

## Foreign Body in the Main Bronchus: Radiological Signs, Complications, and Differential Diagnosis

Maja Šljivić<sup>1</sup>, Mojca Glušič<sup>1</sup>, Damjana Ključevšek<sup>1, 2</sup>

<sup>1</sup>Radiology Unit, Children's Hospital, University Medical Centre Ljubljana, Ljubljana, Slovenia, <sup>2</sup>University of Ljubljana, Faculty of Medicine, Department of Radiology, Ljubljana, Slovenia

**Correspondence:** *sljivicmaja18@gmail.com*; Tel.: + 386 1 5229264

**Received:** March 2 2024; **Accepted:** March 15 2024

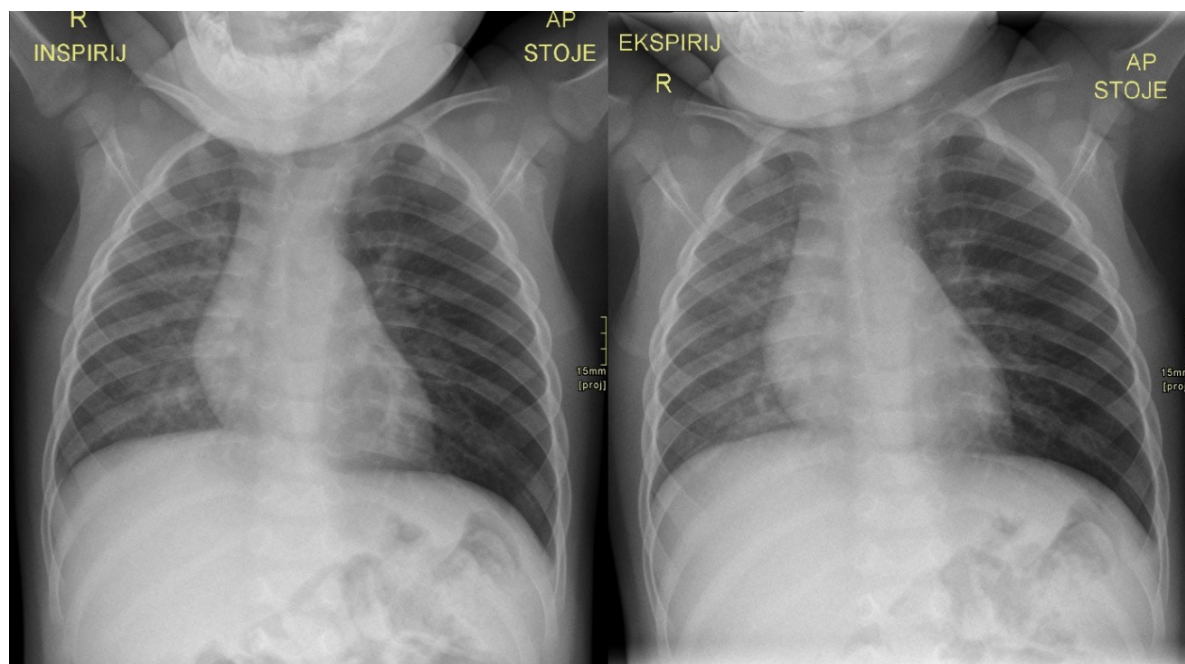
**Key Words:** Chest X-ray ■ Foreign Body ■ Aspiration.

A 1-year-old boy presented to the emergency room with agitation, mild fever, and increased respiratory effort, with quieter left chest sounds. His saturation and laboratory results were normal. His parent suspected peanut inhalation that occurred a day prior. Initial symptoms of violent coughing spontaneously subsided but recurred the next day. When foreign body (FB) aspiration is suspected, chest X-rays (CXR) of inspiration and expiration are obtained. The CXR demonstrated hyperinflation of the left lung, a classical radiological finding consistent with FB in the main bronchus (Fig. 1) (1). The child underwent an emergency bronchoscopy, revealing a lodged peanut in the left main bronchus, confirming the radiological diagnosis.

Foreign bodies are most commonly aspirated by children younger than three years old (1, 2) and mostly located in the proximal portions of the bronchial tree: the larynx, trachea, and main bronchi (2). Clinical signs can range from entirely asymptomatic to coughing, wheezing and choking, based on the size and anatomic location of the FB. Most aspirated FBs consist of non-radiopaque organic matter, making them invisible on a CXR (2). As a result, CXRs may appear normal, especially in the early stages, before indirect findings develop.

Therefore, in cases with probable but unclear aspiration of FB and normal CXR (in 35% of cases), bronchoscopy should still be considered, as acute progression can lead to atelectasis and respiratory decompensation or even a systemic inflammatory response (3). Prompt diagnosis prevents respiratory complications such as bronchospasm, pneumothorax, pneumonia, abscesses, bronchiectasis, bronchial stenosis or even death (2).

Inspiratory-expiratory CXR is initial imaging in suspected FB aspiration. A most common finding is air trapping, much better depicted in expiratory CXR, which can help estimate the location of the FB within the airways. This is valuable information before bronchoscopy. In younger children, where acquiring inspiration and expiration images may be challenging, obtaining images in the lateral decubitus position on the side of the suspected foreign body can be helpful. This approach can reveal the absence of physiological lung collapse, indicating hyperinflation. Additionally, lung ultrasound has been proposed as a possible diagnostic tool, as it demonstrated decreased or even absent lung sliding on the hyperinflated side (4). Differential diagnosis of main bronchus FB includes oesophageal foreign body, lung hyperinflation caused by



**Fig. 1.** In the expiration CXR image (right), the left lung remains more radiolucent than the right, indicating hyperinflation caused by air trapping due to the ball-valve mechanism that happens when a foreign body is lodged in the bronchi. Additional signs such as mild rib flaring, depression of the left hemidiaphragm and shift of the mediastinal organs to the right are also present. In the expiration CXR image (right), the lungs typically appear smaller and more opaque than in the inspiration image. This difference is evident in the right lung but not the left lung, indicating that the left lung volume remained unchanged during the respiratory cycle; the entire left lung is affected by an obstruction in the left main bronchus.

pulmonary sling, mass causing bronchial compression, and Sweyer-James syndrome.

**Authors Contributions:** Drafting the article: MŠ; Revising it critically for important intellectual content: MG and DK; The approved final version of the manuscript: MŠ, MG and DK.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

## References

1. Cramer N, Jabbour N, Tavarez MM, Taylor RS. Foreign Body Aspiration. StatPearls (serial on the Internet). Treasure Island (FL): StatPearls Publishing; 2024 (cited 2024 Mar 4). Available from: <https://www.ncbi.nlm.nih.gov/books/NBK531480/>.
2. Johnson K, Linnaus M, Notrica D. Airway foreign bodies in pediatric patients: anatomic location of foreign body affects complications and outcomes. *Pediatr Surg Int.* 2017; 33(1):59-64.
3. Lowe DA, Vasquez R, Maniaci V. Foreign Body Aspiration in Children. *Clin Pediatr Emerg Med.* 2015; 16(3):140-8.
4. Lovrenski J, Vilotijević Dautović G, Lovrenski A. Reduced or absent „lung sliding“ - a novel lung ultrasound sign of pediatric foreign body aspiration. *J Ultrasound Med.* 2019; 38(11):3079-3082.