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A MULTIMODAL APPROACH TO THE MANAGEMENT OF DIVERTICULAR ABSCESS WITH PARAESOPHAGEAL HERNIA COMPLICATION

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Abstract

This study aims to evaluate the management of acute diverticulitis complicated by hernia and the role of electroacupuncture in managing postoperative ileus. The case involved a 51-year-old male patient who presented with left lower abdominal pain, fever, and defecation disorder. Physical examination showed signs of infection with localized peritonitis, while laboratory tests revealed neutrophilia. CT scan showed diverticulitis with abscesses in the descending and sigmoid colon, as well as free air around the colon and perihepatic region, and paraesophageal hernia. The patient underwent left hemicolectomy with Hartmann's procedure. Postoperatively, the patient developed ileus which was treated using electroacupuncture. The results showed that the relationship between diverticulosis and hernia is due to connective tissue changes. Approximately 10-20% of diverticulosis cases progress to acute diverticulitis. CT scan is the gold standard for diagnosis, staging and management of diverticulitis. In cases of Hinchey III diverticulitis, laparoscopic washing does not give better results compared to colonic resection. The Hartmann procedure is recommended for patients with multiple comorbidities. Electroacupuncture proved to be an effective adjunctive therapy in managing postoperative ileus. The conclusion of this study is that a multimodal approach, including surgery and complementary therapies such as electroacupuncture, is essential in the management of diverticulitis and its complications. The implication of this study is the need for a holistic approach in managing patients with acute diverticulitis, especially in cases with multiple comorbidities and risk of postoperative complications.

Keyword: multimodal approach, diverticula, paraesophageal hernia

Introduction

Diverticulitis is one of the gastrointestinal emergencies that often presents with acute abdomen. Almost 10%-25% of people with diverticulosis will experience diverticulitis in their lifetime. Diverticulitis commonly occurs in men under the age of 50th and women between the ages of 50th to 60th (Lanas & Latella, 2022).

Risk factors that increase the occurrence of diverticulosis and diverticulitis include a low-fiber diet, high-fat intake, and high consumption of red meat. Other risk factors are smoking, obesity, use of non-steroidal anti-inflammatory drugs (NSAIDs), steroids, and opioids, which can also increase the incidence of diverticulitis. Complications that may occur from diverticulitis include abscesses, perforation, obstruction, and fistula, which require immediate management. Diverticulitis itself has a classification, Hinchey classification, that can be assessed based on specific findings on

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CT scans, that is known as the gold standard examination for diverticulitis. The diverticulitis classification is used to assess the severity and treatment plan for diverticulitis. The Hinchey diverticulitis classification has undergone some modifications (Lanas & Latella, 2022; Stewart, 2021).

It is known that there is a relationship between hernia and diverticulosis. Recent studies suggest that there is a hypothesis indicating that hernia and diverticulosis are interconnected due to changes in connective tissue (Oma et al., 2017). However, there are still few studies discussing the occurrence of diverticulosis with paraesophageal hernia.

Postoperative ileus and insomnia often occur after surgical procedures. Electroacupuncture therapy has been recognized as a treatment option for managing postoperative ileus and insomnia. Electroacupuncture is a modified acupuncture technique that involves the stimulation of specific acupuncture points with low-level electrical currents alongside traditional acupuncture (Cheong et al., 2016). This study aims to evaluate the management of acute diverticulitis complicated by hernia and the role of electroacupuncture in managing postoperative ileus.

Case

A 51-year-old male presents to the Emergency Department (ED) with complaints of severe pain in the lower left abdomen. The pain has been present for two days prior to admission and has been progressively worsening. The patient reports that the pain intensifies when moving, such as during walking. He also experiences pain in the upper abdomen. The patient complains of fever, nausea, bloating, and gastrointestinal dysfunction, including the inability to pass flatus and constipation. This is the first time the patient has experienced such pain. The patient denies any history of non-steroidal anti-inflammatory drug (NSAID) use, immunosuppressants, or smoking. The patient has a history of paraesophageal hernia for the past year.

On examination, vital signs reveal a temperature of 38.9°C, heart rate of 108 beats per minute, blood pressure of 120/70 mmHg, and respiratory rate of 20 breaths per minute. Abdominal examination shows distention, increased bowel sounds, tenderness in the left lower and suprapubic regions. Complete blood count reveals a neutrophilia (79%). Abdominal CT scan with contrast reveals diverticulitis in the distal descending colon to the distal sigmoid, accompanied by a diverticular abscess adhering to the ventral wall of the major pelvic, measuring 47 mm in medial length (ML), 18 mm anterior-posterior (AP), and 35 mm craniocaudal (CC) (Figure 1). The CT scan also shows thickening of the colon with suspicious signs of rupture, along with perihepatic free air (Figure 2). No thickening of the other parts of the colon or regional lymphadenopathy is observed. The CT scan also reveals a paraesophageal hernia (omentum with cardiac, partial fundus, and corpus of the stomach, accompanied by perigastric vessels in the left supradiaphragmatic posterior defect measuring 62 mm in ML and 64 mm in AP) (Figure 3).

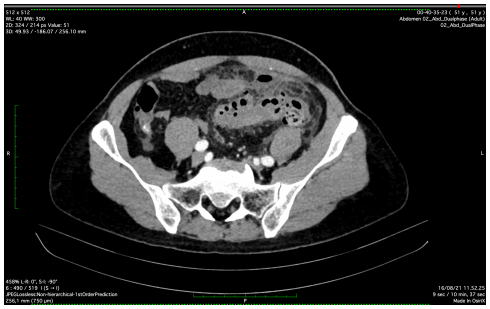


Figure 1. A diverticular abscess is adhering to the ventral wall of the major pelvic, along with diverticulitis in the distal descending colon to the distal sigmoid

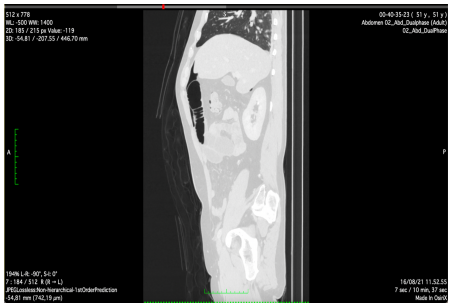


Figure 2. There is free air surrounding the thickened colon and suspicious perihepatic air suggesting a rupture



3.a 3.b



3.c

Figure 3. (3.a) Paraesophageal hernia, (3.b) with omentum involving the cardiac and partial fundus of the gaster, accompanied by perigastric vessels, and (3.c) in the left supradiaphragmatic posterior defect measuring 62 mm in medial length (ML) and 64 mm in anterior-posterior (AP) dimensions

For pain management, the patient was given analgesic therapy and hydration. Subsequently, the patient was scheduled for exploratory laparotomy and left hemicolectomy. During the intraoperative procedure, a laparotomy was performed, and a left hemicolectomy with Hartmann's procedure (stoma creation) was carried out (Figure 1). Following the surgical procedure, the patient was planned for a gradual diet, continued analgesic and antibiotic therapy. On postoperative day 2, the patient experienced postoperative ileus and insomnia. The patient received proton pump inhibitor (PPI), analgesics, antitussive, and vitamin B1 therapy. Additionally, the patient was scheduled for electroacupuncture therapy. After undergoing electroacupuncture therapy, the patient experienced improvement in his condition, with the ileus resolved as indicated by the

presence of flatus and bowel movements, and the patient being able to sleep. Additionally, the postoperative pain was significantly reduced.



Figure 4. Stoma in patient after Hartmann procedure.



Figure 5. Electroacupuncture therapy in patient

Discussion

Diverticulitis is an inflammatory condition of the diverticula located in the colon. Diverticula are protrusions of the mucosal and submucosal layers through the muscular layer of the colon wall. Several studies have shown a correlation between diverticulosis and hernia. One study discussing the relationship between diverticulosis and hernia is conducted by Oma et al. which states that changes in connective tissue or herniosis become etiological factors for the occurrence of colon diverticulosis and abdominal hernia (direct inguinal hernia and umbilical or epigastric hernia) (Oma et al., 2017).The occurrence of colon diverticulosis itself is closely associated with hiatus hernia (Hauer-Jensen et al., 2009).

The extracellular matrix (ECM) matrix with components of collagen, elastin, and proteoglycan plays a role in the integrity, strength, and flexibility of the intestinal muscle wall. Several studies have shown an increase in elastin levels and a decrease in the ratio of collagen type I:III due to an increase in collagen type III, which leads to stiffness and reduced flexibility of the colonic wall, increasing the occurrence of diverticulosis, especially in individuals over 50 years of age (Brown et al., 2017; Von Rahden & Germer, 2012). This phenomenon is also found in hernias. A study conducted by Henriksen et al. also showed an increase in collagen type III in hernias, leading to a decreased ratio of collagen type I:III, decreased collagen quality, and increased collagen breakdown. It is known that 10-20% of diverticula develop into diverticulitis, and the coexistence of diverticulitis and hernia is a common disease encountered in clinical practice separately, while the simultaneous occurrence of both conditions is rare (Henriksen et al., 2011). In this case, it is interesting that the patient is 51 years old and has a paraesophageal hernia, which is part of hiatus hernia. Based on the previously discussed studies, the occurrence

of diverticulosis in patients with paraesophageal hernia may be attributed to changes in connective tissue, especially the increase in collagen type III in patients with paraesophageal hernia, thereby increasing the occurrence of diverticulosis.

Almost 10-25% of people with diverticulosis will experience acute diverticulitis in their lifetime. Diverticulitis is an inflammatory condition of the diverticula located in the colon. Acute diverticulitis can be classified according to the World Society of Emergency Surgery (WSES) guidelines as uncomplicated and complicated cases. Uncomplicated acute diverticulitis refers to localized inflammation of the diverticula with thickening of the colon wall and the potential development of small abscesses or phlegmon. Complicated acute diverticulitis, on the other hand, involves an infection that has spread far from the colon. Complications may include pericolonic abscess, fistula formation to other organs, perforation, obstruction, and peritonitis (Lanas & Latella, 2022; Sugi et al., 2020). In this case, the patient's acute diverticulitis falls under the category of complicated acute diverticulitis. The presence of pericolonic abscess, perforation indicated by free air in the upper abdomen and perihepatic area, signs of peritonitis, as well as complete bowel obstruction manifested by the inability to pass flatus and has constipation.

The clinical manifestations found in acute diverticulitis depend on the course of the disease. Acute diverticulitis presents with symptoms such as lower left quadrant abdominal pain that worsens with movement, changes in bowel habits including diarrhea (35%) and constipation (50%), nausea and vomiting associated with bowel obstruction, and fever (Lanas & Latella, 2022; Swanson & Strate, 2018). During the physical examination of acute diverticulitis, attention should be given to changes in temperature, heart rate, respiratory rate, and blood pressure to assess the patient's hemodynamics. Abdominal examination focuses on assessing the location of pain (lower left quadrant of the abdomen and/or suprapubic area, indicating sympathetic cystitis), checking for tenderness, rebound tenderness, abdominal distension, and palpable abscess mass. Bowel sounds may be decreased or increased (sign of obstruction) or absent (sign of perforation) upon abdominal auscultation (Hawkins et al., 2020; Swanson & Strate, 2018). In this case, the patient already exhibits symptoms of complicated acute diverticulitis, including worsening lower left abdominal pain with walking, nausea, constipation, tenderness in both the left quadrant and suprapubic area during physical examination, and increased bowel sounds, indicating the presence of obstructive ileus.

Diagnostic imaging for diverticulitis includes a complete blood count to look for signs of inflammation and a CT scan. CT scan is considered the gold standard imaging modality for diagnosing diverticulitis, staging the disease, and planning the appropriate therapy. CT scan has a sensitivity and specificity of 95% each (Hall et al., 2020; Sartelli et al., 2020). The severity of diverticulitis can be determined through CT scan findings. Moderate diverticulitis is characterized by (1) localized thickening of the sigmoid colon wall (> 5mm), (2) pericolonic fat stranding, while severe diverticulitis is characterized by abscess formation, extraluminal gas, and extraluminal contrast. Furthermore, based on specific CT scan findings in diverticulitis, the staging of diverticulitis can be based on the latest Hinchey classification performed by Saterli et al., and the management is as follows (Hall et al., 2020; Roccatagliata et al., 2020; Schultz et al., 2020):

a. Stage 0: Diverticula with thickening of the colon wall and increased pericolonic fat density. If the patient's general condition is good, outpatient therapy with or

without antibiotics is recommended. Patients with signs of sepsis and comorbidities should be hospitalized and receive intravenous antibiotics.

b. Stage IA: Small pericolonic air bubbles or free pericolonic fluid abscess. Treatment with intravenous or oral antibiotics and inpatient observation is recommended.
c. Stage IB: Abscess < 4 cm (without distant free air). Hospitalization and intravenous antibiotic administration are recommended, and in case of treatment failure, percutaneous drainage with imaging should be performed.
d. Stage IIA: Abscess > 4 cm (without distant free air), percutaneous drainage with imaging should be performed.
e. Stage IIB: Presence of distant free air (> 5 cm from the inflamed intestinal segment). If the patient is stable without comorbidities, conservative management with potential percutaneous drainage with imaging is recommended; if not, surgical resection should be performed with or without anastomosis.
f. Stage III: Diffuse free fluid without pneumoperitoneum. If the patient is stable without comorbidities, lavage and laparoscopic drainage are recommended; if not, surgical resection should be performed with or without anastomosis.
g. Stage IV: Diffuse free fluid associated with pneumoperitoneum. Surgical resection with or without anastomosis is recommended.

In this case, the complete blood count (CBC) revealed an increase in neutrophil count, indicating signs of inflammation. The patient with acute diverticulitis underwent a CT scan immediately. Based on the CT scan findings, the patient is classified as having severe diverticulitis due to the presence of abscess and extraluminal air. Specifically, the patient falls under Hinchey III staging for diverticulitis. The patient received antibiotics and underwent exploratory laparotomy, followed by left hemicolectomy with a Hartmann procedure. This aligns with the management of acute diverticulitis according to the WSES guidelines, which recommend antibiotic therapy for complicated cases and suggest either laparoscopic lavage or colon resection with or without anastomosis for Hinchey III cases. However, laparoscopic lavage does not show superior results compared to colon resection. The WSES guidelines also recommend the Hartmann procedure (resection of the rectosigmoid, with closure of the anus and formation of a colostomy) for patients with diffuse peritonitis, severe pain, and multiple comorbidities. For stable patients without comorbidities, the primary recommended intervention is colon resection with or without anastomosis (Sartelli et al., 2020).

In this case, the patient experienced postoperative ileus and insomnia. Postoperative ileus is known as an enteroplegia or a disturbance in intestinal function that often occurs after colon resection surgery and can last for 2-4 days. If it lasts longer than that, it is referred to as paralytic ileus.Recent studies have shown the benefits of electroacupuncture therapy in cases of postoperative ileus. Electroacupuncture is a modified acupuncture technique that involves the stimulation of specific acupuncture points with a small electric current in addition to traditional acupuncture. The study conducted by Cheong et al. demonstrates improvement in pain, bloating, flatulence, constipation, appetite, nausea, vomiting, and fever in postoperative ileus patients who received electroacupuncture therapy (Cheong et al., 2016). The study conducted by Man Luo et al. also demonstrates the benefits of electroacupuncture therapy in addressing sleep quality issues or postoperative insomnia due to general anesthesia. Electroacupuncture can regulate

serotonin, norepinephrine, cortisol, melatonin, and endogenous substances that indirectly affect sleep quality (Luo et al., 2020). In this case, electroacupuncture therapy was also performed to manage postoperative ileus and insomnia in the patient. The patient experienced improvement in his condition, with the ileus resolved as indicated by the presence of flatus and bowel movements, and the patient being able to sleep. Additionally, the postoperative pain was significantly reduced.

Conclusion

Diverticulosis and hernia are closely associated with changes in connective tissue, which increases the occurrence of diverticulosis and hernia. Approximately 10-20% of diverticulosis cases progress to acute diverticulitis. In cases where patients present with clinical manifestations such as lower left abdominal pain worsened by walking, nausea, and signs of obstructive ileus, acute diverticulosis with complications should be suspected, requiring immediate management. CT scan is considered the gold standard and should be promptly performed to establish the diagnosis of diverticulitis, staging of the disease, and determining the appropriate treatment plan. In Hinchey III classification of diverticulitis, laparoscopic lavage or colon resection with or without anastomosis is recommended, although laparoscopic lavage does not show superior results compared to colon resection. Additionally, the Hartmann procedure is recommended for managing patients with diffuse peritonitis, severe pain, and multiple comorbidities. Electroacupuncture therapy can be applied to patients with postoperative ileus and insomnia, and showed improvement of the condition.

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