

Chilaiditi's Sign: A Case Report

Raman J. Sohal¹, Steven H. Adams¹, Vishal Phogat², Ceren Durer³, Abha Harish³

1. Medicine, SUNY Upstate Medical University, Syracuse, USA 2. General Medicine, S.G.T. Medical College, Hospital & Research Institute, Gurgaon, IND 3. Internal Medicine, SUNY Upstate Medical University, Syracuse, USA

✉ **Corresponding author:** Raman J. Sohal, rjeetsohal@gmail.com

Abstract

Chilaiditi's sign refers to the interposition of the colon (usually the transverse colon) between the diaphragm and the liver. When associated with abdominal pain it is referred to as Chilaiditi's syndrome. Chilaiditi's sign is rare entity with an estimated incidence of 0.025 to 0.28% worldwide. The sign occurs more frequently in males, with a male to female ratio of 4:1. Apparent pneumoperitoneum seen on imaging below the right hemidiaphragm, a life-threatening condition, may in fact be merely Chilaiditi's sign. Awareness of this phenomenon and its consideration as a differential diagnosis is essential to prevent unnecessary laparoscopic intervention.

Here we present a case of a 74-year-old male who was incidentally found to have free air under the diaphragm without symptoms of abdominal pain. After further evaluation by the radiologists and surgeons it was concluded that he had Chilaiditi's sign and no further intervention was required. However, due to the lack of awareness of this radiographic finding patients can be subjected to unnecessary surgical intervention.

Categories: General Surgery, Emergency Medicine, Internal Medicine

Keywords: chilaiditi's sign, pneumoperitoneum, syndrome, abdominal pain, surgical intervention

Introduction

Chilaiditi's sign refers to the interposition of the colon (usually the transverse colon) between the diaphragm and the liver. When associated with abdominal pain it is referred to as Chilaiditi's syndrome. Chilaiditi's sign is uncommon with an estimated incidence of 0.025 to 0.28% worldwide [1]. The sign occurs more frequently in males, with a male to female ratio of 4:1 [2]. Apparent pneumoperitoneum seen on imaging below the right hemidiaphragm, a life-threatening condition, may in fact be merely Chilaiditi's sign. Awareness of this phenomenon and its consideration as a differential diagnosis is essential to prevent unnecessary laparoscopic intervention [1-3].

Case Presentation

A 74-year-old male came to the ED with the acute onset of worsening back pain and lower extremity weakness. His past medical history included chronic lower back pain from severe spinal stenosis, hypothyroidism, hypertension, hyperlipidemia, anxiety, benign prostatic hyperplasia, and a pulmonary nodule. Upon review of symptoms, he was found to have chills and decreased activity. Initially, there was concern for cord compression and epidural abscess. He denied any history of fever, nausea, vomiting, or abdominal pain at admission. He reported no history of recent changes in his bowel or bladder habits. He described having had dental work performed two weeks prior to presentation.

How to cite this article

Sohal R J, Adams S H, Phogat V, et al. (November 25, 2019) Chilaiditi's Sign: A Case Report. Cureus 11(11): e6230. DOI 10.7759/cureus.6230

Received 11/06/2019

Review began 11/06/2019

Review ended 11/21/2019

Published 11/25/2019

© Copyright 2019

Sohal et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 3.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

CT spine showed severe degenerative lumbar spine along with multilevel cervical spine stenosis. Neurosurgery was consulted who recommended MRI. Preliminary blood cultures grew gram positive cocci in clusters and the patient was started on vancomycin plus cefazolin. ID team was consulted and they recommended to continue with vancomycin and cefazolin until final blood culture report. Repeat blood culture grew MSSA. The source of infection was thought to be abscess in spine, however, MRI cervical/thoracic/lumbar spine showed no evidence of osteomyelitis, epidural abscess or cord compression. Yet, it showed multilevel severe spinal canal stenosis worse at L4-L5 along with multilevel bilateral neuroforaminal stenosis. Neurosurgery recommended only pain management and no acute intervention stating the surgery can be done in the outpatient setting. The patient was started on intravenous oxacillin 2 gram every four hours for total of four weeks of therapy.

A transesophageal echo was obtained which showed small 4-mm linear echo density on the ventricular side of the left coronary cusp of the aortic valve. Differentials included Lambl's excrescence versus valvular vegetation. Cardiovascular surgery recommended against the intervention and to continue with conservative measures; antibiotics and pain management. The source of the patient's MSSA bacteremia was deemed to be secondary to infective endocarditis.

A CT chest was performed inpatient to further elucidate the pulmonary nodule. During this exam CT chest showed bubbles of gas in the upper abdomen, rendered likely intraluminal by the radiologist's report. The CT chest finding was followed up with a CT abdomen to rule out pneumoperitoneum. CT abdomen reported Chilaiditi sign with anterior interposition of the colon to the liver (see Figures 1-2). No bowel perforation, small bowel obstruction, or surrounding inflammatory changes were noted on CT imaging.



FIGURE 1: CT of the abdomen. Red arrow shows the interposition of bowel loops anterior to the liver.



FIGURE 2: CT of the abdomen. Red arrows show loops of bowel in the right subdiaphragmatic space.

Discussion

Chilaiditi's sign is the malposition of the colon between the diaphragm and the liver. Thus, it is the manipulation of any of these three organs (the diaphragm, liver, or colon) which can predispose to such organ misplacement. The diaphragmatic causes include any factor that raises the diaphragm, thereby increasing the space between it and the liver. These include phrenic nerve palsy which produces a right-sided diaphragmatic hemiparesis, and the congenital loss of the muscular fibers of the diaphragm which can result in diaphragmatic eventration [3]. Potential hepatic causes of Chilaiditi's sign are the loss of tone in the falciform ligament, which normally functions to connect the liver to the anterior abdominal wall and

diaphragm, or a small liver secondary to cirrhosis or hepatectomy [4]. Dolichocolon, an abnormally long large intestine, can also be a cause of Chilaiditi's sign as the extra colon finds home in random spaces [5]. Ascites and obesity have also been associated with increased risk of developing Chilaiditi's sign [4,6]. Additionally, patients with abdominal adhesions are at risk. These fibrous tissue bands, if formed between the correct organs, may facilitate the colon's interposition between the liver and diaphragm [7].

Symptomatic patients will frequently present with nausea, vomiting, and loss of appetite [8]. Cases of Chilaiditi's sign causing severe dyspnea have also been reported [9-11]. A diagnosis of Chilaiditi's is based on imaging with techniques including chest or abdominal X-rays, CT scanning, or sonography [12]. In some cases, such as with our patient, more than one imaging series or modality may be necessary to make the diagnosis with certainty [5]. If symptomatic and left untreated, severe complications include intestinal obstruction, bowel wall ischemia and perforation, and respiratory failure. However, conservative treatment including bed rest, IV fluids, endoscopic bowel decompression, and laxatives is often sufficient [13]. Surgical intervention should be considered in patients who show no improvement with conservative measures and those with serious complications [14].

Chilaiditi's sign in our patient was an incidental finding on a CT thorax. His presentation fit with the epidemiology of the disease described in the literature - elderly males [6]. However, he did not appear to have any of the risk factors, such as cirrhosis, ascites, obesity, a history of abdominal surgery causing adhesions, or diaphragmatic palsy, that could predispose him to the interposition of intestine between liver and diaphragm. This atypical finding was concerning and led to a follow-up CT abdomen and pelvis which revealed no pneumoperitoneum, bowel obstruction or perforation. Per hospital protocol, the surgical service was consulted and based upon their clinical evaluation of the patient a recommendation was made to continue with conservative management.

Conclusions

Chilaiditi syndrome is relatively uncommon and is easily misdiagnosed. This case highlights the importance of clinical awareness of this sign among physicians to reduce the need for unnecessary surgical intervention.

Additional Information

Disclosures

Human subjects: Consent was obtained by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Risaliti A, De Anna D, Terrosu G, Uzzau A, Carcoforo P, Bresadola F: Chilaiditi's syndrome as a surgical and nonsurgical problem. *Surg Gynecol Obstet.* 1993, 176:55-58.
2. Yin AX, Park GH, Garnett GM, Balfour JF: Chilaiditi syndrome precipitated by colonoscopy: a case report and review of the literature. *Hawaii J Med Public Health.* 2012, 71:158-162.
3. Gulati MS, Wafula J, Aggarwal S: Chilaiditi's sign possibly associated with malposition of chest tube placement. *J Postgrad Med.* 2008, 54:138-139. [10.4103/0022-3859.40781](https://doi.org/10.4103/0022-3859.40781)

4. Cawich SO, Spence R, Mohammed F, Gardner MT, Sinanan A, Naraynsingh V: The liver and Chilaiditi's syndrome: significance of hepatic surface grooves. *SAGE Open Med Case Rep.* 2017, 5:2050313X17744979. [10.1177/2050313X17744979](https://doi.org/10.1177/2050313X17744979)
5. Moaven O, Hodin RA: Chilaiditi syndrome: a rare entity with important differential diagnoses. *Gastroenterol Hepatol (N Y).* 2012, 8:276-278.
6. Murphy JM, Maibaum A, Alexander G, Dixon AK: Chilaiditi's syndrome and obesity. *Clin Anat.* 2000, 13:181-184. [10.1002/\(SICI\)1098-2353\(2000\)13:3<181::AID-CA4>3.0.CO;2-7](https://doi.org/10.1002/(SICI)1098-2353(2000)13:3<181::AID-CA4>3.0.CO;2-7)
7. Fiumecaldo D, Buck L: Chilaiditi's syndrome causing high-grade small-bowel obstruction requiring exploratory laparotomy. *Mil Med.* 2018, 183:281-283. [10.1093/milmed/usx069](https://doi.org/10.1093/milmed/usx069)
8. Teoh SW, Mimi O, Poonggothai SP, Liew SM, Kumar G: Pneumoperitoneum or Chilaiditi's sign. *Malays Fam Physician.* 2016, 11:22-24.
9. Messina M, Paolucci E, Casoni G, Gurioli C, Poletti V: A case of severe dyspnea and an unusual bronchoscopy: the Chilaiditi syndrome. *Respiration.* 2008, 76:216-217. [10.1159/000093323](https://doi.org/10.1159/000093323)
10. Belkouch A, Htit A, Zidouh S, Belyamani L: Dyspnoea caused by a Chilaiditi syndrome: contribution of the non-invasive ventilation. *BMJ Case Rep.* 2013, 2013:bcr2013010421. [10.1136/bcr-2013-010421](https://doi.org/10.1136/bcr-2013-010421)
11. Rosa F, Pacelli F, Tortorelli AP, Papa V, Bossola M, Doglietto GB: Chilaiditi's syndrome. *Surgery.* 2011, 150:133-134. [10.1016/j.surg.2009.11.023](https://doi.org/10.1016/j.surg.2009.11.023)
12. Nakagawa H, Toda N, Taniguchi M, Ibukuro K, Tagawa K: Prevalence and sonographic detection of Chilaiditi's sign in cirrhotic patients without ascites. *AJR Am J Roentgenol.* 2006, 187:589-593. [10.2214/AJR.05.0597](https://doi.org/10.2214/AJR.05.0597)
13. Van Den Heede K, Van Slycke S: The Chilaiditi syndrome: another Greek tragedy? Case report and short review of literature. *Acta Chir Belg.* 2014, 114:352-354.
14. Bin Waqar SH, Mohiuddin O, Khan AA, Ehtesham M: Gut entrapped in the thorax: a rare presentation of abdominal pain in Chilaiditi syndrome. *Cureus.* 2019, 11:e5180. [10.7759/cureus.5180](https://doi.org/10.7759/cureus.5180)