ASPIRATION OF FOREIGN BODIES IN THE MULTISLICE CT ERA

EMPHYSEMA AND AIRWAY DISEASES

P. R. P. Santana¹,², G. S. Meirelles¹, C. G. Y. Verrastro¹, I. Missrie¹, A. C. P. Gomes².

1 – Fleury Group, São Paulo, BRAZIL.
2 – Medimagem/BP Medicina Diagnóstica – H. Beneficência Portuguesa de São Paulo, São Paulo, BRAZIL.
**FINANCIAL DISCLOSURES**

**G.S.M.:** Partner – Ambra Saúde, Consultant – SAMA and Eternit, Medical coordinator at Fleury and IPF advisor at Boehringer.

**P.R.P.S., C.G.Y.V., I.M., A.C.P.G:** No financial disclosures.
Learning Objectives: To illustrate the spectrum of foreign bodies inhaled into the lungs, using post-processed images to demonstrate its precise location, morphology, size and consistency, helping to plan the bronchoscopy.

Outcomes: To identify the different types of bronchial foreign bodies and its complications.
INTRODUCTION

• Inhalation of foreign bodies is more common in children, usually in the first three years of life.
• It is the leading cause of infantile deaths and the fourth among preschool children.
• Although the diagnosis is usually established immediately or within 2-3 days of the event, it may not be possible for weeks or months, even in adults.
• The condition is often clinically silent. Symptoms include cough or wheezing.
• Prolonged irritation may lead to infections resulting in hemoptysis, sometimes life-threatening.
• Most common foreign bodies are food (e.g., peanuts, popcorn and corn), including bone fragments, and broken pieces of teeth or dental material.
INTRODUCTION

• The nature of foreign bodies determines the degree of inflammatory response. Metallic objects cause minimal reaction, while lipophilic materials stimulate intense chemo-inflammation in a response to its fatty acid content. Starchy food adsorbs water, turning partial obstruction into complete ones.

• Multislice CT is the imaging modality of choice to confirm the diagnosis and demonstrate the precise location of the foreign body. Preferential locations are the right main, intermediate and right lower lobe bronchi.

• When clinically suspected, the patient usually mentions the kind of material that was inhaled. But there are unsuspected cases in which CT was performed to investigate related symptoms or complications, especially pneumonia or atelectasis. Air trapping may also be seen.
Only 16% of inhaled foreign bodies are spot diagnosed on chest X-Rays as they are radiopaque. Accordingly, a negative film does not exclude aspiration, rather, it may contain one of the signs detected in 72% of the cases. Such radiological findings include unilateral atelectasis, local hyperinflation or obstructive emphysema. Usually, inspiratory and expiratory incidences are likely to reveal the overinflation as a hyperlucency best during expiration.
Inspiratory and expiratory chest x-rays showing the overinflation of the left lung, best seen during expiration.
82 y-o male performed a chest x-ray after an inhalation of a dentary implant during the procedure.
CASE 2

40-year-old male presenting dry cough, dyspnea, and wheezing for 10 days. No fever. Ex-smoker.

Chest x-ray presenting unilateral subsegmental atelectasis in the left lung base.
Chest x-ray performed 1 month later showed resolution of the unilateral subsegmental atelectasis.

Patient was medicated with prednisone, β-2 agonists and antibiotics with no clinical improvement.

Chest x-ray performed 1 month later showed resolution of the unilateral subsegmental atelectasis.
Conventional chest CT was performed demonstrating air trapping in the left lower lobe and a foreign body (arrow) in the correspondent lobar bronchus.
FOREIGN BODY: ORANGE SEED

Courtesy of Dr. Luiz Francisco Ribeiro Medici
Pulmonologist of the Clemente Ferreira Institute
São Paulo - Brazil.
• The diagnostic yield of CT scan is superior to that of CXR particularly for radiolucent bodies.

• Hence, multislice CT scan is the imaging modality of choice as it permits acquisition of diagnostic images with multiplanar reconstructions using low dose protocols, especially for pediatric patients where the concern of radiation exposure is higher.

• These protocols maintain the performance of multislice CT in characterizing the precise location, morphology, size and consistency of the foreign body, differentiating soft tissue, calcified and metallic densities.

• It also demonstrates associated findings such as obstructive pneumonia and atelectasis, as well as air trapping in the expiratory images when performed.
CASE 3

Female, 62-y-o, complained of aspiration of foreign body

Frontal and lateral chest x-rays show a radiopaque high density image in projection of right lower lobe bronchus.
CT demonstrate a the methalic density of the foreign body in the right lower lobe bronchus. Note the methalic artifacts in the virtual bronchoscopy image.
Patient referred that choked with a methalic dental material.
Another case of methalic dental material aspirated, clearly depicted on chest CT, showing distal subsegmental atelectasis.
CASE 5

Male, 48-y-o, presenting productive cough and intermittent fever for 3 weeks.

Chest CT images demonstrate a calcified foreign body in the right lower lobe bronchus with parenchymal consolidation distally representing obstructive pneumonia. Bronchoscopy removed a fragment of a fish bone.
Female, 53 y-o, presenting dry cough for 5 days.

Chest x-ray presenting unilateral subsegmental atelectasis in the right lower lobe.
Chest CT images show a soft tissue density foreign body in the right lower lobe bronchus with distal atelectasis.
HERE IS A CLUE!
FOREIGN BODY: PEA
Male, 45 y-o, dry cough for 2 months.

Chest x-ray presents a tiny elevation of the left diaphragmatic dome. Vascular structures superimposed in the left pulmonary hila does not permit to valorize for sure any abnormality in this region.
Multiplanar chest CT images demonstrate a calcified foreign body in the left main bronchus. Expiratory CT image shows air trapping of the left lung.
FOREIGN BODY: CHICKEN VERTEBRA
CASE 8

5 y-o girl, presented an episode of bronchospasm 10 days before and then productive cough.

Chest x-ray and CT images showing a hyperinflation of the left lung with a foreign body partially obstructing the left main bronchus.
Reformatted chest CT images elegantly characterizing the foreign body in the left main bronchus with overinflation of the left lung.
CASE 9

5 y-o boy, presented to the Emergency Room after an aspiration episode while he was playing with a pen.

Chest x-ray images showing a metal spring in the projection of the left main bronchus.
Chest CT confirms the position of the metal spring in the left main bronchus.
Chest CT reformatted demonstrating the metal spring in the left main bronchus.
FOREIGN BODY: METAL SPIRAL
CONCLUSION

- Multislice CT permits characterizing the morphology, size and consistency of the foreign body, differentiating soft tissue, calcified and metallic densities, and sometimes indicates unusual circumstances before bronchoscopy.


Thank You!

pablorydz@gmail.com