A Pneumonia Patient with Worsening Respiratory Distress by Chilaiditi Syndrome: A Case Report

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Chilaiditi sign refers to the presence of bowel gas under the right diaphragm which is similar in appearance to a pneumoperitoneum on radiography, and is caused by abnormal anatomic positioning of the colon or small bowel between the liver and the diaphragm. When symptoms are present, this condition is known as Chilaiditi syndrome. The most common symptoms are gastrointestinal. It has been less commonly associated with chronic, recurrent respiratory distress. We report acute respiratory distress without gastrointestinal symptoms exacerbated by Chilaiditi syndrome in a pneumonia patient with no history of chronic respiratory disease.

Key Words: Chilaiditi syndrome, Respiratory distress, Pneumoperitoneum, Diaphragmatic hernia

Introduction

Chilaiditi sign refers to the presence of bowel gas under the right diaphragm that appears similar to a pneumoperitoneum on radiography, and is caused by abnormal anatomic positioning of the colon or small bowel between the liver and the diaphragm. When symptoms are present, this condition is known as Chilaiditi syndrome\(^1\). Chilaiditi sign is identified as an incidental radiographic finding and could be mistaken for subphrenic abscess, pneumoperitoneum, or diaphragmatic hernia\(^2\).

This condition is usually asymptomatic. However gastrointestinal symptoms are common, including abdominal pain, nausea, vomiting and constipation. Severe cases can appear bowel obstruction requiring surgical treatment, and dyspnea or chest pain may rarely appear\(^3\).

Respiratory distress has been reported in few patients with Chilaiditi syndrome\(^4\). In these cases, chronic, recurrent dyspnea with gastrointestinal symptoms such as recurrent abdominal pain was caused by Chilaiditi syndrome in adult patients. In pediatric patients, it causes recurrent respiratory symptoms and dyspnea.

In contrast to these cases, we report acute respiratory distress without gastrointestinal symptoms, exacerbated by Chilaiditi syndrome in a pneumonia patient without a history of chronic respiratory disease.

Case Report

An 81 year old woman admitted to a local hospital 4 days prior presented to our emergency room (ER) with...
cough, sputum and general weakness. The patient had undergone surgery for a left femur fracture one year ago and was currently on medication for hypertension and arthritis. On admission, pneumonia in the upper left lobe was found on the chest computed tomography (CT). Abrupt acute onset of worsening dyspnea began in the evening on the day of transfer. Chest x-ray showed extensive bowel gas in the right lung field, and the patient was transferred to ER with the diagnosis of diaphragmatic hernia.

In the ER, the patient complained of severe dyspnea, but no chest pain, abdominal pain, nausea, vomiting or diarrhea. Blood pressure was 190/106 mmHg, heart rate 138 beats/min, respiratory rate 34 breaths/min, body temperature 36.6°C and oxygen saturation 88% on 15 L/min of oxygen by mask.

On physical examination, the patient was alert, and chest auscultation revealed coarse breath sounds and wheezing in both lungs. The abdomen was not distended or tender. Due to wheezing, nebulized bronchodilator was administered.

Arterial blood gas analysis showed pH 7.34, PaCO₂ 47 mmHg, PaO₂ 54 mmHg, HCO₃ 25.4 mmol/L, and SaO₂ 85% with continuous administration of oxygen at 15 L/min by mask. Complete blood count revealed white blood cells 11740/μL, hemoglobin 12.5 g/dL, platelet 280,000/μL, no significant changes were found in chemical and electrolyte tests, C-reactive protein level was normal at 0.24 mg/dL, and cardiac enzymes were normal.

In the ER, chest x-ray showed elevation of the right

![CT images](image)

**Fig. 2.** No significant changes in ground glass opacity in the lingual lobe of the left lung are seen the chest CT from the local hospital (A) and our ER (C). The local hospital chest CT shows a chilaiditi sign (B). Chest CT in the ER shows the small bowel interposed along with the colon and compression atelectasis is seen in the lower and middle lobes of the right lung (D).
diaphragm with a large amount of bowel gas (Fig. 1). To evaluate diaphragmatic hernia and worsening pneumonia, chest and abdominal CT were performed. No significant changes of ground glass opacity in the lingual lobe of the left lung were seen in the CT studies performed at the local hospital and our hospital (Fig. 2A, C). Chest CT performed 4 days prior at the local hospital showed chilaiditi sign with a colonic loop interposed between the liver and right diaphragm (Fig. 2B). However, unlike previous imaging studies, much small bowel was interposed along with the colon and compression atelectasis was seen in the lower and middle lobe of the right lung (Fig. 2D). Signs of mechanical ileus or bowel ischemia were not seen on the abdomen CT.

Although oxygen was administered, there was no improvement in respiratory difficulty. Therefore, endotracheal intubation was done and the patient was admitted to the intensive care unit. After admission, treatment for pneumonia was done including mechanical ventilation and antibiotics.

Plain chest x-ray taken on the second day of admission showed decreased bowel gas under the right diaphragm (Fig. 3). Mechanical ventilation and intubation were discontinued on the fifth day and the patient was discharged without significant complications on the twelfth day.

**Discussion**

Chilaiditi sign appears in 0.025~0.28% of the general population, and is often incidentally found during a radiographic examination. The incidence increases with age and it is less common in children than in adults. It is more frequently seen in men.

To diagnose Chilaiditi sign based on radiologic findings, the following criteria must be met. The right hemidiaphragm must be adequately elevated above the liver by the intestine, the bowel must be distended by air to illustrate a pseudo-pneumoperitoneum, and the superior margin of the liver must be depressed below the level of the left hemidiaphragm.

Important differential diagnoses of the radiographic findings include subdiaphragmatic abscess, pneumoperitoneum, posterior hepatic lesions, right sided diaphragmatic hernias and retroperitoneal masses. In the present case, the patient was transferred to our ER with the misdiagnosis of a diaphragmatic hernia.

The interposed bowel is most commonly the hepatic flexure, ascending colon, or transverse colon but involvement of the small bowel, either alone or in combination with the colon, has been reported. Common etiologies include increased colonic mobility or redundancy, congenital malrotation or malposition of the colon, and elevation of the right hemidiaphragm.

Chilaiditi syndrome is generally asymptomatic and may cause symptoms only in a minority of patients. These range from nonspecific gastrointestinal symptoms such as nausea, anorexia, vomiting, flatulence, and constipation to signs of pseudo-obstruction and rarely to life threatening complications like volvulus or intestinal obstruction, followed by respiratory distress and, less frequently, angina-like chest pain. Less commonly, Chilaiditi syndrome has been associated with chronic, recurrent respiratory distress.

In the present case, the patient had no history of chronic respiratory disease or dyspnea. Moreover, we found no right diaphragm eventration on chest xray and aortic CT performed several years prior at our hospital. Although the definite cause is unknown, we assume that right diaphragm eventration gradually progresses, and results in a decrease in vital capacity and total lung capacity. This patient had a pulmonary infection (pneu-
monia) and decreased respiratory function and thoracic recoil could be expected due to old age. In this situation, the interposition of the increased, dilated bowel loop between the liver and the diaphragm might be responsible for decreasing the intrathoracic volume and lung ventilation. Due to these complex factors, Chilaiditi syndrome occurred abruptly and worsened the symptoms of respiratory distress in the present patient.

No treatment is required for an asymptomatic patient with Chilaiditi sign. Initial management of Chilaiditi syndrome should include bed rest, intravenous fluid therapy, and bowel decompression. If the patient does not respond to initial conservative management, and either the bowel obstruction fails to resolve or there is evidence of bowel ischemia, then surgical intervention is indicated.

In the present case, bowel decompression by nasogastric tube was not performed in the ER early, but later, after intensive care unit admission. However, a follow up chest x-ray before nasogastric tube insertion showed decreased bowel gas under the right diaphragm. We surmise that providing positive expiratory pressure and recruiting collapsed lung by endotracheal intubation and mechanical ventilation resulted in this effect.

Chilaiditi syndrome is a rare disorder, but must be considered in the differential diagnosis of acute respiratory distress in a case with air or bowel gas under the right diaphragm.

REFERENCES