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Chilaiditi Syndrome Complicated by a Small Bowel Obstruction

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Abstract: *Chilaiditi sign is a rare incidental radiographic finding where bowel is interposed between the diaphragm and the liver, often appearing as air under the right hemidiaphragm. Most patients with Chilaiditi sign are asymptomatic and remain so throughout their lives. When Chilaiditi sign becomes symptomatic, it is referred to as Chilaiditi syndrome, a very rare cause of bowel obstruction. Given the significant financial burden of bowel obstruction on the healthcare system, studying even rare etiologies is valuable. In Chilaiditi syndrome, the presence of free air under the right hemidiaphragm can mistakenly suggest pneumoperitoneum, leading to unnecessary emergent surgical evaluations. By considering a broad differential diagnosis and clinical presentation, physicians can avoid inappropriate allocation of resources and unnecessary surgeries. Keeping Chilaiditi syndrome in the differential diagnosis can help prevent unnecessary interventions, reduce patient costs, and avoid complications. Typically, bowel obstruction due to Chilaiditi syndrome is managed conservatively with intravenous fluids, bowel rest, decompression, and laxatives. Surgical intervention may be required if symptoms worsen and progress to complete bowel obstruction, with positive outcomes often observed. We report a case of a 64-year-old male who presented to the emergency department with a 5-day history of right-sided abdominal pain, obstipation, and vomiting. CT imaging incidentally revealed colonic interposition with mild colonic dilatation. The patient was diagnosed with small bowel obstruction secondary to Chilaiditi syndrome and underwent surgical treatment with a rapid recovery.*

Keywords : colonic interposition, bowel obstruction, chilaiditi syndrome, chilaiditi sign, adult astroenterology

Introduction

Chilaiditi syndrome is a rare disease in which intestinal obstruction is caused by hepatodiaphragmatic interposition of the colon or small bowel. Demetrius Chilaiditi described the first cases of this disease in 1910. [1] Most patients with this intestinal anomaly are asymptomatic throughout their lives; however, they can manifest with intermittent abdominal pain, distention, vomiting, anorexia, and constipation that on rare occasions require surgical intervention. [2]

Case report

A 64-yr-old male presented to the emergency department with 5 days history of right-sided abdominal pain, obstipation and vomiting. He denied having such symptoms previously.
His medical history included chronic nonspecific gastritis and his home medication included omeprazole
He had no significant past surgical history. He was a non-smoker.

On physical examination, he was hemodynamically stable. Her abdomen was distended with decreased bowel sounds, tenderness in the right upper quadrant, and a positive Murphy sign with rebound tenderness.

Computed tomography (CT) scans of the abdomen and pelvis performed with intravenous and oral contrast demonstrated an aspect in favor of a mechanical small bowel obstruction upstream of a pseudo-hernia sac containing ileum with signs of digestive distress, between the inferior surface of the right hemidiaphragm and the liver (Figure 1), likely due to a volvulus on a probable incomplete common mesentery, the gallbladder is non-distended with a thin wall and no lithiasis visible on the scan.

After stabilization, the patient was admitted to the operating room. Exploration through a median laparotomy incision revealed an incomplete common mesentery, distension of the small bowel upstream of a strangulated and gangrenous loop (30 cm from the ileocecal valve) between the liver and the right hemidiaphragm, consistent with Chilaiditi syndrome (Figure 2). It was decided to perform a resection of the gangrenous loop and create a double stoma using the Bouilly-Volkmann technique.
The postoperative course was uncomplicated, and the patient was able to leave the hospital on the 5th postoperative day. The patient is scheduled for continuity restoration in 3 months.

Discussion

In 1910, radiologist Demetrius Chilaiditi first described three patients with bowel interposed between the liver and the right hemidiaphragm. The Chilaiditi sign refers to this incidental radiologic finding of colonic or intestinal interposition in the

hepatodiaphragmatic area of an asymptomatic patient. This sign is often mistakenly interpreted as pneumoperitoneum. The prevalence of the Chilaiditi sign in the general population ranges from 0.025% to 0.28%, and it is more common in males than females. The bowel segments most frequently found between the liver and the diaphragm or abdominal wall are the colonic hepatic flexure and transverse colon, although cases of small bowel interposition have also been documented. [4, 5]

Physiological and anatomical patterns of hepatic and colonic embryogenesis generally prevent the development of colonic interposition. Factors that predispose individuals to the Chilaiditi sign include reduced liver size, elongation of the liver's ligamentous attachments, and colon redundancy. Congenital anomalies and conditions associated with this sign include right hepatic lobe segmental agenesis, relaxation or agenesis of the mesenteric suspensory ligaments, chronic constipation, redundant and hypermobile transverse mesentery and transverse colon, and significant weight loss. Severe chronic obstructive pulmonary disease (COPD) is another significant cause, as it leads to elongation of the lower thoracic cage diameter, creating more space for colonic interposition. Additionally, congenital hernias or diaphragmatic eventration can elevate the right hemidiaphragm, increasing the likelihood of Chilaiditi sign development. Characteristics frequently associated with Chilaiditi sign—such as cirrhosis, ascites, and decreased liver size—enlarge the space between the liver and diaphragm, and these conditions occur in up to 5% of patients. [6]

Patients with Chilaiditi syndrome often exhibit symptoms of bowel obstruction, such as anorexia, nausea, vomiting, abdominal pain, distension, and constipation. [7] In this case study, the patient presented with these symptoms and also experienced right shoulder pain due to diaphragmatic irritation.

Chilaiditi syndrome has been linked to volvulus of the transverse colon. Normally, the anatomy and mesenteric attachments prevent the transverse colon from rotating and forming a volvulus. However, increased colonic mobility and a site of axial colonic rotation can predispose patients to developing a volvulus. Specific factors contributing to a transverse colon volvulus include congenital malrotation of the midgut and associated agenesis of the phrenocolic ligament or shortening of the mesenteric root.

The diagnosis of Chilaiditi syndrome is based on clinical findings and imaging results from plain radiographs and CT scans. CT imaging of the abdomen helps differentiate between subphrenic fluid, true pneumoperitoneum, and air within the bowel lumen. This distinction is crucial for diagnosing hollow viscus perforation, which can complicate Chilaiditi syndrome if the affected bowel segment becomes strangulated and eventually perforates. [8] Radiologic differentiation is made by noting elevation of the right hemidiaphragm due to caudal displacement of the liver, the presence of haustral markings between the liver and diaphragmatic surface, and the absence of image displacement with changes in the patient's position. Pneumoperitoneum and subdiaphragmatic fluid collections are mobile on lateral decubitus radiographs and are often associated with pulmonary findings such as ipsilateral pleural effusion and basilar atelectasis.

In most cases of Chilaiditi syndrome, management is conservative, involving bowel decompression, bowel rest, and aggressive fluid rehydration. [9] If conservative treatment fails, an exploratory laparotomy is recommended. [10] Failure of nonsurgical management in Chilaiditi syndrome has been linked to colonic volvulus and obstruction. [11] To date, there have been no reports of small bowel obstruction requiring surgical intervention in patients with Chilaiditi syndrome.

Summary

Chilaiditi syndrome is an uncommon type of bowel obstruction resulting from the interposition of the colon or small bowel into the hepatodiaphragmatic space. While this condition typically resolves with conservative treatment, the patient in this case report experienced a closed-loop small bowel obstruction that necessitated surgical intervention.

Figures:

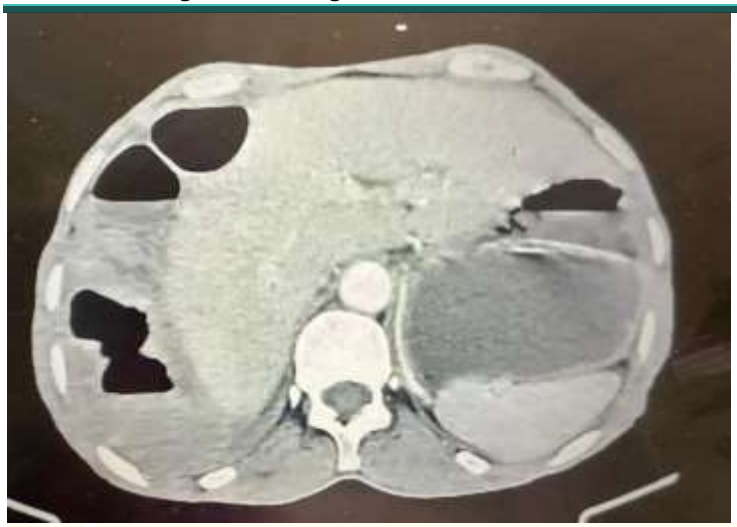

Figure **1** shows a loop of small bowel located between the liver and the abdominal wall

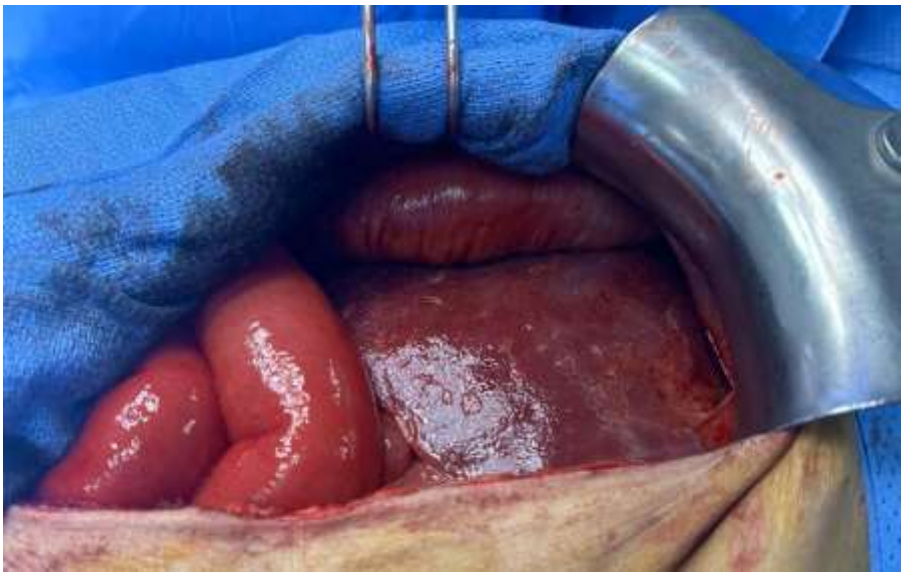

Figure 2 : Intraoperative image of bowel interposition between the right liver and the right hemidiaphragm

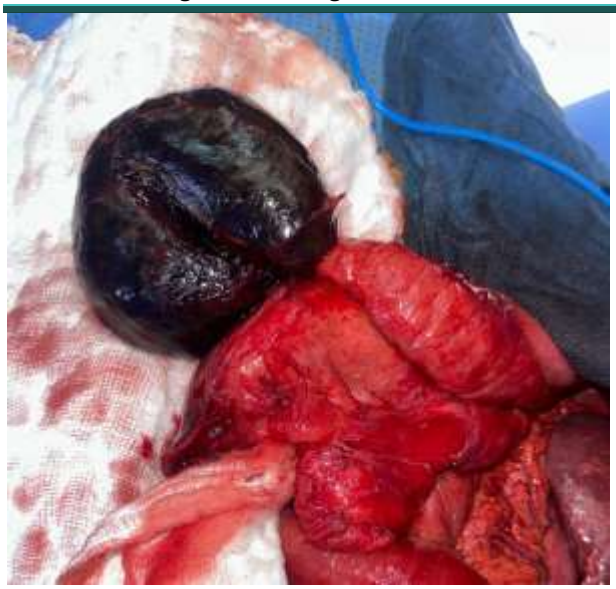

Figure 3 : strangulated and gangrenous loop

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