Case Study

Small Intestinal Diverticulosis with Gangrenous Perforation in a Strangulated Inguinal Hernia: Diagnostic Challenge

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Abstract

Background: The clinical signs of peritonitis in patients with strangulated inguinal hernia, causing perforated small intestine diverticulosis, are often difficult to be recognized. The clinical signs of diverticulosis can be similar or even misdiagnosed with abdominal wall hernia because the pathology of both diseases has some similarities in their mechanisms. Multiple studies indicate that connective tissue disorders might significantly contribute to the development of diverticulosis and hernias in the abdominal wall.

Case Report: A 64-year-old male presented with sudden-onset abdominal pain lasting six hours. He also reported a palpable, non-reducible mass noted in the left inguinal region, accompanied by nausea and vomiting. On physical examination, there was tenderness, rebound tenderness, and defans muscular tense in the entire abdominal region, and a non-reducible mass was palpable in the left inguinal region. Five mililiter of brown gastric fluid was obtained from the NGT tube. The results of a plain abdominal X-ray were dilatation of the small intestine and large bowel; no step ladder image, no free air was seen, and the psoas line was not visible. The diagnosis of small intestine diverticulosis with perforation was concluded during exploratory laparotomy based on indications of peritonitis.

Conclusion: The clinical signs of diverticulosis can resemble an inguinal hernia, so surgeons need to be aware of this occurrence to select the treatment and avoid post-operative worsening.

Keyword: Diverticulosis of small intestine, Perforated Diverticula, Hernia of Abdominal Wall

Introduction

Diverticulosis is a medical condition characterized by the presence of sac-like bulges (diverticula) that develop along the digestive system. While diverticula may develop at vulnerable areas in the walls of either the small or large intestine, they are most frequently found in the large intestine, particularly in the sigmoid colon(1).

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Mostly diverticulosis comes without any symptoms. Diverticular disease manifests as symptomatic diverticulosis (eg, diverticular bleeding); diverticulitis (eg, acute or chronic inflammation that could be complicated by abscess development, fistula creation, ileus obstruction, or perforation); or related segmental colitis (eg, inflammation of the colonic mucosa segments between the diverticula)[2].

Perforated diverticulitis occurs due to severe inflammation of the intestinal wall, resulting in tissue death and weakening of the wall's integrity. Perforation from colonic diverticulitis usually occurs on the left side. Well-regulated perforations appear as tiny, clearly defined perforations; in contrast, uncontrolled perforations, which happen in 1%–2% of patients with acute diverticulitis, can result in local abscesses and the formation of fistulas. Local detection of free air typically occurs with well-regulated perforations, whereas widespread intra-abdominal free air is identified in significant uncontrolled perforations[3,4].

Intraperitoneal rupture can lead to sudden abdominal pain, nausea, and vomiting. Air in the retroperitoneal space can result from perforation of the second and third portions of the duodenum, as well as the back side of the ascending, descending, and sigmoid colon segments. The clinical symptoms in these patients can be gradual and fairly mild, resulting in a postponed diagnosis and possibly serious complications[3].

The clinical manifestations of peritonitis in individuals with a strangulated inguinal hernia, leading to perforated small intestine diverticulosis, are an uncommon occurrence. Only 53 of these hernias have been documented in the literature, with the groin accounting for 73% of them. Diverticulosis may present with a clinical appearance similar to herniation. It is suggested that diverticulosis and abdominal wall hernia are linked due to systemic connective tissue alterations, with herniation being a frequent causal factor. Changes in connective tissue significantly contribute to the development of diverticula. In the same way, various studies have indicated that herniation of the abdominal wall is linked to systemic changes in connective tissue[5,6].

Case Report

A 64-year-old male patient presented with sudden left quadrant abdominal pain 6 hours before coming to the hospital that radiate to his left groin, there was a palpable, non-reducible mass noted in the left inguinal region as seen in figure 1, accompanied by nausea and vomiting. He didn't feel any alterations in his bowel habits, neither constipation nor diarrhea. Fever, chills and urinary symptoms are denied, but he felt nauseous and had vomited 3 times before coming to the hospital.

Figure 1: Intestinal loop in the left thigh crease and left testicle

On physical examination, tenderness, rebound tenderness and muscular defans tenses were felt throughout the abdomen, and a non-reducible mass was noted in the left inguinal region. Five mililiter of brown gastric fluid was obtained from the NGT tube. The blood laboratory tests showed *shift to the left* leukocytosis (2.20 $10^3/\mu L$) with a dominant increase in neutrophils (95.30 $10^3/\mu L$) in the leukocyte count and slightly decreased hematocrit. The results of plain abdominal radiographs found dilatation of the small intestine and large bowel, no step ladder image, no free air, and the psoas line was not visible as seen in figure 2.

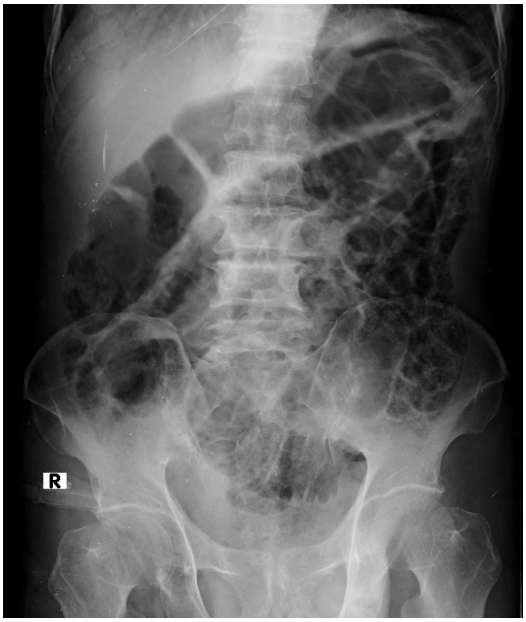

Figure 2: A Plain abdominal X-ray shows a dilatation of the small intestine and large bowel (March 21, 2025)

Initially, the practitioner in the emergency room suspected an inguinal hernia with obstruction and peritonitis because a palpable, non-reducible mass noted in the left inguinal region and muscular defans tense were noted throughout the abdomen. Then, ultrasound revealed a herniated bowel loop in the inguinal. We did not perform an abdominal CT-scan because the patient's clinical signs in the emergency room and abdominal x-ray supported the diagnosis of ileus. The diagnosis of small intestine diverticulosis with perforation was concluded during an exploratory laparotomy based on indications of peritonitis.

On March 22, 2025, the patient had an exploratory laparotomy surgery. Laparotomy, exploration and resection of ileum anastomosis with linear stapler, wash abdominal cavity, install intraabdominal drain, inguinal hernia repair and ligation of internal annulus were performed. During the procedure, 100 cc of turbid peritoneal fluid and pus were discovered; as seen in figure 4 there was perforation and gangrenous diverticulum of the ileum about 50 cm from the ileocecal junction, and several diverticula of the small intestine were noted to be intact up to the proximal jejunum as seen in figure 3. The procedure took 1 hour and 15 minutes; the patient's condition after surgery was stable. Following the surgery, a histopathological analysis of the tumor tissue was performed.

Figure 3: Multiple diverticula of the small intestine in the proximal jejunum are still intact.

Figure 4: Perforated and gangrenous diverticulum of ileum about 50 cm from the ileocecal junction

Post-operatively, the patient was hospitalized and fasted for 3 days. Management included: Bfluid 1000 ml and tutosol infusion, injection cefosulbactam and metronidazole as profilaxis. Two days after the operation, the patient was able to pass flatus, had good vital signs, and minimal pain in the surgical wound.

Discussions

In recent decades, the number of cases of diverticular disease has increased. Yamamichi et al reported that there was an increase in the number of cases of diverticular disease from 1990 to 2010 of 10.9%, with an increase in the incidence ratio of 0.5% in the Asian population, although the number was not greater than the cases reported in the western world[2,7].

About 2% of people have a Meckel's diverticulum in their gastrointestinal tract, which is a remnant of the embryologic vitelline duct. Only 53 of these hernias have been documented in the literature, with the groin accounting for 73% of them, according to a recent systematic study[8]. A Littré's hernia, named for the French physician Alexis Littré who first characterized the ailment in the 18th century, is a hernia that contains a Meckel's diverticulum. The incidence of Littré's hernia is unknown, making it an incredibly rare case[6,9].

In this case report, diverticulosis of the small intestine with perforation appeared with a clinical-symptoms like an inguinal hernia with obstruction because a palpable, non-reducible mass noted in the left inguinal region and there were gastrointestinal symptoms. Although the diagnosis was concluded postoperatively but the gold standard for establishing the diagnosis of acute diverticulitis is CT-Scan with contrast, it can establish an accurate diagnosis and its staging. We did not perform an abdominal CT-scan because the patient's clinical signs in the emergency room and abdominal x-ray supported the diagnosis of ileus.

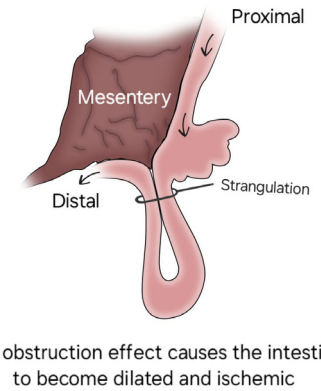

Figure 5: Patho-mechanism of gangrenous diverticulosis of ileum
Source: illustration from the author

CRP also can be used as a useful inflammatory marker to detect the severity of a perforated acute diverticulitis. This can occur because the distal ileum loop of the diverticulosis is necrotic and perforated, trapped internally in the hernial annulus, then strangulated, resulting in impaired perfusion of the diverticular wall, which causes the diverticular wall and intestinal mucosa to become ischemic and causes damage to the mucosa and diverticular wall as illustrated in figure 5. The rate of perforation in acute diverticulitis reaches 10% as reported by Pavlidis in 2022[8,10,11].

This statement is supported by several previous studies, where disruption or damage to connective tissue plays an important role in the formation of diverticula, as is the case with abdominal wall hernias and recurrent hernias, which are also associated with disruption or damage to the intestinal connective tissue[11].

Another possible mechanism that is being considered is the presence of distal obstruction in the diverticulum, causing dilatation of the diverticulum and proximal ileum due to pressure from the proximal ileum and diverticulum, which are dilated, entering the hernia ring, and blockage occurs, so that the clinical signs and symptoms resembles an abdominal wall hernia[12].

The pathogenesis of diverticulosis is not fully understood, but some accepted theories relate to increased pressure on the intestine and defects in the integrity of the intestinal wall. Diverticulosis is associated with damage to the collagen structure of the intestinal wall. Disturbances in the integrity of the intestinal wall can be caused by Marfan Syndrome, Ehlers-Danlos Syndrome, Coffin-Lowry Syndrome, and Williams Syndrome.

Garret Johnson documented a similar case in 2021, when he found a rare instance of strangulated Littré's hernia in a patient's right groin. The sac contained a large Meckel's diverticulum. They performed a midline laparotomy to removed the Meckel's diverticulum along with the necrotic bowel. A Bassini herniorrhaphy reinforced with absorbable mesh was used to repair the hernia due to the

possibility of infection and the presence of necrotic bowel. There were no complications in the patient's recovery[6].

The standard choice for perforated diverticulosis with fecal peritonitis is Hartmann's procedure, although the best choice for case with purulent peritonitis remain unclear, there still studies are in progress. In this case report we performed a laparotomy, exploration and resection of ileum anastomosis with linear stapler. However the outcome of performing a primary anastomosis or not after sigmoidectomy still remains debatable.

Conclusion

A case of small intestine diverticulosis with perforation in a 64-year-old male patient has been reported. The diagnosis was made postoperatively. The patient improved after surgery. Additional research is required to identify the mechanisms that can clarify the clinical presentation of diverticulosis, which is similar to an abdominal wall hernia so that it can help practitioners in establishing a diagnosis of diverticulosis and enhancing the decision of the best choice of surgical treatment.

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