

# Diaphragmatic Hernia Simulating a Left Pleural Effusion

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**ABSTRACT.** We review a case of a diaphragmatic hernia simulating on chest radiograph left lower lobe pneumonia and associated pleural effusion. We also characterize the atypical chest radiographic findings of this patient and recommend further imaging with computed tomography in unusual patient presentations. *Pediatrics* 2003;112:e487–e490. URL: <http://www.pediatrics.org/cgi/content/full/112/6/e487>; Bochdalek hernia, pneumonia, parapneumonic effusion, empyema, thoracentesis.

Congenital diaphragmatic hernias occur rarely with an estimated incidence of 1:3600 live births. Most of these patients present in infancy, but 5% to 25% are discovered from 1 month of life up to adulthood.<sup>1</sup> These late-presenting patients often complain of a wide variety of symptoms, and diagnosis can be difficult. Acquired diaphragmatic hernias can also occur in children, usually after a trauma. We discuss a patient with chest radiographic findings consistent with left lower lobe pneumonia and associated pleural effusion that subsequently proved to be a diaphragmatic hernia.

## CASE REPORT

A previously healthy, well-nourished, 11-year-old male presented to our emergency department with complaints of intermittent, sharp, left upper quadrant pain, constipation, malaise, headache, and 1 episode of vomiting. On review of symptoms, he had a 1- to 2-day history of a slightly productive cough without fever. His medical history was noncontributory. He had recently vacationed in Mexico but otherwise had no known exposures and no recent trauma. Vital signs were normal, with oxygen saturations of 93% on room air. On physical examination, his abdomen was soft and nontender with normal bowel sounds. He had absent breath sounds in the left lower lobe. Electrolytes, amylase, lipase, lactate dehydrogenase, uric acid, hemoglobin, and hematocrit were normal. The white blood cell count was 7100 with a differential of 12% bands, 71% neutrophils, 12% lymphocytes, and 1% monocytes. Abdominal films revealed a possible left lower lobe pneumonia but were otherwise normal. A chest radiograph was consistent with a left lower lobe consolidation and associated pleural effusion (Fig 1). A left lateral decubitus chest film revealed layering of a moderate amount of pleural fluid (Fig 1). Thoracentesis was attempted in the emergency department, but no fluid was drained. The patient was admitted for observation and started on cefotaxime for presumed pneumonia with parapneumonic effusion. He remained stable with continued intermittent complaints of abdominal pain and no fever during the next 24 hours. Sputum cultures showed heavy mixed upper respiratory flora. An acid-

fast bacteria stain on the sputum was negative, and a subsequent mycobacteria culture was also negative. *Mycobacteria pneumoniae* immunoglobulin M was nonreactive.

Because the child's symptoms persisted despite 24 hours of antibiotics, an ultrasound of the chest was completed to further evaluate the pleural space and guide needle placement for thoracentesis. Ultrasound findings suggested unusual echogenic material in the left pleural space. Because a clear pocket of free-flowing fluid was not seen, and the pleural space appeared unusual, a thoracentesis was not attempted. A chest computed tomography was obtained to better understand the pleural space and revealed posterior layering of mesenteric fat in the left pleural space and intestine within the fat. No fluid or pneumonia was seen (Fig 2). The patient was taken to the operating room, and a small Bochdalek hernia defect was found containing omentum and a portion of the splenic flexure of the colon. After reduction of the hernia contents, the posterolateral defect was primarily closed laparoscopically (Fig 3). The patient did well postoperatively with resolution of his symptoms and was discharged from the hospital the next day.

## DISCUSSION

Patients who present with late diaphragmatic hernias may have diverse complaints including acute gastrointestinal symptoms such as recurrent abdominal pain, vomiting, anorexia, and constipation; pulmonary symptoms including cough, dyspnea, and respiratory distress; or nonspecific complaints such as failure to thrive and fever. Plain chest films often show the presence of bowel in the thorax, leading to the diagnosis. However, plain films have been misinterpreted as pneumatoceles, tension pneumothorax, congenital lung cysts, and gastric volvulus.<sup>1</sup> If the bowel is incarcerated and necrotic, reactive pleural effusion has been reported in a few children.<sup>2,3</sup> All of these children had symptoms consistent with necrotic bowel including vomiting, fever, and severe abdominal pain. In comparison, our patient had minimal symptoms and no surgical evidence of necrotic bowel.

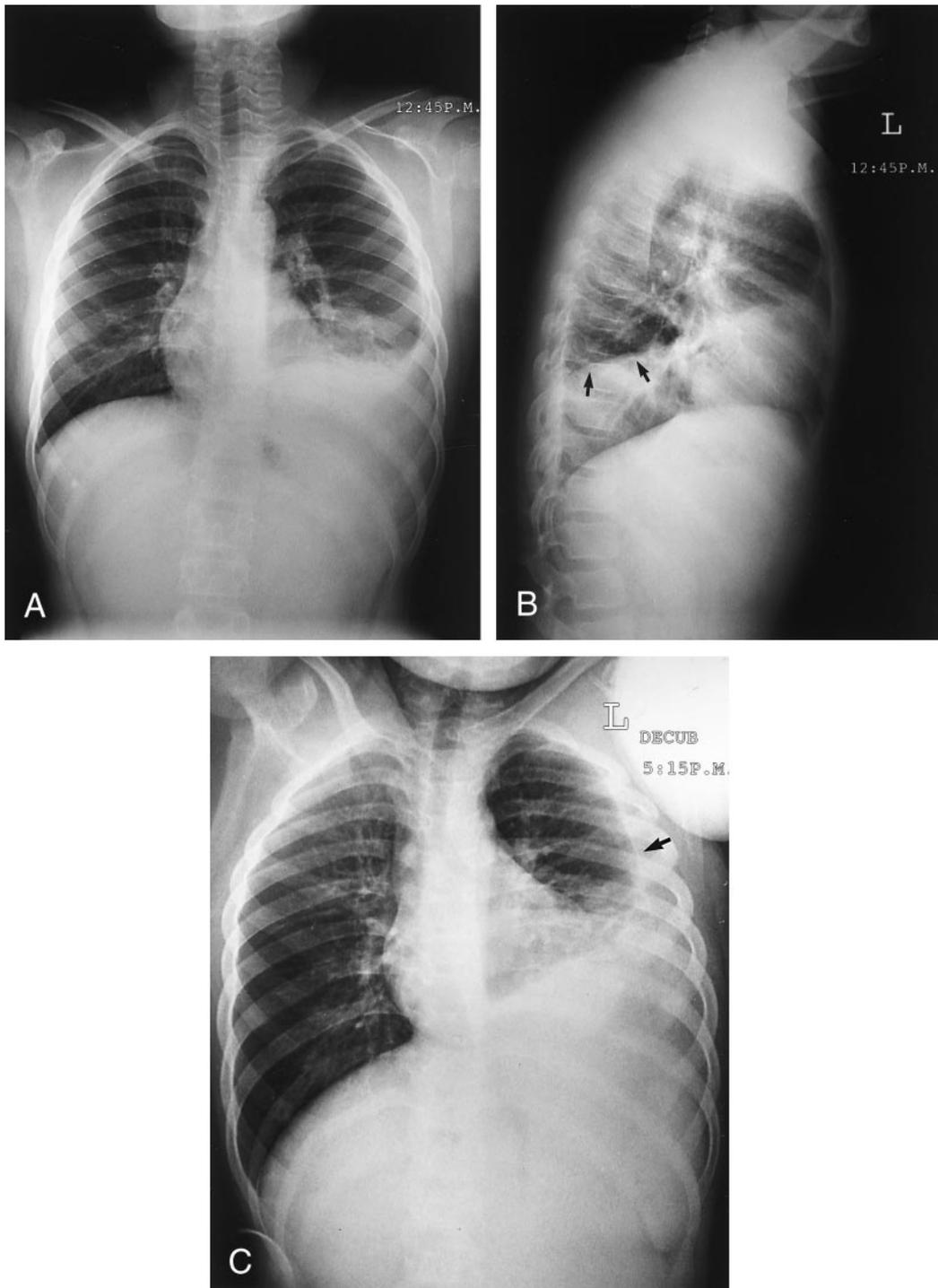
Haines and Collins<sup>4</sup> reported an asymptomatic adult diagnosed with a diaphragmatic hernia after a chest radiograph was interpreted as showing a left pleural effusion that layered in the left lateral decubitus position. At thoracotomy, a large mass of omentum was seen without pleural fluid. Our pediatric patient is very similar to this adult patient. Retrospectively, both cases demonstrated scalloping on the superior surface of the layered pleural density, which is uncharacteristic of free-flowing fluid. Furthermore, our patient's lateral plain film showed a density layering in an upsloping direction parallel with the diaphragm instead of the characteristic downsloping direction of fluid under the effects of gravity (Fig 1 B). The recognition of these 2 subtle radiographic findings, although not diagnostic for a

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Received for publication Apr 18, 2003; accepted Jul 14, 2003.

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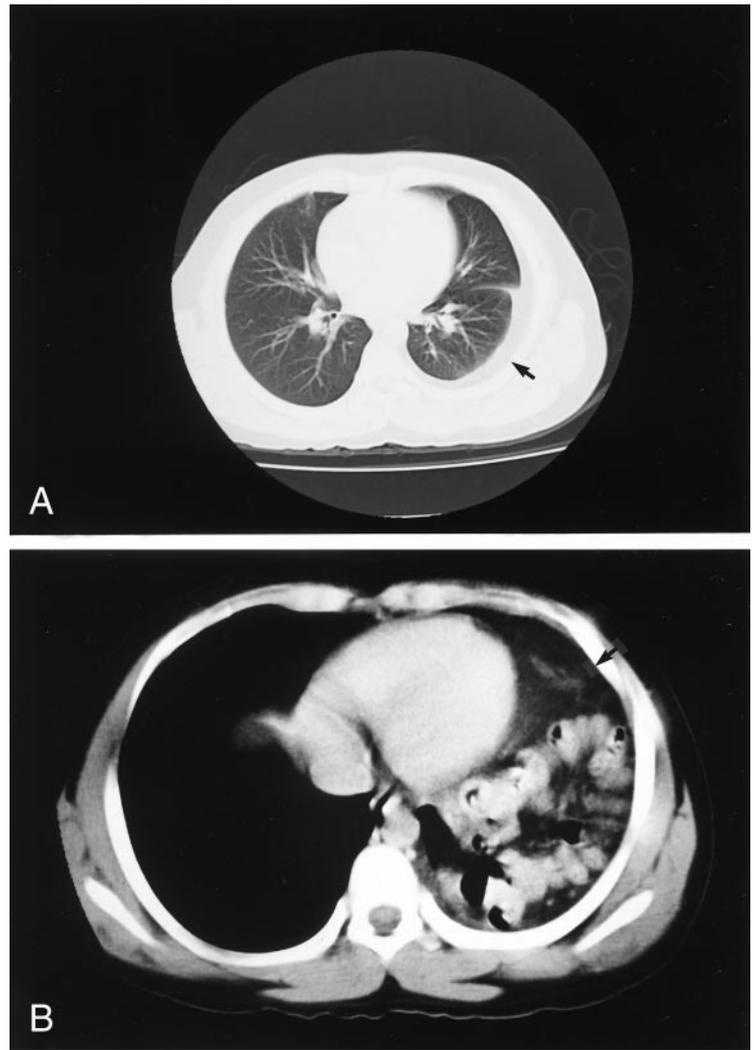
**Fig 1.** Initial chest radiograph shows consolidation in left lower lobe on posterior-anterior film (A), upsloping layering density (arrow) on lateral film (B), and layering of mesenteric fat (arrow) simulating pleural effusion on left lateral decubitus film (C).

diaphragmatic hernia, and the mild clinical symptoms of the patient may have led to earlier further radiographic workup, diagnosis of the hernia, and avoidance of a potentially dangerous thoracentesis.

Observing the thoracic position of a nasogastric tube on a plain chest film has been a common maneuver to diagnose diaphragmatic hernias. This maneuver would not have provided the diagnosis in our patient, because he did not have herniation of the stomach and therefore would have had a normal nasogastric tube placement. Instead, ultrasonogra-

phy of the chest was used to further characterize the pleural space in our patient and provided important clues. Siegel et al<sup>5</sup> showed that ultrasonography was useful in establishing the nature of fluid in the pleural space and may show the presence of an air-containing mass in the thorax. In our patient, the definitive diagnosis of diaphragmatic hernia was made based on computed tomography of the chest. Wilbur et al<sup>6</sup> encouraged computed tomography of the chest in adults for direct visualization of the focal defect and definitive diagnosis of either a hernia or

**Fig 2.** Chest computed tomography shows layering of mesenteric fat (arrow) in pleural space (A), which has the same optic density as chest wall fat, and loops of intestine within mesenteric fat (arrow) in pleural space (B).



**Fig 3.** Laparoscopic view of hernia at time of repair.

other chest masses. Another diagnostic imaging choice available is to give the patient oral contrast and then do an abdominal plain film 24 hours later, looking for contrast in the intestines above the dia-

phragm. The study would have worked well in our patient, because he was not seriously ill or in severe pain. If, however, the patient had necrotic bowel present in the hernia, causing high fever, vomiting,

and severe abdominal pain, waiting 24 hours for the follow-up film would not have been possible. In children with pleural effusions and clinical symptoms atypical for pneumonia, we recommend careful observation of the effusion on the lateral chest radiograph and further imaging with ultrasound or computed tomography in unusual patient presentations before instrumentation of the thorax.

#### ACKNOWLEDGMENT

We thank John Strain, MD, for help with the radiographic interpretation of the plain films and CT scans.

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