries or rugby tackles that exert a unidirectional force over a small surface area [14]. Secondly, diagnosis of a main pancreatic duct injury does not necessarily require visualisation of a major duct disruption on imaging modalities. A diagnosis of complete pancreatic transection was made on initial CT based on parenchymal disruption and a significant peripancreatic fluid collection. Conversely, the MRCP was inconclusive at confirming the ductal injury, with the ducts seemingly appearing aligned on either side of the transection plane. Had an obvious transection not been identified on laparotomy, an ERCP may have provided further diagnostic input.

#### 4. Conclusion

Pancreatic injuries are a rare complication of blunt abdominal trauma. They usually occur in the context of high energy injuries and thus, rarely occur in isolation. This case demonstrates that relatively low-impact trauma can result in isolated injuries of the pancreas. Moreover, evaluation of the main pancreatic duct integrity can be challenging and multi-modal imaging is encouraged to make a timely diagnosis and decision regarding the need for resective surgery.

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#### Ethical approval

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#### Consent

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#### Research registration

N/A.

#### Guarantor

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#### CRediT authorship contribution statement

HJ was responsible for conceptualization, data curation, formal analysis, writing of the original draft and final editing.

TC was responsible for methodology, project administration and review of the final draft for submission.

HR was responsible for conceptualization, supervision, manuscript review and approval for final submission.

#### Declaration of competing interest

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