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# Chilaiditi's Sign: A Rare Differential Diagnosis of Pneumoperitoneum "Case Report"

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## Abstract

Chilaiditi's sign describes the incidental radiographic finding of the bowel positioned between the right diaphragm and the liver. This is a rare condition typically mistaken for pneumoperitoneum, which may lead to unnecessary investigations or surgical procedures. CT scan can confirm the diagnosis. Here, we report a case of incidental chest radiograph findings of air under the diaphragm in a patient who was suffering from hypochondrial pain. This case highlights the importance of awareness of the diagnosis of Chilaiditi's sign to avoid unnecessary exploratory laparotomies.

**Keywords:** Anti-Depressants, Depression

## Pharmaceutical drugs can cause permanent harm

The Chilaiditi sign is a radiological sign that results in the interposition of the large or small intestine, between the liver and the right diaphragm. When this leads to gastrointestinal symptoms, it is called Chilaiditi syndrome [1].

Chilaiditi sign and syndrome are rare and often misdiagnosed. Indeed, the incidence of this syndrome in the general population varies from 0.025% to 0.28% [2]. They are, however, clinically significant, as they can lead to complications including intestinal volvulus, perforation and obstruction [3]. This sign is typically mistaken for pneumoperitoneum, which may lead to unnecessary investigations or surgery [4]. Its treatment is often conservative based on hydration and laxatives and surgery is reserved for complicated cases.

## Patient and Observation

We present a 60 year old patient, without significant past medical history, presented to the emergency department with acute right hypochondrial pain, occurring post-prandially and radiating into the hemi-girdle, associated with bilious vomiting, terminal constipation without fever, jaundice or cessation of feces and gas. The physical examination was normal except an overweight with a BMI of 26.9 kg/m². The biology was normal, notably no biological inflammatory syndrome, nor any disturbance of the hepatic or renal balance. The chest X-ray demonstrated a gaseous image under right hemidiaphragm, suggesting the presence of pneumoperitoneum (Figure 1). As these findings were in contrast with the clinical examination of the patient, further imaging by CT scan of the chest, abdomen, and pelvis was performed. The latter showed a moderately steatotic liver and an interposition of the colon loops between the liver and the diaphragm mimicking free air (Figure 2), defining the Chilaiditi sign. No complications were noted, notably no intestinal volvulus, occlusion, bowel ischemia or colonic perforation. Thus our management was mainly symptomatic and consisted of oral analgesics associated with intravenous hydration and laxative treatment. The evolution was marked by a rapid resolution of his symptomatology and he was discharged 24 hours later.

## Discussion

Intestinal interposition may involve multiple organs, for example, the liver and diaphragm, the spleen and diaphragm, the spleen and left kidney, or the stomach and pancreas. This interposition is called a Chilaiditi sign when it is hepatodiaphragmatic, and a non-Chilaiditi sign when it involves the other organs [5].

The interposed bowel is usually the right colonic angle and less frequently the small bowel, which occurs in 3% to 5% of cases of Chilaiditi sign [6].

The incidence of Chilaiditi syndrome increases with age and has a significant male predominance [7].

The etiology of Chilaiditi's sign is not fully understood, and only few information is available in the literature about its pathogenesis.

However, several factors have been implicated in the induction of this pathological interposition of the colon. These factors may be hepatic such as atrophy due to cirrhosis or congenital etiology (e.g, congenital liver cleft or elongation of suspensory ligaments), diaphragmatic such as ventration or phrenic nerve injury, intestinal, or other.

Intestinal factors are dominated by megacolon, dolichocolon or hypermobile colon with constipation and abnormal gas accumulation due to aerophagia. This may be due to a lack of diaphragmatic function and other factors such as absence, laxity, or elongation of the suspensory ligament of the transverse colon [8].

Other factors leading to enlargement of the lower thoracic cavity (chronic obstructive pulmonary disease), increased intra-abdominal pressure (obesity, multiple pregnancies, and ascites), mental retardation, and schizophrenia, which in combination with anatomical abnormalities, may cause Chilaiditi's sign [8]. Intraperitoneal adhesion, which is caused by previous surgery, or tumor metastasis, is also one of the factors [6]. In a study conducted in China, reviewing the seven cases of Chilaiditi syndrome published in the Chinese literature between 1990 and 2013 [6], two cases were accompanied by malignancies, one had rectal cancer and the other had mesenteric lymphosarcoma.

In addition, psychotropic drugs [9] and iatrogenic factors [6], such as endoscopic procedures, have been reported as causative factors. In our present case, colonic interposition was most likely due to constipation and overweight.

Chilaiditi's sign must be differentiated from pneumoperitoneum by radiography. In contrast to Chilaiditi's sign, pneumoperitoneum normally shows a crescent-shaped gas shadow under the diaphragm, without colonic haustrations or connivant valves, and alteration of the patient's posture changes the position of the gas [6].

Chilaiditi's sign does not require any treatment. Mildly symptomatic patients can be managed conservatively with bed rest, intravenous fluids, nasogastric decompression, enemas, high fiber diet, and stool softeners as reported in our case.

Surgical treatment is indicated in the complicated forms of the disease, or when symptoms do not resolve with conservative management [6].

## Conclusion

In conclusion, Chilaiditi syndrome is rare. It may present with acute abdominal pain. Typically, in trauma surgery, the presence of « pneumoperitoneum» on the initial chest radiograph indicates immediate laparotomy. This case helps clinicians to become familiar with this syndrome and its management and highlights that this sign should be considered in all patients with air under right sub diaphragm and who do not show signs of peritonitis in order to avoid useless surgery.

## Competing Interests

The authors declare no competing interest.

## Authors' Contributions

Cyrine Makni: wrote the manuscript and studied the concepts. Souissi Salma: helped in data interpretation and manuscript evaluation. Olfa Bousnina and Leila Belhadj Ammar: involved in data acquisition. Lamia Kallel and Imene Ridene: critically revised the manuscript.

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