

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

## Eighteen years lasting bronchial foreign body: A case report in Cameroon, sub-Saharan Africa

Olivier Kopong Fola<sup>a,\*</sup>, Joseph Sango<sup>a,b</sup>, William Ngatchou<sup>a,b</sup><sup>a</sup> Department of Surgery, Douala General Hospital, Teaching Hospital, PO BOX 4856, Douala, Cameroon<sup>b</sup> Department of Surgery and Subspecialties, Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon

## ARTICLE INFO

## Article history:

Received 28 November 2020  
 Received in revised form 6 December 2020  
 Accepted 10 December 2020  
 Available online 16 December 2020

## Keywords:

Bronchial foreign body  
 Neglected  
 Case report

## ABSTRACT

**INTRODUCTION:** Foreign body aspiration represents an important cause of morbidity and mortality during childhood. A neglected aspirated foreign body can last for years, leading to complications that are sometimes difficult to manage, dramatically affecting the quality of life of the patient.

**CASE REPORT:** We report the case of a 29-year-old female who presented with eighteen-year history of recurrent cough, choking, and respiratory infections following a foreign body aspiration. The course was complicated by a chronic secondary lung abscess, successfully managed by combined medical and surgical treatment.

**DISCUSSION:** In low-income countries like ours, foreign body aspiration is often misdiagnosed. The often delayed management due to low socioeconomic status can lead to serious complications. To the best of our knowledge, it is the longest period of bronchial foreign body retention reported in the medical literature in Africa.

**CONCLUSION:** Foreign body aspiration is common in childhood and requires early recognition and treatment, in order to avoid complications that can be very serious or even fatal.

© 2020 Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

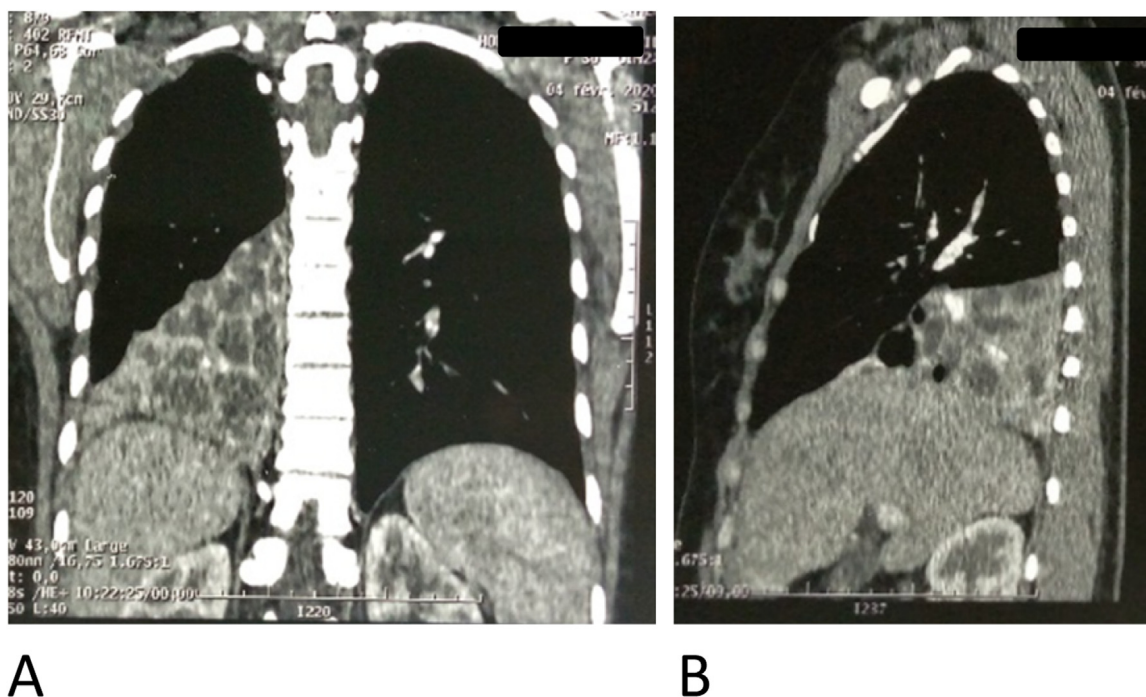
## 1. Introduction

Foreign body aspiration (FBA) occurs when a foreign body (FB) enters the airways and causes choking. Foreign bodies (FBs) can enter the airways through the mouth or nose and get lodge at any site from supraglottis to the terminal bronchioles [1]. FBA is a relatively commonly encountered potential life-threatening emergency in the paediatric age group [1]. Near-total obstruction of the larynx or trachea can lead to immediate asphyxia and death. FBA is more common in children than in adults [2]. Of all the cases, 75 to 85% occur in children younger than 15 years, more commonly in less than three years age group [3]. Most cases of FBA occur in children aged 6 months to 3 years, due to the tendency for children to place small objects in the mouth and nose [4]. The peak of incidence is between 1–2 years old. FBA occurred at an estimated incidence of 29.9/100,000 paediatric population and was responsible for 160 deaths in the US in 2000 [4,5]. Between 2000 and 2009, the mean annual hospital admission rate in the United States for children diagnosed with an airway FB was 6.6 per 10,000 paediatric patients, with a weighted mortality rate of approximately 2.75%, staying relatively unchanged over that period [6,7]. FBA is

the fourth leading cause of death in preschool and younger age children [8]. FBs can either be organic or inorganic. The majority of aspirated objects are organic in nature, mainly food. Peanuts are the FBs most commonly reported, but watermelon and sunflower seeds are also reported as predominant objects [9–14]. In general, small, round objects, plastic objects like caps; seeds, peas, hard candies, popcorn kernels, beans, latex balloons, berries, grapes, dried grapes, carrots, sausages, coins, marbles, whistles, hazelnuts, pistachio nuts and other nuts, knife blade, little particles of various toys, pins, nails and tooth are the commonly encountered usual aspirated foreign materials [5,15–21]. The right main bronchus has a predilection for FB impaction because it is wider than the left and the right main bronchus has more direct extension of the trachea than the left main bronchus [22]. The first successful FB extraction was performed by Gustav Killian in 1897 [23,24]. He extracted a bone from the right mainstem bronchus of a 63-year-old man using an esophagoscope [23,24]. From there, a new era of successful extraction of aspirated FBs with rigid bronchoscope initially, then with flexible bronchoscope started. FBs may be misdiagnosed or neglected and last for years in airways. Those ‘forgotten FBs’ can lead to serious complications impacting the quality of life of patients or threatening their lives. Thus, the management can be very complex. Very few studies have been carried out on FBA in Cameroon. We describe the case of a patient with eighteen years lasting bronchial foreign body (BFB), managed in a resource

\* Corresponding author.

E-mail addresses: [folalivier@yahoo.fr](mailto:folalivier@yahoo.fr) (O.K. Fola), [josephsango2020@gmail.com](mailto:josephsango2020@gmail.com) (J. Sango), [willyngatchou@yahoo.fr](mailto:willyngatchou@yahoo.fr) (W. Ngatchou).



**Fig. 1.** Chest CT Scan showing an aspect of right lower lobar alveolar pneumonia (A and B) comprising numerous excavations in connection with areas of necrosis or abscess, with laterotracheal mediastinal lymphadenopathy.

limited-setting in sub-Saharan Africa. The work has been reported in line with the SCARE criteria [25].

## 2. Presentation of case

A 29-year-old female, student, presented at the outpatient department of our institute on the 4th February 2020, with an 18-years history of intermittent cough, minor haemoptysis, mucopurulent expectoration, fever, dyspnoea and right-sided dull chest pain. She accidentally aspirated a pen cap that she was chewing eighteen years ago, when she was 11-year-old. Following this, she had a dry cough of sudden onset and vomiting, with choking episodes followed by intractable cough. Her relatives took her to a health centre for primary care where caregivers, believing the pen cap had been expelled through the vomiting, allowed her to return home. The course was marked by intermittent onset of pneumonia and dyspnoea, medically managed over time with antibiotics in different health centres, based on the aspects of pneumonia on chest x-rays. All this was really disturbing her by weakening her. She could no longer achieve her studies normally. Seven years ago, a physician advised her to consult in a specialised centre for FB removal, but she did not have enough money to perform the procedure. Chest tubes were inserted at her right side in the last health centre where she presented, thinking of pleural effusion. Worsening of symptoms prompted consultation in our institute. On admission she complained of more recurrent cough, haemoptysis, mucopurulent expectoration, fever, right-sided dull chest pain and dyspnoea when walking on flat ground, classified as Sadoul grade 3 [26]. She was a non-smoker and had no history of exposure to biomass fuel. There was no history of wheezing episodes in the past, nor weight loss or anaemia. On examination, she had a normal body mass index, a temperature of 37.2 °C, a blood pressure of 114/73 mmHg, a pulse of 98 bpm, a respiratory rate of 21 cpm, with SpO<sub>2</sub> at 97%. Positive findings were reduced expansion of the thorax on inspiration, increased vocal fremitus, basal dull percussion, pan-inspiratory crackles, and whispered pectoriloquy on the right side. Our working diagnosis was chronic

pneumonia. Our differential diagnoses were recurrent pneumonia, chronic secondary lung abscess, atelectasis, pulmonary tuberculosis, pulmonary aspergilloma or pulmonary malignancy. Her chest radiograph showed right basal mass-like opacities with cavitation.

A contrast-enhanced chest CT scan was performed, showing an aspect of right lower lobar alveolar pneumonia comprising numerous excavations in connection with areas of necrosis or abscess (Fig. 1).

Pulmonary Function Tests (PFTs) revealed obstructive ventilatory disorders of the distal bronchi with prebronchodilator Forced Expiratory Volume in the first second (FEV<sub>1</sub>) of 1.71 L, Forced Expiratory Flow (FEF<sub>25–75%</sub>) of 1.44 L/s and FEV<sub>1</sub>/FVC (Forced Vital Capacity) ratio of 0.75.

Rigid bronchoscopy revealed a foreign body completely obstructing the right intermediate trunk (Fig. 2). The FB could not be extracted by bronchoscopy, because of important inflammation and fibrosis, causing bleeding at contact, with a risk of perforation.

Bronchoalveolar fluid analysis after lavage revealed predominant neutrophils (85%) and no degenerating changes. Culture isolated *Pseudomonas aeruginosa* and methicillin-resistant *Staphylococcus aureus* (MRSA), with sensibility to levofloxacin and vancomycin respectively.

Complete blood count revealed: White blood cells 4,900/mm<sup>3</sup>, Hemoglobin 12.1 g/dL and Platelets 212,000/mm<sup>3</sup>. Erythrocyte Sedimentation Rate was 52 mm at first hour. C-Reactive Protein was 20 mg/L. Other laboratory tests including complete pre-operative work-up were within normal limits. Patient was admitted and then, placed on intravenous levofloxacin 500 mg/12 h and intravenous vancomycin 0.5 g/6 h for 14 days.

We carried out a surgical procedure under general anesthesia, six days after admission. A regular single lumen endotracheal tube was used to achieve selective left lung intubation. Patient was then placed in the lateral decubitus position. We made a 16 cm skin incision for right posterolateral thoracotomy through the 5th intercostal space. Intraoperative findings were atelectasis of the right middle and lower lobes, associated with extensive fibrosis. The dissection resulted in the rupture of an abscess of the intermediate



**Fig. 2.** Bronchoscopy revealing a bluish foreign body completely obstructing the right intermediate trunk, associated with numerous mucopurulent exudates.

trunk containing a blue pen cap. We removed the pen cap (Fig. 3) and then proceeded with right lower bilobectomy. We inserted a chest tube before closure.

Histopathological examination of specimens revealed a granuloma associated with confluent abscesses and no malignancy.

The patient underwent a postoperative physiotherapy. Postoperative therapy comprises analgesic using intravenous paracetamol 900 mg/6 h, intravenous diclofenac 75 mg/12 h (48 h) and intravenous tramadol 50 mg/6 h. Antibiotherapy was made up of intravenous levofloxacin 500 mg/12 h and intravenous vancomycin 0.5 g/6 h. Thrombo-embolic prevention was done using 4,000 IU daily subcutaneous enoxaparin. The postoperative course was uneventful. Chest tube was removed on postoperative day 5 and the patient was discharged on postoperative day 9. The patient is still followed up, with actually, 9 month after surgery, no signs of recurrence of infection, or complications.

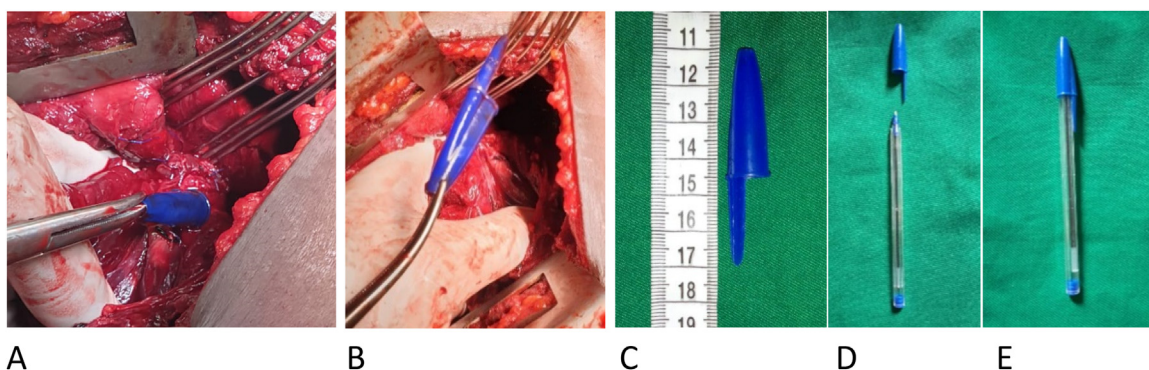
### 3. Discussion

The increased incidence of FBA at young ages has been attributed to several factors: chewing objects as stage of normal oral development; incomplete development of posterior teeth (molars) and, consequently, the food placed in the mouth is not adequately chewed; engagement in various activities such as playing, run-

ning, crying, or laughing, while having various objects or food in the mouth, increasing the possibility of making a forced air inspiration; anatomic particularities of the larynx during childhood, high positioned, with inadequate control of deglutition [5,27–29]. Children generally behave and learn by imitation. Particular attention should be paid to the objects they handle every day, the people they hang out with and the TV programs they watch. Cases of FBA have been reported after watching conjurers swallow objects of all kinds, and sometimes very sharp ones [21]. FBA is most frequently observed in boys, with overall reported sex ratio ranging from 2.1 : 1 to 2.6 : 1 [5,27,28,30–34]. FBA is rarely reported in girls older than 4 years of age [5]. The fact that the majority of aspirations affect boys could be explained by their likely more impulsive nature and adventurous games. Contrary to this trend, however, several studies reported a similar incidence of FB in both genders [5,35,36].

Because the angles made by the mainstem bronchi with the trachea are identical until the age of 15 years, FBs can be found on either side with equal frequency in persons in this age group [1]. With normal growth and development, the adult right and left mainstem bronchi diverge from the trachea with very different angles, with the right mainstem bronchus being more acute and therefore making a relatively straight path from larynx to bronchus. Objects that descend beyond the trachea are more often found in the right endobronchial tree than in the left [21,37]. FBA is classically characterized by the “penetration syndrome”, consisting of a choking episode followed by intractable cough which is more common in children than in adults. The classic triad of cough, wheeze, and diminished breath sounds may not always be present [38]. The common abnormal x-ray findings are mediastinal shift, obstructive emphysema, air trapping, atelectasis and pneumonia [5,35,39–42]. Positive history and clinical findings with normal chest x-ray should never deter the physician from carrying out a bronchoscopy. Computed tomography (CT) of the chest has a better discriminatory value than plain x-rays. On CT, manifestations of FBA include either direct visualization of radio-opaque foreign bodies or indirect signs like non-resolving pneumonia, atelectasis, unilateral hyperinflation or localized bronchiectasis [43]. Most tracheobronchial FBs in children are radiolucent, and accurate diagnosis of such FBs is difficult with routine imaging procedures.

Aspirated FBs may last for years in airways. To the best of our knowledge, the longest period of foreign body retention in an adult recorded in the medical literature is 40 years [44,45]. It was the case of 57 years old otherwise healthy male who had aspirated vegetables at the age of seventeen. Complications can appear due to misdiagnosis, delayed management or management itself. In our case, the disease was initially misdiagnosed, and the patient was unable to support the management fees. It is often very difficult for patients to support their treatments in resource-limited settings where there is lack of universal health coverage



**Fig. 3.** Extraction of the foreign body (blue pen cap, A and B); details and utility (C, D, E).

system. A total of 2,000 US dollars (USD) was necessary for the full management of our patient, including chest CT-Scan, preoperative work-up, surgery, drugs, hospital stay fees ; a real dilemma in a country like ours, where the guaranteed minimum wage is only 65.44 USD. Typical signs of a chronic FBA are fever, purulent bronchitis, and bronchopneumonia that may be followed by a pulmonary abscess [46]. The diagnosis of BFB should be considered in children who present with repeated pneumonia and agnogenic bronchiectasis and actelectasis despite repeated medical treatment [47]. Recurrent pneumonia is defined as two or (usually) more separate episodes of lower respiratory tract infection that generally are accompanied by fever, leucocytosis, and purulent sputum production. Chronic pneumonia is an illness that lasts at least 6 weeks and is caused by a microorganism. The most common causative organisms of bronchopneumonia are *S. aureus*, *H. influenzae*, *P. aeruginosa*, and anaerobic bacteria [48]. Pneumonia caused by *S. aureus* usually follows aspiration of organisms from the upper respiratory tract [49]. The clinical presentation of staphylococcal pneumonia is changing and of particular importance is the dramatic increase of the incidence of methicillin-resistant *Staphylococcus aureus* (MRSA) infections in recent years. The radiographic manifestations usually consist of bilateral patchy areas of consolidation. Air bronchograms are uncommon. Other features are cavitation, pneumatoceles, pleural effusions, and spontaneous pneumothorax. Pneumatoceles are seen especially in children [49]. Intermittent antibiotherapy, and possibly wrong doses may have contributed to emergence of MRSA in our patient. Even if the object is removed, the inflammatory changes may not be completely reversible. Some investigators believe scar carcinoma may develop over time.

Bronchoscopic removal of aspirated large or chronic FBs in general is an arduous task because most endoscopic instruments are unable to gain a firm and wide grasp of solid or sharp objects, and the attempt is more locally traumatic than therapeutic, especially when there is important inflammation or fibrosis. Hence, early involvement of a thoracic surgeon is of paramount importance in the management of large or chronic aspirated foreign bodies because expertise in both rigid and flexible bronchoscopy, as well as in airway surgery, is necessary [21]. Delayed diagnosis of children with BFB can lead to significant pulmonary complications such as chronic bronchial obstruction with bronchiectasis and destruction of lung parenchyma and may require segmental or lobar resection [55]. Surgical treatment is necessary and effective in patients with either unextractable BFB or irreversible damage of lung tissue [55]. Most of the cases occur in low socio-economic background and when parents are uneducated and ignorant. Prevention of FBA should be of national concern, involving the training of doctors, teachers, parents, children, with the contribution of the mass media. First aid gestures such as Heimlich maneuver must be popularized. There should be stricter guidelines for toy manufacturers as well as prominent product safety labeling that will inform consumers of the dangers of choking through age appropriate labeling of toys and high-risk items which can be aspirated [4,50].

#### 4. Conclusion

FBA is a common and serious problem in childhood that requires early recognition and treatment. The diagnosis of BFB should be considered in children who present with repeated pneumonia despite repeated medical treatment. Wide national politics including education of doctors, teachers, parents, children, manufacturers of toys or high-risk items and implementation of a universal health coverage system remain crucial in low-income countries.

#### Declaration of Competing Interest

The authors declare no conflict of interest.

#### Funding

No funding sources.

#### Ethical approval

Our study is exempt from ethical approval by the ethics committee of the Faculty of Medicine and Pharmaceutical Sciences of the University of Douala (Cameroon).

#### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Author contribution

The patient was admitted and operated under the care of William NGATCHOU who conceived the study with Olivier KOPONG FOLA. Joseph SANGO and Olivier KOPONG FOLA collected data. From there, the paper was written. William NGATCHOU reviewed the paper and gave the final approval.

#### Registration of research studies

N/A.

#### Guarantor

**William Ngatchou**, M.D, Associate Professor of Surgery, General Surgeon, Thoracic Surgeon, Department of Surgery and Subspecialties, Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon, email: willyngatchou@yahoo.fr.

#### Provenance and peer review

Not commissioned, externally peer-reviewed.

#### References

- [1] S. Kumar, R. Al-Abri, A. Sharma, H. Al-Kindi, P. Mishra, Management of pediatric tracheo bronchial foreign body aspiration, *Oman Med. J.* 25 (4) (2010) e019, <http://dx.doi.org/10.5001/omj.2010.99>.
- [2] A.L. Rafanan, A.C. Mehta, Adult airway foreign body removal. What's new? *Clin. Chest Med.* 22 (2001) 319–330 [PubMed] [Google Scholar].
- [3] F. Baharloo, F. Veyckemans, C. Francis, Tracheobronchial foreign bodies: presentation and management in children and adults, *Chest* 115 (1999) 1357–1362 [PubMed] [Google Scholar].
- [4] Centers for disease control and prevention, non fatal choking-related episodes among children - United States, 2001, *MMWR Morb. Mortal. Wkly. Rep.* 51 (2002) 945–948 [PubMed] [Google Scholar].
- [5] G. Ding, B. Wu, A. Vinturache, C. Cai, M. Lu, H. Gu, Tracheobronchial foreign body aspiration in children. A retrospective single-center cross-sectional study, *Med.* 99 (22) (2020), e20480, <http://dx.doi.org/10.1097/MD.00000000000020480>.
- [6] J. Cheng, B. Liu, A.E. Farjat, J. Routh, The public health resource utilization impact of airway foreign bodies in children, *Int. J. Pediatr. Otorhinolaryngol.* 96 (2017) 68–71 [Medline].
- [7] J. Cheng, B. Liu, A.E. Farjat, J. Routh, National estimations of airway foreign bodies in children in the United States, 2000 to 2009, *Clin. Otolaryngol.* 44 (3) (2019) 235–239 [Medline].
- [8] J.E. Tsang, J. Sun, G.C. Ooi, K.W. Tsang, Endobronchial foreign body presenting as exacerbation of asthma, *Case Rep. Emerg. Med. (N Y)* 2017 (2017), 6863083 [PubMed].

- [9] N. Saki, S. Nikakhlagh, F. Rahim, H. Abshirini, Foreign body aspirations in Infancy: a 20-year experience, *Int. J. Med. Sci.* 6 (6) (2009) 322–328, <http://dx.doi.org/10.7150/ijms.6.322>.
- [10] F. Midulla, F. Guidi, A. Barbato, P. Capocaccia, N. Forenza, G. Marseglia, et al., Foreign body aspiration in children, *Pediatr. Int.* 47 (6) (2005) 663–668.
- [11] M. Raos, S.B. Klancir, S. Dodig, I. Koncul, Foreign bodies in the airways in children, *Lijec. Vjesn.* 122 (3–4) (2000) 66–69.
- [12] Ts. Tsolov, M. Melnicharov, P. Perinovska, F. Krutilin, Foreign bodies in the upper airways of children – problems relating to diagnosis and treatment, *Khirurgiia (Sofia)* 55 (5) (1999) 33–34.
- [13] H. Emir, G. Tekant, C. Besik, M. Eliçevik, O.F. Senyüz, C. Büyükkunal, et al., Bronchoscopic removal of tracheobronchial foreign bodies : value of patient history and timing, *Pediatr. Surg. Int.* 17 (2-3) (2001) 85–87.
- [14] F. Brkić, S. Delibegović-Dedić, D. Hajdarović, Bronchoscopic removal of foreign bodies from children in Bosnia and Herzegovina : experience with 230 patients, *Int. J. Pediatr. Otorhinolaryngol.* 60 (3) (2001) 193–196, September (28).
- [15] Committee on injury, violence, and poison prevention, prevention of choking among children, *Pediatrics* 125 (2010) 601–607 [PubMed] [CrossRef].
- [16] R.E. Black, D.G. Johnson, M.E. Matlak, Bronchoscopic removal of aspirated foreign bodies in children, *J. Pediatr. Surg.* 29 (5) (1994) 682–684, [http://dx.doi.org/10.1016/0022-3468\(94\)90740-4](http://dx.doi.org/10.1016/0022-3468(94)90740-4).
- [17] H.A. Abdel-Rahman, Fatal suffocation by rubber balloons in children: mechanism and prevention, *Forensic Sci. Int.* 108 (2000) 97–105 [PubMed] [Google Scholar].
- [18] H.K.K. Tan, K. Brown, T. McGili, M.A. Kenna, P.L. Lund, G.B. Healy, Airway foreign bodies: a 10-year review, *Int. J. Pediatr. Otorhinolaryngol.* 56 (2000) 91–99 [PubMed] [Google Scholar].
- [19] P.C. Fitzpatrick, J.L. Guarisco, Pediatric airway foreign bodies, *J. State Med. Soc.* 150 (1998) 138–141 [PubMed] [Google Scholar].
- [20] S.J. Keny, U.C. Kakodkar, A forgotten foreign body in bronchus, *Lung India* 33 (6) (2016) 694–696, <http://dx.doi.org/10.4103/0970-2113.192854>.
- [21] A. Qureshi, A. Behzadi, Foreign-body aspiration in an adult, *Can. J. Surg.* 51 (3) (2008) E69–E70.
- [22] B. James, J.R. Snow, Disease of the nose, throat, ear, head and neck, *Bronchol. Int.* 14 (2) (1991) 1278–1296 [Google Scholar].
- [23] J.C. Hewlett, O.B. Rickman, R.J. Lentz, U.B. Prakash, F. Maldonado, Foreign body aspiration in adult airways: therapeutic approach, *J. Thorac. Dis.* 9 (9) (2017) 3398–3409, <http://dx.doi.org/10.21037/jtd.2017.06.137> [PubMed].
- [24] G. Killian, Meeting of the society of physicians of freiburg, freiburg 1897, *Munchen Med. Wschr.* 45 (December (17)) (1898) 378.
- [25] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, SCARE Group, The SCARE, Guideline: Updating Consensus Surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* (2020), S1743-9191(20) (2020) 30771–30778.
- [26] P. Sadoul, D. Teculescu, Assessment of respiratory functional impairment, *Bull. Eur. Physiopathol. Respir.* 14 (1978), 475e83.
- [27] C.E. Skoulakis, P.G. Doxas, C.E. Papadakis, E. Proimos, P. Christodoulou, J.G. Bizakis, et al., Bronchoscopy for foreign body removal in children. A review and analysis of 210 cases, *Int. J. Pediatr. Otorhinolaryngol.* 53 (2000) 143–148 [PubMed] [CrossRef].
- [28] B. Mansour, N. Elias, Foreign body aspiration in children with focus on the role of flexible bronchoscopy: a 5 year experience, *Isr. Med. Assoc. J.* 17 (2015) 599–603 [PubMed].
- [29] J.D. Rovin, B.M. Rodgers, Pediatric foreign body aspiration, *Pediatr. Rev.* 21 (2000) 86–90 [PubMed] [CrossRef].
- [30] H. Schmidt, B.C. Manegold, Foreign body aspiration in children, *Surg. Endosc.* 14 (2000) 644–648 [PubMed] [CrossRef].
- [31] B. Wolach, A. Raz, J. Weinberg, Y. Mikulski, J.B. Ari, N. Sadan, Aspirated foreign bodies in the respiratory tract of children: eleven years experience with 127 patients, *Int. J. Pediatr. Otorhinolaryngol.* 30 (1994) 1–10 [PubMed] [CrossRef].
- [32] F. Oğuzkaya, Y. Akçali, C. Kahraman, M. Bilgin, A. Sahin, Tracheobronchial foreign body aspirations in childhood: a 10-year experience, *Eur. J. Cardiothorac. Surg.* 14 (1998) 388–392 [PubMed] [CrossRef].
- [33] F. Baharloo, F. Veyckemans, C. Francis, M.P. Bietlot, D.O. Rodenstein, Tracheobronchial foreign bodies: presentation and management in children and adults, *Chest* 115 (1999) 1357–1362 [PubMed] [CrossRef].
- [34] X. Latifi, A. Mustafa, Q. Hysenaj, Rigid tracheobronchoscopy in the management of airway foreign bodies: 10 years experience in Kosovo, *Int. J. Pediatr. Otorhinolaryngol.* 70 (2006) 2055–2059 [PubMed] [CrossRef].
- [35] L. Mu, P. He, D. Sun, Inhalation of foreign bodies in Chinese children: a review of 400 cases, *Laryngoscope* 101 (6 Pt 1) (1991) 657–660 [PubMed] [CrossRef].
- [36] A. Baram, H. Sherzad, S. Saeed, F.H. Kakamad, A.M.H. Hamawandi, Tracheobronchial foreign bodies in children: the role of emergency rigid bronchoscopy, *Glob. Pediatr. Health* 4 (1-6) (2017), 2333794X17743663.
- [37] M.A. Van Looij, P.P. Rood, L.J. Hoeve, A. Borgstein, Aspirated foreign bodies in children: why are they more commonly found on the left? *Clin. Otolaryngol. Allied Sci.* 28 (2003) 364–367 [PubMed] [CrossRef].
- [38] J.C. Hewlett, O.B. Rickman, R.J. Lentz, U.B. Prakash, F. Maldonado, Foreign body aspiration in adult airways: therapeutic approach, *J. Thorac. Dis.* 9 (9) (2017) 3398–3409, <http://dx.doi.org/10.21037/jtd.2017.06.137>.
- [39] J. Liang, J. Hu, H. Chang, Y. Gao, H. Luo, Z. Wang, et al., Tracheobronchial foreign bodies in children - a retrospective study of 2,000 cases in Northwestern China, *Ther. Clin. Risk Manag.* 11 (2015) 1291–1295.
- [40] J.R. Sink, D.J. Kitsko, M.W. Georg, D.G. Winger, J.P. Simons, Predictors of foreign body aspiration in children, *Otolaryngol. Head Neck Surg.* 155 (2016) 501–507 [PubMed] [CrossRef].
- [41] V.E. Mortellaro, C. Iqbal, R. Fu, H. Curtis, F.B. Fike, S.D. St Peter, Predictors of radiolucent foreign body aspiration, *J. Pediatr. Surg.* 48 (2013) 1867–1870 [PubMed] [CrossRef].
- [42] Ade M. Fraga, M.C. Reis, M.P. Zambon, I.C. Toro, J.D. Ribeiro, E.C. Baracat, Foreign body aspiration in children: clinical aspects, radiological aspects and bronchoscopic treatment, *J. Bras. Pneumol.* 34 (2008) 74–82, <http://dx.doi.org/10.1590/s1806-37132008000200003> [PubMed].
- [43] R. Zissin, M. Shapiro-Feinberg, J. Rozenman, S. Apter, J. Smorjik, M. Hertz, et al., CT findings of the chest in adults with aspirated foreign bodies, *Eur. Radiol.* 11 (2001) 606–611 [PubMed] [Google Scholar].
- [44] S.J. Keny, U.C. Kakodkar, A forgotten foreign body in bronchus, *Lung India* 33 (6) (2016) 694–696, <http://dx.doi.org/10.4103/0970-2113.192854>.
- [45] S. Lerra, R. Raj, S. Aggarwal, V.K. Saini, N.M. Nagarkar, A long standing foreign body in bronchus in adult: a diagnostic dilemma, *JK Sci.* 13 (2011) 27–28 [Google Scholar].
- [46] M.M. Saquib, A.K. Rauf, A. Al-Bassam, Late presentation of tracheobronchial foreign body aspiration in children, *J. Trop. Pediatr.* 51 (2005) 145–148 [PubMed] [CrossRef].
- [47] Y. Wu, J. Dai, G. Wang, Y. Li, H. Li, C. Wu, et al., Delayed diagnosis and surgical treatment of bronchial foreign body in children, *J. Pediatr. Surg.* 55 (9) (2020) 1860–1865, <http://dx.doi.org/10.1016/j.jpedsurg.2019.10.052>.
- [48] L. Ketai, K. Jordan, K.H. Busby, Imaging infection, *Clin. Chest Med.* 36 (2) (2015) 197–217, <http://dx.doi.org/10.1016/j.ccm.2015.02.005> [PubMed] [CrossRef] [Google Scholar].
- [49] J. Vilar, M.L. Domingo, C. Soto, J. Cogollos, Radiology of bacterial pneumonia, *Eur. J. Radiol.* 51 (2) (2004) 102–113, <http://dx.doi.org/10.1016/j.ejrad.2004.03.010> [PubMed] [CrossRef] [Google Scholar].
- [50] E. Dias, An unusual case of foreign body aspiration in an infant, *Ann. Med. Health Sci. Res.* 2 (2) (2012) 209–210, <http://dx.doi.org/10.4103/2141-9248.105678>.

## Open Access

This article is published Open Access at [sciencedirect.com](https://www.sciencedirect.com). It is distributed under the [IJSCR Supplemental terms and conditions](#), which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.