

Duodenal injury secondary to blunt abdominal trauma, an injury that goes unnoticed. Case report with imaging approach

Lesión duodenal secundaria a trauma cerrado de abdomen, una lesión que puede pasar desapercibida. Presentación de caso con enfoque imagenológico

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Summary

Introduction: Duodenal injuries due to blunt abdominal trauma are a challenging scenario as they have non-specific symptoms or can even be asymptomatic in the first hours. The objective of this article is to present the case of a 15-year-old patient with duodenal injury secondary to blunt abdominal trauma, from an imaging approach. ***Clinical case:*** A 15-year-old patient with blunt abdominal trauma secondary to being run over by a motorcycle as a pedestrian. CT findings suggest duodenal injury such as thickening of the walls, enhancement of the mucosa and laminar fluid. Intestinal transit evaluation identifies duodenal perforation, and MR cholangiopancreatography (MRCP) rules out bile duct injury. ***Conclusion:*** Traumatic duodenal injury is a complication that is rarely encountered but can constitute a diagnostic challenge for both the surgery and radiology groups.

Resumen

Introducción: Las lesiones duodenales por trauma abdominal cerrado son un escenario desafiante al tener una clínica inespecífica o incluso ser asintomáticas en las primeras horas. El objetivo de este artículo es presentar el caso de una paciente de 15 años de edad con lesión duodenal secundaria a trauma abdominal cerrado, desde un enfoque imagenológico. ***Caso clínico:*** Paciente con trauma cerrado de abdomen secundario a arrollamiento por motocicleta, con hallazgos en tomografía computarizada que sugieren lesión duodenal: engrosamiento de las paredes, realce de la mucosa y líquido laminar. El estudio de tránsito intestinal identifica perforación duodenal y la colangiorresonancia descarta lesión de vía biliar. ***Conclusión:*** La lesión traumática de duodeno es una complicación poco frecuente en trauma abdominal cerrado que constituye un reto diagnóstico tanto para el grupo de cirugía como para el de radiología.

Introduction

Blunt abdominal trauma can cause small bowel injury in approximately 1% to 10% of cases. Specifically, duodenal injuries occur in a range of 3.7% to 5% and the penetrating mechanism of injury is the most common cause of duodenal trauma (80%), while blunt trauma accounts for only 20% of cases. The ratio of duodenal injuries between male and female sex is 5:1 and the most affected age range is between 16 and 30 years old, with a mortality of up to 19% (1). Duodenal trauma remains a challenging scenario, not only because of its low frequency, but also because it can be clinically asymptomatic in principle.

The aim of this article is to present the case of a 15-year-old patient who presented with duodenal injury secondary to blunt abdominal trauma due to a traffic accident, whose direct and indirect signs of duodenal perforation were evidenced by various imaging techniques.

Case

This is a 15-year-old patient, hit by a motorcyclist resulting in blunt abdominal trauma. On admission he presented with abdominal pain and profuse emesis. Computed axial tomography (CT) was performed with intravenous contrast medium, without oral contrast. The CT scan showed thickening of the walls and enhancement of the mucosa of the third portion of the duodenum, associated with laminar fluid in the hepatorenal space and gas bubbles in a collection located caudal to the third portion of the duodenum. The described fluid extends to the interaortocaval region and to the root of the mesentery. No direct signs of pancreatic trauma were observed (Figure 1).

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In view of the findings, conservative management was considered; however, on the third day of hospitalization, due to exacerbation of abdominal pain, a new CT scan was performed in which increased volumes of free fluid and gas were observed (figure 2).

The findings were indicative of duodenal perforation and expanding retroperitoneal hematoma. The patient was taken to laparotomy, where retroperitoneal hematoma is found in duodenum and ascending colon. During the hospital stay, the patient presented dark biliary material coming out through the abdominal drainage, so a cholangiorresonance was performed, which ruled out biliary tract lesion (Figure 3). Intestinal transit was performed to identify duodenal perforation, which was confirmed by extraluminalization of the contrast medium in the third portion of the duodenum (figure 4).

Due to the location of the fistula and the impossibility of placing a covered stent due to the high probability of migration, conservative management was indicated, with periduodenal drain, total parenteral nutrition and nasojejunal tube distal to the fistula to perform trophic stimulation. Given the adequate clinical response and tolerance to the oral route, the patient was discharged from the hospital.

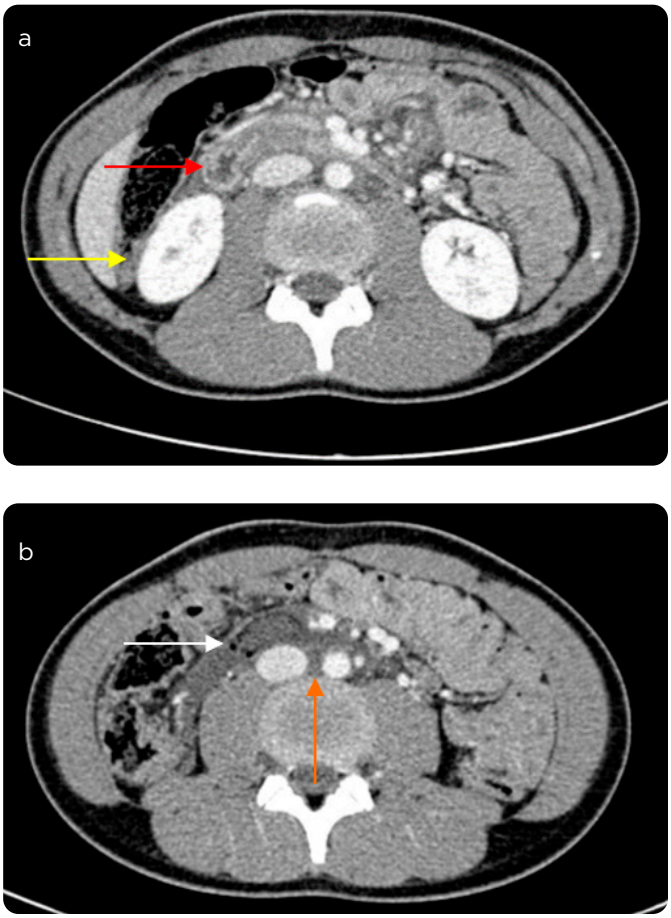


Figure 1. CT of the abdomen with contrast medium in axial sections in portal phase. a) Thickening of the wall and enhancement of the mucosa of the third portion of the duodenum (red arrow) associated with free liquid extending to the hepatorenal fossa (yellow arrow). b) Free liquid in the interaortocaval space and in the root of the mesentery (orange arrow) associated with gas in the collection caudal to the horizontal portion of the duodenum (white arrow).

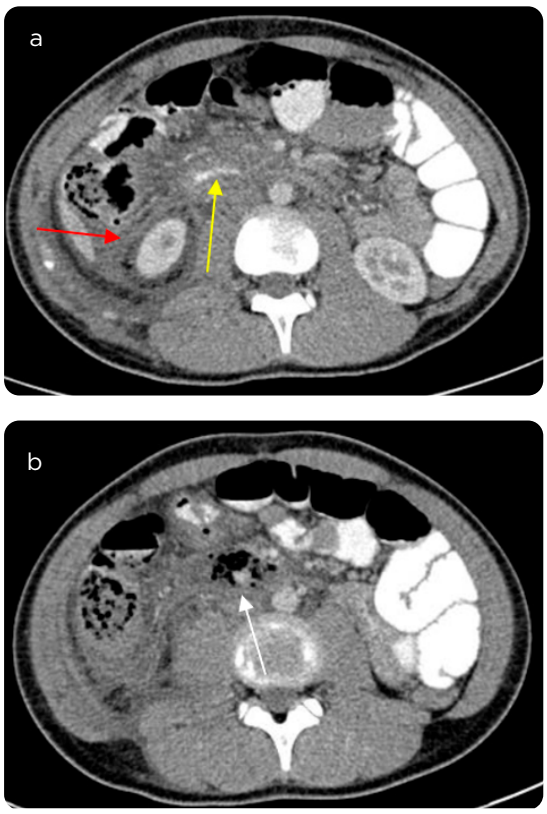


Figure 2. Abdominal CT with contrast medium in axial sections in portal phase. a) Thickening of the duodenal wall (yellow arrow) and fluid with extension to the hepatorenal fossa (red arrow). b) Retroperitoneal free fluid with increase in the volume of the collection with respect to the previous image (white arrow).



Figure 3. Cholangiorresonance. Cholangiographic phase in which the choledochus is intact, without fistulas or leaks, which rules out involvement of the extrahepatic biliary tract.



Figure 4. Intestinal transit image revealing extravasation of the contrast medium to the caudal abdominal cavity, to the third portion of the duodenum (red circle).

Discussion

Por su localización retroperitoneal, las lesiones duodenales son un reto diagnóstico. Se asocian a una mayor morbimortalidad debido al retraso que se puede presentar en su identificación (2-4).

El mecanismo de lesión penetrante es la causa más frecuente de trauma duodenal en alrededor del 80 % de los casos (5), mientras que hasta el 20 % es consecuencia de trauma cerrado de abdomen secundario a fuerzas de cizallamiento entre la pared abdominal y la columna vertebral o fuerzas de aceleración y desaceleración, como sucede en traumatismos por caídas de grandes alturas (1, 6, 7). Los sitios de lesión duodenal más comunes son la segunda (36 %) y tercera porción (18 %); el sitio de lesión menos frecuente es la primera porción (13 %) (7).

Los signos y síntomas pueden ser inespecíficos o estar enmascarados por lesiones coexistentes, ya que el trauma duodenal aislado es excepcional debido a su proximidad anatómica con otros órganos. En orden de frecuencia, los órganos afectados son hígado (17 %), lesiones vasculares (15 %), colon (13 %), páncreas (12 %), otras partes del intestino delgado (11 %) y estómago (9 %) (7). El retraso más allá de las 24 horas en la identificación y tratamiento de estas lesiones aumenta la mortalidad del 11 % al 40 %. Los exámenes de laboratorio son de poca utilidad para el diagnóstico de lesión duodenal temprana (7).

En cuanto a las imágenes diagnósticas, la radiografía de abdomen puede ser el estudio inicial, que muestra alteración en el patrón de distribución del gas intestinal o aire libre en cavidad abdominal; también puede sugerir presencia de líquido libre, pero, en general, su utilidad inicial es baja, ya que muchas veces los signos son sutiles y difíciles de identificar (7, 8). En cuanto a la serie gastrointestinal, resulta ser un estudio de alto valor para identificar extraluminización del medio de contraste, indicativo de fístulas y/o perforaciones; así mismo, permite localizar y calcular el tamaño del defecto al utilizar medios yodados hidrosolubles minimizando el riesgo de peritonitis química. La estabilidad del paciente es una de las mayores limitantes para este estudio.

La TAC de abdomen es útil para la evaluación del espacio retroperitoneal, incluyendo las porciones del duodeno correspondientes. La perforación duodenal se puede observar como fuga de contenido intestinal hacia el saco menor, pudiendo existir comunicación con la cavidad peritoneal a través del foramen de Winslow y, en ocasiones, evidenciarse neumoperitoneo (8).

En pacientes con perforación duodenal secundaria a trauma abdominal cerrado, la TAC muestra engrosamiento de la pared duodenal, realce anormal de la pared intestinal, falta de continuidad de la pared duodenal, rarefacción de la grasa adyacente, interrupción del tránsito del medio de contraste oral y extraluminización del mismo (hallazgo patognomónico), así como presencia de gas y líquido libre. En algunos casos, se pueden observar abscesos o hematomas (8).

With the aim of predicting duodenal injury, among others affecting abdominal organs in the context of blunt abdominal trauma, the BATiC (Blunt Abdominal Trauma in Children Score) scale stands out, in which abdominal Doppler can be an initial tool to rule out vascular lesions. It is used to identify pseudoaneurysms, dissections, thrombi and retroperitoneal and intramural hematomas. Color Doppler assessment in pseudoaneurysm can identify inflow and outflow, known as the 'ying-yang' sign (9). A score less than or equal to 7 correlates with a low probability of intra-abdominal organ injury, so additional studies would be unnecessary (Table 1). The management of duodenal trauma depends on the degree of injury found in the exploratory laparotomy findings, according to the classification of the American Association for the Surgery of Trauma-Organ Injury Scale Committee (AAST-OIS) (Table 2) (9). In the specific management of each grade of duodenal injury, the basis is to perform the simplest surgical procedure preserving as much tissue as possible. Primary repair, whenever feasible, should be performed in AAST-OIS grade I-III lesions, and damage control surgery should be performed in more complex cases, such as AAST-OIS grade IV-V lesions, in which surgical reconstruction is unfeasible (10). However, conservative management of isolated duodenal lesions or AAST-OIS grade I lesions has also been described, provided that the patient's condition allows it and in sites where adequate clinical and radiological follow-up can also be performed (11).

Table 1. BATiC scale adapted from Karam et al. The score can range from 0-18

Item	Score
Abnormalities on abdominal Doppler ultrasonography	4
Abdominal pain	2
Signs of peritoneal irritation	2
Hemodynamic instability	2
AST > 60 IU/l	2
ALT > 25 IU/l	2
Leukocytes > 9.5 g/L	1
LDH > 330 IU/l	1
Lipase > 30 IU/l	1
Creatinine > 50 µg/L	1

Table 2. Grades of duodenal injury according to the American Association for the Surgery of Trauma, in agreement with the Committee on Organ Injury Scales (American Association for the Surgery of Trauma-Organ Injury Scale) [AAST-OIS])

Grade	Injury	Description
I	Hematoma	Involves a single portion of the duodenum
	Laceration	Laceration Partial laceration, without perforation
II	Hematoma	Involves more than one portion
	Laceration	Disruption of less than 50 % of circumference
III	Laceration	Disruption of 50-75 % of the circumference of D2
		Disruption of 50-100 % of the circumference of D1, D3, and D4
IV	Laceration	Disruption of more than 75 % of the circumference of D2
		Involves the ampulla or distal portion of common bile duct
V	Laceration	Massive disruption of the duodenopancreatic complex
	Vascular	Devascularization of the duodenum

Conclusion

Traumatic duodenal injuries can be a diagnostic challenge for both the clinician and the diagnostic imaging expert. A thorough evaluation is needed since lesions suggestive of duodenal rupture are often not easily identifiable on tomographic images. It is essential that both the surgical and radiology teams are aware of this lesion in order to perform a correct diagnostic approach (5).

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