

# Bronchial foreign body aspiration

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## History

A 13-month-old girl had a choking event after accidentally swallowing a peanut and was presented to the emergency department in our hospital. Auscultation revealed suppressed respiration of the right lung. A bronchial foreign body aspiration (FBA) was suspected and a CT examination was immediately performed, using an ultra-low dose scan protocol for diagnosis.

## Diagnosis

CT images revealed a nodular isodense opacity, blocking the right main bronchus. The right lung appeared hyperlucent in comparison to the left one, suggesting hyperinflation due to the valve effect. Multiple patchy opacities were visualized in the right lower lobe, suggesting local infiltration. The mediastinum and the trachea were slightly shifted to the right. Subsequently, a bronchoscopy was performed and the peanut was successfully retrieved.

## Comments

Foreign body aspiration (FBA) is a common pediatric emergency. It can be life-threatening or cause irreversible lung/airway damage if diagnosis and treatment are not promptly carried out. Radiography, sometimes in combination with fluoroscopy, used to be the first-line imaging modality when airway FBA has been suspected. However, a recent study (1) has shown that ultralow-dose CT can be performed

at an equivalent dose level, using tin filter technology, as a first and only diagnostic tool in emergency settings. The CT attains higher sensitivity, specificity, predictive positive and negative values, as well as accuracy. A tin filter optimizes the X-ray spectrum by filtering out most low-energy photons and leaves a narrow, high-energy spectrum, thus reducing the radiation dose to the patient. It also improves air/soft tissue contrast and reduces beam hardening. In this case, the same technique is applied in combination with other standard dose reduction techniques, such as CARE Dose4D (automatic controlled tube current modulation) and ADMIRE (Advanced Modeled Iterative Reconstruction), achieving optimal image quality at ultra-low dose. It is also noteworthy that an ultra-fast scan mode - "Turbo Flash mode" - is performed which enables a complete thorax scan in 0.31 s in free breathing. Three-dimensional images can be displayed using multiplanar reconstruction (MPR), minimum intensity projection (MinIP) and volume rendering technique (VRT). The optimal image quality helps the physicians in reaching a confident diagnosis, avoiding the risk of negative bronchoscopy outcomes and operative costs. ●

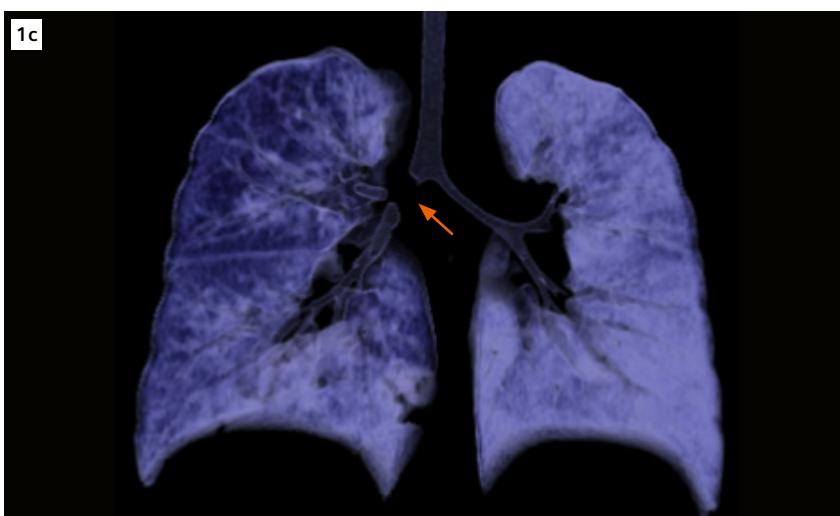
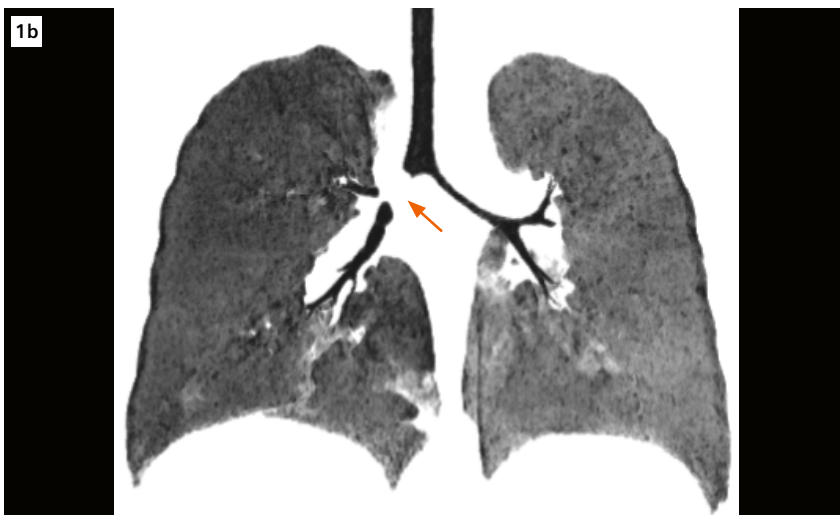
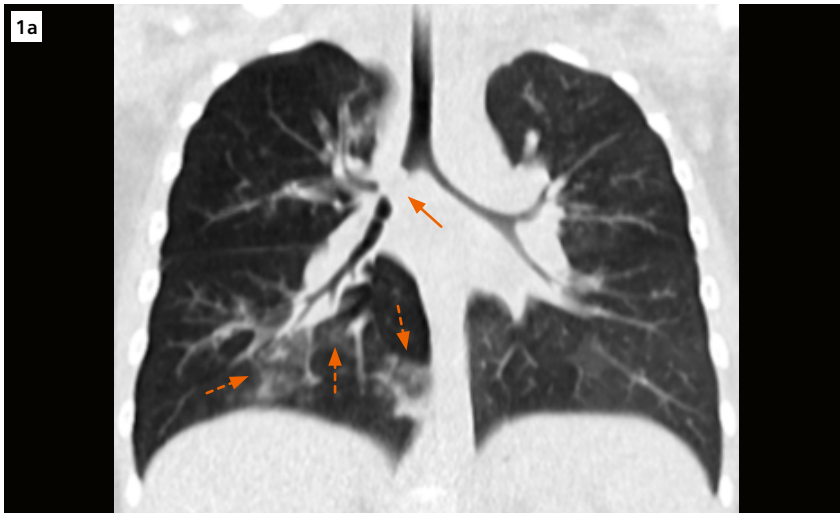
## References

- [1] Lena Gordon, Patrik Nowik, Shahla Mobini Kesheh, Marika Lidegran, Sandra Diaz. Diagnosis of foreign body aspiration with ultralow-dose CT using a tin filter: a comparison study. *Emergency Radiology* (2020) 27:399–404

## Examination Protocol

Scanner	SOMATOM Force
Scan area	Thorax
Scan mode	Turbo Flash mode
Scan length	175 mm
Scan direction	Cranio-caudal
Scan time	0.31 s
Tube voltage	Sn100 kV
Effective mAs	81 mAs
Dose modulation	CARE Dose4D
CTDI <sub>vol</sub>	0.28 mGy
DLP	5.7 mGy*cm
Rotation time	0.25 s
Pitch	2.0
Slice collimation	192 x 0.6 mm
Slice width	1.0 mm
Reconstruction increment	0.7 mm
Reconstruction kernel	Br59, ADMIRE4

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**1** Coronal MPR (Fig. 1a), MinIP (Fig. 1b) and VRT (Fig. 1c) images show a nodular isodense opacity (arrows) blocking the right main bronchus. The right lung appears hyperlucent in comparison to the left one, suggesting hyperinflation due to the valve effect. Multiple patchy opacities (Fig. 1a, dotted arrows) seen in the right lower lobe, suggest local infiltration.