



Case Report

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Perforated Jejunal Diverticulum with Generalized Peritonitis and Concurrent Meckel's Diverticulum: A Case Report

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Abstract

Background: Jejunal diverticulosis is a rare, acquired disorder of the small intestine, accounting for less than 1% of gastrointestinal diverticular disease. Most patients remain asymptomatic throughout life; however, serious complications such as diverticulitis, hemorrhage, obstruction, and perforation may occur. Perforation of a jejunal diverticulum is an uncommon but life-threatening condition associated with delayed diagnosis due to nonspecific clinical manifestations. The coexistence of jejunal diverticulosis and Meckel's diverticulum is exceptionally rare.

Case Presentation: A 47-year-old diabetic man presented with acute onset abdominal pain predominantly in the upper abdomen, progressive abdominal distension, and low-grade fever of two days' duration. There was no vomiting, jaundice, or alteration in bowel habits. Clinical examination revealed generalized abdominal tenderness with guarding and abdominal distension. Laboratory investigations demonstrated elevated inflammatory markers, hyperbilirubinemia, mild renal impairment, and anemia. Chest radiography showed bilateral subdiaphragmatic free air suggestive of hollow viscus perforation. Ultrasonography demonstrated moderate free intraperitoneal fluid with septations. Following resuscitation and optimization, emergency exploratory laparotomy was performed. Intraoperative findings revealed three jejunal diverticula with through-and-through perforation of the largest diverticulum located 19 inches distal to the duodenojejunal junction. A concomitant Meckel's diverticulum and multiple intra-abdominal abscesses were identified. Segmental jejunal resection with primary jejunojejunal anastomosis, wedge resection of Meckel's diverticulum, appendicectomy, peritoneal lavage, and drainage were performed. Histopathology confirmed acute-on-chronic diverticulitis with jejunal perforation, suppurative appendicitis, and inflamed Meckel's diverticulum without malignancy. The patient recovered uneventfully and remained asymptomatic during follow-up.

Conclusion: Perforated jejunal diverticulum is a rare surgical emergency requiring a high index of suspicion, particularly in patients presenting with generalized peritonitis and pneumoperitoneum. Early diagnosis, prompt resuscitation, and definitive surgical intervention are crucial for favorable outcomes. This case highlights the diagnostic challenges, operative management, and successful recovery in a patient with perforated jejunal diverticulitis associated with Meckel's diverticulum.

Keywords: Jejunal diverticulum, Jejunal diverticulitis, Diverticulum perforation, Generalized peritonitis, Meckel's diverticulum, Laparotomy, Small bowel diverticulosis

Introduction

Jejunal diverticulosis is an uncommon disorder characterized by the presence of acquired pulsion diverticula arising from the mesenteric border of the small intestine. Unlike Meckel's diverticulum, which represents a true congenital diverticulum containing all layers of the bowel wall, jejunal diverticula are pseudodiverticula composed only of mucosa and submucosa herniating through weak points in the muscular layer. The reported incidence ranges from 0.06% to 4.6% in radiological and autopsy studies, making it a rare clinical entity. Because of its low prevalence and frequently asymptomatic nature, the diagnosis is often overlooked until complications develop [1].

The pathogenesis of jejunal diverticulosis is believed to involve abnormalities in intestinal motility resulting in increased intraluminal pressure. This pressure causes mucosal herniation through sites of vascular penetration in the muscularis propria. The condition predominantly affects older individuals, with most cases reported in the sixth and seventh decades of life. Associated disorders include visceral neuropathies, smooth muscle dysfunction, connective tissue disorders, and systemic diseases that impair intestinal motility [2].

Although most patients remain asymptomatic, approximately 10-30% develop complications requiring medical or surgical intervention. Chronic symptoms may include vague abdominal pain, bloating, malabsorption, chronic diarrhea, and nutritional deficiencies. Acute complications include diverticulitis, hemorrhage, intestinal obstruction, volvulus, intussusception, abscess formation, and perforation. Among these, perforation is the most serious complication and is associated with significant morbidity and mortality, particularly when diagnosis and treatment are delayed [3].

Perforated jejunal diverticulitis presents a substantial diagnostic challenge because its clinical manifestations often mimic other intra-abdominal emergencies such as perforated peptic ulcer disease, acute appendicitis, perforated colonic diverticulitis, pancreatitis, or bowel ischemia. Clinical findings are frequently nonspecific, and laboratory investigations typically reveal only evidence of systemic inflammation. Computed tomography has emerged as the most useful imaging modality for preoperative diagnosis; however, many cases are diagnosed only during exploratory laparotomy [4].

The coexistence of jejunal diverticulosis and Meckel's diverticulum is extremely rare. Meckel's diverticulum results from incomplete obliteration of the vitelline duct and is present in approximately 2% of the population. Although usually asymptomatic, it may become inflamed, bleed, perforate, or cause intestinal obstruction. The simultaneous presence of perforated jejunal diverticulitis and Meckel's diverticulum poses unique diagnostic and therapeutic considerations, particularly when generalized peritonitis is present [5,6].

We report a rare case of acute generalized peritonitis caused by perforation of a jejunal diverticulum in a 47-year-old diabetic male with concomitant Meckel's diverticulum. The patient underwent emergency laparotomy with segmental jejunal resection and primary anastomosis, wedge resection of Meckel's diverticulum, appendectomy, and extensive peritoneal lavage. This report discusses clinical presentation, diagnostic evaluation, operative findings, postoperative recovery, and a review of the current literature regarding this uncommon surgical emergency [7-15].

Case Presentation

A 47-year-old man presented to the emergency department with acute onset abdominal pain predominantly involving the upper abdomen and progressive abdominal distension of two days' duration. The pain initially began in the epigastric region and subsequently became generalized. He also reported low-grade fever during the illness. There was no history of vomiting, hematemesis, melena, jaundice, diarrhea, constipation, or recent abdominal trauma. His bowel habits had remained normal before the onset of symptoms. He was a known diabetic on regular treatment but had no previous history of abdominal surgery, peptic ulcer disease, inflammatory bowel disease, or known diverticular disease.

On admission, the patient appeared ill but remained conscious and oriented. Clinical examination revealed a blood pressure of 90/60 mmHg and a pulse rate of 104 beats per minute. He was afebrile at the time of examination. There was no pallor, icterus, cyanosis, peripheral edema, or lymphadenopathy. Cardiovascular and respiratory examinations were otherwise unremarkable except for reduced respiratory excursion secondary to abdominal pain. The patient's diabetic status and borderline hemodynamic parameters raised concern regarding the severity of the underlying intra-abdominal pathology.

Abdominal examination demonstrated generalized distension with diffuse tenderness involving all quadrants. Guarding was present throughout the abdomen, although frank rigidity was absent. Rebound tenderness was elicited in several regions. Bowel sounds were present but reduced in intensity. No palpable abdominal mass was detected. Rectal examination was unremarkable. The overall clinical impression was that of generalized peritonitis secondary to perforation of a hollow viscus.

Initial laboratory investigations revealed hemoglobin of 10.7g/dL, white blood cell count of $9.67 \times 10^3/\mu\text{L}$, and platelet count of $205 \times 10^3/\mu\text{L}$. Renal function tests demonstrated elevated blood urea nitrogen of 55.3mg/dL and serum creatinine of 1.67mg/dL, indicating mild acute kidney injury likely related to sepsis and dehydration. C-reactive protein was markedly elevated to 156.1mg/L, suggesting significant inflammatory activity. Liver function testing revealed total bilirubin of 6.32mg/dL with a mildly elevated AST of 49.5 U/L, whereas other liver enzymes were within normal limits. Serum amylase was normal at 92.4 U/L, reducing the likelihood of acute pancreatitis.

Electrolyte analysis showed mild hyponatremia with sodium of 131.3 mmol/L, while potassium, chloride, and bicarbonate levels were within acceptable ranges. Viral screening for HIV, hepatitis B, and hepatitis C was negative. Coagulation studies demonstrated a prothrombin time of 13.6 seconds and an INR of 1.18.

Cardiopulmonary assessment was performed because of the patient's septic condition and underlying diabetes mellitus. Electrocardiography demonstrated normal sinus rhythm. Echocardiography revealed structurally normal cardiac chambers

and valves with preserved left ventricular systolic function and a left ventricular ejection fraction of 65.96%. Chest radiography showed widespread patchy opacities in both lung fields, more pronounced on the left side, consistent with pulmonary tuberculosis-related changes (Figure 1). In addition, free gas was observed beneath both hemidiaphragms, strongly suggesting gastrointestinal perforation (Figure 2). Abdominal ultrasonography demonstrated mild hepatosplenomegaly and a moderate amount of free intraperitoneal fluid containing internal septations, indicating complicated intra-abdominal infection (Figure 3).



Figure 1: Chest X-ray (PA view) showing free gas under both hemidiaphragms and bilateral pulmonary opacities.



Figure 2: Erect abdominal X-ray showing free gas under both hemidiaphragms and dilated small bowel loops with air-fluid levels.

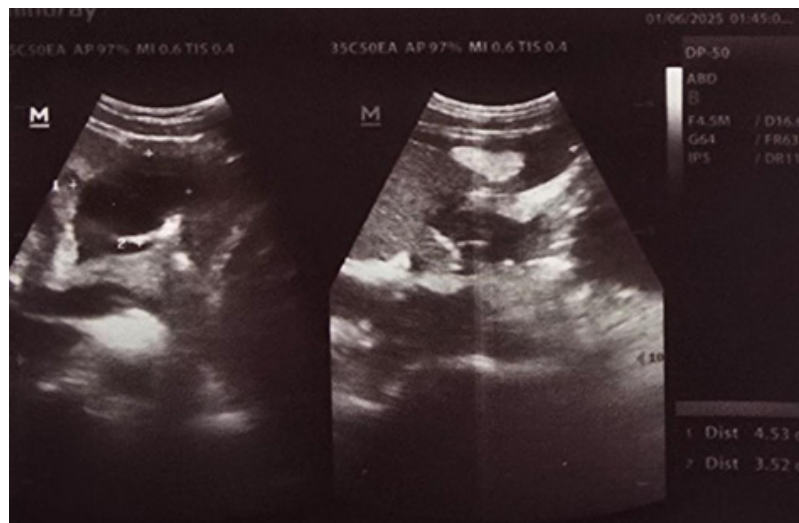


Figure 3: Ultrasound (abdomen) showing moderate free intraperitoneal fluid with internal septations.

The patient was diagnosed with generalized peritonitis secondary to bowel perforation and was immediately resuscitated. Intravenous crystalloid fluids were administered to correct dehydration and optimize hemodynamic status. Broad-spectrum antimicrobial therapy consisting of intravenous imipenem and metronidazole was initiated. Gastrointestinal protective medications and supportive treatment were provided. One unit of whole blood was transfused because of anemia and anticipated surgical blood loss. Cardiologist and anesthesiologist consultations were obtained, and following comprehensive assessment, the patient was deemed fit for emergency surgery despite the high operative risk. Informed high-risk consent was obtained from the patient and his relatives. Emergency exploratory laparotomy was performed through a midline incision. Upon entering the peritoneal cavity, a large amount of purulent fluid was encountered. Multiple abscess collections were identified within the interloop spaces, pelvic cavity, bilateral paracolic gutters, and subphrenic regions (Figure 4). Thorough exploration of the gastrointestinal tract revealed three closely clustered jejunal diverticula arising from the mesenteric border of the proximal jejunum, located approximately 19 inches distal to the duodenojejunal junction (Figure 5). Among these diverticula, the largest diverticulum demonstrated a through-and-through perforation with surrounding inflammatory changes and localized necrosis, while the two adjacent diverticula appeared intact without evidence of perforation or active inflammation (Figure 6). A Meckel's diverticulum was also identified incidentally in the distal ileum (Figure 7). The liver, stomach, duodenum, and

the remaining small and large bowel appeared grossly normal. Definitive surgical management consisted of segmental resection of the diseased jejunal segment containing the diverticula followed by primary jejunojunctional anastomosis (Figure 8 & 9). Wedge resection of the Meckel's diverticulum was performed to eliminate the risk of future complications (Figure 10). Appendectomy was carried out because of inflammatory changes noted intraoperatively and to avoid future diagnostic confusion. Extensive peritoneal lavage with warm saline was undertaken until the effluent became clear. Drainage tubes were inserted in appropriate locations before abdominal closure. The patient tolerated the procedure well and was transferred to the surgical ward for continued monitoring and postoperative care. During the immediate postoperative period, the patient's condition remained stable. On postoperative day one, laboratory investigations demonstrated a transient rise in white blood cell count to $14.47 \times 10^3/\mu\text{L}$, reflecting the postoperative inflammatory response. Renal function showed improvement, with serum creatinine decreasing to 1.32 mg/dL. By postoperative day three, the white blood cell count had normalized to $6.46 \times 10^3/\mu\text{L}$. Hypokalemia (2.93 mmol/L) developed and was corrected with intravenous potassium supplementation. Liver function tests showed temporary worsening, including alkaline phosphatase of 525.6 U/L, AST of 68.3 U/L, and total bilirubin of 7.77 mg/dL, although ALT remained within normal limits. Renal function continued to improve, with serum creatinine decreasing to 0.95 mg/dL.

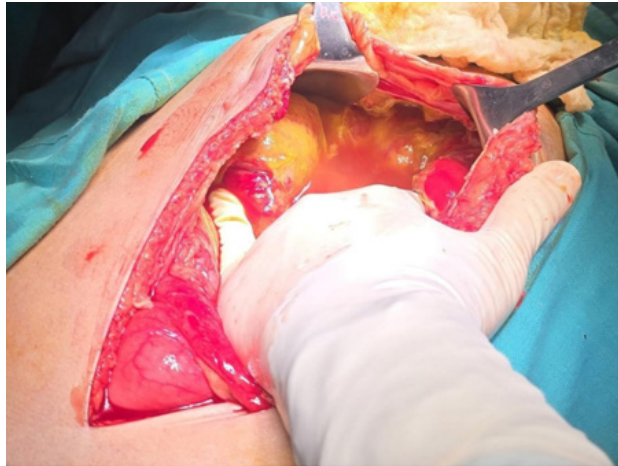


Figure 4: Intraoperative view of diffuse purulent peritoneal contamination and fibrinous inflammatory exudates within the abdominal cavity.

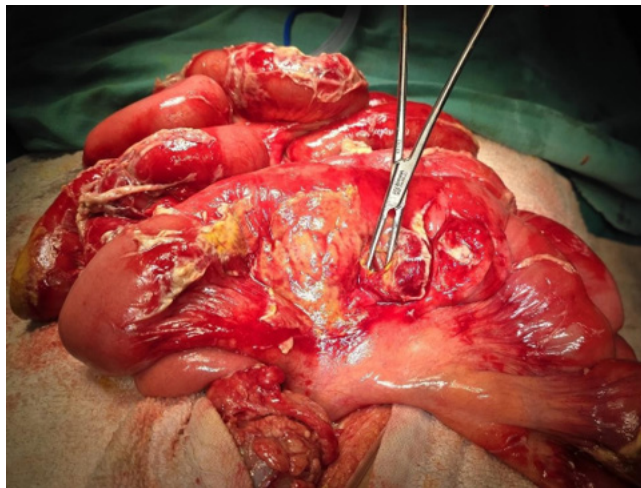


Figure 5: Intraoperative view showing three closely clustered jejunal diverticula located approximately 19 inches distal to the duodenojejunal junction.

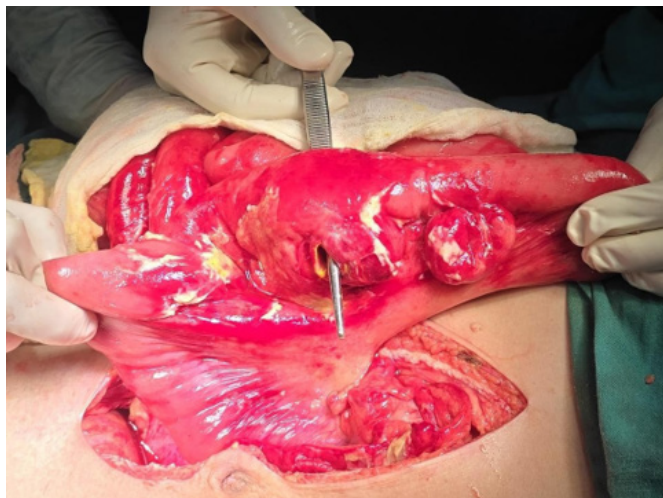


Figure 6: Intraoperative view showing through-and-through perforation of the largest jejunal diverticulum.

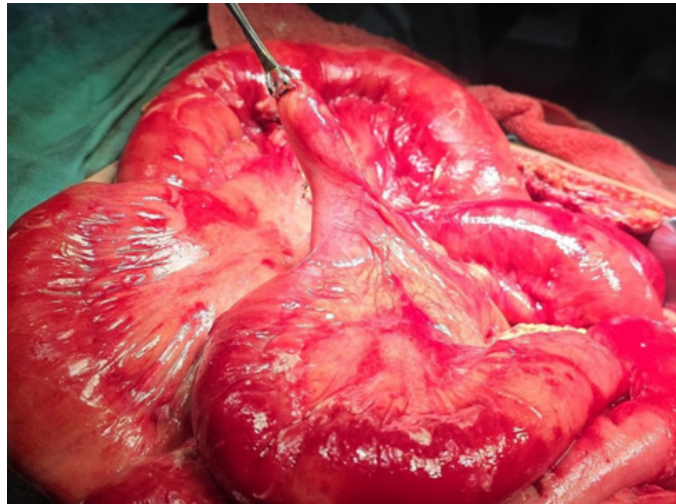


Figure 7: Intraoperative view showing an incidental Meckel's diverticulum.

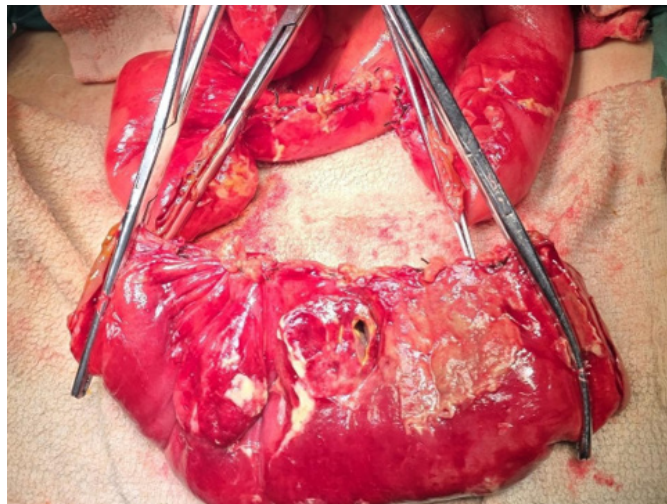


Figure 8: Resected jejunal segment containing the perforated diverticulum and adjacent diverticula.

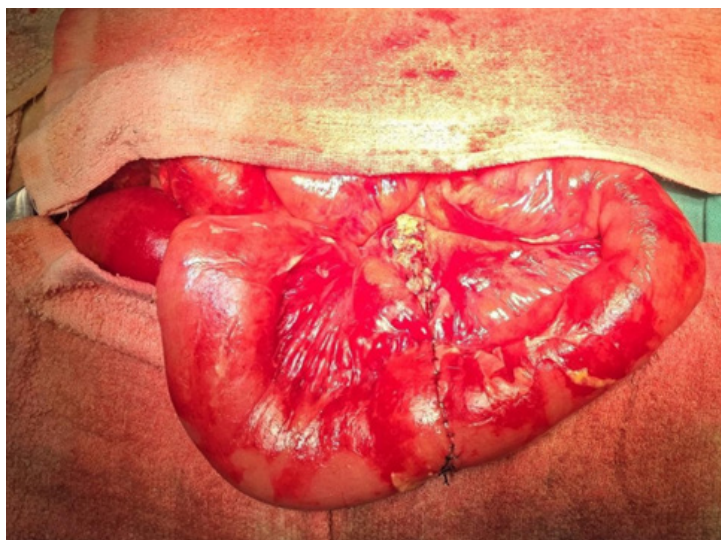


Figure 9: Intraoperative view showing completed jejunojejunal anastomosis following resection of the diseased jejunal segment.

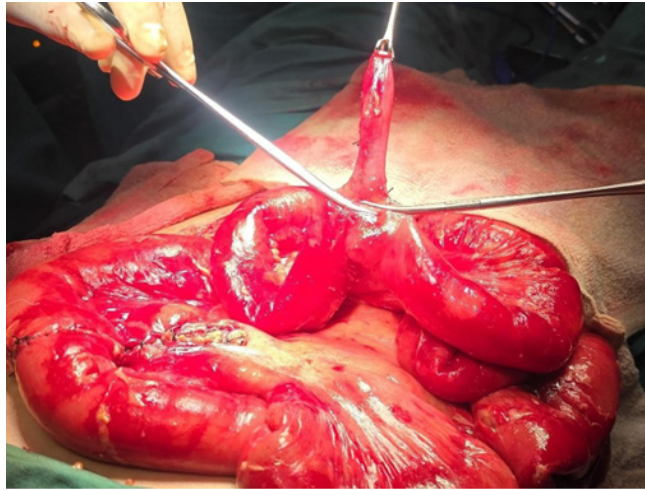


Figure 10: Intraoperative view showing Meckel's diverticulum before wedge resection.

The patient's clinical condition improved progressively. Return of bowel function occurred without complication, and clear fluids were initiated on postoperative day five. The diet gradually advanced from liquids to semisolid food as tolerated. Serial laboratory investigations demonstrated normalization of inflammatory markers, renal parameters, and hematological indices. By postoperative day ten, liver function tests showed significant improvement. The abdominal drains were removed sequentially after cessation of significant output. The patient remained afebrile, tolerated oral intake well, and was fully ambulatory. Histopathological examination of the resected specimen revealed acute-on-chronic diverticulitis with perforation of the jejunal diverticulum (Figure 11 & 12). Meckel's diverticulum demonstrated inflammatory changes without evidence of ectopic tissue, dysplasia,

or malignancy (Figure 13). The appendix showed features of suppurative appendicitis (Figure 14). No neoplastic lesions were identified in any specimen. These findings confirmed the clinical diagnosis of perforated jejunal diverticulitis with associated intra-abdominal sepsis. The patient was discharged on postoperative day fourteen in good general condition. Follow-up assessments at one week, two weeks, one month, and three months demonstrated continued recovery. He reported a good appetite, normal bowel function, and complete resolution of abdominal symptoms. Physical examination remained unremarkable, and he resumed normal daily activities without restriction. No postoperative complications, recurrence of symptoms, or nutritional deficiencies were observed during follow-up.



Figure 11: Gross specimen of resected jejunal segment with clustered diverticula and Meckel's diverticulum.

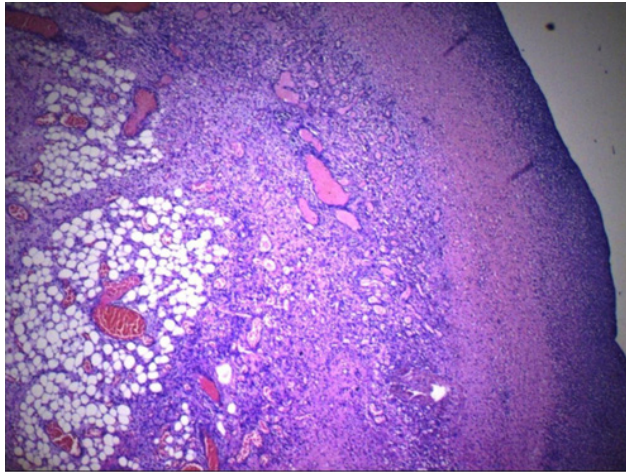


Figure 12: Histopathological examination of acute-on-chronic diverticulitis with perforation of the jejunal diverticulum.

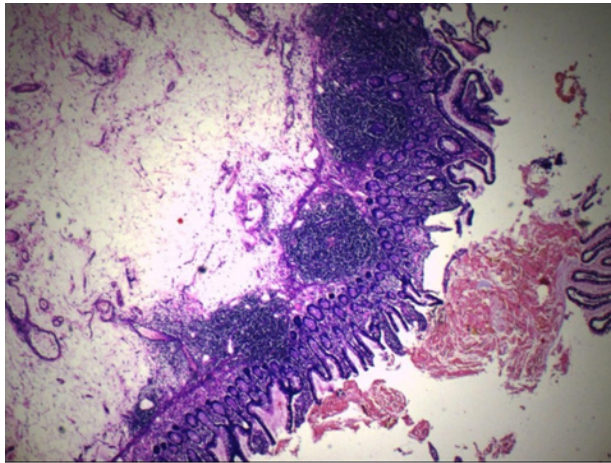


Figure 13: Histopathological examination of the Meckel's diverticulum demonstrating inflammatory changes without malignancy.

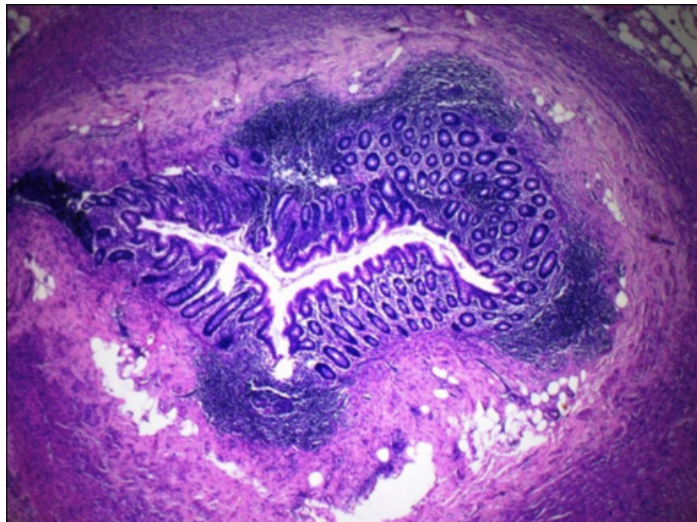


Figure 14: Histopathological examination of the appendix with suppurative inflammatory changes.

Discussion

Jejunal diverticulosis is an uncommon disease of the small intestine and represents a rare cause of acute abdomen. The condition was first described by Sommering in 1794 and later characterized in greater detail by Astley Cooper in 1807. Unlike colonic diverticulosis, jejunal diverticulosis is encountered infrequently in routine surgical practice, with reported prevalence ranging from 0.06% to 4.6% in autopsy and radiological series. The majority of diverticula occur in the proximal jejunum because the penetrating mesenteric vessels create potential sites of weakness through which mucosa and submucosa may herniate under increased intraluminal pressure [1].

The exact pathogenesis remains incompletely understood. Current evidence suggests that abnormalities in smooth muscle function, visceral neuropathy, and intestinal dyskinesia contribute to increased segmental intraluminal pressure and formation of pulsion diverticula. These diverticula are considered false diverticula because they lack the muscular layer of the bowel wall. Advanced age is the most frequently reported risk factor, and most patients are diagnosed during the sixth or seventh decade of life. The relatively young age of our patient, 47 years, makes this case particularly unusual [2].

Most patients with jejunal diverticulosis remain asymptomatic throughout life. When symptoms occur, they are usually vague and chronic, including intermittent abdominal pain, bloating, malabsorption, diarrhea, and nutritional deficiencies. Serious complications occur in approximately 10-30% of patients and include diverticulitis, perforation, intestinal obstruction, volvulus, intussusception, and hemorrhage. Among these complications, perforation is the most feared because it carries a reported mortality rate ranging from 20% to 40%, particularly when diagnosis is delayed or diffuse peritonitis develops [3].

Perforation usually results from acute diverticulitis, enterolith formation, foreign body impaction, traumatic injury, or progressive necrosis of the diverticular wall. In the present case, histopathology confirmed acute-on-chronic diverticulitis with perforation, indicating that chronic inflammatory changes had probably existed before the acute presentation. The presence of multiple abscesses within the interloop spaces, pelvis, paracolic gutters, and subphrenic regions suggests that the perforation may initially have been localized before progressing to generalized peritonitis. Similar patterns have been reported in previously published case series [4].

Diagnosis of perforated jejunal diverticulum remains challenging because clinical manifestations are nonspecific and often mimic other surgical emergencies. Patients frequently present with abdominal pain, fever, leukocytosis, nausea, and signs of peritoneal irritation. The differential diagnosis includes perforated peptic ulcer disease, perforated appendicitis, acute pancreatitis, mesenteric ischemia, perforated colorectal diverticulitis, and

small bowel perforation secondary to infectious diseases [5]. In our patient, the presence of free gas under both hemidiaphragms strongly indicated hollow viscus perforation but did not identify the precise site of perforation.

Computed tomography is currently considered the imaging modality of choice because it can demonstrate diverticula, localized inflammatory changes, extraluminal air, abscess formation, and bowel wall thickening. However, CT scanning may not be available in all healthcare settings, and many patients continue to undergo exploratory laparotomy based on clinical findings and plain radiographic evidence of pneumoperitoneum. In the present case, emergency surgery was indicated because of generalized peritonitis, hemodynamic compromise, and radiological evidence of bowel perforation. Exploratory laparotomy not only established the diagnosis but also provided definitive treatment [6].

The recommended surgical treatment for perforated jejunal diverticulitis is segmental resection of the involved bowel segment with primary anastomosis whenever feasible. Simple diverticulectomy is generally discouraged because of the risk of anastomotic failure, leakage, and persistence of diseased bowel. Extensive diverticulosis involving long segments of bowel may require individualized management to avoid short bowel syndrome [7]. In our patient, resection of the diseased jejunal segment followed by primary jejunojejunal anastomosis provided excellent source control and resulted in favorable recovery. Thorough peritoneal lavage and drainage were essential because of extensive intra-abdominal contamination.

An additional noteworthy feature of this case was the coexistence of Meckel's diverticulum. Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract and occurs in approximately 2% of the population. Although usually asymptomatic, it may cause bleeding, inflammation, obstruction, and perforation [8]. The simultaneous occurrence of perforated jejunal diverticulitis and Meckel's diverticulum is exceedingly rare. Because the abdomen was already being explored and resection could be performed safely, prophylactic wedge resection of the Meckel's diverticulum was considered appropriate. Histological examination demonstrated inflammation but no evidence of malignancy.

Another interesting finding was the marked hyperbilirubinemia in the absence of significant hepatobiliary pathology. The liver and biliary system appeared normal during surgery. Sepsis-induced cholestasis has been well described in patients with severe intra-abdominal infections and is characterized by elevated bilirubin levels despite relatively preserved transaminases. The gradual normalization of liver function tests following source control and antimicrobial therapy support this explanation in our patient.

The patient's favorable outcome can be attributed to several factors, including prompt recognition of generalized peritonitis, aggressive resuscitation, administration of broad-

spectrum antibiotics, timely surgical intervention, and meticulous postoperative care. Despite the presence of diabetes mellitus, renal dysfunction, severe inflammatory response, multiple abscesses, and extensive peritoneal contamination, complete recovery was achieved without major complications. This case reinforces the importance of maintaining a high index of suspicion for rare causes of bowel perforation and demonstrates that excellent outcomes can be achieved through early definitive management.

Conclusion

Perforated jejunal diverticulum is a rare but potentially fatal cause of generalized peritonitis. Because clinical manifestations are nonspecific, diagnosis is often delayed until surgery. This case illustrates the importance of considering small bowel diverticular disease in patients presenting with acute abdomen and pneumoperitoneum.

Prompt resuscitation, broad-spectrum antimicrobial therapy, and emergency surgical resection with primary anastomosis remain the cornerstone of successful treatment. The coexistence of Meckel's diverticulum further highlights the rarity and educational value of this case. Early recognition and timely intervention can significantly reduce morbidity and mortality and result in excellent long-term outcomes.

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Conflicts of Interest

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