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Rare Cause of Peritonitis - Perforated Duodenum Diverticulum

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ABSTRACT

Introduction: Perforated duodenum diverticulum is a rare, but life-threatening condition, and there are not well-established guidelines in the management of this disease. Worldwide, there are less than 200 reported cases of perforated duodenum diverticulum and its management has changed from immediate surgery to conservative treatment, in selected cases.
Case report: We present a case of a female patient treated in our department for duodenal (D2) diverticulum perforation. A diverticulectomy and duodenal suture with omental flap was performed, the patient had a favorable postoperative course, and she was discharged on the 7th day.
Discussions: Prevalence of duodenum diverticulum can be as high as 22%. Complications are rare and include inflammation, jaundice, pain, hemorrhage, or perforation. The symptoms and signs of perforation are not specific. In selected cases non-operative treatment was also used, but the standard management consists of surgery (diverticulectomy, duodenopancreatectomy).
Conclusions: When peritoneal irritation and generalized abdominal symptoms are present, surgery remains the elective treatment modality for perforated duodenum diverticulum.
Key words: perforated duodenum diverticulum, diverticulectomy, duodenopancreatectomy

INTRODUCTION

The duodenum is a common site for diverticula formation. Based on cadaveric studies, the prevalence of duodenal diverticula is estimated at 22% of the population, and this percentage increases with age, without differences being observed between the sexes. Most duodenal diverticula are asymptomatic and are discovered accidentally during investigations, such as upper digestive endoscopy or imaging investigations. 1-5% of duodenal diverticula present symptoms during life: pain, hemorrhage, inflammation, jaundice, cholangitis or perforation. Duodenal diverticulum perforation is a rare, but potentially fatal complication for the patient. In these cases, the treatment of choice is surgical intervention (1,2,3).

Perforation of the duodenal diverticulum is the rarest, but also the most severe complication, with an increased mortality rate: 3-30%. Until 2012, a total of 162 cases were reported worldwide (4,5,6).

Due to the low prevalence of perforation, it is often omitted in the diag-

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nostic process, and its symptoms are confused with another cause of acute abdomen. In some selected cases, the treatment can be non-surgical, or we can talk about a double surgical and endoscopic approach (5,7,8).

CASE REPORT

We present the case of a 82 years old female patient known to have essential arterial hypertension under treatment, varicose veins of the lower limb, kidney stones, osteoporosis, and nodules of the thyroid gland. She presented at the Emergency Department with a 5-hour history of epigastric pain and abdominal flatulence. The patient's blood pressure was 171/81 mmHg, pulse was 87 and saturation 97%. On physical examination abdominal distension and diffuse abdominal pain were revealed, with signs of peritoneal irritation. The lab test results showed a mildly increased white blood cell level. *Table 1* shows the results of the blood tests.

Table 1 - Initial blood test

Blood test	Results
Hemoglobin	11.9 g/dL
Hematocrit	37.2%
White blood cells	15.0 10^3/uL
Neutrophils	92.6%
Lymphocytes	1.63%
Monocytes	5.11%
Eosinophils	0.038%
Basophils	0.00%
Platelets	252.000/mm³
Amylase	154 U/L
Urea	47.08 mg/dL
Creatinine	0.87 mg/dL
Glucose	110 mg/dL
SGPT	10 U/L
SGOT	25 U/L
INR	1.04
Sodium	140 mmol/L
Kalium	4.92 mmol/L

Abbreviations: SGPT - serum glutamic pyruvic transaminase, SGOT - serum glutamic oxaloacetic transaminase, INR - international normalizes ratio

The abdominal and pelvic computed tomography showed a small amount of pneumoperitoneum around the gall bladder and on the side of duodenum, a thin blade of liquid around the liver and the right colon, and a few hydro aerial levels on the ileum and the coecum (*fig. 1*).

The preliminary diagnosis was perforated duodenal ulcer and we decided to do a laparotomy. After opening the peritoneum free liquid and peritoneal soiling were found, but without a perforated duodenal or gastric ulcer. We decided to insert methylene blue substance on the naso-gastric tube and examine the duodenum (*fig. 2*). After performing the Kocher maneuver, a perforated duodenum diverticulum was identified, at level D2, which measured around 3x3 cm (*fig. 3*).

The decision of manual diverticulectomy and duodenal suture, with omental flap was made (*fig. 4*). A drain tube was inserted around the duodenal suture and another drain in the rectouterine pouch.

Figure 1 - Abdominal CT scan: pneumoperitoneum on the side of duodenum (marked with errow)

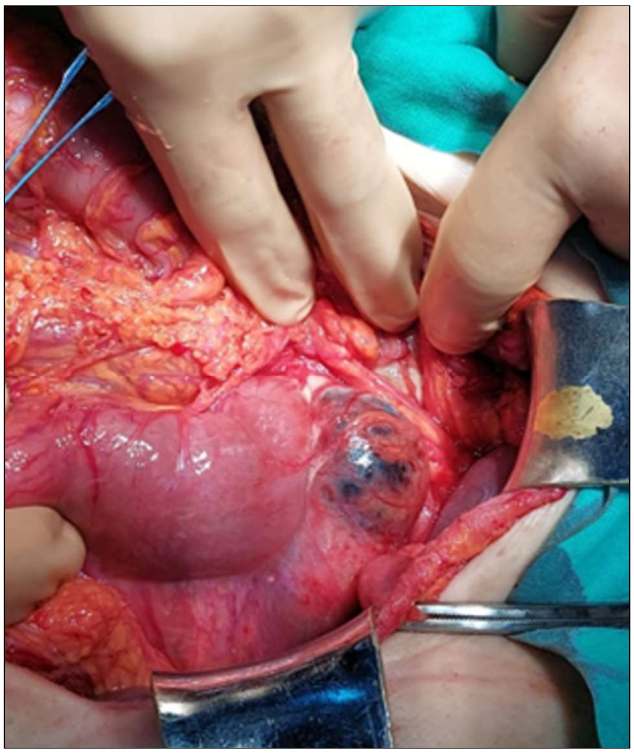

Figure 2 - The methylene blue substance externalized in the retroperitoneal space

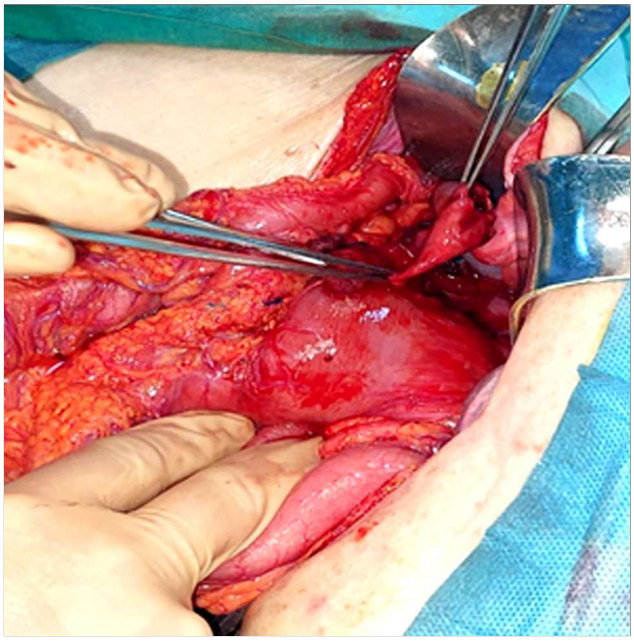

Figure 3 - Duodenum (D2) diverticulum

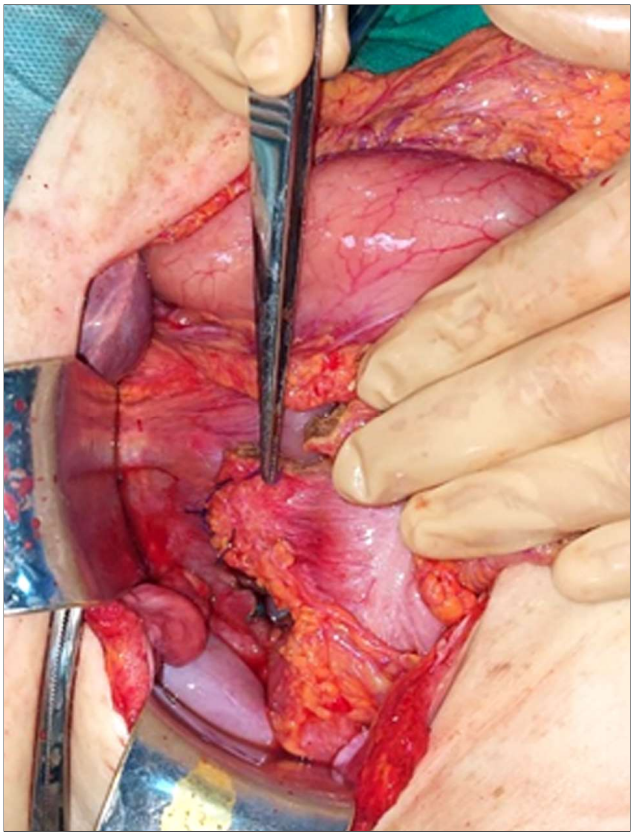

Figure 4 - Duodenal suture with omental flap

The naso-gastric tube was removed on the 4th post-operative day. The postoperative period was uneventful, the patient was discharged on the 7th day.

DISCUSSIONS

The duodenum is described as the second most common location for diverticula, followed by the colon. As far as the duodenum is concerned, the most frequent diverticula are localized in the second segment (D2), on the medial wall, around the ampulla of Vater. Their prevalence increases with age and no gender differences have been described. 85-90% of diverticula are solitary. Based on the described cases, the most common causes of perforation are diverticulitis (62%), enterolithiasis (10%), iatrogenic cause (5%), ulceration (5%), trauma (4%) and foreign body.

Regarding symptomatology, it is usually not pathognomonic. In most cases, the patient goes to the doctor because of abdominal pain. If it is an intra-peritoneal perforation, the pain will be in the epigastrium or in the right hypochondrium, but some patients may complain of back pain, especially if the perforation is retroperitoneal. Other possible symptoms can be fever, nausea, vomiting. In some cases, patients may report the presence of some signs and symptoms related to the presence of a duodenal diverticulum, for a longer period before the acute episode, such as weight loss, jaundice, or a feeling of satiety (9).

Symptoms can easily be attributed to other causes of acute abdomen, such as cholecystitis, biliary or pancreatic obstruction, pancreatitis, peptic ulcer, retro-cecal appendicitis, neoplasia, pancreatic pseudocyst, or colitis. Practically, it is impossible to differentiate pre-operatively between a duodenal ulcer and a perforated duodenal diverticulum, although the ulcer usually affects the bulb, and the diverticulum occurs more often in the second part of the duodenum (10).

In the diagnostic process, laboratory investigations are suggestive, but non-specific. Usually, the number of leukocytes increases, with neutrophilia. The level of inflammatory markers can help us in the positive diagnosis of the perforation, respectively in the post-operative follow-up.

Imaging investigations are necessary in the diagnostic process of patients with acute abdomen, and they can help us establish the indication for emergency surgical intervention. Native abdominal radiography and abdominal ultrasound can highlight the presence of free air in the subdiaphragmatic region in only 10% of cases. The most important imaging investigation in the case of perforation of the duodenal diverticulum is the abdominal CT, which can reveal small amounts of air or liquid in the abdominal

cavity, thinning of the intestinal walls, fatty infiltration, or the presence of abscesses, all of which may be present in the case of perforation of the duodenal diverticulum (1,12).

Until recently, the only treatment option in the case of perforation was surgical intervention, due to the high mortality rate. Several types of surgical interventions have been described, depending on the severity of the situation, respectively the location of the diverticulum and the perforation: diverticulectomy with mechanical or manual suture, in a single plane or double plane, with or without the use of omental flap, segmental and duodenal duodenectomy - jejunostomy, duodenal occlusion and biliary diversion, Whipple procedure with preservation of the pylorus (11).

The procedure chosen by us, diverticulectomy with double plan suture, can also have complications: damage to the common bile duct, the common pancreatic duct, duodenal fistula, sepsis, intra-abdominal abscess, or pancreatitis (12).

Being a rare complication, no conclusions can be drawn regarding the advantages or disadvantages of one surgical procedure, compared to others, and no consensus can be reached regarding surgical treatment. However, studying the literature and the meta-analyses done on this topic, one can observe a tendency towards conservative treatment, in well-selected cases. Kapp et al developed an algorithm, based on their study, which can be used in clinical practice, in the classification and stratification of the optimal treatment of patients with perforated duodenal diverticulum (5).

To summarize, the perforation of a duodenal diverticulum is a serious, potentially fatal complication. In the diagnostic process and treatment planning, the most important investigation is the abdominal CT with oral or intravenous contrast. In cases with signs and symptoms of peritonitis or pneumoperitoneum, the treatment of choice remains surgical intervention. A patient with a small perforation, located retro-peritoneally, with the local formation of a small abscess, without significant comorbidities or signs of septicemia, may be a candidate for conservative management. The treatment method must be individualized and chosen not only according to the listed criteria, but also according to the equipment of the health unit, respectively the experience of the surgeon and the presence of an interventional radiologist.

CONCLUSIONS

As numerous other studies conclude, it would be necessary to create a classification of perforation of the duodenal diverticulum, depending on the severity, to help the clinician in choosing the correct treatment method.

Conflict of interests

The authors declare no conflict of interest.

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Ethical statement

Written informed consent was obtained from the patient of this case report.

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