CASE REPORT

Medical Journal of Western Black Sea
Batı Karadeniz Tıp Dergisi

Med J West Black Sea 2024;8(1): 79-84
DOI: 10.29058/mjwbs.1364345

Duodenal Diverticulum Perforation: A Rare Case Report and Review of the Literature

Duodenal Divertikül Perforasyonu: Nadir Bir Olgu Sunumu ve Literatür İncelemesi

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Cite this article as: Yıldız EO and İlgün AS. Duodenal diverticulum perforation: A rare case report and review of the literature. Med J West Black Sea. 2024;8(1):79-84.

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Received
21.09.2023

Revision
01.01.2024-27.02.2024

Accepted
11.03.2024

ABSTRACT

Aim: Duodenal diverticulum is the second most common diverticulum section in the gastrointestinal system, but perforation is rare. It is frequently diagnosed incidentally and has little clinical evidence. There are no certain treatment strategies for duodenal diverticulum perforation.

Our aim is to identify perforated duodenal diverticulum cases published in the last 10 years through our case report and to evaluate different approaches to treatment.

Case Report: A 58-year-old male was diagnosed central nervous system (CNS) tumor with a perforated duodenal diverticulum. Our case presented with abdominal pain and pneumoperitoneum on imaging. The patient was treated surgically with an omental patch, pyloric exclusion, retrocolic gastrojejunostomy, and tube duodenostomy. The patient died on the 10th postoperative day.

Conclusion: Duodenal diverticulum perforation is a rare but fatal condition. CT is useful in diagnosis. If the patient is not in a septic condition, it can be followed conservatively. However, if the patient is in a septic condition, surgery may be required. Surgical options should be determined based on the perforation site and characteristics.

Keywords: Duodenum, perforation, duodenal diverticulum

ÖZ

Amaç: Duodenal divertikül gastrointestinal sistemde en sık görülen ikinci divertikül kesitidir ancak perforasyon nadirdir. Sıklıkla tesadüfen teşhis edilir ve çok az klinik kanıtı vardır. Duodenal divertikül perforasyonu için kesin bir tedavi stratejisi yoktur. Amacımız olgu sunumumuz aracılığıyla son 10 yılda yayınlanan perfore duodenal divertikül vakalarını tespit etmek ve farklı tedavi yaklaşımlarını değerlendirmektir.

Olgu Sunumu: Merkezi sinir sistemi (MSS) tümörü bulunan 58 yaşında bir erkek hastaya, perfore duodenal divertikülü tanısı konuldu. Hastanın karın ağrısı ve görüntülemede pnömoperitonyum mevcuttu. Hastaya omental yama, pilorun çıkarılması, retrokolik gastrojejunostomi ve tüp duodenostomi ile cerrahi olarak tedavi edildi. Hasta ameliyat sonrası 10. günde ex oldu.

Sonuç: Duodenal divertikül perforasyonu nadir fakat ölümcül bir durumdur. BT tanıda faydalıdır. Hastanın septik durumu yoksa konservatif olarak takip edilebilir. Ancak hastanın septik bir durumu varsa ameliyat gerekebilir. Perforasyon yerine ve özelliklerine göre cerrahi seçenekler belirlenmelidir.

Anahtar Sözcükler: Duodenum, perforasyon, duodenal divertikül

INTRODUCTION

The duodenum is the second most seen diverticulum site of the gastrointestinal system, following the large bowel. The duodenal diverticulum is usually acquired rather than congenital. While there is a lack of clinical evidence supporting the existence of a duodenal diverticulum, it is important to note that the diagnosis in radiological series reaches up to 5% and as high as 22% in endoscopic retrograde cholangiopancreatography (ERCP) series (1).

Patients with duodenal diverticulum present with acute abdominal pain with a rate of 5% due to inflammation, hemorrhage, obstruction, and perforation, posing a challenge in the differential diagnosis with perforated peptic ulcer, cholecystitis, or pancreatitis (1-4). Perforation of the duodenal diverticulum is a relatively uncommon condition that can occur spontaneously or as a result of iatrogenic injury, such as during procedures like ERCP-sphincterotomy, or due to abdominal trauma. The treatment strategy for duodenal diverticulum perforation is not well-defined with no specific consensus regarding approach. The management options typically range from conservative treatment, which involves supportive measures such as bowel rest, intravenous fluids, and antibiotics, to more extensive surgical interventions like the Whipple procedure (5).

We present duodenal diverticulum perforation in a patient with brain tumor and discuss strategies for the diagnosis and management of this unusual condition.

CASE REPORT

A 58-year-old patient was admitted to the emergency department with weakness in his left arm. He had no abdominal complaints and no significant medical history. He got the diagnosis of CNS tumor from his radiological imaging. In addition, the thoracoabdominal computed tomography revealed aerial images in adjacent to posterior part of head of the pancreas, which indicated the presence of a duodenal diverticulum in the second part of the duodenum. However, no evidence of perforation or inflammation was detected in the imaging findings. The patient was hospitalized and followed-up at the neurosurgery clinic due to CNS tumor. The patient was treated with anti-edema treatment including cortisol and mannitol with anti-epileptics were initiated. The patient suffered from abdominal pain that started 15 days after the hospitalization. His physical examination, revealed tenderness in the right upper quadrant and epigastric region with no signs of peritoneal irritation; associated with nausea but no vomiting. His vital signs showed an auricular temperature of 38°C, heart rate of 120/min and blood pressure of 90/50 mmHg. The blood tests showed 3800 white blood cells /μL (normal: <11000) with 94% neutrophils in the count (normal: <80%), C-reactive protein of 435 mg/L (normal: <5 mg/L) a normal lipase level, liver tests, and arterial blood gases. The computed tomography of the abdomen demonstrated moderate extra-luminal aerial images in the supero-posterior of the ascending colon (Figure 1-2).

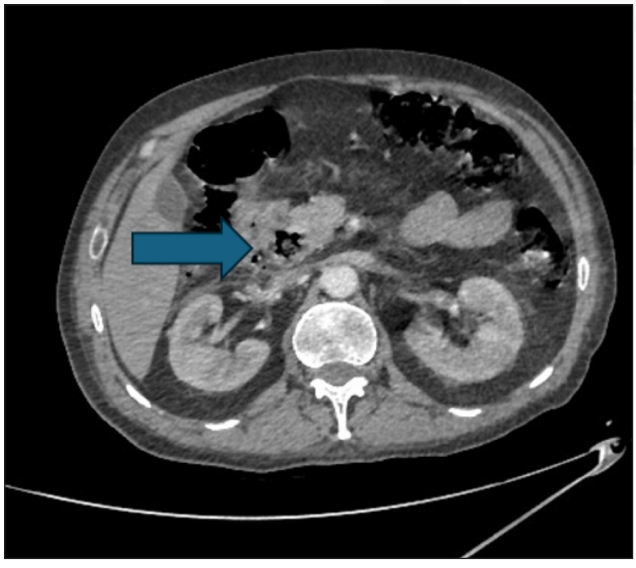

Figure 1: Axial computed tomographic image of extraluminal retroperitoneal air (Arrow).

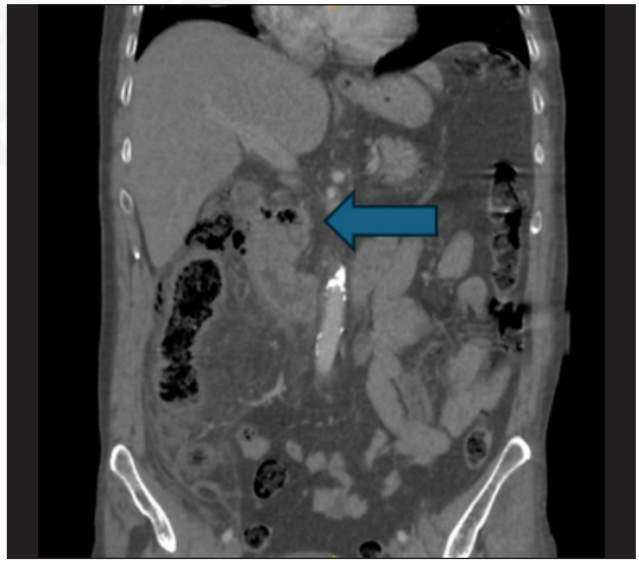

Figure 2: Coronal computed tomographic image of duodenal diverticulum (Arrow).

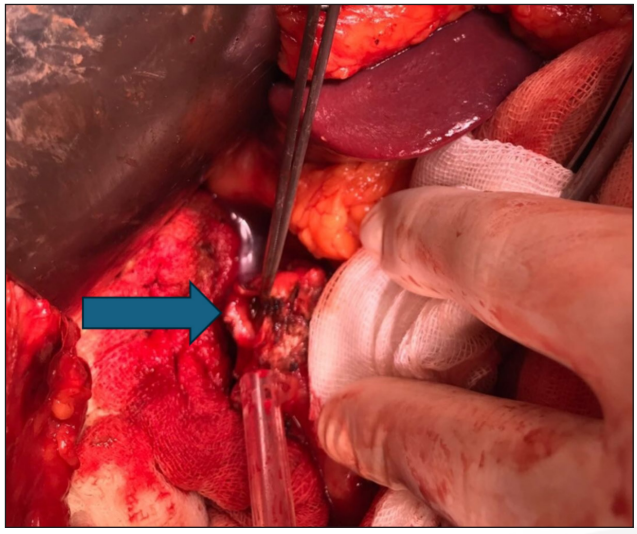

Figure 3: Perforated duodenum diverticulum (Arrow).

The patient underwent surgery with the diagnosis of GIS tract perforation. During the laparotomy, diverticular perforation was discovered along the lateral border of the second side of the duodenum, and there was generalised peritonitis (Figure 3). We carried out omental patching, pyloric exclusion and retrocolic gastrojejunostomy.

Postoperatively the patient was intubated in the intensive care unit and intravenous broad spectrum antibiotics were administered. Oral feeding was not started and was given intravenous total parenteral nutrition. The bile started to come out through the drain on the 8th postoperative day. In re-laparotomy, the gastroenterostomy anastomosis was found to be safe but there was extensive intraabdominal contamination due to the opening of the stitches placed in the perforation site. The gastroenterostomy anastomosis was found to be safe but the perforation area was open. With these findings, tube duodenostomy and Witzel jejunostomy were performed. The patient died on the 10th postoperative day as a result of multiorgan failure.

After the patient was diagnosed with duodenal diverticulum before the operation, consent was obtained for use in scientific research due to the rarity of this pathology.

DISCUSSION

Duodenal diverticulum perforation is a infrequent, possible mortal complication of duodenal diverticula. In the last 10 years, only 54 such cases have been reported in the literature. Information from each publication was extracted including; year of publication, author of publication, age and gender of patient, etiology, location of perforation, treatment and complications. The parts of the duodenum are; the first part of the duodenum (D1) is a continuation from the pylorus to transpyloric plane, the second part of the duodenum (D2) begins at the superior duodenal flexure, The third part of the duodenum (D3) begins at the inferior duodenal flexure, the fourth partof the duodenum (D4) passes upward, joining with the jejunum at the duodenojejunal flexure. The primary outcome measure was the proportion of patients who underwent and did not undergo surgery (4-36).

J. Chomel defined duodenum diverticula for the primarily in 1710 (37). Duodenal diverticula can be categorized as primary, which are congenital and involve all layers of the intestinal wall, including the serous, muscular, and mucosal layers. They are present from birth and considered developmental anomalies. On the other hand, secondary duodenal diverticula are acquired and typically involve the serous and mucosal layers. They develop due to a combination of increased intraluminal pressure and a defect in the duodenal wall. This can weaken the muscularis layer, leading to the herniation of the mucosa at specific sites. Pulsion diverticula are a result of a combination of increased intraluminal pressure and a defect in the duodenal wall. These diverticula form at sites where the muscularis layer of the duodenal wall is weak, often due to the passage of blood vessels, resulting herniation of the mucosa (38-40).

The prevalence of duodenal diverticulum perforation increases with age. The second and third portions are the most frequent duodenal diverticulum locations. The most common cause is diverticulitis (62%), other causes are iatrogenic perforation due to ERCP (5%) and trauma (4%). The highest reported rate of mortality is 34% and morbidity are 33%. Other diagnoses that come to mind; acute cholecystitis, acute pancreatitis, peptic ulcer disease, colitis, or retrocecal appendicitis. The diagnosis of perforated duodenal diverticulum is difficult due to the rarity of that pathology and the absence of early peritoneal signs due to its retroperitoneal localization. The most frequent The most frequent sign and symptoms at presentations are vomiting, right upper abdominal pain (98%) and nausea (34%). CT is the best imaging tool for diagnosis, demonstrating a thickened bowel wall, extraluminal retroperitoneal air and fluid. The duodenal perforation has traditionally been treat via surgery, on the other hand, conservative management might be a safe and raitonal option for patients without evidence of intraabdominal sepsis. (1-8). In 1963 Shackleton reported the first non operative treatment of a perforated duodenal diverticulum (41). Patients who are clinically steady without generalized peritonitis, who may be considered for nonoperative treatment, and can be operated electively. When there is no peritonitis, old age and presence of major comorbidities were key reasons underpinning the decision for nonoperative treatment. Nonoperative treatment includes bowel rest, nasogastric absorption, parenteral nutrition, intravenous antibiotic treatment, endoscopic depurating of the infected site and combined endoscopic and percutaneous drainage

of the retroperitoneal abscess (42,43). In 2012 literature review of 61 patients conducted by Thorson et al. reported 23% of conservative management turns out to be successful in 29% of cases without need for surgical intervention. (1)

Patients presenting with symptoms of peritoneal inflammation and intra-abdominal sepsis should undergo urgent surgery (44). Surgically, the following can be done; repairing perforation are simple repair (duodenorrhaphy), diverticulectomy, resection and anastomosis, repair and decompressive enterostomy, serosal or mucosal patch and pyloric exclusion or pancreaticoduodenectomy (3). The most important considerations regarding surcial decision making are the importance of tissue fragility, the place of the diverticulum, the period of up to diagnosis, and the length of the diverticular collar. In cases with restricted tissue friability, a basic diverticulectomy was shown to be an intervention for perforated diverticula site located in the D1, D3, D4, as well as diverticula in the second site which can be removed reliable, outside compromising the ampulla (45).

When the tissues have become friable, single or double wall closure may become complex, if this happens, more extensive surgery may be necessary. D3, D4 diverticulum is anatomically suitable for partial duodenectomy with end-to-end or end-to-side duodenojejunostomy (45). In the situation of D2 diverticula, the surgical treatment becomes more complicated, ranging from gastric diversion procedures to duodenopancreatectomy (Whipple) in cases when the periampullary region cannot be spared. For instance pyloric exclusion with Roux en- Y reconstruction, Billroth II or duodenostomy. Fujisaka et al. reported pyloric exclusion can be adequate and in difficult cases closure of the perforation can not always be compulsory (9). These are hazardous operations; should the patient become unstable, the surgeon can be left without any chance other than placing a retro-peritoneal drain and aborting surgery. Unluckily, certain knowledge relating to diverticular neck size and circumference was not reachable for most cases in the present series (45).

In our case, the patient was operated on in a septic condition, and wound healing was negatively affected due to the catabolic side effects of CNS tumor. As a result, omental patch leakage occurred at postoperative day 8 and the patient was lost.

Conclusion

Duodenal diverticulum perforation is a rare but fatal condition. CT is useful in differential diagnosis for ambiguous cases. For patients without septic features, conservative management would help, however, surgery becomes the only option if septic signs and symptoms develop. The choice of treatment approach depends on the individual case's condition and decision should be made in case-by case manner. The strict monitorization of patient's clinical course is crucial to determine the appropriate course of action. Surgical options should be determined based on the perforation site, characteristics and time period up to diagnosis.

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Acknowledgment

None.

Author Contributions

Both authors have equal contributions

Conflicts of Interest

We have no conflict of interest.

Financial Support

None.

Ethical Approval and Consent

Ethics committee approval was not received for the case report. After the patient was diagnosed with duodenal diverticulum before the operation, consent was obtained for use in scientific research due to the rarity of this pathology.

Review Process

Extremely peer-reviewed and accepted.

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