

CASE REPORT

Isolated Blunt Duodenal Trauma: Delayed Diagnosis and Favorable Outcome with “Quadruple Tube” Decompression

Stefano Crippa, Massimo Falconi, Rossella Bettini, Giuliano Barugola,
Silvia Germenia, Roberto Salvia, Paolo Pederzoli

Department of Surgery, University of Verona. Verona, Italy

ABSTRACT

Context Isolated blunt duodenal injury is a rare finding associated with high morbidity and significant mortality. The early identification of a duodenal injury is usually difficult, considering the anatomical location of the duodenum and lack of peritoneal signs and diagnostic delay is part of the clinical picture in most cases.

Case report A 43-year-old man was admitted to our hospital after a motor vehicle collision. At admission he underwent emergency surgery because of lower extremities fractures. Twelve hours later he started to complain an increasing abdominal pain; blood tests showed serum amylase up to 180 U/L and a CT scan demonstrated a perforation of the third duodenal portion. At laparotomy a Grade III injury of the duodenum was evident. The laceration was sutured and a “quadruple-tube” decompression was performed. The postoperative course was uneventful. One year after surgery he is well without any long-term complication.

Conclusion A high degree of suspicion is necessary for early diagnosis of blunt duodenal trauma and CT scan should be performed in case of all significant epigastric trauma. In most cases primary direct repair of duodenal wounds can be safely achieved and duodenal decompression via triple or quadruple tube technique is required to decrease the risk of duodenal fistula.

INTRODUCTION

Blunt duodenal injury is an uncommon finding associated with significant mortality (6 to 25%) and morbidity (30 to 60%) [1, 2, 3]. The evidence of an isolated traumatic duodenal lesion is an even more rare event. In fact considering its anatomic location, lesions of the duodenum are usually associated with pancreatic, hepatic, gastric and intra-abdominal vascular injuries. These latter are responsible for the great majority of deaths in these patients [4, 5, 6].

The early identification of a duodenal injury can be challenging, and the high complication rate associated with it is partly the results of misdiagnosis and diagnostic delay, which can lead to major septic and inflammatory complications [7, 8, 9].

Here we report a case of an isolated duodenal injury with delay in diagnosis and final favorable outcome, treated with “quadruple-tube” decompression.

CASE REPORT

A 43-year-old man was admitted to our hospital after a motor vehicle collision with lower extremities and abdominal trauma. At admission he was well oriented with Glasgow coma score of 15, ventilation and saturation were within normal values as well as blood pressure and heart rate. The abdomen was soft and tender at palpation; lap belt sign and ecchymoses or lacerations were absent. Plain

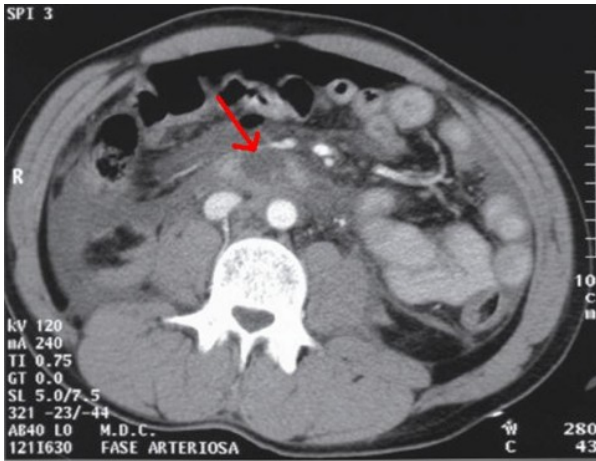


Figure 1. Preoperative CT scan showing a perforation of the third portion of the duodenum (arterial phase).

X-rays showed fractures of the left greater trochanter, left tibial plateau and right ankle, for which he underwent urgent surgery with bone stabilization. Chest X-ray and two abdominal ultrasounds performed at the time of admission were negative. Blood tests showed only increased white cells count ($11.8 \times 10^9/L$; reference range: $4-11 \times 10^9/L$) and hemoglobin was 11.5 g/dL (reference range: 12-16 g/dL). Serum amylases were mild elevated (114 U/L; reference range: 0-100 U/L). After orthopedic surgery he was transferred to Intensive Care Unit. Twelve hours from initial admission he started to complain an increasing abdominal pain; blood tests showed a further increase of serum amylase up to 180 U/L. Therefore, he underwent an abdominal computed tomography (CT) with intravenous contrast, which showed a perforation of the third duodenal portion (Figures 1 and 2) with evidence of duodenal laceration, peripancreatic collection with no intravenous contrast extravasation and free abdominal air. Surgical open approach was decided. At laparotomy a wide Kocher maneuver was performed, the lesser sac was entered to visualize the posterior proximal duodenum and a mobilization of the duodenum was done up to the ligament of Treitz. Superior mesenteric vein was already exposed by the trauma without evidence of bleeding. A laceration of 4 cm in size of the third-fourth duodenal portion (disruption of 75% of the circumference - grade III injury) was evident

[4]. There was a 100 mL of intra-abdominal peripancreatic fluid with no signs of infection. The laceration was oversewn with two-layer closure and a four-tube decompression was done. A cholecystectomy was performed and a T-tube was placed in the common bile duct. Then, a nasogastric tube was placed in the first portion of the duodenum, a feeding jejunostomy was performed and also a retrograde duodenal decompression was placed. Enteral jejunal feeding was started on postoperative day two and duodenostomy tube was removed on postoperative day eight. Two additional external drains were left near the duodenal wound. The postoperative course was uneventful. A light diet was started on postoperative day six. He was discharged from the Department of Surgery on postoperative day ten, and one year after surgery he is well without any long-term complications.

DISCUSSION

Blunt abdominal injuries are the results of a direct blow to the epigastrium, and they account for 25% of all duodenum traumas, while the remaining 75% are due to penetrating trauma [1, 2, 3]. Isolated blunt duodenal injuries are very rare since they are commonly associated with lesions of other abdominal or thoracic organs, including major vessels. They are usually due to motor vehicle accidents, especially in unrestrained drivers [4].



Figure 2. Preoperative CT scan (portal phase) showing a disruption of the third duodenal portion.

Considering the deep and relatively protected anatomical site of the duodenum, it is likely that when a trauma is able to determine an injury to the duodenum, other organs are usually involved. Thus, if a traumatic lesion of the duodenum is detected, injuries to other structures have to be ruled out [1, 2, 3, 4, 5]. The diagnosis is difficult unless a high index of suspicion is maintained; misdiagnosis or diagnostic delay is common, as in the present case: in case of small duodenal wound, initial physical examination is generally negative. In fact, in case of small or retroperitoneal perforations, signs of peritonitis usually develop once duodenal contents extravasate in the peritoneal cavity, and this process can require several hours [6, 9]. Ultrasound can be performed initially to rule out injuries to intra-abdominal organs and vessels but it is inadequate to detect lesions in the pancreaticoduodenal area [4]. Thus CT scan with both oral and intravenous contrast medium is of paramount importance; in fact in this way it may be possible to demonstrate the extravasation of oral or intravenous contrast medium in the presence of a laceration. The development of multidetector-row CT has improved the ability to examine and detect duodenal injuries. However, in some cases even CT scan can be negative at admission, or subtle CT findings such as small amount of unexplained fluid, and unusual bowel morphology, can be underestimated and dismissed [10, 11, 12]. For these reasons, subtle findings on abdominal CT should be an indication for laparotomy or explorative laparoscopy.

Serum amylase might be helpful since persistently increased or rising amylase can indicate a lesion in the duodenopancreatic area. In the present case the increased value of amylase over the time associated with the presence of abdominal pain, which was absent at initial presentation, addressed the suspicion of a pancreatic or duodenal injury and subsequently a CT scan was performed.

Approximately 80% of duodenal injuries can be safely primarily repair, while the remaining usually requires more complex procedures, such as pyloric exclusion,

duodenoduodenostomy, and duodenojejuno-stomy [2, 4, 6, 7, 13]. Pancreaticoduodenectomy is rarely required and it might be performed in case of massive disruption of the duodenopancreatic complex [14]. Such area should be always adequately explored at laparotomy, through a wide Kocher maneuver and exposing all the duodenal portions [4]. Unfavorable prognostic factors are the involvement of common bile duct and/or pancreas, blunt trauma, and an involvement of more than 75% of the duodenal circumference. Additional factors were represented by delay of treatment after the first 24 hours from the trauma, and lesions located in the first and second portions of the duodenum [4, 5, 6].

Protection of a primary duodenal repair is important to decrease the risk of duodenal suture dehiscence. Approximately 10 liters of gastric, biliary, pancreatic and duodenal secretions pass daily through the duodenum. The proteolytic enzymes content and the great volume by itself may lead to a breakdown of suture lines, with subsequent fistula, which can lead to peritonitis and sepsis [9]. So far with the primary closure of the duodenal wound, many methods for diversion of gastric flow have been suggested such as duodenal diverticulization, antrectomy, vagotomy and end-to-side gastrojejunostomy [4]. Pyloric exclusion without antrectomy plus vagotomy and biliary diversion has been also proposed. A more common alternative to the aforementioned techniques is the triple-tube decompression, with nasogastric tube or gastrostomy, a retrograde and antegrade tubes for both for duodenal decompression and feeding jejunostomy, respectively [4, 6, 7]. In the presented case an additional T-tube in the common bile duct was placed, obtaining a "quadruple tube" decompression. After decompression, a lower incidence of duodenal leaks have been reported, even if there are no prospective randomized study, comparing decompression *versus* other techniques [1, 2, 3, 4, 5, 6, 7]. In the present case, despite the initial diagnostic delay, which was however less than 24 hours from initial trauma, the course was uneventful without complications.

In conclusion, isolated duodenal injury is a rare event usually related to mild or severe abdominal trauma. The diagnosis can be extremely difficult, considering the anatomical location of the duodenum and lack of peritoneal signs. A high degree of suspicion is therefore necessary for early diagnosis and CT scan should be performed in case of all significant epigastric trauma. In most cases primary direct repair of duodenal wounds can be achieved and duodenal decompression via triple or quadruple tube technique is required to decrease the risk of duodenal fistula.

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Correspondence

Massimo Falconi
Department of Surgery (Chirurgia B)
University of Verona
Policlinico GB Rossi
Piazzale L.A. Scuro, 10
37134 Verona
Italy
Phone: +39-045.812.4553
Fax: +39.045.820.1294
E-mail: massimo.falconi@univr.it

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