Duodenal diverticulum in the third portion of duodenum as a cause of upper gastrointestinal bleeding and chronic abdominal pain. Case report and literature review

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**Background:** Duodenal diverticulum is a little-known pathology. The duodenum represents second place in frequency for the presence of diverticula in the digestive tract after the colon. Duodenal diverticulum as a cause of hemorrhage of the upper gastrointestinal (GI) tract has been described as an infrequent complication, although it must be considered in patients with digestive hemorrhage without evident cause at the esophagogastric level. Localization of diverticula in the third or fourth portions of the duodenum is rare and the diverticula are asymptomatic in 80% of cases. Diagnosis is made by endoscopy, contrast X-rays of the upper GI tract, selective arteriography and as a transoperative finding. The objective of this study was to identify and analyze the clinical presentation of duodenal diverticulum to familiarize surgeons and gastroenterologists when there is suspicion of the diagnosis.

**Clinical case:** We report the case of an 85-year-old male presenting with massive upper GI tract hemorrhage and chronic abdominal pain due to a duodenal diverticulum located in the third portion of the duodenum. Diagnosis was made with upper GI barium series because visualization of the diverticulum was not possible by endoscopy. Other therapeutic options are described in the literature. A successful simple diverticulectomy, manually opened with a two-plane transversal incision, was performed on the patient. After >12 months of follow-up, the patient is completely asymptomatic.

**Discussion:** Clinical diagnosis presents difficulty because a classic presentation does not exist. Symptoms are generally vague, <10% of the duodenal diverticulum are frankly symptomatic, and <1 to 2% will require surgical resolution.

**Conclusions:** Hemorrhage of the upper GI tract and chronic abdominal pain secondary to duodenal diverticulum present with recurrence and may be associated with the presence of duodenal diverticulum when other sources of bleeding are not found.

**Key words:** duodenal diverticulum, diverticulum, diverticulectomy, upper digestive tract bleeding, abdominal pain.

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**Abstract**

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**Resumen**

**Introducción:** El divertículo duodenal es una entidad patológica poco conocida. El duodeno representa el segundo lugar más frecuente para la presencia divertículos en el tubo digestivo después del colon. El divertículo duodenal como causa de hemorragia de tubo digestivo alto se ha descrito como una complicación infrecuente aunque debe tenerse en cuenta en pacientes con hemorragia digestiva sin causa evidente a nivel esófago-gástrico. Su localización en la tercera o cuarta porción del duodeno es rara y son asintomáticos en el 90% de los casos. El diagnóstico se establece a través de endoscopia, radiografías contraste de tubo digestivo alto, arteriografía selectiva y también como un hallazgo transoperatorio. El objetivo fue determinar y analizar la presentación clínica del divertículo duodenal, para orientar a cirujanos y gastroenterólogos en su sospecha diagnóstica.

**Caso clínico:** Mujer de 85 años de edad con hemorragia masiva de tubo digestivo alto y dolor abdominal crónico este último de siete años de evolución, originados por un divertículo duodenal, localizado en la tercera porción del duodeno, el diagnóstico fue realizado por una serie esófago/gastro-duodenal (GDES) con bario, debido a que por endoscopia no fue posible su visualización. La diverticulectomía simple, abierta con cierre transversal en dos planos en forma manual fue realizada exitosamente, aunque existen otras modalidades terapéuticas reportadas en la literatura. Actualmente la paciente tiene más de doce meses de seguimiento y se encuentra asintomática.

**Discusión:** El diagnóstico clínico presenta dificultad, debido a que no existe una presentación característica, generalmente, los síntomas son imprecisos, menos del 10% de los divertículos duodenales son francamente sintomáticos y menos del 1 al 2% requieren manejo quirúrgico.

**Conclusiones:** La hemorragia de tubo digestivo alto y el dolor crónico abdominal con origen en un divertículo duodenal se presentan con un curso clínico recurrente, deberá de sospecharse o por lo menos pensar la presencia de un divertículo duodenal al no encontrar otra fuente de sangrado.

**Palabras clave:** divertículo duodenal, divertículos, sangrado de tubo digestivo alto, dolor abdominal.
Introduction

Duodenal diverticulum was described by Chromel in 1710 and in 1951 Patterson and Bromberg described and documented the first case of upper gastrointestinal (GI) tract hemorrhage due to duodenal diverticula. Only a few well-documented cases have been described worldwide.\(^1\)

The duodenum represents the second most frequent location for the presence of diverticula in the digestive tract after the colon. Contrary to colonic diverticula, duodenal diverticula produce little symptomatology, perhaps due to their greater size.\(^2\)

Duodenal diverticula tend to be congenital simple herniations of the mucosa and submucosa through the muscular layer, preferentially localized in the duodenal mesenteric border.\(^3\)

Duodenal diverticula are asymptomatic in 90% of the cases and between 10 and 67% of these are localized in the second portion of the duodenum, rarely in the third or fourth portion. Complications are rare but with significant morbidity.\(^4\)

The incidence of duodenal diverticula is unknown but may vary according to the diagnostic method used. It is present in 0.16 to 5% of the population, using barium upper GI studies. In autopsies it is reported in 14.5 to 23% of cases, and in endoscopic cholangiographic studies it is present in 9 to 23% of cases. In Mexico, Acuña et al. reported an incidence of up to 11.6% by endoscopic cholangiography. Duodenal diverticulum does not require specific treatment but may be a rare cause of massive hemorrhage of the GI tract or may present as chronic abdominal pain.\(^5,8\)

Duodenal diverticula are infrequent before the age of 30 years, and its incidence increases between the ages of 50 and 60 years, with a slight predominance of women affected (ratio 1.6:1).\(^6\)

Duodenal diverticula constitute a diagnostic and therapeutic challenge due to their nonspecific presentation. Diagnosis is generally established using studies such as upper endoscopy, upper GI barium studies, and selective arteriography. Diagnosis can also be made as a transoperative finding.\(^2,7,8\)

Clinical case

We present the case of an 85-year-old sedentary woman with type 2 diabetes mellitus of long evolution controlled with oral hypoglycemics. Patient was a smoker and used nonsteroidal anti-inflammatory drugs (NSAIDS) on a regular basis for various reasons. Surgical history of this patient included open cholecystectomy 10 years prior due to cholelithiasis.

The patient presented colicky abdominal pain localized in the epigastrum and radiating towards the posterior face of the abdomen, with evolution of >7 years. During this time, a variety of medical evaluations were done, and due to the history of NSAID use, the patient was treated systematically for a probable clinical picture of gastric/duodenal ulcer managed with cycles of H2 blockers and diet, with relative improvement.

The patient was admitted to the emergency service for abdominal pain localized in the epigastrum, fever, melena, BP 90/60 and anemia with hemoglobin of 9.8 g/dl and was satisfactorily managed with crystalloids. On her first admission to the hospital, the patient presented a good clinical response to the established management and had normal evacuations. The patient was discharged from the hospital in an improved condition with final diagnosis of bleeding ulcer due to history of medication ingestion.

Twenty days after being discharged the patient was again admitted to the emergency department. She was conscious but disoriented and showed pallor of the mucosa and integument with abdominal pain and melena localized in the epigastrum, which were present after the beginning of the abdominal pain.
Blood pressure was 100/60, tachycardia (120/min), hemoglobin (6.2 g/dl). The patient required transfusion of three units of blood due to hemodynamic instability, as well as fluid replacement, with good response.

Once the patient was stabilized, upper endoscopy was carried out and showed mild gastritis, but without localization of ulcer site or other additional lesion, which could explain the upper GI tract bleeding.

A rectosigmoidoscopy was also done and showed vascular bundles classified as grade II hemorrhoids.

Colonoscopy did not demonstrate any tumoral lesions, diverticula, ulcerative lesions or angiodysplasia. Abdominal ultrasound and tomography were reported without alterations.

Later, upper GI barium studies had as a principal finding a duodenal diverticulum with wide base in the third portion of the duodenum without noticing any more diverticula. This lesion, because of its anatomic site, was not demonstrated with upper endoscopy (Figures 1 and 2).

Patient’s evolution was satisfactory, with discrete skin pallor, without abdominal pain and with normal evolution. Hemoglobin was 10.3 g/dL. When preoperative evaluation was completed, the surgery was scheduled.

An exploratory laparotomy was performed with a median supra- and inframural incision into the abdominal cavity. Multiple adhesions were observed throughout the stomach, duodenum and transverse colon in the right upper quadrant due to previous open cholecystectomy. Lysis of adhesions was performed with dissection of the organs involved. Once the stomach and duodenum were identified, an extensive Kocher maneuver was performed totally exposing the duodenal/pancreatic arcade towards the midline, and the ligament of Treitz is incised. The duodenum is completely exposed, examining its four portions, with identification of a firmly attached creased sac at the antimesenteric side of the duodenum (Figure 3), which is totally dissected. There is visualization of a diverticulum on the third portion of the duodenum (Figure 4), which is loosely attached to the anterior wall of the abdominal aorta. Upon dissection, a medium caliber artery was found and a pair of vascular vessels at the base was ligated with 0 silk. A 3 × 4 cm diverticulum and a 3-cm base is skeletonized.

Simple diverticulectomy is performed by manually opening incision transversally in two planes with 3-0 polygalactine (Vicryl) and 2-0 silk. Permeability of the loop and impermeability of the duodenal closure are verified (Figure 5).

Tolerance to oral feeding was initiated on the fourth day but the patient presented with postprandial vomiting and oral feeding was suspended for 24 h. During this time an abdominal ultrasound was performed to rule out the possibility of retroperitoneal hematoma. However, results were negative. Diet

**Figure 3.** Extraluminal duodenal diverticulum in the third portion of the duodenum.

**Figure 4.** Complete dissection of duodenal diverticulum.

**Figure 5.** Simple diverticulectomy with transversal closure.
was again begun on the 6th day with good tolerance. There was no infection or dehiscence of the surgical wound, vital signs were stable, and there were no signs of active bleeding in the upper GI tract. The patient was discharged from the hospital on the 7th day with minimal postoperative sequelae.

Histopathological study reported a true lobulated diverticulum (4 x 3.3 x 3 cm) with hemorrhage of the intestinal wall and hematic content in its lumen. There was no evidence of ectopic mucosa or angiodyplasia.

**Discussion**

Upper GI tract hemorrhage is an important cause for emergency service consultation. The majority of the entities that produce GI hemorrhage require immediate management because of the possibility of hemodynamic instability, increasing morbimortality.

Of the duodenal diverticula, <10% are symptomatic and extremely rare and <1 to 2% will require surgical management.\(^\text{4,9-11}\)

Diagnosis is complex and frequently erroneous because the patient presents with a nonspecific origin. Frequent disease, cholecystitis, right base pneumonia or bleeding duodenal ulcer may present a similar clinical picture. Associated symptoms tend to more often be a reason for study of other entities than a true expression between anomaly and ailments.\(^\text{3,4,9-12}\)

In our case, the patient presented important signs for suspicion of duodenal diverticulum: chronic abdominal pain in the epigastrium for 7 years evolution, significant upper GI tract hemorrhage with hemodynamic alterations, anemia and negative upper endoscopic studies, without determining the cause of the bleeding.\(^\text{3,11}\)

The duodenum is the second most frequent location of diverticula of the GI tract followed by the jejunum and they are generally seen between 50 and 65 years of age, with frequency increasing with age.\(^\text{9,13,15}\)

The second portion of the duodenum is the most common site in 85 to 90% of duodenal diverticula. The third and fourth portions of the duodenum represent 10 to 20%, respectively.\(^\text{15}\)

Our patient was 85 years of age, which corroborates that duodenal diverticula are more frequent in the elderly and should therefore be considered as a diagnostic possibility in the presence of upper GI tract bleeding and chronic abdominal pain in patients past the third stage of life. The majority of the cases reported worldwide with duodenal diverticulum are >50 years of age.

Duodenal diverticula are frequently associated with other GI tract pathologies such as colonic diverticula, peptic ulcer and hiatal hernia, although the association appears to be mostly associated with patients >50 years of age.\(^\text{2,1,15}\)

This association was not observed in our case where upper endoscopy and colonoscopy were negative.

According to the worldwide literature, upper endoscopy plays an important role in the diagnosis of duodenal diverticula in up to 75% of the cases. The percentage of diagnostic failures could be increased if the site of the diverticulum is found in the third or fourth portion of the duodenum. Other studies point out that bleeding diverticula were not identified by endoscopy in up to 70% of the patients, especially when localized in the third or fourth portion of the duodenum.\(^\text{15-18}\)

In other reports of cases of duodenal diverticula, upper GI series is not used but may be used when upper endoscopy is negative. This method is currently useful for the study of duodenal diverticula especially where selective arteriography or Technesium-99-labeled cell studies are not available. Diagnosis of duodenal diverticulum is made radiologically as well as by esophagogastroduodenoscopy in 1 to 5% of patients.\(^\text{3,9,14,19,20}\)

For the patient, the upper GI barium series was the radiological study that provided important information for definitive diagnosis. Although its sensitivity is low, we believe it may occasionally be the only study to determine the cause of upper GI tract hemorrhage, such as in our case.

Finally, an endoscopic technique approved since 2001 that allows for non-invasive evaluation of the GI tract should be mentioned, which is the 30 x 11 mm capsule that contains a camera that transmits images obtained as it passes through the intestine. At present its efficacy continues to be determined, and few studies exist in this regard.\(^\text{21}\)

Surgical treatment in asymptomatic diverticula in adult patients is not justified, whereas in the pediatric patient the criteria is surgical, to avoid a broad range of serious complications.\(^\text{16}\)

For symptomatic duodenal diverticula, the treatment most performed is simple open diverticulectomy or with laparoscopic approach, with apparently good results using both approaches.\(^\text{2,18,15,22}\)

In the case of our patient with diverticulum of the third portion of the duodenum, it was successfully managed with open simple manual diverticulectomy closed transversally using two planes and with the same favorable results as with stapler. No postsurgical duodenal fistula were present, although studies do not exist that demonstrate superiority of the manual over the mechanical technique for treatment of this pathology.

There are isolated reports of symptomatic duodenal diverticula surgically managed laparoscopically, performing stapler diverticulectomy with good results.\(^\text{23}\)

Other alternatives for the treatment of duodenal diverticulum are endoscopic with epinephrine and cauterization, although some authors recommend this management as temporary to control hemorrhage and later subjecting the patient to surgery as definitive treatment.\(^\text{1,24-26}\)

Selective arterial embolization is considered as one additional option in the treatment of bleeding duodenal diverticulum, although reports in the literature are scarce.\(^\text{27,28}\)

Currently, this patient has >12 months of follow-up with good evolution and without presenting melena or abdominal pain in the epigastrium. For these reasons, we consider that the cause of
A cause of upper gastrointestinal bleeding and chronic abdominal pain

the original problem originated from duodenal diverticum in the third portion of the duodenum.

In conclusion, the form of presentation of this case could contribute to early diagnosis of duodenal diverticulum, the majority of which are asymptomatic. The association of upper GI tract bleeding, chronic abdominal pain, and advanced age should be cause for suspicion of duodenal diverticulum when other sources of bleeding are not found. Its incidence should not be underestimated.

Upper GI tract hemorrhage and chronic abdominal pain originating in a duodenal diverticulum presents with a recurrent clinical course, occasionally making diagnosis difficult. Some patients require multiple admissions before confirming definitive diagnosis.

Morbimortality of upper GI tract bleeding as a result of duodenal diverticulum could be reduced with timely diagnosis and opportune treatment.

References