
CASE REPORT

Concomitant Occult Post-traumatic Pancreatic Transection and Duodenal Contusion: a Case Report

WSC Cheong, RSZ Yiin, KM Wong, TJ Tan, S Wang

Department of Radiology, Changi General Hospital, Singapore

ABSTRACT

A 33-year-old man presented to the emergency department after sustaining blunt abdominal trauma which led to concomitant pancreatic transection and duodenal contusion complicated by distal duodenal obstruction. We highlight the value of serial computed tomography and delayed fluoroscopy in establishing a definitive diagnosis and reiterate the importance of potential pitfalls that may be encountered in the initial imaging assessment and clinical management of such severe injuries.

Key Words: Abdominal injuries; Duodenum; Fluoroscopy; Multiple trauma; Pancreas

中文摘要

隱匿性創傷後胰腺橫斷和十二指腸挫傷同時發生：病例報告

張素翠、尹仕祖、王康敏、陳天勁、王詩苑

一名33歲男性因腹部鈍傷導致同時發生胰腺橫斷和十二指腸挫傷以及併發十二指腸遠端梗阻就急診。本病例報告強調系列CT掃描和延時X光透視檢查對確診的價值，並重申這種嚴重損傷的初始影像學評估和臨床處理可能遇到的潛在誤診可能。

INTRODUCTION

In most trauma centres, the diagnosis of abdominal injuries relies heavily on the accurate interpretation of findings from adequately performed computed tomography (CT) examinations acquired in a timely fashion. This has also become an essential step in enabling physicians to assess the severity of the injuries,

and to determine the order in which these should be treated. However, diagnosing traumatic pancreatic and duodenal injuries on initial CT may be difficult.¹ We present a case of concomitant pancreatic and duodenal injury after blunt abdominal trauma, and highlight the value of serial CT and delayed fluoroscopic imaging in the management of these severe injuries.

*Correspondence: Dr TJ Tan, Department of Radiology, Changi General Hospital, Singapore
Email: tien_jin_tan@cgh.com.sg*

Submitted: 28 Dec 2017; Accepted: 16 Jul 2018.

Conflicts of Interest: All authors have disclosed no conflicts of interest.

Funding/Support: This case report received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics Approval: This study was conducted in accordance with the Declaration of Helsinki.

CASE REPORT

A 33-year-old man was conveyed to the emergency department of our hospital after he was pinned against a fence by a truck which had reversed into him. He complained of abdominal pain which was maximal in the epigastric region after his extrication. Initial physical examination at the emergency department revealed a tender albeit soft abdomen without the presence of guarding. The vital signs of the patient were stable. Laboratory investigations performed at the time of presentation revealed normal serum haemoglobin and lactate levels, and the patient's liver and renal function test results were unremarkable. The patient's serum amylase level was marginally elevated with a value of 102 U/L [normal (30-100 U/L)].

A CT scan of the abdomen and pelvis performed at the emergency department at the time of initial presentation demonstrated mild swelling of the pancreatic body associated with minimal peripancreatic fat stranding (Figure 1), which was attributed to post-traumatic mild pancreatitis.

The patient's abdominal pain subsequently worsened and he developed vomiting. A repeat CT scan of the abdomen and pelvis was performed 2 days after the initial presentation, and this revealed a linear hypodensity traversing the width of the pancreatic body which was suspicious for transection (Figure 2a), as well as marked mural oedema of the adjacent third part of the duodenum which was suspicious for contusion (Figure 2b). Magnetic resonance imaging (MRI) of the pancreas

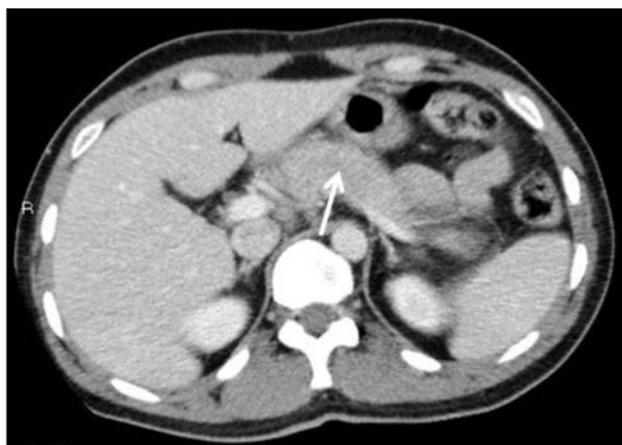


Figure 1. Contrast-enhanced axial computed tomography scan image at the time of initial presentation shows mild swelling of the pancreatic body (white arrow) associated with minimal peripancreatic fat stranding.

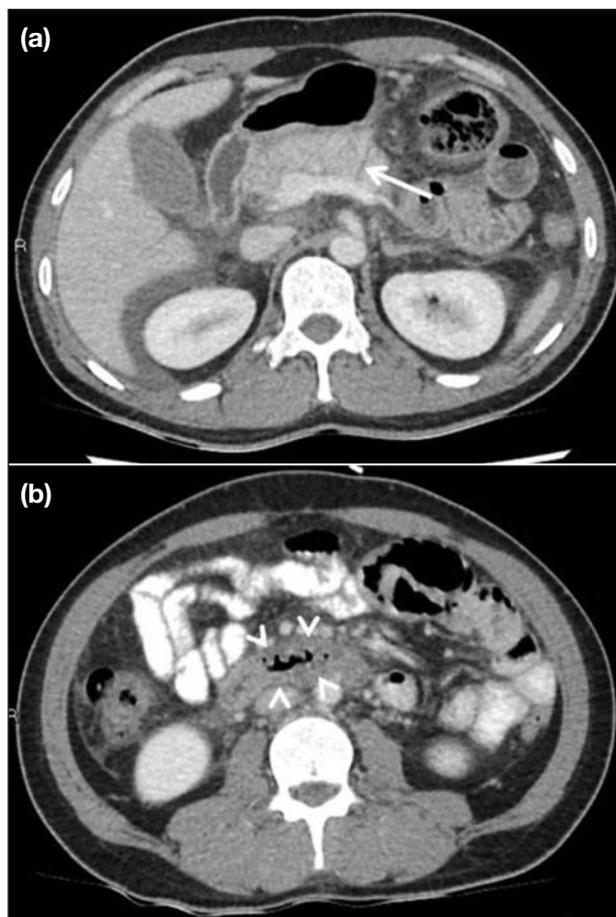


Figure 2. (a) Contrast-enhanced axial computed tomography scan image 2 days after initial presentation shows linear hypodensity traversing the width of the pancreatic body suspicious for transection (white arrow). (b) Contrast-enhanced axial computed tomography scan image 2 days after initial presentation shows marked mural oedema of the third part of the duodenum suspicious for contusion (white arrowheads).

performed later the same day confirmed the CT finding of transection of the caudal aspect of the pancreatic body (Figure 3a), but no clear evidence of injury of the main pancreatic duct lying just cephalad to the pancreatic transection, nor evidence of a peripancreatic collection (Figure 3b).

A fluoroscopic swallow and meal examination using water soluble contrast performed 4 days after the initial presentation showed obstruction of ingested contrast medium at the third part of the duodenum, with upstream dilatation of the first and second parts of the duodenum (Figure 4). This was considered secondary to the marked mural oedema from the duodenal contusion causing significant luminal narrowing and obstruction.

Repeat CT of the abdomen and pelvis 2 months after

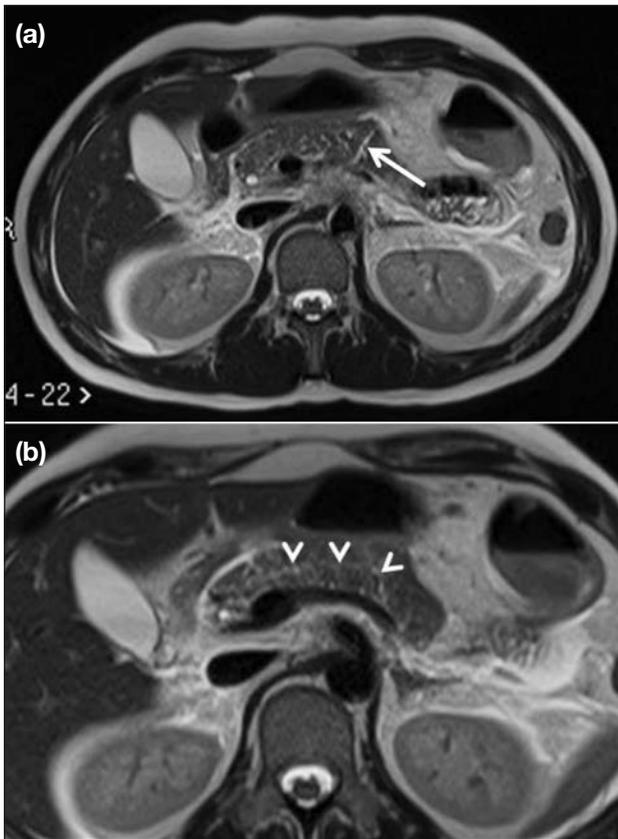


Figure 3. (a) Axial T2-weighted magnetic resonance imaging 2 days after initial presentation confirms the presence of pancreatic transection involving the pancreatic body (white arrow). (b) Axial T2-weighted magnetic resonance imaging 2 days after initial presentation shows the intact main pancreatic duct lying just cephalad to the pancreatic transection (white arrowheads).

the initial injury revealed complete resolution of the pancreatic and duodenal findings seen in the earlier CT scans.

DISCUSSION

Blunt pancreatic and duodenal trauma is relatively uncommon, and accounts for less than 2% of all abdominal injuries.²⁻⁶ Direct impact to the upper abdomen by a steering wheel during a road traffic accident, or bicycle handlebars are the typical mechanisms of trauma recorded with injury to the pancreas and / or the duodenum, which may also involve the left hepatic lobe, stomach, or spleen.

Patients with pancreatic or duodenal injuries may complain of epigastric or vague abdominal pain and vomiting, which are fairly non-specific.²⁻⁶ In addition, blunt pancreatic and duodenal injury can occur in the setting of polytrauma, and such patients may have undergone intubation or received sedatives, precluding



Figure 4. Spot fluoroscopic image shows abrupt cut-off at the level of the third part of the duodenum (black asterisk), with obstruction of ingested oral contrast proximally suggesting distal duodenal obstruction.

accurate assessment of the patient's signs and symptoms. Raised serum amylase and lipase levels may be present, although these levels may lie within normal or near-normal levels at the time of initial presentation,^{7,8} as seen in our patient.

The pancreatic neck and body are the most common sites of injury. Injury to the pancreas after blunt pancreatic trauma may manifest on imaging as pancreatic contusion, laceration, or transection.^{1,9,10} Pancreatic contusions appear on CT as focal areas of swelling or low attenuation. Pancreatic lacerations may be superficial, or traverse the entire width of the pancreas, resulting in a transection or 'fracture'. Involvement of more than 50% of the thickness of the pancreas is positively correlated with main pancreatic ductal injury.^{11,12} Whilst magnetic resonance cholangiopancreatography is an important non-invasive method to establish the presence of injury to the main pancreatic duct, endoscopic retrograde cholangiopancreatography remains as the standard of reference and serves as a means for endoscopic therapy (pancreatic stent placement) when deemed necessary.^{1,10}

The imaging diagnosis of acute pancreatic injuries in the initial post-traumatic period can be challenging. Although the reported sensitivities of multidetector CT for the detection of pancreatic injuries range from 70% to 95%,¹¹⁻¹⁴ the injured pancreas may appear normal

within the first 12 hours of injury, and a repeat CT examination performed 24 to 48 hours later may show an injury not evident at the time of initial presentation,⁹⁻¹¹ as was the case with our patient. Clinicians should be aware of the importance of repeating cross-sectional imaging evaluations of patients with persistent or worsening clinical symptoms in the setting of normal or minor findings detected on initial imaging, given that the incidence of complications that arise after delayed diagnosis of duodenal or pancreatic injury is between 30% and 60%.^{10,14,15}

Complications which may arise after blunt pancreatic trauma include pancreatitis (3%-8%), pancreatic pseudocysts (1.6%-4%), pancreatic fistulas (2%-15%), as well as pancreatic and intra-abdominal abscesses (10%-25%), with the latter complications arising from pancreatic ductal injury.^{4,13,16-18} Delayed diagnosis leading to the development of these complications and consequent therapeutic interventions often result in a difficult clinical course for the patient, and may result in septicemia and multi-organ failure which increases the risk of patient mortality.^{4,16} In the present case, the diagnosis of pancreatic transection was made after a repeat CT examination, and MRI was then performed urgently to find pancreatic ductal injury.

Injury to the duodenum after blunt trauma may manifest on imaging as a duodenal contusion with mural oedema and thickening, duodenal haematoma with submucosal or subserosal accumulation of mixed attenuation blood products, or duodenal laceration with or without perforation with findings of periduodenal fluid and / or extraluminal air.^{1,10} Isolated duodenal contusions and duodenal haematomas are usually managed conservatively. However, distal duodenal obstruction is a fairly common complication of duodenal contusions and haematomas, particularly in the subacute stage after the initial trauma, when insertion of a nasojejunal feeding tube may be required.^{5,18,19} In our patient, imaging features of duodenal contusion and distal duodenal obstruction were only manifested on serial CT and delayed fluoroscopic evaluation.

Pancreaticoduodenal injury after blunt abdominal trauma is uncommon, but significant patient morbidity and mortality may result from delayed diagnosis. Radiologists and clinicians should be aware of the potential pitfalls in the initial imaging assessment of the severity of such injuries. Serial cross-sectional imaging evaluation should be considered for patients

with persistent or worsening clinical symptoms despite normal or minor findings detected on initial imaging.

REFERENCES

1. Soto JA, Anderson SW. Multidetector CT of blunt abdominal trauma. *Radiology*. 2012;265:678-93. [Crossref](#)
2. Akhrass R, Yaffe MB, Brandt CP, Reigle M, Fallon WF Jr, Malangoni MA. Pancreatic trauma: a ten-year multi-institutional experience. *Am Surg*. 1997;63:598-604.
3. Asensio JA, Demetriades D, Hanpeter DE, Gambaro E, Chahwan S. Management of pancreatic injuries. *Curr Probl Surg* 1999;36:325-419. [Crossref](#)
4. Vasquez JC, Coimbra R, Hoyt DB, Fortlage D. Management of penetrating pancreatic trauma: an 11-year experience of a level-1 trauma center. *Injury*. 2001;32:753-9. [Crossref](#)
5. Khan MA, Garner J, Kelty C. Management of duodenal injuries. *Trauma* 2012;14:3-15. [Crossref](#)
6. Allen GS, Moore FA, Cox CS Jr, Mehall JR, Duke JH. Delayed diagnosis of blunt duodenal injury: an avoidable complication. *J Am Coll Surg*. 1998;187:393-9. [Crossref](#)
7. Takishima T, Sugimoto K, Hirata M, Asari Y, Ohwada T, Kakita A. Serum amylase level on admission in the diagnosis of blunt injury to the pancreas: its significance and limitations. *Ann Surg* 1997;226:70-6. [Crossref](#)
8. Mahajan A, Kadavigere R, Sripathi S, Rodrigues GS, Rao VR, Koteswar P. Utility of serum pancreatic enzyme levels in diagnosing blunt trauma to the pancreas: a prospective study with systematic review. *Injury*. 2014;45:1384-93. [Crossref](#)
9. Gupta A, Stuhlfaut JW, Fleming KW, Lucey BC, Soto JA. Blunt trauma of the pancreas and biliary tract: a multimodality imaging approach to diagnosis. *Radiographics*. 2004;24:1381-95. [Crossref](#)
10. Linsenmaier U, Wirth S, Reiser M, Körner M. Diagnosis and classification of pancreatic and duodenal injuries in emergency radiology. *Radiographics*. 2008;28:1591-602. [Crossref](#)
11. Wong YC, Wang LJ, Lin BC, Chen CJ, Lim KE, Chen RJ. CT grading of blunt pancreatic injuries: prediction of ductal disruption and surgical correlation. *J Comput Assist Tomogr*. 1997;21:246-50. [Crossref](#)
12. Teh SH, Sheppard BC, Mullins RJ, Schreiber MA, Mayberry JC. Diagnosis and management of blunt pancreatic ductal injury in the era of high-resolution computed axial tomography. *Am J Surg*. 2007;193:641-3. [Crossref](#)
13. Wong YC, Wang LJ, Fang JF, Lin BC, Ng CJ, Chen RJ. Multidetector-row computed tomography (CT) of blunt pancreatic injuries: can contrast-enhanced multiphasic CT detect pancreatic duct injuries? *J Trauma*. 2008;64:666-72. [Crossref](#)
14. Lahiri R, Bhattacharya S. Pancreatic trauma. *Ann R Coll Surg Engl*. 2013;95:241-5. [Crossref](#)
15. Lin BC, Chen RJ, Fang JF, Hsu YP, Kao YC, Kao JL. Management of blunt major pancreatic injury. *J Trauma*. 2004;56:774-8. [Crossref](#)
16. Iqbal CW, St Peter SD, Tsao K, Cullinane DC, Gourlay DM, Ponsky TA, et al. Operative vs nonoperative management for blunt pancreatic transection in children: multi-institutional outcomes. *J Am Coll Surg* 2014;218:157-62. [Crossref](#)
17. Patton JH Jr, Lyden SP, Croce MA, Pritchard FE, Minard G, Kudsk KA, et al. Pancreatic trauma: a simplified management guideline. *J Trauma*. 1997;43:234-9. [Crossref](#)
18. Degiannis E, Boffard K. Duodenal injuries. *Br J Surg*. 2000;87:1473-9. [Crossref](#)
19. Velmahos GC, Tabbara M, Gross R, Willette P, Hirsch E, Burke P, et al. Blunt pancreatoduodenal injury: a multicenter study of the Research Consortium of New England Centers for Trauma (ReCONNECT). *Arch Surg*. 2009;144:413-9. [Crossref](#)