RADIOLOGY ROUNDS
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Department Editor

A young child with a history of foreign body aspiration

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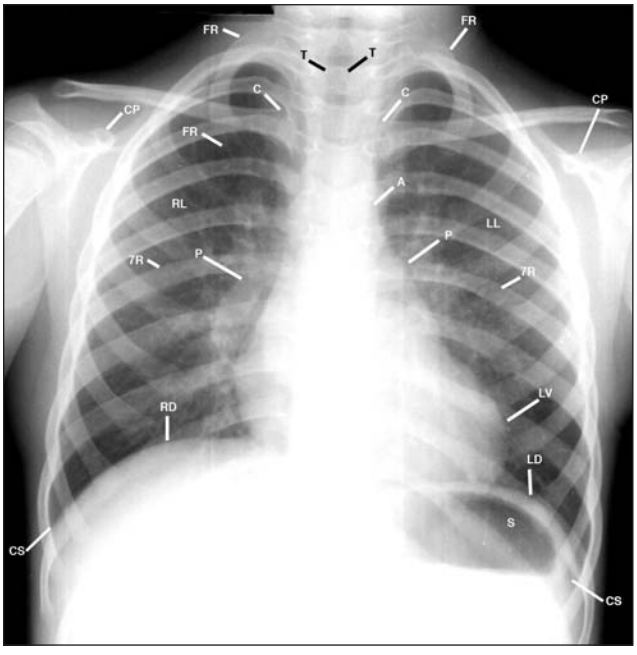

Figure 1 This posteroanterior (PA) inspiratory chest radiograph appears near normal except for the hyperexpanded left lung (LL) and prominent right pulmonary artery (P) reflecting a shift in blood flow compared with the left. Observe the left costophrenic sulcus (CS) lower than the right. A = aorta; C = clavicle; CP = coracoid process; FR = first rib; LD = left hemidiaphragm; LV = left ventricle; RD = right hemidiaphragm; RL = right lung; S = stomach; T = trachea; 7R = seventh rib.

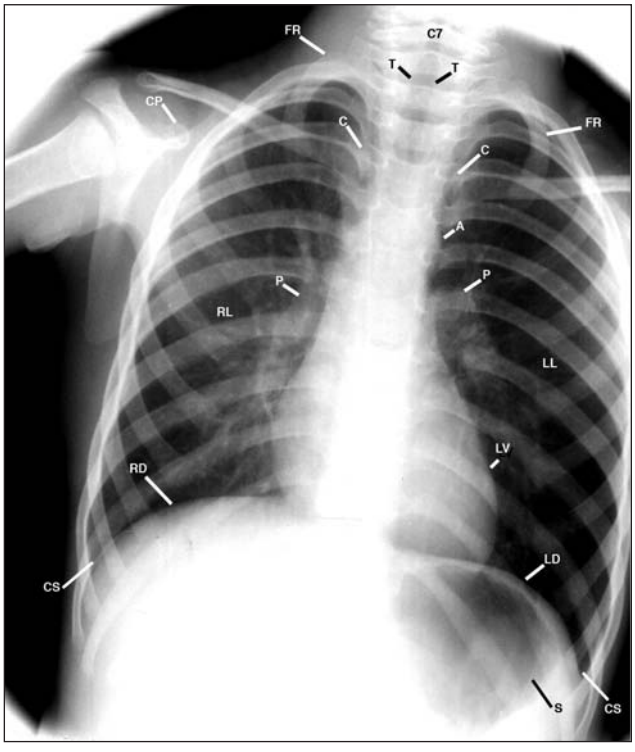

Figure 2 This inspiratory posteroanterior (PA) chest radiograph displays air trapping in the hyperlucent left lung (LL) compared with the right lung (RL) and the left costophrenic sulcus (CS) lower than the right. The left hemidiaphragm (LD) is lower than in Figure 1 (page 00). A = aorta; C = clavicle; CP = coracoid process; C7 = 7th cervical vertebra; FR = first rib; LV = left ventricle; P = pulmonary artery; RD = right hemidiaphragm; S = stomach; T = trachea.

The mother of this 21/2-year-old girl brought her daughter to the emergency department (ED) because the child's symptoms had recently worsened after probable aspiration of a foreign body several weeks earlier. She said her daughter had been eating vegetable bean soup, started coughing, and had trouble breathing. Her symptoms seemed to improve shortly after the incident, but over a 6-week period she continued to have occasional coughing spells, wheezing, and hoarseness.

The history suggested a possible foreign body in the left lung. Findings of the physical examination included asymmetrical expansion greater in the right

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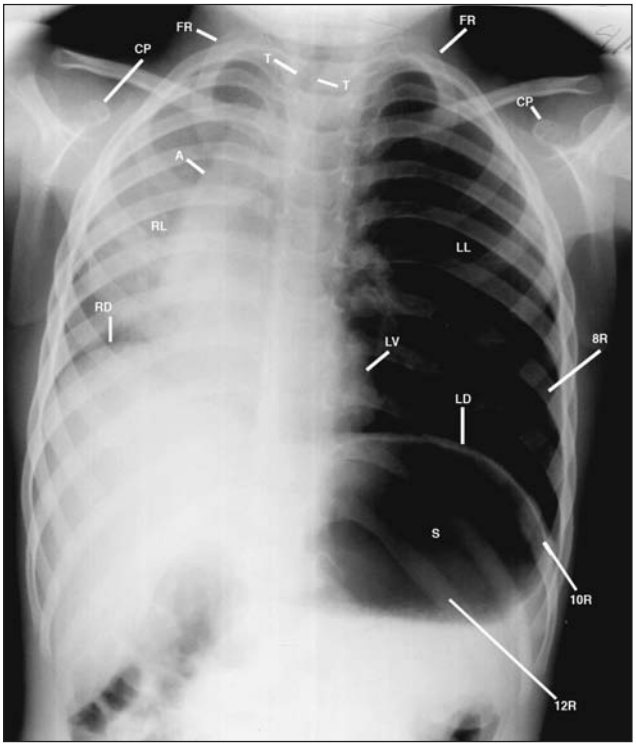

Figure 3 This expiratory posteroanterior chest radiograph displays air trapped in the hyperexpanded left lung (LL) displacing the trachea (T) and cardiomediastinal structures into the dense right hemithorax. Observe the right hemidiaphragm (RD) more elevated than the left hemidiaphragm (LD); the increased density of the right hemithorax because of expelled air in the right lung (RL); and increased lucency in the stomach (S) reflecting the more depressed posterior sulcus of the left lung compared with Figure 1 (page 00) and Figure 2 (page 00). A = aorta; C = clavicle; CP = coracoid process; FR = first rib; LV = left ventricle; 8R, 10R, 12R = 8th, 10th, 12th ribs.

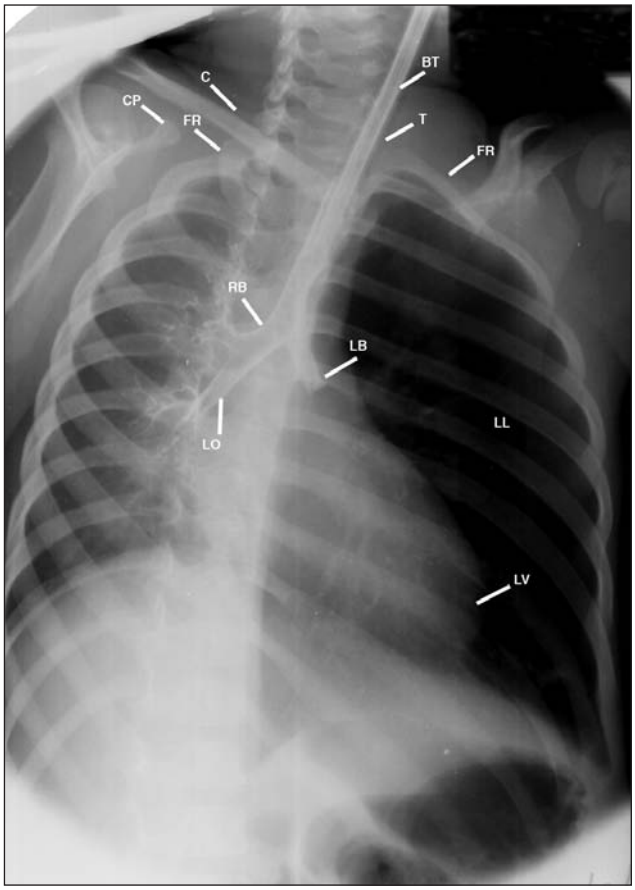

Figure 4 This right posterior oblique chest radiograph displays an indwelling bronchial tube (BT) for injecting barium solution into the trachea (T). The barium demarcates the obstructed left main-stem bronchus (LB). Observe the normal right bronchus (RB) and lower lobe (LO) bronchi. C = clavicle; CP = coracoid process; FR = first rib; LL = left lung; LV = left ventricle.

than in the left posterior ribs and wheezing at the left lung base. Inspiration and expiration radiographs were requested.

A routine posteroanterior (PA) inspiratory chest radiograph (Figure 1, page 00) displayed increased lucency of the left lung as a result of hyperexpansion and a mild mediastinal shift to the right, which suggested left main-stem bronchus obstruction. Several hours later, a second inspiratory chest radiograph (Figure 2, page 00) displayed marked hyperinflation of the left lung (air trapping) confirming left main-stem bronchus obstruction. An expiratory PA chest radiograph (Figure 3, page 00) also displayed air trapping in the left lung shifting the cardiomediastinal structures into the right hemithorax.

Because of the suspected bronchus obstruction, the physician requested bronchography that was done 1 month later with fluoroscopic control under general anesthesia to avoid possible edema and damage with endoscopy. A thin mixture of sterile saline and barium was introduced into the trachea through a small tube. A right posterior oblique chest radiograph (Figure 4, page 00) after the barium procedure demonstrated hyperinflation (air trapping) of the left

lung and the obstructed left main-stem bronchus. The right main-stem, middle, and lower lobe bronchi were within normal limits.

In surgery, the foreign body, which was not radiodense, was removed from the left main bronchus through a thoracotomy. A postoperative PA chest radiograph (not shown) revealed normal expansion of the left lung with no evidence of residual pneumonitis.

Discussion

Foreign body aspiration into the respiratory tree can occur in all age-groups and may cause immediate death or lead to chronic lung disease (bronchitis and/or bronchiectasis). Infants are more susceptible, particularly those with primary swallowing dysfunction or lack of coordination between swallowing and breathing. An increased respiratory rate may also increase risk in infants. The most common symptom is cough, and the most severe is dyspnea. Immediate physical signs or symptoms such as temperature may not be apparent unless there is superimposed infection. An anatomic cause can impede percussion and produce difficulty breathing or speaking.

If findings of the physical examination and history suggest obstruction, routine PA and lateral chest radiographs should be obtained. Expiratory (the more sensitive) and inspiratory chest radiographs are warranted, even if no density is detected. A normal chest radiograph does not exclude the diagnosis of foreign body aspiration. Computerized imaging with CT and MRI may give additional information although it requires sedation, particularly in infants and young children.

Invasive instrumentation should be avoided as it can irritate the trachea or bronchi and increase inflammatory and edematous changes. Consultation with a pulmonary specialist should be considered.

Take-home message

When airway obstruction is suspected, baseline chest radiographs should be obtained, including expiratory (the more sensitive) and inspiratory radiographs, keeping in mind that the foreign object may not be radiodense. Normal radiographic findings do not rule out a foreign body. In children, radiographs may display air trapping, with enhanced radiolucency in a hyperextended lung. A barium-enhanced radiograph may identify the site of obstruction. ■