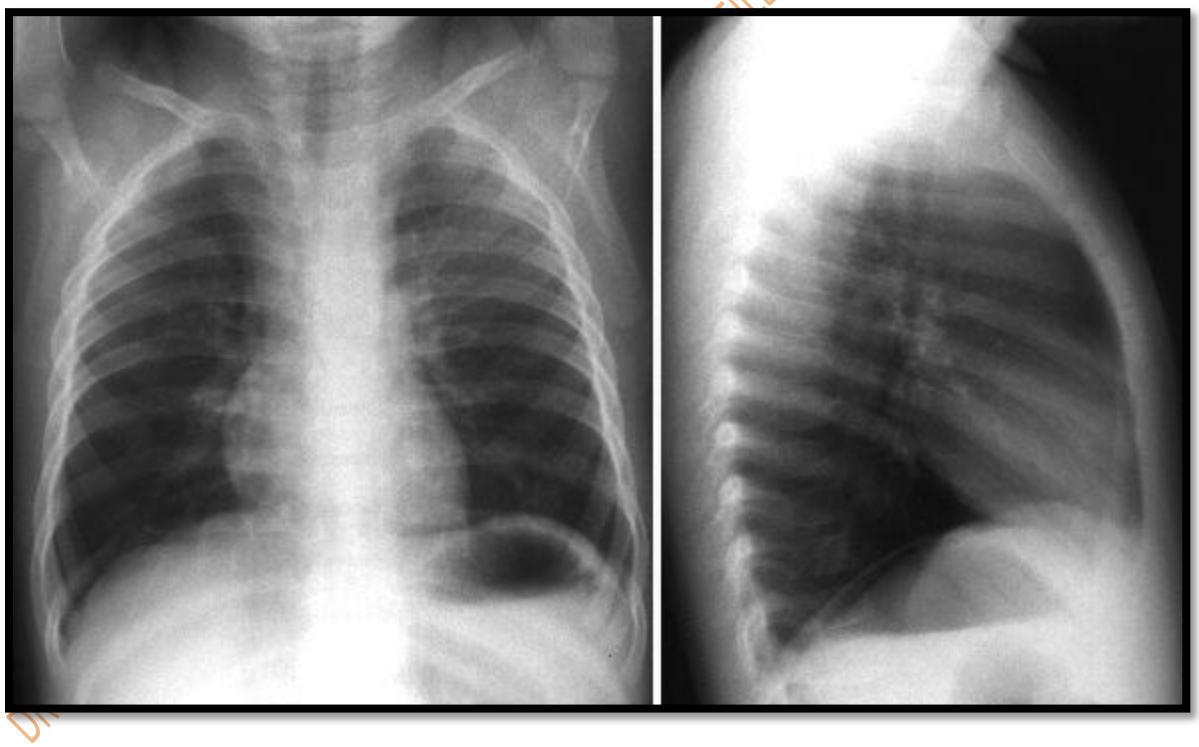
Foreign Body Aspiration in a Child

A 17 month old male presents to the ED in the evening with a one-hour history of noisy and abnormal breathing after a choking episode while he was eating a chocolate and almond bar. He was able to speak and drink fluids without difficulty.

Exam: VS T36.8, P200 (crying), R28 (crying), oxygen saturation 99% in room air. He appeared alert, with no signs of respiratory distress. He was able to speak, had no cyanosis, no drooling, and no dyspnea. His lung sounds showed mild wheezing with possible mild inspiratory stridor. An albuterol aerosol was administered but no improvement was noted. A chest radiograph was ordered.

View CXR.



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Questions:

1. Are any foreign bodies visible on this radiograph?
2. Are there any subtle findings on this radiograph to suggest a foreign body?

3. Are there other radiologic procedures that can be done to try to identify a foreign body?

4. Is an invasive procedure necessary or indicated at this point, i.e., Bronchoscopy?

This CXR is within normal limits; however, when a clinical suspicion of an Airway foreign body is present, a standard PA and lateral CXR are an insufficient evaluation. A lateral neck film should be obtained to examine the upper airway for evidence of swelling or foreign body. Decubitus films and/or expiratory films should also be obtained to look for evidence of air trapping.

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View supplementary radiographs.

Lateral neck.

Expiratory Chest.

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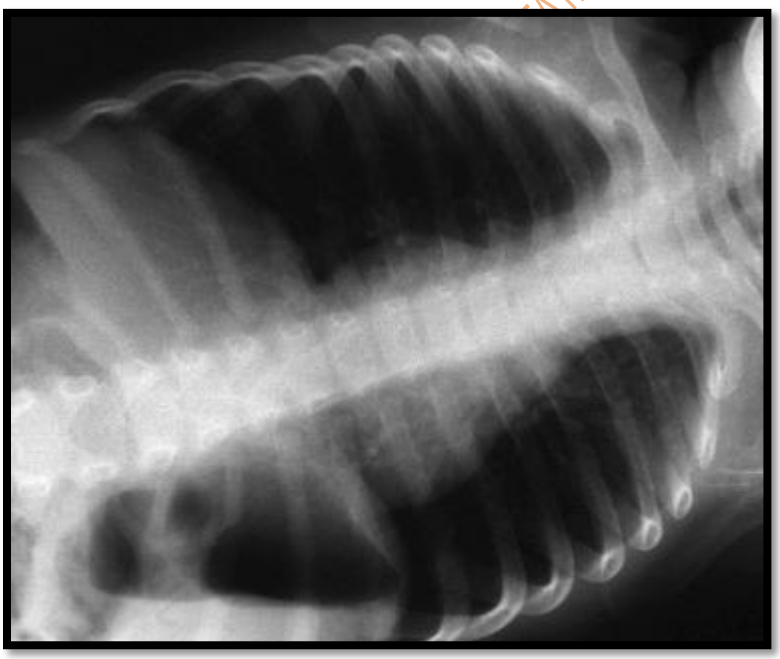
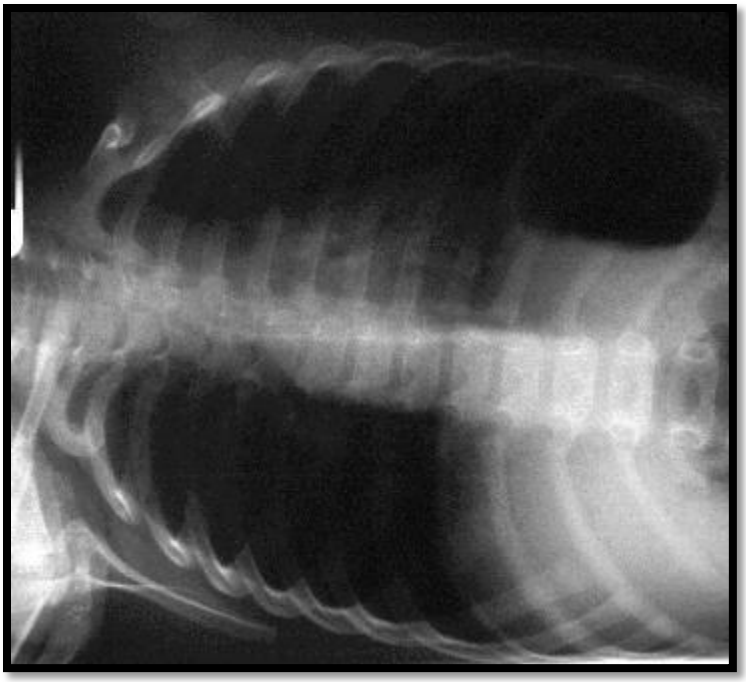
Left lateral decubitus.



Right lateral decubitus.



The lateral neck radiograph is within normal limits.
The black dots in the upper right are pointing to a metallic object in the holder's watch band. These other radiographs were interpreted as possible bilateral air trapping.

The expiratory view is fairly symmetric in this instance. A foreign body in a ronchus is expected to show air trapping with some hyperexpansion visible in that lung. In the expiratory view, both lung volumes should normally be decreased. If one side is still expanded during expiration, this indicates air trapping and a possible foreign body on that side.

An expiratory CXR that shows symmetry of both lung volumes does not rule out a foreign body. Such a CXR is often assumed to be consistent with asthma. Although this is often true, this is occasionally a pitfall that should be avoided by considering such a CXR to also be consistent with a tracheal foreign body. Examine the expiratory CXR again. It shows that both lungs empty poorly, indicating bilateral air trapping. This could be consistent with asthma or with a tracheal foreign body.

The left lateral decubitus view (left side down) shows the left lung volume to be somewhat smaller than the right lung volume. However, one might expect the left lung to be even smaller in the dependent position, so perhaps it isn't as small as it should be. This suggests some degree of air trapping on the left. The right lateral decubitus view (right side down)is of poor quality. The original film was

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very dark so the scanned image is very grainy. This shows the right lung to be clearly expanded even though it is dependent. This suggests air trapping since a normal lung should appear smaller in the dependent position.

The patient was taken to the operating room for bronchoscopy. At bronchoscopy, about 15-20 pieces of nut particles in the lower trachea and in both major bronchi were found. They were somewhat difficult to remove because of their small size. Most were removed with grasping forceps and suction. He did well postoperatively.

Discussion and Teaching Points:

Approximately 75% of all cases of foreign body aspiration occur in children less than 3 years of age. Organic debris is most frequently retrieved on bronchoscopy. Peanuts are the most common offending agent. Unfortunately, only 6-17% of airway foreign bodies are radio-opaque. Respiratory symptoms may be produced by an object lodged anywhere in the airway, from the hypopharynx to a segmental bronchus.

Children who ingest or aspirate foreign bodies may present in acute respiratory distress days or months after the aspiration episode. Between 50% and 90% of children have a suggestive history, most commonly of an acute episode of paroxysmal cough. Other common signs are cyanosis, choking, and dyspnea. However, delays in presentation for care are common, and concern about aspiration as a cause of the child's symptoms may diminish as the primary event becomes more distant. Only half of all children are diagnosed correctly in the first 24 hours after an aspiration event. An additional 30% receive the correct diagnosis in the following week, while the remainder may have delays in diagnosis of weeks to years. One-fourth of children may be asymptomatic at the time of presentation, and up to 38% may have no helpful physical exam findings.

The complete triad of coughing, wheezing, and decreased or absent breath sounds is present in only about 40% of cases. Other suggestive physical exam findings are stridor, tachypnea, retractions, rales, and fever. They are often misdiagnosed as croup, asthma, pneumonia, or bronchitis. This is a diagnostic

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pitfall that should be avoided. Thus, the diagnosis of foreign body aspiration must be considered in any previously well, child who has a history of acute onset of choking, coughing, or wheezing, as well as any child who has a poorly defined, chronic respiratory complaint.

Remember this general principle:

Nuts + Choking = Bronchoscopy
(regardless of radiographic results)

Roughly 85% of foreign bodies are bronchial, while 15% are laryngotracheal. Laryngotracheal foreign bodies are more difficult to diagnose and they have a higher mortality rate. Differential findings, clinically or radiographically, may only be present in unilateral bronchial foreign bodies. Differential findings are often absent in bilateral bronchial foreign bodies or laryngotracheal foreign bodies.

Additionally, foreign bodies may shift in position. Thus, a previously suspicious radiographic study may be negative if it is repeated. One cannot assume that such a patient is now normal since a more likely explanation is that the foreign body has moved. Avoid this pitfall.

Although appropriate radiologic studies may localize the site of the foreign body, a significant number of children with retained airway foreign bodies have non-diagnostic films. Radiologic evaluation should start with AP and lateral views of the chest and neck. Although plain films may be interpreted as normal, differential inflation of the affected lung, the most common abnormality identified, may be documented by fluoroscopy, lateral decubitus views, or an assisted expiratory film (the examiner compresses the patient's abdomen during expiration). Other indirect signs of an airway foreign body include reabsorption atelectasis beyond the site of bronchial obstruction, and the presence of pulmonary infiltrates reflecting an inflammatory reaction.

One source (Esclamado) reported positive findings on chest radiographs in only 42% of children with laryngotracheal (as opposed to bronchial) foreign bodies, but a higher rate of positive findings on lateral neck films in the same series. This emphasizes the need to direct the examination to the neck (ie., lateral neck view) when signs of upper airway obstruction are present. Esophageal foreign bodies

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may also cause predominantly respiratory symptoms. Although CT scan, xeroradiography, and ultrasonography have been advocated for foreign body imaging, their utility is not well defined at this time.

CT scanning may be non diagnostic because of respiratory motion (resulting in poor images) and such patients usually require sedation which can be risky in the presence of airway compromise.

Given the high morbidity associated with delay in the diagnosis of an airway foreign body, and the limited sensitivity of radiographic studies in identifying this condition, clinical judgment must dictate whether the child should be Scheduled for diagnostic bronchoscopy in the absence of radiographic findings.

References

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