

# Perforated jejuneal diverticulosis.

## Case report and review of literature



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### Perforated jejunal diverticulosis. Case report and review of the literature

*Acquired (non-Meckel's) jejunoileal diverticulosis is an uncommon disease, generally characterised by vague and unspecific symptoms. This rare condition is mainly expressed as acute complications: gastrointestinal haemorrhage, mechanic obstruction of the small intestine or perforated diverticulum, requiring urgent surgical intervention.*

*The authors report a case of this unusual clinical occurrence characterized by a picture of abdominal pain due to perforation of jejuneal diverticulum. The final etiological diagnosis was possible only during surgery.*

KEY WORDS: Acute abdomen, Diverticulosis, Jejunoileal diverticulitis, Perforation, Small Bowel.

### Introduction

Acquired diverticula of the small intestine are rare and, in most patients, asymptomatic. They may come to the doctor's attention incidentally, during radiographic examination or under a laparotomy performed for other reasons, or they may cause vague and unspecific chronic symptoms, or acute symptoms due to the occurrence of complications, such as intestinal occlusion, haemorrhage or perforation. The diagnosis is generally given during surgery. The aim of this work is to describe a case of jejunal diverticulosis complicated by the perforation of the diverticulum and review the literature on the subject, in order to draw up a set of treatment guidelines.

### Case Report

C.N., a 68 year-old-man, with a negative medical record for other diseases, came to our observation at the II level Emergency Department of the Umberto I General Hospital in Rome, for the sudden appearance, 24 hours before observation, of piercing pains in the epigastric region in the immediate postprandial period. The pains

were associated with nausea and a low fever (T 37.4°C). During the objective examination, the patient proved moderately in pain and dehydrated. Arterial pressure was 120/80 mmHg and pulse rate was 72 pulses/minute. The abdomen was altogether unstrained, it was treatable and tender on the right quadrants; Blumberg sign was negative; upon percussion tympanites had significantly increased; peristalsis was present. Rectal exploration detected the presence of normally shaped faeces in the rectal ampulla and non-tenderness of the Douglas.

The direct X-ray examination of the abdomen upon admission in the Emergency Unit reported the presence of two small air-fluid levels within the ileum and faecal encumbrance of the large intestine. The values reported in the hemato-chemical examination were normal, while the haemachrome revealed the presence of neutrophil leucocytosis (WBC 14.700/mm<sup>3</sup>; neutrophils 86,2%).

The patient was therefore admitted for observation and underwent medical therapy including phleboclysis and antibiotics. The following morning the patient's conditions and local abdominal state were unchanged compared to when admitted in the Emergency Unit, while the haemachrome revealed a fall of the leucocytosis (WBC 11.100/mm<sup>3</sup>; neutrophils 86,3%).

The patient underwent a new direct X-ray examination of the abdomen about 18 hours after the first one, revealing the presence of a thin stratum of loose air in the right subdiaphragmatic side, the presence of a few air-fluid levels in the small intestine and a patch of inhomogeneous adipose tissue located caudad to the transverse colon, resulting from an inflammatory reaction.

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The patient was therefore proposed for explorative laparotomy surgery. After opening the peritoneum, about 300 cc. of loose corpuscular material was removed from the abdomen. There were numerous loose adhesion bands in the first jejunal loop, where a few large diverticular formations on broad implantation basis were present, the largest with a 3.5 cm diameter, disseminated over an approx. 40 cm tract (Fig. 1, 2). Several of these formations were inflamed and congested and one of them was perforated on the apex. An intestinal resection was performed, including all the diverticular formations, restoring the continuity of the intestine with an end-to-end enteroenterostomy. The histological examination confirmed the presence of multiple diverticula on the jejunal mucous membrane, with a picture of acute rectal peritonitis. The patient was discharged on the eighth day after surgery in good general conditions.

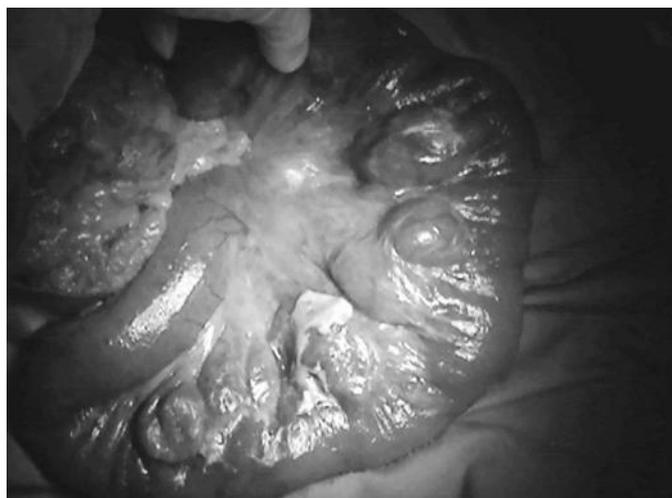


Fig. 1: Large diverticular formations of first and second jejunal ansa disseminated over a 40 cm tract.



Fig. 2: One jejunal's diverticulum was perforated on the apex.

## Discussion

Congenital diverticula of the small intestine represent an anomaly similar to other intestinal duplications (like Meckel's diverticulum, the most common). They are real diverticula, in the sense that they comprise all the tunica of the intestinal wall. They are generally solitary and, as a rule, they are placed on the ante-mesenteric edge of the intestinal segment. They can turn symptomatic even at a very young age.

Acquired diverticula, on the contrary, are pseudo-diverticula. They develop within the mesenteric membrane in the small intestine. About two-thirds of acquired jejunoileal diverticula are multiple. Diverticula occur five to eight times more often in the jejunum than in the ileum. Small intestine diverticulosis has the lowest diverticulosis impact in the gastrointestinal tract; however, associated diverticula are found in the colon in 35% to 75% of cases, in the duodenum in 15% to 42%, in the oesophagus in 2%, in the stomach in 2%, and in the urinary bladder in 12% of cases<sup>1</sup>. In addition, the association of small bowel diverticulosis with rheumatic arthritis, ulcerative colitis, myxoedema thyroiditis and peripheral neuropathy has been described<sup>2</sup>.

The first description of diverticula in the small intestine found in literature dates back to 1794, to the work of Soemmering and Baillie. In 1804, Sir Ashley Cooper reported finding diverticula of the small intestine during the post-mortem examination of a 50-year-old man who died from cirrhosis of the liver. Gordinier and Sampson were the first to discover them during surgery, while the most ancient radiological evidence of diverticula of the small intestine dates back to 1920, thanks to James T. Case, who published a survey on 6,847 patients who underwent radiological examination for gastrointestinal pathologies after eating a barium treated meal, highlighting 4 cases of jejunal diverticula and 1 with jejunum and ileum diverticula<sup>2</sup>.

Small intestine diverticulosis is rare, its impact is estimated as being between 0,5 and 2,3% of small intestine contrast graphic examinations and between 0,3 and 4,5% of post-mortem examinations. A male-female ratio ranging from 2:1 to 1:2 has been reported in different studies<sup>1</sup>. Most cases of jejunal diverticula occur during the 6<sup>th</sup> to 7<sup>th</sup> decades.

The most broadly accepted etiopathogenetic theory is the "locus minoris resistentiae" formulated by Edwards. He observed that nearly all the diverticula developed on the mesenteric side of the small intestine, where the vasa recta perforate the muscolaris mucosae. As a matter of fact, among all the cases examined, only one patient had a diverticulum on the anti-mesenteric side of the wall, and in this particular case the location of the diverticulum coincided with the place where an unusual large arterial ramus penetrated the intestinal wall. This theory is exemplified by the fact that these lesions are most frequently found in the proximal jejunum and distal

ileum, where the vasa recta of greatest diameter lie. Edwards suggested that an irregular or hyperactive peristalsis provoke the protrusion of the mucous membrane through these weak areas, leading to the formation of pseudo-diverticula. Some authors suggest that obesity, venous stasis, or constipation increase the intra-luminal pressure and may lead to the formation of diverticula. Krishnamurthy, on the contrary, suggests that this pathology is mainly due to a visceral myopathy, caused by a functional and structural abnormality of the smooth muscle. The disorderly peristaltic contractions produced determine the development of intra-luminal pressure that causes the protrusion of the mucous membrane through these vascular defects in the intestinal wall<sup>3</sup>. Manometer analysis revealed anomalies in the inter-digestive motor complex in subjects with jejunoileal diverticulosis: some patients are proved to have spasm-like contractions during phase II, leading to increase in intraluminal pressure or lower number of phase III<sup>4</sup>.

Most patients with the jejunoileal diverticular disease are asymptomatic. Only 20-30% of patients with small intestine diverticulosis presents any symptoms and, generally, symptoms are vague and atypical. The triad of chronic symptoms, including intermittent abdominal pain and flatulence, anaemia and dilated bowel loops on barium X-rays is suggestive of jejunoileal diverticulosis<sup>5</sup>. Besides this uncharacteristic clinical picture, we should mention malabsorption, due to the interference with normal peristalsis and the adequate propulsion of intestinal contents along the bowel. The consequent stanching determines a proliferation of bacterial flora in the lumen of the diverticulum, especially of aerobic germs (*E. Coli* in particular). This is the cause of the deconjugation of biliary acids in the intra-luminal zone, and consequent non-absorption of liposoluble vitamins and fats, which therefore create a clinical picture of steatorrhea and macrocytic anaemia, due to the deficit of vitamin B12, accompanied or not by neuropathies<sup>6</sup>. This malabsorption syndrome requires the oral administration of an antibiotic therapy, usually tetracycline or metronidazole, and the parenteral administration of vitamin B12. Additionally, a high-protein, low-residue diet with vitamin supplements is recommended. The reappearance of the symptoms after a short time may require long-term antibiotic prophylaxis. Surgery, in these cases, should be limited to those very rare cases of chronic symptomatology, with no reaction to medical treatment, with a clinical picture of severe malnutrition<sup>7</sup>.

Only 5-10% of the cases reveal an evident symptomatology, due to the appearance of acute complications: haemorrhage, obstruction and perforation.

*Haemorrhage* has been attributed to diverticulitis with ulceration, diverticulosis associated with trauma and irritation, and congenital arteriovenous malformations<sup>8</sup>. Gastric heterotopy of diverticula's mucosa has been described, as compared with the Meckel's diverticulum. It may lead to acute or chronic intestinal haemorrhage<sup>2</sup>.

Most of the patients reach clinical observation due to hematochezia, but also cases of melena and/or hematemesis. An haemorrhage is estimated to develop in 5% cases of pseudo-diverticulosis. Just as for many cases of acute gastrointestinal bleeding, the pre-surgical diagnosis may not be easy, since the picture is often confused due to the disease's frequent association with colon diverticulosis. The bleeding, which is generally not identified by endoscopic examinations, may be identified by an angiography showing blood in the diverticulum. Because of its frequent recurrence, surgical resection represents the best treatment. The suggested procedure is exploration, resection of the segment involved, and primary anastomosis.

*Intestinal obstruction* may be the consequence of the strangulating of an ansa on the inflammatory band due to peridiverticulitis, of the formation of a volvulus on the adhesional band, of the intussusception of a diverticulum, of a volvulus of a large diverticulum full of food waste or parasites, of the endoluminal stoppage of a large enterolith produced within the diverticulum and later migrating into the intestinal lumen<sup>6</sup>. Surgical treatment is obviously required. Other cases described include chronic mechanical sub-occlusions supported by the formation of chronic inflammatory caused pseudo-tumours. Obstruction may also be a non-mechanical problem deriving from dyskinesia. Peristaltic activity of the small bowel may become uncoordinated and inadequate. Metoclopramide was suggested in an attempt to enhance peristalsis in the treatment of pseudo-obstructions.

*Perforation* may clinically simulate other acute intra-peritoneal conditions, such as a perforated ulcer, pancreatitis, appendicitis, cholecystitis or sigmoid diverticulitis. It is rare for the diagnosis of a perforated diverticulum to be made prior to surgical intervention. Generally a direct abdominal X-ray reveals the presence of a pneumoperitoneum and the diagnosis is made directly in the operating theatre by means of an explorative laparotomy, as in the case reported by the authors. However, pneumoperitoneum without perforation and peritonitis are well-documented complications of small bowel diverticulosis<sup>1</sup>, which is an asymptomatic condition due to the transmural passage of air through thin-walled diverticula, that can be treated non-surgically. There are rare cases in literature of pre-surgery diagnosis of perforated jejunal diverticula, based only on CT reports, or diagnosis by means of a laparoscopic approach<sup>9,10</sup>. Acute necrotizing inflammatory reactions are the most common causes of perforation (82%), other causes are blunt trauma to the abdominal wall (12%) and foreign body impaction in a diverticulum (6%)<sup>11</sup>. In rare cases the perforation of an ileal diverticulum presents itself with a bladder or jejunum fistula, or a picture of an inflammatory mass in the right lower quadrant, simulating the presence of appendicitis or Crohn's disease in the ileum under CT or laparotomy. Therapy is essentially surgical, through intestinal or ileocaecal resection, depending on the loca-

tion of the perforated diverticulum, and recovery of the intestinal continuity with end-to-end enteroenterostomy. Diverticulectomy is not an appropriate option due to the high recurrence of site break-downs and subsequent infections. Another approach that should be avoided is the plain intromflexion of the diverticular sack, since it presents a fair amount of complications such as ulcerations, haemorrhages and mechanical intestine occlusions due to invagination.

When asymptomatic small bowel diverticula are discovered incidentally by X-ray studies or surgery, no surgical treatment is indicated. In the case of incidental detection of small bowel dilated hypertrophied loops with large diverticula, Altemeier suggests the resection of the intestinal segment involved, since it would represent a progressive form of the disease.

### Riassunto

La diverticolosi acquisita digiunoileale è una non comune malattia, caratterizzata generalmente da vaghi e non specifici sintomi.

Questa rara condizione è espressa principalmente da severe complicazioni: emorragia gastrointestinale, ostruzione meccanica dello *small intestine* o da diverticoli perforati, e richiede un urgente intervento.

Gli AA riportano un caso caratterizzato da un quadro di dolore addominale dovuto alla perforazione di un diverticolo del digiuno. La diagnosi eziologica finale è stata possibile solo durante l'intervento chirurgico.

### Conclusions

Diverticula of the small intestine are quite an infrequent pathology, sometimes reported incidentally during X-ray examinations or under surgical abdominal interventions performed for other reasons. The majority of patients with jejunoileal diverticula do not require surgical management.

The scarce specificity of X-ray examinations, that may prove the presence of air-fluid levels in case of direct X-ray examination, or canalization trouble in case of intestinal transit, gives surgery performed for complicated diverticulosis both a diagnostic and therapeutic significance. Current laparoscopic techniques make this procedure well suited for both diagnosis and treatment of jejunoileal

diverticula<sup>13</sup>. Medical therapy is helpful in controlling diarrhoea and anaemia, while surgical therapy is reserved for acute complications (haemorrhage, obstruction and perforation), or in case of severe malnutrition and failure of medical treatment. In the case of surgical therapy, resection and primary anastomosis are the preferred treatment. Diverticulectomy is not an appropriate option, due to the high recurrence of site break-downs and subsequent infections, while the plain intromflexion of the diverticular sack exposes the patient to a fair amount of complications such as ulcerations, haemorrhages and mechanical intestine occlusions due to invagination.

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