

**Review Article**

# Jejunal Diverticulosis Is a Rather Difficult Diagnosis: Report of a Case and Review of the Literature

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**Abstract:** Jejunal diverticulosis is most commonly an incidental intraoperative finding, while rarely can be a clinical diagnosis as demonstrated in our case and on published articles in the literature. Besides the rarity of the disease, a second factor that incommodes the preoperative diagnosis is the vague symptomatology. The case of a 72-year-old male patient is described, who was complaining for mild intensity abdominal pain, with no other specific symptoms. A leucocytosis of  $12.500/\text{mm}^3$  was revealed, with all other laboratory tests being within normal limits. CT scan showed bubbles of free air in abdominal cavity and the decision for surgical exploration was taken. In the operating room multiple large diverticula were found along the jejunum without obvious perforation. A resection of 105 cm of jejunum was performed. Patient's postoperative recovery was uneventful and two years later he does not complain of any abdominal symptoms. Postoperatively an expert radiologist was asked to read and explain the preoperative CT scan. Radiologist's diagnosis was that the patient had either multiple jejunal diverticula or trapped free air in peritoneal cavity. Consequently, the preoperative diagnosis is feasible with a prompt cooperation between surgeon and radiologist and a better interpretation of CT scan findings from the radiologist.

**Keywords:** Jejunum, Diverticula, Jejunal Diverticulosis, Acute Abdomen, Free Air

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## 1. Introduction

Small bowel diverticula are sac like protrusions of the bowel wall consisted of mucosal, submucosal and serosa without muscularis layer [1]. It's a rare disease [2] with an unknown incidence and prevalence and non-specific clinical presentation. The most common symptom is chronic mild abdominal pain and discomfort [3]. Malabsorption and anemia are even rarer manifestations of the disease [4]. In the case of complicated diverticula symptoms depend on specific complications. Hemorrhage, perforation, acute diverticulitis and intestinal obstruction could be fatal complications [5]. A case of a 72-year-old man is described, with uncomplicated diverticula of the jejunum and multiple visits in the emergency department, due to mild abdominal pain.

## 2. Case Report

### 2.1. Initial Admissions

#### 2.1.1. Clinical Signs and Symptoms

A 72-year-old man presented to the emergency department complaining for chronic abdominal pain that had been worsened the last two days. He was also suffering from nausea, flatulence and one vomit for the last few hours. A 4-year medical history was mentioned, with intermittent abdominal pain localized mainly to the epigastrium and left upper abdominal quadrant, while the patient made six emergency department visits in the previous five months, while in two of the visits he was admitted to the hospital for a few days each time.

### 2.1.2. Management

The main findings on the first and second admission were acute abdominal pain with free bubbles of air in the abdominal cavity, revealed on CT scan. The patient was conservatively treated, with intravenously liquids and antibiotics, due to ambiguous findings on physical examination and almost normal laboratory tests. A mild Leukocytosis of about  $12.500/\text{mm}^3$  was the only abnormal finding in both admissions, while his temperature was normal.

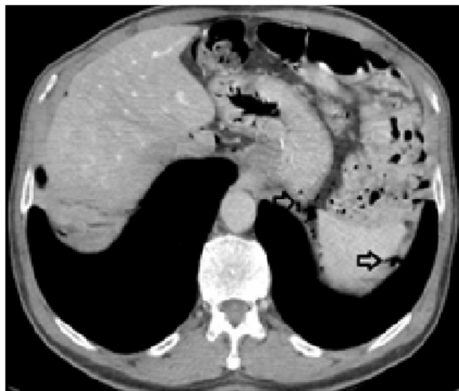
## 2.2. Last Admission

### 2.2.1. Clinical Signs and Symptoms

During his last visit the patient presented with tachycardia, abdominal tenderness, distention, nausea and one vomit, without fever. On physical examination his abdomen was tender, mainly on left upper quadrant, without muscular guarding or rebound and rectal examination did not reveal any abnormal findings. Laboratory tests were within normal limits except of WBC  $15.700/\text{mm}^3$  and C-reactive protein  $5.2\text{mg/dl}$ .

### 2.2.2. Management

A plain abdominal X-ray showed multiple air-fluid levels indicating a small bowel ileus. CT scan showed, again, free air and bubbles of free air and mild distention of the jejunum, without leakage of contrast material in abdominal cavity "Figure 1" and "Figure 2". The patient was admitted in the hospital and due to the fact of recurrent episodes of abdominal pain the decision for laparoscopic exploration was taken.



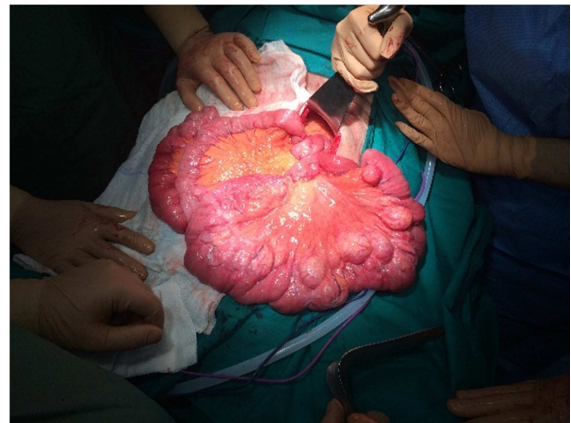
**Figure 1.** Free air around the spleen (arrows).



**Figure 2.** Bubbles of free air (arrow).

### 2.2.3. Operation

During laparoscopy multiple large diverticula were found along the mesenteric border of the jejunum, starting 10cm distally to ligament of Treitz, without obvious perforation. The absence of perforation could not explain the presence of free intra-abdominal air, shown up on CT exploration "Figure 3". Even after laparotomy, no clear site of perforation in a diverticula or other hollow viscous was found. No other pathology was inspected from the rest viscera or solid organs of the abdomen. A resection of 105 cm of jejunum with a side to side anastomosis was performed "Figure 4". Patient's postoperative recovery was uneventful and he left the hospital on the 4<sup>th</sup> postoperative day. He is quite well two years after the operation without abdominal symptoms.



**Figure 3.** Jejunal diverticula intraoperatively.



**Figure 4.** Surgical specimen of the jejunum (105 cm).

### 2.2.4. Consultation with Radiologist

Postoperatively an expert radiologist, with 22 years of experience, was asked to read and explain again the preoperative CT scan. After discussion for patient's history, symptoms, signs and clinical findings, without any discussion about surgical findings, radiologist's opinion was that the bubbles of free air could represent either trapped free air or multiple jejunal diverticula. This radiological diagnosis was done for the first time.

**Table 1.** Symptoms' duration and CT interpretation in patients with confirmed jejunal diverticulosis, mentioned by several authors.

Authors	Symptoms duration	Number of patients	CT interpretation	Final diagnosis
Kowalski G., Wiad Lek. 2017;70(6 pt 1):1146-1150.	6 months	1	Not performed	Intraoperatively
Rafik Ghrissi, Journal of Surgical Case Reports, 2016, vol. 2, 1–3	1 year	1	Not performed	Intraoperatively
Ina Jochmans MD PhD, The New England Journal of Medicine, 2016, vol. 375:e2	2 years	1	Not diagnostic	Intraoperatively
Jae Young Kwak, Annals of Surgical Treatment and Research, 2016, 90(6): 346–349.	10 years	1	Correct diagnosis	Intraoperatively
Patrick Teoule, Frontiers in Surgery, 2015, vol2, article 57	No information	10	Not diagnostic in 8 out of 10 patients	intraoperatively
Carolyn Hanna, Gastroenterology Report, 2016, vol 4, issue 4, 337-340	3 years	1	Not diagnostic	Intraoperatively
Giannopoulos P, Journal of Medical Cases, 2013, 439-442	Several years	1	Not performed	Intraoperatively
Fintelmann F., American Journal of Roentgenology, 2008, vol. 190 (5), 1286-1290	No information	28	Not diagnostic in 26 out of 28 patients, from the radiologists in charge	Barium study
Jordan Grubbs, International Journal of Surgery Case Reports, 2017, vol 40, 77-79	3 weeks	1	Not diagnostic	Intraoperatively
Syllaios A., Chirurgia, 2018, issue 2, 577-578	1 month	1	Not diagnostic	Intraoperatively

### 3. Discussion

Jejunal diverticula are sac like protrusions of the small bowel wall, as has been mentioned above. On CT scans they have been described as rounded outpouchings from the bowel [6, 7]. Although, characteristic radiological findings, on CT scan, have been described as indicators for diagnosis [6-10], the disease is still hardly diagnosed on daily clinical practice.

The purpose of this study is not to describe the characteristic CT findings of this condition, as this has already been done by other authors, but to sensitize and point out that prospective diagnosis of the disease through CT scan is feasible, provided that the radiologist is able to localize the specific signs and there is also a high suspicion index of the presence of the disease. The consultation between radiologist and clinical physician may help to this direction.

The duration of patients' medical history and the frequency of CT diagnosis of jejunal diverticulosis, from several authors, published during the last decade are depicted on table 1. It is notable that the medical history is long enough, more than one year in most of the cases and the percentage of CT diagnosis is low, even in the case of complicated disease. We would like to note specifically, the case of Fintelmann and collaborators who re-examined the CT scans of 28 patients with confirmed jejunal diverticulosis, diagnosed on barium studies. CT scans were performed before barium studies in 26 out of 28 patients and in the rest 2 afterwards. The initial radiologist's report was negative for jejunal diverticulosis for the first 26 patients but positive for the last 2, who were submitted to CT scan after the barium study and the radiologist could be aware for the diagnosis. In contrast, Fintelmann and col., with a retrospective review of the CT scans of the same group of patients, diagnosed diverticulosis in 21 of 28 cases, based exclusively on CT findings. The reviewers were 2 radiologists specialized in gastrointestinal track with 23 and 25 years' experience. Similarly, Teoule P. and col. examined retrospectively the medical records of 10 patients with intraoperatively confirmed jejunal diverticulosis and found

only 2 cases with correct preoperative CT diagnosis. In the rest 8 cases the preoperative CT interpretation did not indicate the disease. These examples are not the exception, but they actually constitute the rule in the course of the patients with this condition. It means that patients are submitted to CT scan but the correct diagnosis of jejunal diverticulosis is rarely set. The long course of the medical history of these patients before the correct diagnosis and the difficulty of radiologists for appropriate interpretation of CT findings underline the weakness to have the diagnosis of jejunal diverticulosis on time.

Paul Lebert and col. in their publication, report a 91% of success (30 out of 33) in the diagnosis of jejunoileal diverticulitis based on CT findings [11]. They make clear however that their study was retrospective from three different centers in France and the confirmation of jejunoileal diverticulitis relied either on clinical and radiological data or on surgical findings. The CT scans of all 33 patients were seen by two radiologists who were blinded to the clinical data and had 20 and 25 years of experience with abdominal imaging respectively.

The incidence of small bowel diverticula is actually unknown as most cases are never revealed due to the mild intensity of symptoms. They have been reported ranges of incidence from 0.02%, up to 100 times higher, to 2.3% in roentgen graphic series [2, 12] and up to 5% in post mortem studies [13]. The big difference in reported incidence demonstrate that the real incidence of the disease is actually unknown.

Jejunal diverticula are not whole thickness diverticula as is the case for Meckel's diverticulum. Their wall is consisted of mucosal, submucosal and serosa without muscularis layer. Mucosal and submucosal are protruding through weakened parts of the bowel wall, such as the anatomic points of the bowel wall where the blood vessels penetrate the bowel [1].

Multiple disorders and syndromes have been correlated with jejunal diverticula appearance. Neuromuscular disorders [14], multiple sclerosis [15], amyloidosis [16], myasthenia

gravis [17], Cronkhite-Canada syndrome [18], Marfan syndrome [19, 20], Fabry's disease [21] and familial diverticulosis [22, 23], are some of the diseases which are linked with the development of small bowel diverticula.

The most common part of the small bowel where diverticula can be developed is the proximal jejunum (75%), followed by the distal (20%) and then the ileum (5%) [24]. Coexistent diverticula can be found in colon 20%–70%, in the duodenum 10%–40%, and in the esophagus and stomach 2% of patients [25, 26]. Despite that duodenum diverticula are found 5 times more frequently than those seen in the small bowel [27], the latter are 4 times more prone to develop a complication [3, 28] than the former. A higher incidence for jejunoileal diverticula has been reported in men than in women [29] and are most frequently seen in the sixth and seventh decade of life with a male predominance [30].

While the course of the disease is usually silent, Rodriguez et al. [31] reviewed the literature and noted symptoms in 29% of the cases. Tsiotos et al in a retrospective analysis of 112 cases noted that the disease was an incidental finding in 42% of the patients, it was diagnosed in 40% due to minor symptoms appearance (malabsorption and chronic pain) and only in 18% was diagnosed due to a complication development [32]. Main symptoms that have been reported, in uncomplicated cases, are vague recurrent abdominal pain, flatulence, abdominal discomfort and similar others unsubstantial troubles, mainly postprandial [3, 33]. Symptoms of anemia (iron or B12 deficiency) may also appear [4, 34]. The stasis of the intestinal content and the bacterial overgrowth has been implicated for the above symptoms appearance [35, 36].

The silent course and/or the non-specific symptoms of a patient with uncomplicated disease are the cause of delay in diagnosis, if it will ever be made. We report here a case of a patient with jejunal diverticula which underlines the diagnostic difficulties of this uncommon condition. Plain radiographic and ultrasound findings are rarely contributory in the diagnosis [37] whereas CT, as shown in our patient, may help to demonstrate the diagnosis. In the case of complicated disease the diagnosis is easier, depending on the specific complication that has been arisen. CT may reveal round or ovoid structures outside the lumen of the small bowel, with a smooth, extremely thin wall without small-bowel folds [7]. In the case of inflammation some indirect signs are present, such as asymmetric thickness of the jejunum wall, inflammatory mass containing gas and/or feces like material and imprecision of the surrounding fat [8, 9]. However, these signs are non-specific and other entities such as focal Crohn's disease, foreign body perforation, medication-induced ulceration, traumatic hematoma, and bowel perforation due to neoplasm may give the same signs. Entrapped air in the mesentery may be in favor of the diagnosis of jejunal diverticulitis. Indeed, before perforation the inflammatory diverticulum was sealed by mesenteries, which explains entrapped air in the mesentery when perforation occurs instead of free air in the peritoneal cavity [9]. At CT, jejunal diverticulitis manifests as a focal area of asymmetric small bowel wall thickening, most prominent on the mesenteric side of the bowel. The inflamed diverticulum could be seen as a focal out-pouching on the mesenteric side of the bowel.

Adjacent inflammation is usually apparent [38]. However, the above radiological criteria are very subtle and the lesions barely discernible, especially in the case of uncomplicated disease [7]. Given the data provided above, it is clear that a diagnosis which requires one or maybe two radiologists, specialized in gastrointestinal track with more than 20 years' of experience, in order to avoid mistakes in interpreting the CT images, is a "rather difficult diagnosis", as written in the title of this paper.

Besides sonography and CT scan, other diagnostic modalities have been used for the approach of patients with ileojejunal diverticulosis such as barium studies [7], double-balloon enteroscopy [39], wireless capsule endoscopy [40], Tc<sup>99</sup> RBC scan in cases with bleeding [41], Magnetic Resonance Enterography [42] and laparoscopy [43] with different results.

Though diverticula are generally asymptomatic, they can occasionally be accompanied by life-threatening complications, such as diverticulitis, hemorrhaging, obstruction and perforation [5]. Traditionally, resection of affected intestinal segment with primary anastomosis remains the mainstay of management in case of perforation, hemorrhage, abscesses and obstruction [30]. The extent of resection depends on the length of the bowel affected by diverticula. If diverticula involve a long intestinal segment, the resection should be limited to the perforated or inflamed intestinal segment in order to avoid a short bowel syndrome [44]. Nevertheless, there are publications with case series of perforated diverticulitis treated conservatively with antibiotics and CT-guided drainage of abdominal abscesses [45]. Asymptomatic jejunoileal diverticulosis does not require intestinal resection [43, 46], while patients with chronic mild symptoms can be treated conservatively and when symptoms will become persistent or refractory to treatment, resection is obligatory [47].

## 4. Conclusion

The majority of patients with jejunal diverticulosis remain asymptomatic thereby making rates among populations difficult to ascertain. The contrast enhanced CT scan, using different protocols is a widely available and useful tool for the diagnosis of complicated ileojejunal diverticulosis. Asymptomatic diverticulosis doesn't need any treatment. Symptomatic but stable patients may be managed conservatively whereas patients with refractory complications require surgical intervention.

## Conflict of Interests

Authors have no potential competing interests or conflicts to report.

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