



Case report

The air up there - Chilaiditi's syndrome: A case report and review of the literature

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ABSTRACT

Chilaiditi's sign is the presence of radiolucency in the subdiaphragmatic space as a result of colonic interposition, often misdiagnosed as a pneumoperitoneum. It is caused by anatomical variations that result in transpositioning of bowel within the subdiaphragmatic space. Chilaiditi's syndrome is the presentation of cardiac, respiratory or abdominal symptoms accompanied by Chilaiditi's sign. Symptomatic patients are managed with surgical intervention with the literature suggesting various resective and non-resective techniques to correct the anatomical defect. In this case an open right hemicolectomy was performed in attempt to remove the transpositioning bowel and a hepatopexy was performed to prevent any further reoccurrence of the syndrome. This case report highlights the diagnostic dilemma and management of Chilaiditi's syndrome in a resource constrained Sub-Saharan Hospital.

African relevance

- Radiolucency in the subdiaphragmatic space as a result of colonic interposition is termed Chilaiditi's sign.
- Symptoms that result from this anatomic variation is termed Chilaiditi's syndrome.
- Chilaiditi's syndrome poses diagnostic and therapeutic challenges in a resource-limited setting.

Introduction

The presence of radiolucency in the subdiaphragmatic space as a result of colonic interposition is termed Chilaiditi's sign when discovered on X-ray. Symptoms that result from this anatomic variation is termed Chilaiditi's syndrome, a rare condition with potentially devastating complications.

Case report

A 22-year-old female presented with a one-week history of right-sided pleuritic chest pain, without any significant gastrointestinal symptoms or constitutional symptoms however she did have Tuberculosis (TB) contact. She did not have any notable past medical or surgical history.

The clinical assessment confirmed a normotensive and afebrile

patient with a normal general examination. Abdominal examination revealed non-tender gaseous abdominal distension predominantly over the right side and no palpable masses. She had no signs of respiratory distress but was noted to have reduced breath sounds on the right middle and lower zones (both anterior and posterior). Cardiac and neurological examinations were normal. Laboratory studies showed: haemoglobin 11.5 g/dl, white cell count 6.8600 cells/cu, platelet count $243 \times 10^9/l$, blood urea nitrogen 2.4 mmol/l, creatinine 57 mmol/l, total protein of 67 g/l, albumin 22 g/l, alanine transaminase 11 U/l. Urinalysis did not reveal haematuria or signs of infection.

Upon admission, chest and abdominal radiographs (Fig. 1) were performed which revealed interpositioning of the right hepatic flexure and transverse colon between the right hemidiaphragm and liver. Computed Tomography (CT) revealed gross dilatation of the caecum, ascending colon and hepatic flexure and transverse colon (12 cm in diameter), as well as pneumatosis coli (Fig. 1).

A decision was made to offer the patient an exploratory laparotomy. Intra-operatively, ptosis of the liver, laxity of the falciform ligament and a large defect between the right hemidiaphragm and liver was noted thus right-sided hemicolectomy was performed.

Furthermore, in an attempt, to reduce the subdiaphragmatic dead space and prevent a recurrence, a hepatopexy was performed by suturing the falciform ligament to the anterior right hemidiaphragm as well as suturing the greater omentum to the peritoneal surface in the subdiaphragmatic space.

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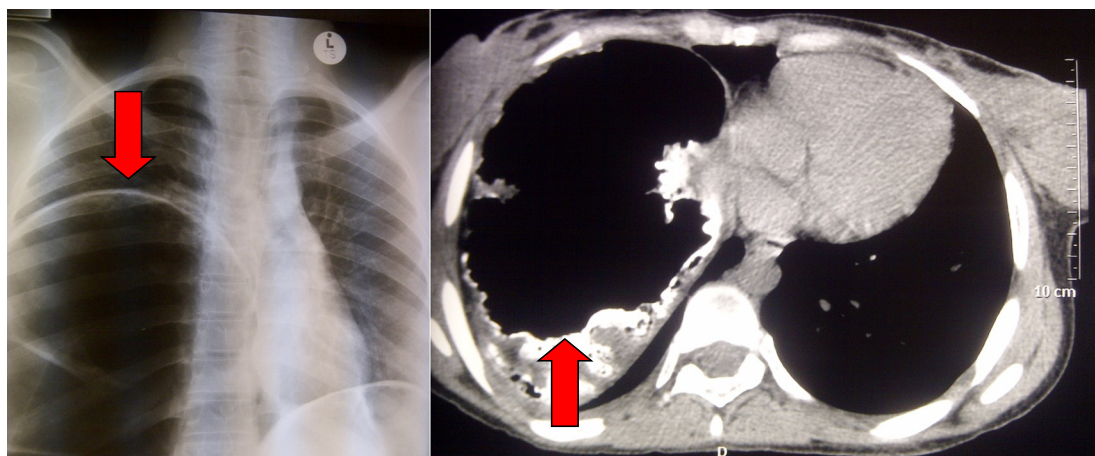


Fig. 1. Radiological studies of the patient.
Left: Erect Chest X-ray with transverse colon interpositioned in subhepatic space.
Right: CT Abdomen confirming colonic interposition.

Discussion

Demetrios Chilaiditi, a Greek radiologist first described three cases of right hemi-diaphragmatic interposition of the colon in 1910 [1]. Chilaiditi's sign describes an incidentally encountered radiological phenomenon of hemi-diaphragmatic interposition of bowel in an asymptomatic patient which can often be misdiagnosed as pneumoperitoneum [2]. Chilaiditi's sign prevalence is 0.025–0.28% on abdominal and chest radiographs, whilst the prevalence on computed tomography scans is in the region of 1.18–2.4% [2,3]. The age of presentation has a wide range from several months to patients in their ninth decade of life, with a significant predilection in males [2,4].

Chilaiditi's Syndrome refers to Chilaiditi's sign accompanied by clinical symptoms [2]. Symptoms are more commonly related to the gastrointestinal which include abdominal pain, nausea, vomiting, constipation and less commonly related to the cardiorespiratory system where symptoms include dyspnoea, respiratory distress and cardiac arrhythmias [3,4]. Normal abdominal anatomical structures such as the suspensory ligaments of the liver, colon and falciform ligament maintain the subhepatic space. Under normal physiology with the appropriate anatomical structures, the interposition of the bowel within the subhepatic space is not possible. The underlying aetiology of the sign has not been well defined, however it is suggested that any condition resulting in an enlarged right subdiaphragmatic space or hypermobile intestine can lead to the development of Chilaiditi's sign [4,5]. Possible causes of the condition can be classified anatomically as related to the diaphragm, liver, and intestines [4]. Diaphragmatic conditions can include phrenic nerve injury or muscle degeneration that results in an abnormally high diaphragm [4]. Hepatic causes include laxity within suspensory ligaments and conditions that result in a reduced liver volume [4]. Further aetiological factors include intestinal malrotation, deficient peritoneal attachments, colonic redundancy attributed to excess mesentery, as well as colonic dysmotility [4]. Intellectual disability and the psychotropic drug use for disorders such as schizophrenia, depression and post-traumatic stress disorder are associated with anatomical abnormalities that could result in Chilaiditi's syndrome [4,5].

Radiological and clinical evidence is key in securing a diagnosis of this syndrome. Plain abdominal X-ray classically depicts an elevated right hemidiaphragm with interpositioned bowel gas between the hemidiaphragm and liver [3]. A CT scan can settle the debate of the source of this gas shadow, be it interpositioning of the intestine in this space or free intraperitoneal air [4].

A noninterventional approach can reliably be adopted for an incidental finding of Chilaiditi's sign. Chilaiditi's Syndrome, however, should be treated conservatively by bed rest, nasogastric

decompression, stool softeners and intravenous hydration [4,6,7]. Emergency operative surgery is indicated if there are signs of intestinal obstruction, bowel ischaemia, perforation or subdiaphragmatic appendicitis [4,7]. There is no clear surgical guideline to the surgical management of bowel interposition [4]. Surgical procedures may be performed using open, laparoscopic or robotic surgery with a variety of procedures possible to correct the interposition [4,6–8]. Successful operative interventions described are varied including colonic resections ranging from a segmental resection to a subtotal colectomy together with a hepatopexy [4]. Literature suggests that resective surgery has a lower chance of recurrence of symptoms relative to non-resective procedures [7].

Conclusion

The importance of the Chilaiditi's sign lies in the fact that it can mimic a pneumoperitoneum and can furthermore mask a concomitantly existing pneumoperitoneum with disastrous consequences. A CT scan in this instance is often beneficial. Approach to an incidentally discovered Chilaiditi's sign is conservative unless a complication occurs warranting surgical intervention.

Author contribution

Authors contributed as follows to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: HAT and TP contributed 50% each. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Declaration of competing interest

The authors declare no conflict of interest.

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