

## Duodenal hematoma: multiple etiologies for an underestimated diagnosis. Case series

### *Hematoma duodenal: múltiples etiologías para un diagnóstico subestimado. Serie de casos*

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#### Abstract

Duodenal hematoma refers to the accumulation of blood in the wall of the duodenum due to a vascular rupture of the subserosa layer. The most common etiologies are closed abdominal trauma, coagulation disorders, pancreatitis, iatrogenesis, and vasculitis, among others. It can manifest as acute abdomen, intestinal obstruction, or with non-specific symptoms. For diagnosis, it is essential to consider risk factors and support with imaging studies. In this paper, three cases of duodenal hematoma in patients of different ages are described with ultrasound and/or tomographic records.

**Keywords:** Duodenal hematoma. Computed tomography. Acute abdomen.

#### Resumen

El hematoma duodenal corresponde a la acumulación de sangre en la pared del duodeno debido a una rotura vascular de la capa subserosa. Las etiologías más frecuentes son traumas abdominales cerrados, trastornos de coagulación, pancreatitis, iatrogenia y vasculitis, entre otros. Se puede manifestar como abdomen agudo, obstrucción intestinal o con síntomas inespecíficos. Para el diagnóstico es fundamental considerar factores de riesgos y apoyo en estudios imagenológicos. En este trabajo se describen tres casos de hematoma duodenal en pacientes de distintas edades, con registro ecográfico y/o tomográfico.

**Palabras clave:** Hematoma duodenal. Tomografía computarizada. Abdomen agudo.

#### Introduction

Duodenal hematoma refers to the accumulation of blood in the duodenal wall, more frequently in the submucosa, due to a vascular rupture of the subserosa layer<sup>1</sup>. It can have serious consequences on patients'

alimentation and in some cases cause potentially fatal complications. Most of the data come from case reports, since it is a rare entity, so a high suspicion is needed to diagnose it<sup>2</sup>. Findings using the main imaging modalities will be shown through three clinical cases.

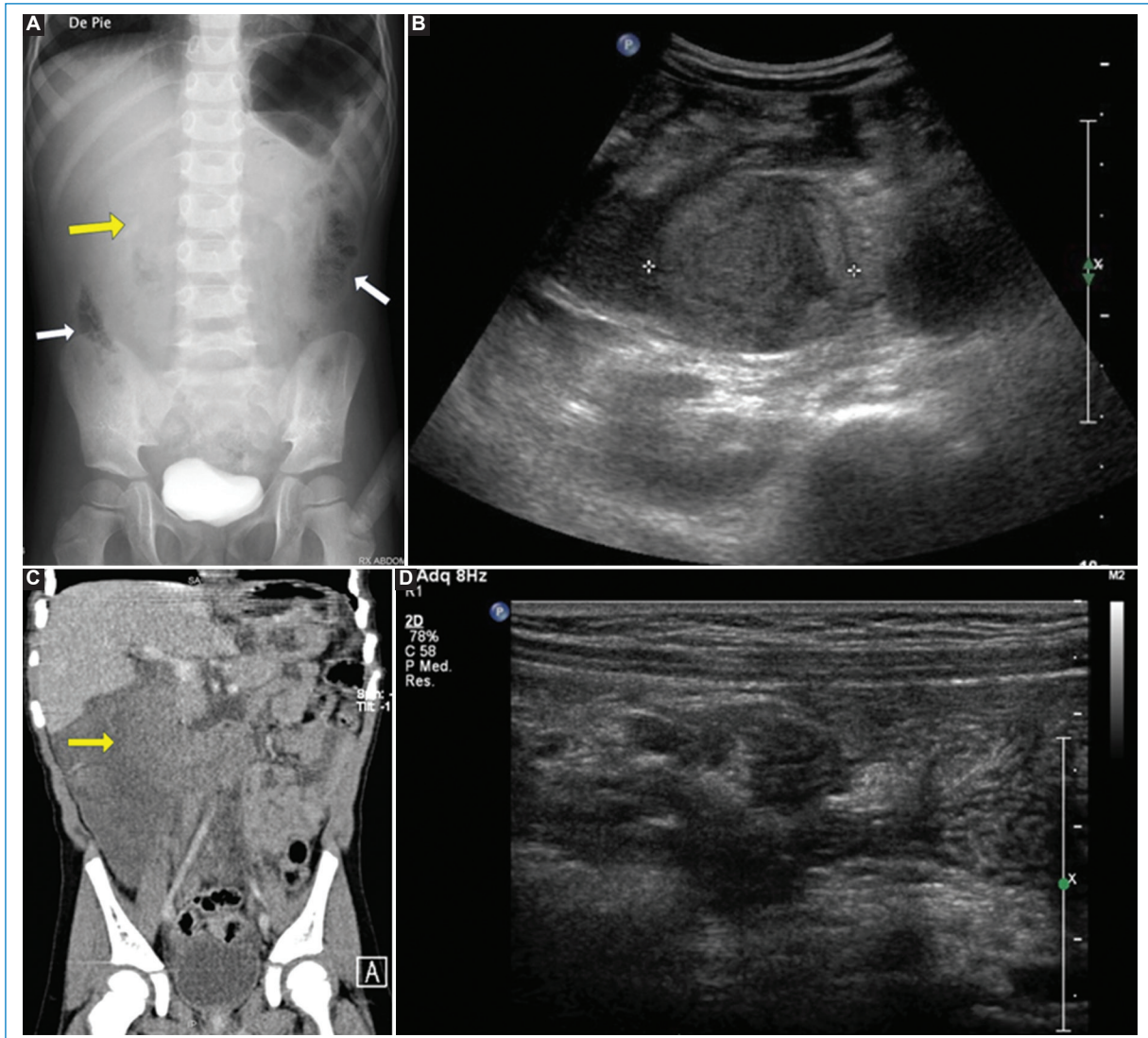
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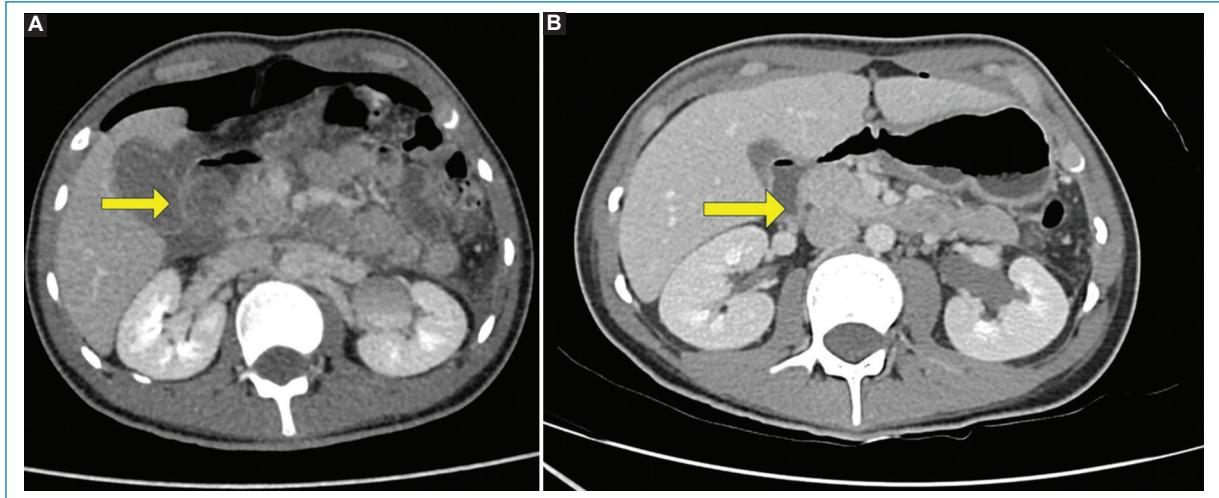
**Figure 1.** **A:** simple abdominal X-ray, opacity in the upper abdomen (yellow arrow), and abnormal distribution of lumen gas (white arrows). **B:** abdominal ultrasound, heterogeneous tubular structure with a solid appearance in the second and third portion of the duodenum. **C:** computed tomography of the abdomen and pelvis without contrast, hyperdense L-shaped structure in the upper hemiabdomen, in the second and third portion of the duodenum corresponding to a duodenal hematoma (yellow arrow). **D:** control abdominal ultrasound performed at 6 weeks showing resolution of the hematoma.

## Presentation of cases

### Case 1

Three-year-old girl is studied for food allergy. An upper digestive endoscopy (EGD) is performed with duodenal biopsy without incident. After the procedure, the patient progresses with intense abdominal pain, vomiting, weakness, and pale mucous membranes. A plain abdominal radiograph was requested (Fig. 1A) which showed a central opacity in the upper hemiabdomen and abnormal distribution of endoluminal gas.

At the same time, the abdominal ultrasound shows a tubular structure of heterogeneous echogenicity in the upper hemiabdomen, with a solid appearance in the location corresponding to the second and third duodenal portion (Fig. 1B). Computed tomography (CT) of the abdomen and pelvis without contrast is requested, which better shows this hyperdense L-shaped structure in the upper abdomen, which coincides with the course of the second and third portion of the duodenum, corresponding to a duodenal hematoma (Fig. 1C). Conservative management was performed, the patient



**Figure 2. A:** computed tomography of the abdomen and pelvis with intravenous contrast, duodenal hematoma of the second and third portion of the duodenum that protrudes into the lumen of the duodenal bulb (yellow arrow). **B:** CT scan of the abdomen and pelvis with control intravenous contrast, complete resolution of the hematoma (yellow arrow).

presented a good clinical evolution, and she was discharged from the hospital and was monitored with a new ultrasound 6 weeks later, which showed resolution of the hematoma (Fig. 1D).

### Case 2

A 19-year-old man, under study for inflammatory bowel disease; EGD was performed, with a duodenal biopsy, which was described as uneventful. Approximately 48 h later, he consulted the emergency department due to acute abdominal pain with clinical signs of peritoneal irritation. A CT scan of the abdomen and pelvis was performed and showed signs of acute edematous pancreatitis, associated with duodenal hematoma of the second and third portion of the duodenum, protruding into the lumen of the duodenal bulb (Fig. 2A), without determining intestinal obstruction. During hospitalization, he developed acute cholecystitis, so a cholecystectomy was performed; during the surgical procedure, the duodenal hematoma was drained, subsequently monitored with CT, which showed complete resolution of the hematoma (Fig. 2B).

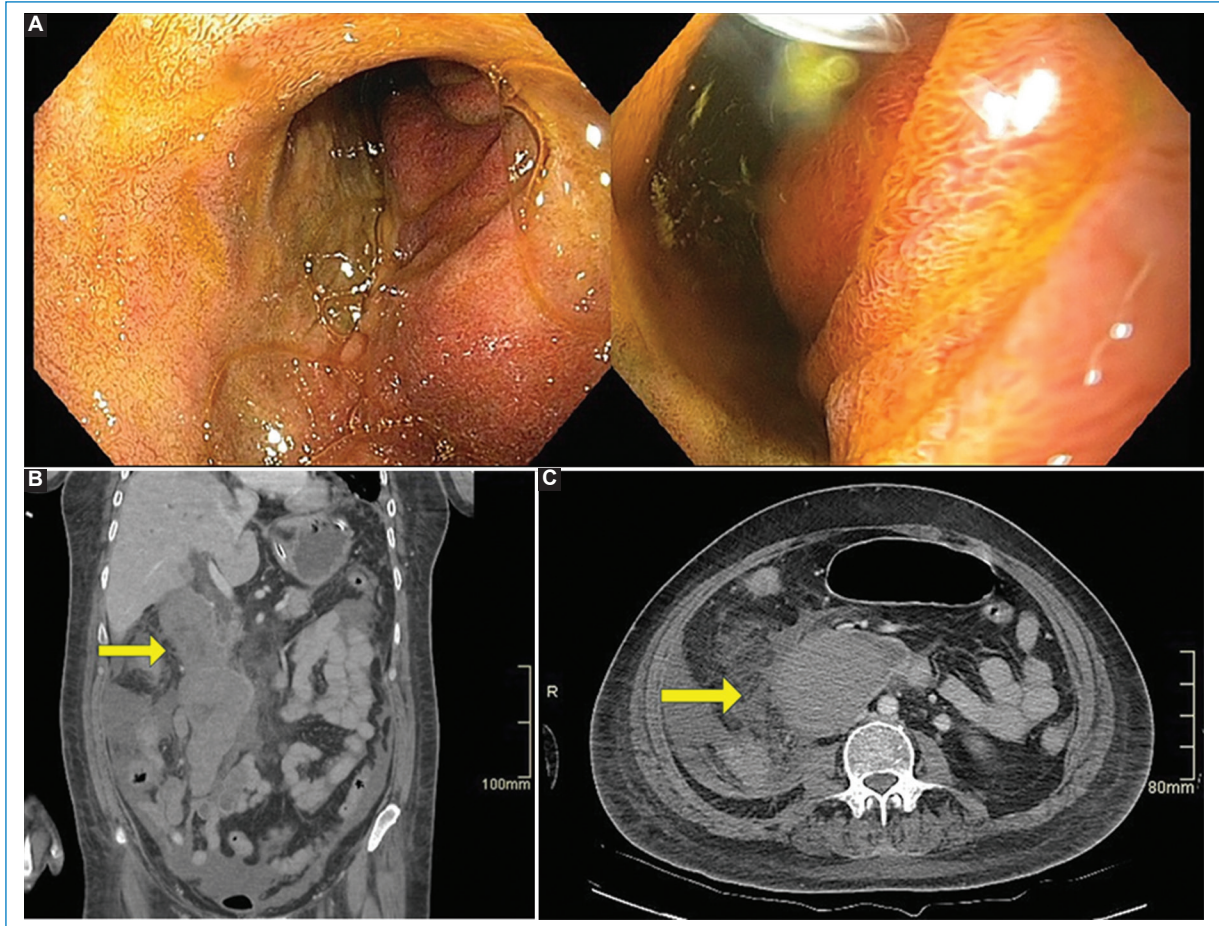
### Case 3

A 52-year-old woman who, during a hospitalization, presents signs of cholangitis, which is satisfactorily treated with endoscopic retrograde cholangiopancreatography. Later, she presented upper digestive

tract hemorrhage, so an EGD is performed (Fig. 3A) which showed a hematoma of the posterior wall of the bulb and the second duodenal portion, without evident endoluminal bleeding. It is complemented by a CT of the abdomen (Fig. 3 B and C) showing a voluminous hematoma of the medial wall of the second duodenal portion with signs of active bleeding. Management by interventional radiology is decided, under anesthesia and with ultrasound-guided micropuncture technique entering through right femoral access, the common hepatic artery with direct origin from the aorta is catheterized and the pancreaticoduodenal artery is pictured that shows two of its branches suspected of bleeding, which were embolized with coils. The patient evolves without hemorrhage, but unfavorably due to multiple pulmonary infectious intercurrent events and severe respiratory failure, requiring prolonged hospitalization and a long rehabilitation process.

### Discussion

The duodenal hematoma is a rare condition that requires early diagnosis because the mortality rate can reach up to 30%<sup>3</sup>. Its correct diagnosis is difficult due mainly to two reasons: first, epidemiologically, it has a low incidence; it is suggested that only 3.7-5% of abdominal traumas cause duodenal injury, which rarely occurs in isolation, despite the fact that their main form of presentation is duodenal hematoma<sup>2</sup>. The second reason that makes its diagnosis difficult is its



**Figure 3.** **A:** upper gastrointestinal endoscopy, hematoma of the posterior wall of the bulb and the second portion of the duodenum, without endoluminal bleeding. **B:** computed tomography of the abdomen and pelvis with intravenous contrast, sagittal reconstruction, and **C:** axial slice, voluminous hematoma of the medial wall of the second duodenal portion with signs of active bleeding (yellow arrow).

retroperitoneal location, which is difficult to detect during physical examination. The method of choice for diagnosis is abdominal CT without and with intravenous contrast, where a thickening of the duodenal wall is observed with heterogeneous attenuation or sometimes it can be seen as a homogeneous duodenal mass with spontaneous increase in density (50-60 UH). It is important to look at the sagittal reconstruction as we can identify the residual lumen or site of occlusion. If ultrasound is available and there is an experience on the part of the operator, it is possible to visualize this lesion as a structure of heterogeneous echogenicity along the duodenal convexity, and in more acute stages, it may have a uniform and echogenic appearance<sup>2,4</sup>. Multiple reports show that the most frequently compromised portion is the second (36%), then the third (18%), followed by the fourth portion (15%), and finally the first portion (13%)<sup>5,6</sup>, which coincides with

what was seen in our series of cases. As for magnetic resonance imaging, according to some reports, it would allow a more precise evaluation of the size and extent of the intramural hematoma, in addition to showing early signs of biliary or pancreatic parenchyma dilation and could also help evaluate the timing of bleeding with a behavior similar to cerebral hemorrhages in the different sequences<sup>7</sup>.

Regarding its etiology, the most common cause is blunt abdominal trauma, followed by coagulation disorders, iatrogenesis, pancreatitis, and vasculitis, among others<sup>5</sup>. The clinical presentation is variable and may manifest as acute abdomen, intestinal obstruction, obstructive biliary pathology, or with non-specific symptoms, such as nausea, vomiting, or non-specific abdominal pain<sup>3</sup>. Management is usually conservative<sup>6</sup> and is based on digestive rest, decompression with a nasogastric tube for a variable period between 1 and

3 weeks and parenteral nutrition. In cases of active bleeding, treatment by interventional radiology should be considered and surgical interventions only in cases of perforation, where the main radiological difference lies in the existence of extraluminal gas. Other reasons for opting for surgical resolution include the failure of medical treatment or suspicion of concomitant malignancy<sup>4,5</sup>.

This pathology constitutes a diagnostic challenge, where clinical suspicion plays a very important role and timely diagnosis is necessary for a favorable evolution, avoiding complications and mortality. In these scenarios, imaging studies are essential, preferring CT to confirm the diagnosis<sup>6</sup>.

## Conclusion

After analyzing this series of clinical cases, it is possible to conclude that duodenal hematoma is a rare entity, that it has various etiologies with well-defined risk factors, and that, although the symptoms are variable, its most common manifestation is acute abdomen, followed by non-specific gastrointestinal symptoms. Given the correct clinical context, it is essential to remember this diagnosis and search for it in a targeted manner with imaging tests, abdominal CT being the most recommended.

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## Conflicts of interest

The authors declare no conflicts of interest.

## Ethical disclosures

**Protection of people and animals.** The authors declare that no experiments have been carried out on humans or animals for this research.

**Data confidentiality.** The authors declare that they have followed their workplace's protocols regarding the publication of patient data.

**Right to privacy and informed consent.** The authors have obtained informed consent from the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

**Use of artificial intelligence to generate texts.** The authors declare that they have not used any type of generative artificial intelligence in the writing of this manuscript or for the creation of figures, graphs, tables, or their corresponding captions or legends.

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