



Case report

Case report emphasize pearls of duodenal perforation

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ABSTRACT

Introduction: Isolated duodenal perforation secondary to trauma is a rare abdominal surgical condition, with a questionable surgical approach depending on the case.

Presentation of case: This is a case report of a 27-year-old male patient who presented with a free perforation in the posterior wall of the third portion of the duodenal frame and secondary retroperitoneum without injuring any contiguous organ, after a medium-impact blunt abdominal trauma during a soccer game.

Discussion: A laparotomy was performed, followed by duodenorrhaphy with Connell-Mayo suture and Lambert suture using vascular prolene in two planes. A nasogastric tube was placed up to the jejunum, and a Jackson-Pratt drain was placed in close to the duodenum next to the sutures. During hospitalization was found a positive bacterial culture of the peritoneal fluid hence received antibiotics, without complication.

Conclusion: It is essential to make a timely diagnosis with its respective individualized surgical approach and it must be managed as an emergency surgical procedure.

1. Introduction

Traumatic injuries that cause duodenal perforation are rare and infrequent events, representing less than 2 % of all abdominal injuries [1,2]. This entity requires urgent attention from the emergency and surgery services, this can be explained by the mortality range from 8 % to 25 % of cases because many of them are not identified and treated promptly [1–3]. Likewise, the surgical approach can be controversial due to the anatomical relationship between the duodenum and other organs around with their respective irrigation. We present the surgical approach and the follow-up of a young patient with no past medical history who consulted the emergency department after an abdominal impact. This case report is reported in line with SCARE criteria [4].

2. Case report

A 27-year-old male with no pathological history attended the emergency department for 24-h of diffuse abdominal pain associated with multiple episodes of vomiting of gastric content. The time from the

trauma to the onset of symptoms was immediate, but the patient had previously consulted another institution, due to delayed medical care, he decided to leave voluntarily and sought consultation again the day after. He was playing soccer when he presented with blunt abdominal trauma caused by a kick with a knee to the abdomen. Vital signs revealed a high heart rate of 94 beats/min, respiratory rate of 19 breaths/min, blood pressure of 130/50 mmHg, temperature 36 °C and oxygen saturation level of 94 %. On physical examination, he presented generalized abdominal pain on palpation, predominantly in the lower abdomen with voluntary muscular defense and signs of peritoneal irritation.

Laboratory results show a normal hemoglobin level but mild leukocytosis. Hemoglobin: 17.6 g/dL, Hematocrit: 52 %, Leukocytes: $13.1 \times 10^3/\mu\text{L}$, Platelets: $317 \times 10^3/\mu\text{L}$, creatinine and urinalysis within normal limits. Computed tomography showed (see Figs. 1–2) a rupture of the third portion of the duodenum and secondary retroperitoneum (see Fig. 3). The patient's waiting time between admission to hospital and diagnosis was around 30 min as per the findings of computed tomography and correlated with the signs and symptoms of the patient. An exploratory laparotomy was defined and

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performed after careful examination.

The exploration was a free perforation of approximately 1 cm in diameter was found in the posterior wall of the third portion of the duodenal frame (see Fig. 4).

A laparotomy was performed, exposing the duodenum and retroperitoneum with a Kocher maneuver, followed by duodenorrhaphy was performed with Connel-Mayo suture and Lambert suture with vascular prolene in two planes; a Jackson-Pratt drain was placed in close to the duodenum, next to the sutures and a nasogastric tube up to the jejunum. A culture sample, and Gram stain of the peritoneal fluid got, with a piperacillin-tazobactam antibiotic coverage for one week. The patient required enteral nutrition for one week, with a good response. The drain was removed 15 days later without additional complications. The patient did not require a stay in the intensive care unit.

Subsequently, the peritoneal fluid culture reported *Enterobacter cloacae* complex, an inducible strain that produces beta-lactamases, with an AmpC pattern, which required evaluation by the infectology service. They considered titration to ertapenem over 10 days due to elevated acute phase reactants and leukocytosis. After finishing the course of antibiotics, the patient had a successful evolution and was discharged with postoperative control a week later and one month later with no evidence of any complications, without affectation in his activities of daily living. As part of the recommendations and rehabilitation, was instructed to follow an early diet, physical therapy, and early mobilization, sports activity involving lifting heavy loads was restricted for one month. Altogether, he was hospitalized for three weeks due to the antibiotic treatment received for secondary peritonitis caused by the uncontained perforation.

3. Discussion

Isolated duodenal trauma after blunt abdominal trauma is rare; injuries range from simple hematoma to perforation [5]. The anatomical relationship of the duodenum and its extension to the retro and intra-peritoneal spaces implies proximity to a number of other viscera such as pancreatic injury and major vascular structures [5]. A free perforation in the duodenum can lead to peritonitis by leaking freely into the abdominal cavity, followed by a systemic inflammatory response syndrome, and finally an infectious process such as sepsis with its subsequent contamination [1,6]. The mechanism underlying the penetration or perforation can determine the extent of the perforation [7].

There are multiple mechanisms of injury, such as direct force between the spine and the anterior abdominal wall causing tearing the

mesentery, a shearing force by acceleration and deceleration, an increase in intraluminal pressure [8–10]. Because the duodenum has a retroperitoneal location, it provides a degree of protection [11]. However, there is still a risk for injury due to its relationship with the spine and its relatively fixed position in the abdomen [12]. In our case, it was an isolated duodenal trauma, and we presume that the mechanism was the result of a sudden blow to the epigastrium by a direct kick, in which a significant amount of energy caused the perforation of the duodenum.

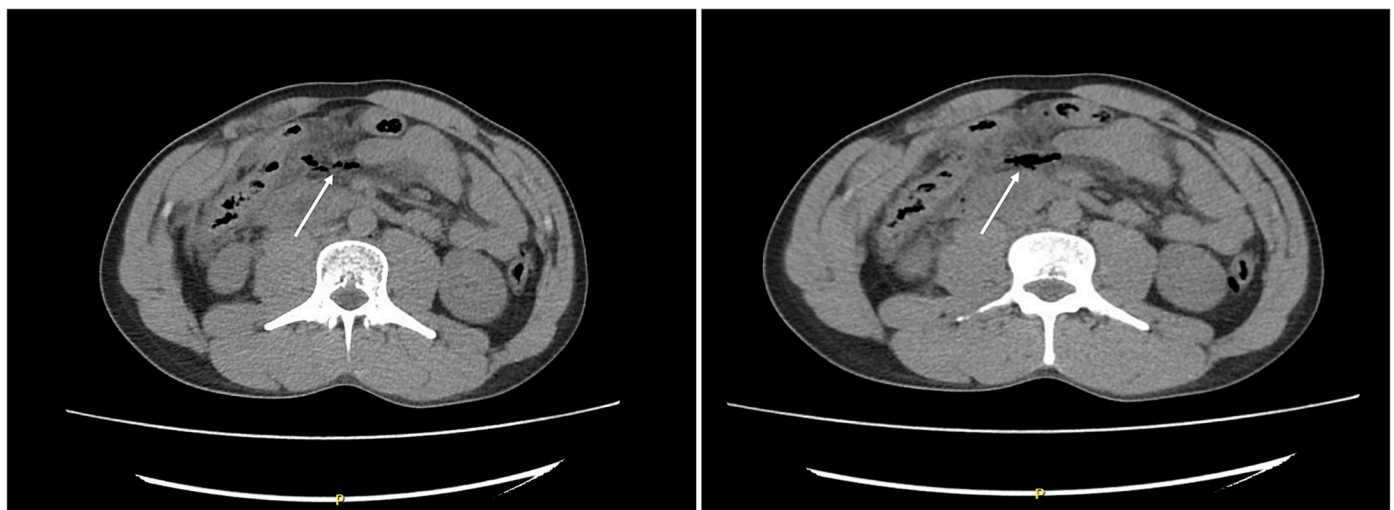
Clinical approach symptoms include abdominal pain, leukocytosis, and symptoms of delayed peritoneal irritation; imaging findings include duodenal wall discontinuity and the presence of extraluminal air or extravasated oral contrast [13]. The use of radiological imaging is essential to classify and characterize the location, extension, time of establishment, and cause of the perforation; the best resource in these scenarios is contrast computed tomography [2]. But in some cases, surgical exploration may be necessary for an acute approach and treatment [3]. In the surgical field, the management of duodenal perforations remains controversial [2].

Historically duodenal lesions were managed with major surgeries, for example, pyloric exclusion, which added morbidity and a longer hospital stay for patients [14]. Actually there are different management strategies to treat this condition including conservative management, endoscopic or surgical repair depending on factors like size, location, the viability of the walls if the perforation is contained, individual conditions of the patient [2,3,15,16].

In our case, open surgery was decided upon due to the unique characteristics of the injury, such as the findings of pneumoperitoneum, free perforation, and signs of peritoneal irritation. Additionally, the limitations of the laparoscopic retroperitoneal approach were considered, as there are few cases of retroperitoneal surgical conditions treated in our setting using minimally invasive surgery. The advantages of laparotomy in this case, laparotomy allowed adequate exposure of the duodenum, optimal cleaning of contamination in the peritoneal cavity, and adequate closure of the duodenal lesion.

4. Conclusion

Duodenal perforation secondary to trauma is a complex condition that can present in different scenarios and that can compromise the vital prognosis. Its surgical management has been controversial, with minimally invasive procedures being an optimal and effective alternative. Factors such as the nature of the trauma, involvement of other associated structures, and symptoms indicative of peritoneal irritation must be



Figs. 1–2. Images suggestive of continuity solution in the posterior wall of the third portion of the duodenal frame. Mild inflammatory changes were adjacent to the ascending colon, with extraluminal air.

taken into account, as was the case with our patient who underwent laparotomy due to signs of peritoneal irritation, in which a primary duodenal suture was performed in accordance with the global literature on duodenal traumas, adhering to the principle of “less is more” which enabled rapid recovery.

Consent

The patient voluntarily accepted the publication of his clinical case report, including the accompanying images, through verbal and written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Ethical approval

This case study was approved by the Medical Ethics Committee.

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Guarantor

Diana Camila Navarro-Pimiento.

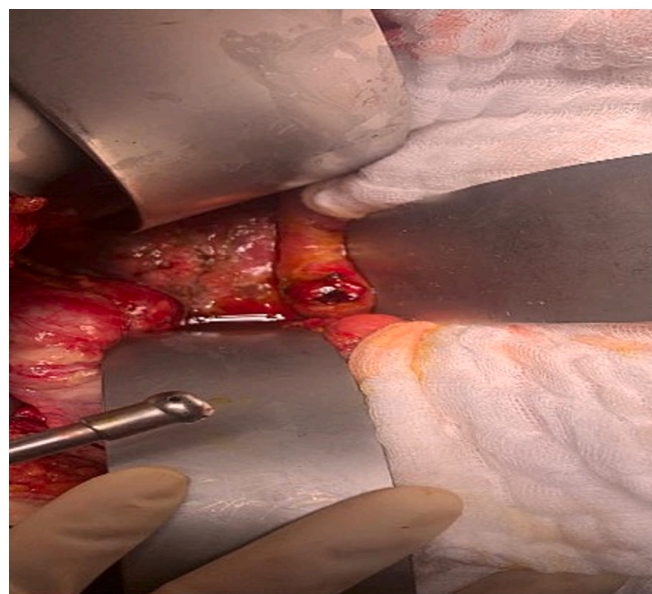


Fig. 4. Perforation of approximately 1 cm in diameter in the posterior face of the third part of the duodenum.

CRediT authorship contribution statement

Diana Camila Navarro-Pimiento substantial contributions to concept and design, acquisition of data, analysis and interpretation of data,

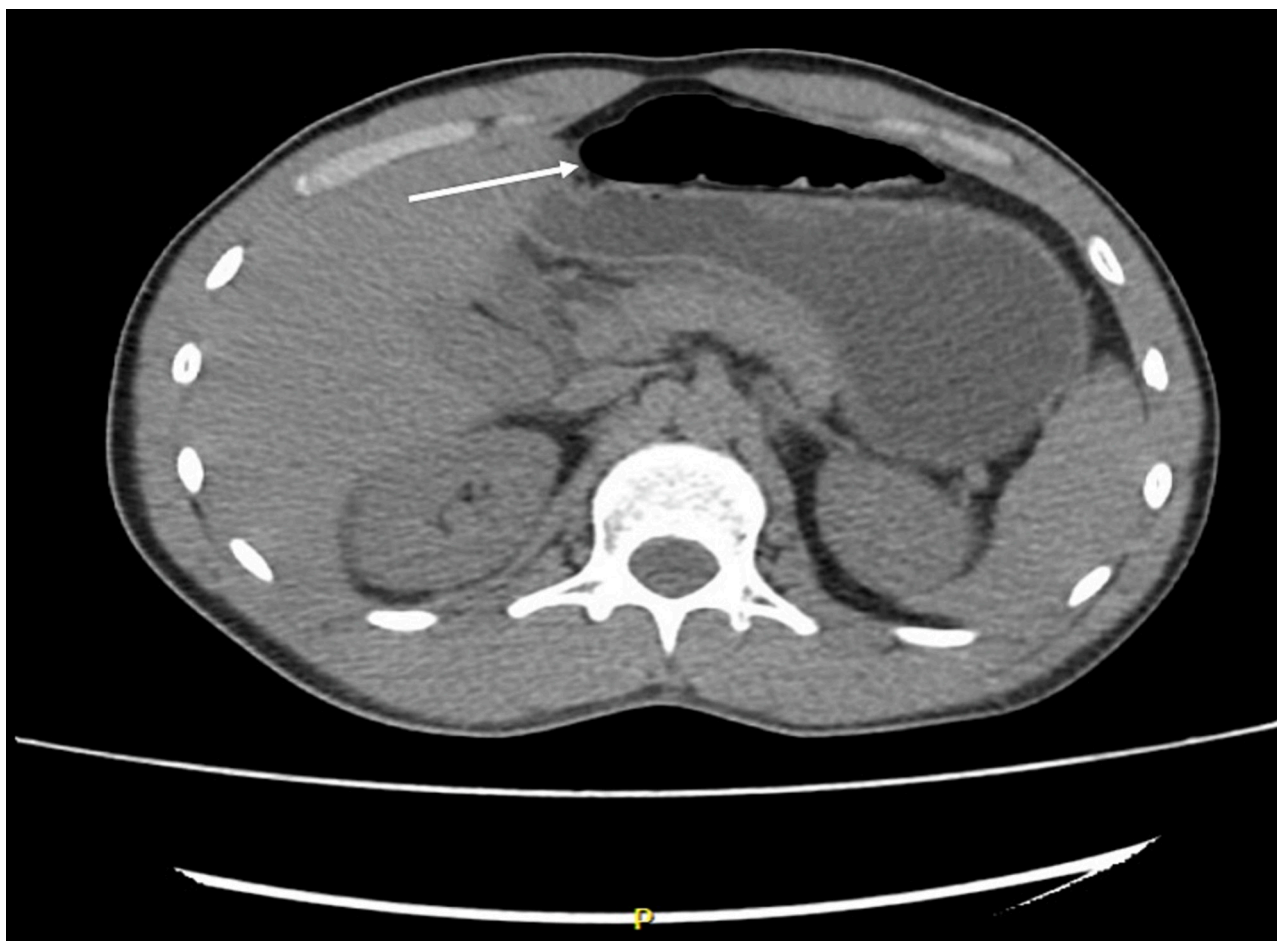


Fig. 3. Presence of retroperitoneum extending posteriorly, inferiorly, and right paramedian to the iliac region.

drafting the manuscript, revising manuscript critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work.

Rubén Daniel Luna-Álvarez substantial contributions to concept and design, acquisition of data, analysis and interpretation of data, drafting the manuscript, revising manuscript critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work.

Yuber Fabián Alarcón-Carvajal substantial contributions to concept and design, acquisition of data, analysis and interpretation of data, drafting the manuscript, revising manuscript critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work.

Angelica Johana Naranjo-Soler substantial contributions to concept and design, acquisition of data, analysis and interpretation of data, drafting the manuscript, revising manuscript critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work.

Declaration of competing interest

The authors have no conflict of interest to declare.

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