



## Case report

# Retroperitoneal duodenal perforation and IVC injury in blunt abdominal trauma: Pushing the boundaries of non-operative management? Brief report and a review of the literature



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## ABSTRACT

**Introduction:** Duodenal injuries present a significant challenge for trauma management because of the associated injuries and its anatomical inaccessibility. Surgical management can range from simple repair, Roux-en-Y duodenojejunostomies, T-tube decompression, or even pancreaticoduodenectomy as a last resort. Conservative treatment is very rarely described in the literature and in this report we present a case of retroperitoneal duodenal perforation with IVC injury successfully managed conservatively.

**Case report and discussion:** We reviewed other cases described in the literature and attempt to identify the common characteristics which indicate the circumstances where conservative management might be successful. The described case, along with the three other cases reported in the literature, point to the feasibility of conservative management under the following conditions. The patient was coherent with reliable clinical symptoms and signs, which were stable and non-progressive. The retroperitoneal location of the perforation of the duodenum, without pancreatic or biliary injuries, allowed the possibility of non-operative management.

In this described case, we demonstrate the feasibility of non operative management with an associated contained IVC injury. Although there is at least a 20-day observation period required for these cases, obviation of considerable surgical morbidity is a significant benefit.

**Conclusion:** Whilst our case may not qualify to demonstrate proof-of-concept in conservative management of duodenal perforation and IVC injury, we believe that given the appropriate clinical context, level of monitoring, availability of expertise, and evolution of clinical picture in the positive direction, in highly selected cases, non-operative management of retroperitoneal duodenal and IVC trauma is a viable option.

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## 1. Introduction

Duodenal injuries present a significant challenge for trauma management because of the associated injuries and its anatomical inaccessibility. Injury to the duodenum is often not isolated, either as a result of blunt or penetrating mechanism. The complex regional anatomy means surgical management has to take into

account bleeding or damage in the neighbouring vascular structures: the superior mesenteric vessels, inferior vena cava (IVC), extrahepatic biliary tree, pancreatic duct, renal hilum and the hepatic flexure of the colon. In fact, the region of the pancreatic head within the C-loop of the duodenum has been called the surgical soul for these reasons [11].

Preoperative assessment with computed tomography (CT) scan in stable patients to delineate the exact injuries may not always be accurate given that retroperitoneal haematoma makes anatomic interpretation difficult [18]. Surgical management can range from simple repair, Roux-en-Y duodenojejunostomies, T-tube decompression, duodenal diverticulisation, or even pancreaticoduodenectomy as a last resort [8].

Conservative treatment is very rarely described in the literature and in this report we present a unique case of retroperitoneal

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duodenal perforation with IVC injury successfully managed conservatively. We review other cases described in the literature and attempt to identify the common characteristics which indicate the circumstances where conservative management might be successful.

## 2. Case report

The patient is a 36-year old man who suffered blunt abdominal injury when a heavy object weighing about 200 kg fell from a forklift and landed on his abdomen, pinning him onto the ground. He was admitted to another hospital where a CT scan done 3 h after the injury showed a retroperitoneal haematoma at the retro-duodenal region and no free air or solid organ injury was seen. He was discharged after a period of observation. Eight hours after the injury, he had severe epigastric abdominal pain and presented to the emergency department. On physical examination, he was haemodynamically stable with no evidence of on-going haemorrhage; he had tenderness at the epigastric area and there was right upper abdominal wall contusion with no obvious haematoma. There was tenderness in the midline at the upper lumbar region as well, with no neurological deficit demonstrated.

His laboratory investigations were as follows: Hb 12.43 g/dL, WBC  $14.9 \times 10^9/L$ , lactate 1.0 mmol/L, amylase 113 U/L, bil 23  $\mu\text{mol/L}$ , ALP 76 U/L. The electrolytes were normal. Chest X-ray did not reveal any abnormalities. A sixty-four slice helical CT scan of the abdomen showed mural thickening of the second and third part of duodenum, consistent with duodenal contusion. A locule of extraluminal gas was seen anterior to the third part of the duodenum, indicative of perforation, most likely from the D2/3 junction. There was haematoma in the retroperitoneal region tracking along the right paracolic gutter into the right hemi-pelvis. There was contrast extravasation from the inferior vena cava at the level of L1, indicative of on-going bleeding from this. In view of the clinical evolution after more than 12 h from the time of injury and the likely small duodenal perforation into the retroperitoneum, the decision was made to monitor him in the surgical high dependency whilst undergoing a trial of conservative management. He was maintained on intravenous fluids, nasogastric tube decompression and intravenous ceftriaxone and metronidazole. Care was taken to control the patient's pain and blood pressure to prevent hypertension which might disrupt the retroperitoneal haematoma in the setting of an active bleed from the IVC injury, albeit likely to be very small. Total parenteral nutrition (TPN) was not instituted and somatostatin or the equivalent was not given. With serial systemic observations and frequent abdominal examinations by the same surgeons in the first 48 h, we found no evidence of abdominal distension, progression of abdominal tenderness, peritonism or signs of hypotension.

In view of persistent back pain, magnetic resonance imaging (MRI) of the lumbar spine was performed and it showed an incomplete ligamentous Chance fracture of the spine between L2 and 3. He was treated non-operatively with a lumbar orthosis brace.

Progressive improvement of his clinical status became evident, indicating that the duodenal perforation had spontaneously sealed and he did not require surgical intervention. Interval CT scan performed seven days later with oral contrast showed that the locule of air anterior to the duodenum had become slightly smaller, and no leakage of oral contrast was seen in the area. The oral contrast was also noted to have passed through the duodenum into jejunum. The zone 1 retroperitoneal haematoma was noted to be stable and no further contrast extravasation was seen from the IVC. The patient was subsequently started on oral feeding on day 8 of the injury. He was able to eat with no abdominal complaints and was later discharged 10 days after admission.

During the time following discharge, he experienced four days of abdominal pain, which was worse after meals. The pain became progressive and was associated with vomiting on day 14 after the injury, when he was readmitted and a repeat CT scan with oral contrast was performed. This showed no leakage, and passage of contrast through a narrowed D2/3 lumen. The patient was clinically well and able to tolerate a liquid diet on day 16 after the abdominal trauma, there was no succussion splash on subsequent physical examinations. There was also no evidence of infection. He eventually progressed to solid diet on day 18 after the injury and was discharged well on day 19. He was given antibiotics for a total of 14 days since the injury.

He was well when last reviewed in the clinic 60 days after discharge. An ultrasound of the abdomen showed resolution of the retroperitoneal haematoma, and no collection at the retropancreatic region. He opted for ultrasound evaluation as he was concerned about the risks of radiation associated with repeated CT scans in short intervals.

## 3. Discussion

Conservative management of duodenal trauma is very rarely described in the literature as duodenal trauma is often associated with a mortality of up to 30% due to significant associated vascular and hepatic injuries [7]. There have been only three previously described cases where duodenal perforation was managed conservatively. Ballard et al. included in their series a patient with blunt duodenal perforation in the second part of the duodenum, who refused operative management. The patient was discharged after 25 days of hospitalisation [2]. In another case by Besselink et al., a patient with a rupture of the 3rd part of the duodenum presented 48 h after the injury and was conservatively managed for 20 days before discharge [3]. Soeta et al. described a case with rupture of the 2nd/3rd part of the duodenum managed conservatively for 46 days before discharge [20]. All three cases of retroperitoneal duodenal injuries did not report associated pancreatic or biliary injuries. The case we report here had a delayed presentation of a combined injury of retroperitoneal structures including duodenal perforation and an IVC injury with a zone 1 retroperitoneal haematoma (refer to Table 1).

The complications associated with duodenal trauma are catastrophic and are related to the extent of duodenal disruption, injury to the pancreas, biliary tract or major vessels (refer to Table 2) [15]. They include intra-abdominal and retroperitoneal abscess, duodenal fistula, duodenal dehiscence, biliary and pancreatic leak, all of which are associated with significant morbidity and mortality. Although it was previously emphasised that the time from injury to definitive treatment was a crucial determinant of outcome, with markedly increased morbidity and mortality rates when the diagnosis was delayed more than 24 h, more recent studies did not show the same conclusion [18,19] (Figs. 1 and 2).

We are also cognizant that the salvage surgical procedure would be rather extensive should non-operative management fail. In the literature, many studies have emphasised on early surgical intervention of duodenal injuries with procedures ranging from simple primary repair to Whipple's procedure [6]. However, surgical exploration of the duodenal injury in the presence of significant tissue oedema and surrounding haematoma with disruption of the normal anatomical tissue planes might potentially lead to the exacerbation of the grade II duodenal trauma to grade III or even IV injuries which necessitate complex procedures such as pyloric exclusion or even a Whipple's procedure [1]. In addition, exploration of a possibly sealed off duodenal perforation might predispose the existing haematoma in the area to develop into an abscess.

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