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Coexistence of pneumothorax and chilaiditi sign: A case report

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PEER REVIEW

Peer reviewer

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Comments

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ABSTRACT

We present a case of 50 year old male patient with coexistence of Pneumothorax and Chilaiditi sign. Chilaiditi sign is an incidental radiographic finding of a usually asymptomatic condition in which a part of intestine is located between the liver and diaphragm; however, the term "Chilaiditi syndrome" is used for symptomatic hepatodiaphragmatic interposition. The patient had no symptoms of abdominal pain, constipation, diarrhea, or emesis. Incidentally, Chilaiditi sign was diagnosed on chest radiography. Pneumothorax is defined as air in the pleural space. Pneumothoraces are classified as spontaneous or traumatic. Spontaneous pneumothorax is labelled as primary when no underlying lung disease is present, or secondary, when it is associated with pre-existing lung disease. Our case is the rare in the literature indicating the coexistence of Chilaiditi sign and pneumothorax.

KEYWORDS

Chilaiditi syndrome, Chilaiditi's sign, Hepatodiaphragmatic interposition, Pneumothorax, Dyspnoea, Chest pain

1. Introduction

Pneumothorax is defined as air in the pleural space[1], while Chilaiditi sign is an incidental radiographic finding of a usually asymptomatic condition in which a part of intestine is located between the liver and diaphragm. However, the term "Chilaiditi syndrome" is used for symptomatic hepatodiaphragmatic interposition[2]. It occurs most often in elderly patients, and is fourfold more common in males than in females. This syndrome is a rare disorder in childhood[3]. Such sign was first described in 1865 by Cantini who observed it at clinical examination, but only in 1910, with the publication of a study reporting three cases, by Demetrius Chilaiditi, was it consolidated as a radiological diagnosis[4]. As per knowledge, in the existing literature, Chilaiditi sign was not previously described along with pneumothorax. Here we report a rare case in which pneumothorax is accompanied by Chilaiditi sign.

2. Case report

A 50 years old male patient was admitted to the Department of Respiratory Medicine, MM Institute of Medical Sciences and Research Hospital, with one day history of sudden dyspnoea, left sided chest pain and occasional cough. Dyspnoea was progressive in nature and increased on exertion. It was associated with left sided

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chest pain, which was non-radiating and no palpation or sweating was noted. Upon physical examination, he was afebrile with a respiratory rate of 72 breaths/min, heart rate of 92 beats/min and an oxygen saturation of 85% in room air and 89%-91% when 2-4 litres of oxygen was applied, with normal breath sounds. Air entry was decreased toward left side. His abdomen was non-distended and no mass or organomegaly were detected on palpation. Whole blood count and biochemistry measurements were within normal limits. Urgent chest X-ray revealed presence of air in left pleural space *i.e.* pneumothorax and dilated colonic loop under the right hemi diaphragm (Figure 1). Pneumothorax was treated immediately with chest tube placement under water seal drainage. Repeat chest X-ray confirmed the re-expansion of the lung (Figure 2). Chilaiditi sign was confirmed by abdominal ultrasonographic examination. Chest tube was removed on the fourth post procedure day and patient was discharged (Figure 3).

Figure 1. Chest X-ray showing pneumothorax on left side with chilaiditi sign.

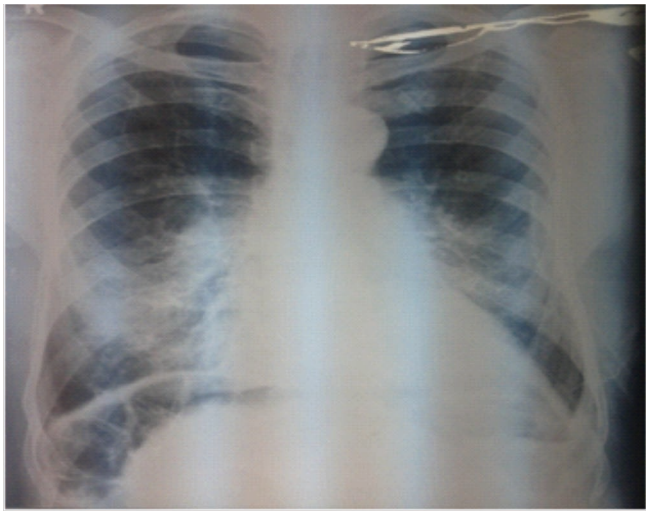

Figure 2. Chest X-ray showing expanded left side of lung with intercostal drainage tube in situ and chilaiditi sign.

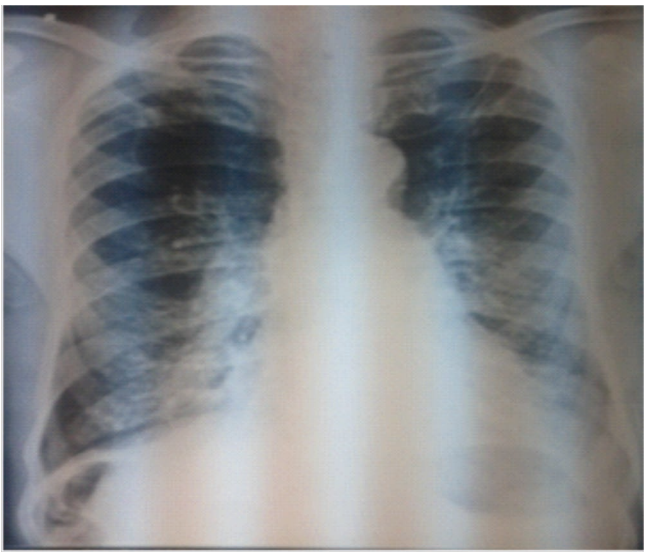

Figure 3. Chest X-ray of the same patient after removal of intercostal drainage tube.

3. Discussion

Hepatodiaphragmatic interposition of hollow viscera, colon or bowel, described in 1910 by Chilaiditi, is a rare entity that is generally incidentally found in imaging studies, with an incidence of up to 0.3% at plain chest radiography and 2.4% at chest/ abdominal computed tomography. In cases where such a sign is found in association with symptoms such as pain, nausea, dyspepsia and vomiting, it is called Chilaiditi's syndrome. Its cause still remains unknown, but it is probably multifactorial[4]. Predisposing factors can be categorized into diaphragmatic, intestinal, hepatic, and other miscellaneous causes (Table 1)[5].

Table 1

Predisposing factors for the development of chilaiditi's sign.

Causes	Examples
a) Diaphragmatic	Abnormally high diaphragm due to muscular degeneration or phrenic nerve injury
b) Hepatic	Cirrhosis
	Right lobe segmental agenesis
	Ptotic liver
	Relaxation or laxity of the suspensory ligaments
c) Intestinal	Abnormal or increased colonic mobility
	Elongated or redundant colon with long mesentery
	Absence of peritoneal attachments
	Malrotation or congenital malpositioning of the bowel
d) Miscellaneous	Ascites
	High abdominal fat content/obesity
	Pregnancy
	Aerophagia

Pneumothorax is defined as air in the pleural space which can be classified as spontaneous or traumatic. Spontaneous pneumothorax is labelled as primary where there is no underlying lung disease present, and secondary if it is associated with pre-existing lung disease. In primary spontaneous pneumothorax, 91% of cases are smokers, with the relative risk increasing with the number of cigarettes smoked, particularly in males. Other risk factors for primary spontaneous pneumothorax include a tall slim body type,

Marfan's syndrome, pregnancy, or a family history. Secondary spontaneous pneumothorax may be associated with chronic obstructive pulmonary disease (COPD), tuberculosis, sarcoidosis, cystic fibrosis, severe asthma, idiopathic pulmonary fibrosis, malignancy, necrotising pneumonia and HIV associated Pneumocystis carinii pneumonia. The incidence of primary spontaneous pneumothorax is 7.4-24/100 000 in men and 1.2-10/100 000 in women. Primary spontaneous pneumothorax occurs predominantly in adults in their second and third decades of life. The incidence of secondary pneumothorax is 6.3/100 000 in males and 2.0/100 000 in females; however, in individuals with COPD the incidence increases to 26/100 000 with a 3.5-fold increase in mortality associated with secondary spontaneous pneumothorax. Secondary spontaneous pneumothorax has been shown to peak in incidence in the 60- to 65-year age bracket[1].

Traumatic pneumothorax may be iatrogenic or non-iatrogenic. Causes of non-iatrogenic pneumothorax include penetrating or non-penetrating traumatic injuries, rib fractures, and high risk professions or sports including diving or flying. The common causes of iatrogenic pneumothorax include transthoracic needle biopsy, central venous subclavian vein catheterization, thoracentesis, transbronchial lung biopsy, pleural biopsy, intercostal nerve block, suprascapular nerve block, tracheostomy, nasogastric feeding tube placement, nephrectomy, gastrostomy, cardiopulmonary resuscitation, and positive pressure ventilation[1].

Our patient was a smoker who used to smoke Bidi. No relevant family history or history of trauma was given. Investigators identified Chilaiditi sign incidentally on chest X-ray done as a part of diagnosis for pneumothorax. The present case was treated with chest tube placement under water seal drainage and conservatively with oxygen, fluid supplementation and antibiotic therapy in the hospital. His respiratory symptoms disappeared; and repeat chest X-ray showed rexpansion of lung. However, the dilated colonic loop under the right hemi diaphragm did not disappear. Chest tube was removed on the fourth post procedure day and patient was discharged. This syndrome is a rare disorder, and we conclude that this rare entity should be kept in mind in patients with pneumothorax.

Conflict of interest statement

We declare that we have no conflict of interest.

Comments

Background

Chilaiditi's sign is a condition characterized by interposition of the small or large bowel between the liver and the right hemidiaphragm. It was first described in 1910 by Demetrious Chilaiditi and it is an incidental radiographic finding with prevalence of 0.025 to 0.25%. Pnumothorax is characterized by air in pleural cavity with incidence of primary spontaneous pneumothorax is 1-24/100 000. There is no clear etiology behind both conditions.

Research frontiers

The case report provide light about association of chiladiti sign and pneumothorax as coexistence which becomes important considering possibility of inadvertent bowel injury while managing pneumothorax. Further may help understand etiopathogenesis of both condition as true etiology remains unclear.

Related reports

There are reports of chiladiti being common in patients of COPD, a chronic respiratory condition associated with smoking which may be complicated by pneumothorax. The smoking is a risk factor for both primary spontaneous pneumothorax and COPD. So, the above association becomes important to unravel.

Innovations and breakthroughs

Primary spontaneous pneumothorax with Childatiti sign as coexistance is rare in the literature. Both the conditions have associations but no clear etiology and the present case gives a good starting point toward looking for this asscoiation.

Applications

Recognition of chiladiti sign in patients of pneumothorax becomes important as coexistence may increase chance of inadvertent bowel injury. Also there is possibility of mistaking bowel interposisition as pneumothorax unless haustral pattern and diaphragm are recognized. Also since the etiology of both conditions remain unclear. More work on this association may shed more light on etiopathogenesis.

Peer review

The case report puts in light a rare association of chiladiti sign which is characterized by bowel interposistion between liver and right hemidiaphragm and is an incidental finding ususally and primary spontaneous pneumothorax. Recognition of chiladiti sign in patients of pneumothorax becomes important as coexistence may increase chance of inadvertent bowel injury. Also there is possibility of mistaking bowel interposisition as pneumothorax unless haustral pattern and diaphragm are recognized. Also since the etiology of both conditions remain unclear. More work on this association may shed more light on etiopathogenesis.

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