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Optimal intervention: Flexible Fiberoptic Bronchoscopy's Role in Chronic Aspiration Foreign Body Removal

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Abstract

Foreign body aspiration in the lower airway is prevalent among children under 5 years old and rare among adults, except in cases of neurodegenerative or neuromuscular conditions. This condition is linked to substantial morbidity, necessitating awareness of potential complications. Flexible bronchoscopy stands as a primary method for foreign body removal. We present a case of a 56-year-old male who aspirated a denture 15 years ago. Recent symptoms encompassed persistent hemoptysis, worsening over two weeks, accompanied by mucopurulent sputum, fever, chest pain, and dyspnea. Physical examination indicated shortness of breath with positive rhonchi. X-ray revealed tubular opacities and atelectasis. Two days post-admission, flexible bronchoscopy exposed moderate mucopurulent secretion in both bronchial trees, with multifocal hyperemic edematous mucosal changes in the right bronchial tree. A denture was successfully extracted from the lower left lobe during the procedure. Treatment included antibiotics, bronchodilators, and mucolytics. Flexible fiberoptic bronchoscopy's adaptability allows local anesthesia usage, reducing costs and risks. The integration of high-definition imaging in flexible bronchoscopes enhances airway visualization and foreign body localization, ensuring precise and safe removal.



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1. Introduction

Lower airway aspiration caused by foreign bodies is a common occurrence among children under 5 years of age, whereas it is rare in adults [1]. In the case of adults, the presence of neurodegenerative or neuromuscular diseases increases the risk of such incidents happening. These diseases, which affect the nervous system and muscles, can contribute to foreign objects being inhaled into the airway. Airway foreign bodies are generally classified as consisting of inorganic or organic material [2].

The age and demographics of the patients exert a noteworthy influence on the epidemiology of the types of objects discovered within the respiratory tract. In Asian countries, there is a higher incidence of animal bone aspiration, whereas in Western countries, meat aspiration is more prevalent [3]. A recent meta-analysis encompassing global literature on foreign body aspiration unveiled a gender disparity, with males constituting 60% of the patients. Nuts were identified as the primary cause in 40% of cases across both high- and lower-middle-income countries. The diagnosis was delayed by over 24 hours in 60% of the cases [4].



Figure 1. Honeycomb and atelectasis.

Clinical manifestations aspiration foreign body more often is cough and objects obstructing the distal airway are more likely to cause chest pain, wheezing, hemoptysis and pneumonia [4].

Bronchoscopy is the first choice in removing foreign bodies from the airway. Flexible bronchoscopy provides several advantages over rigid bronchoscopy. This procedure can be performed under moderate sedation. Its small size and maneuverability make flexible bronchoscopy the method of choice for removing foreign bodies found in the peripheral airways [4].

In this case report, the author presents the case of a 56-year-old man who survived dentures for 15 years. The patient came to the hospital with shortness of breath and was diagnosed with bronchiectasis then eventually the problem was resolved by extraction using a flexible bronchoscope.

2. Cases

A 56-year-old man presented at the hospital with complaints of hemoptysis persisting for the past month, which had worsened over the last two weeks. He also experienced mucopurulent sputum, fever, shortness of breath, and chest pain. Negative history of coughing up blood. The patient also has a history of TB treatment in 2007 and has completed treatment.

Physical examination showed asymmetric chest wall movement, reduced left stem fremitus, decreased vesicular sound in the left lung. Additional breath sounds found positive rhonchi without wheezing.

X-ray showed high right diaphragm than left, reduced bronchovascular markings, honeycomb appearance on left hemithorax, diffuse opaque image, atelectasis with left tracheal deviation (Fig 1).

Following a two-day period from admission, a flexible bronchoscopy was performed on the patient. The procedure involved the administration of intravenous propofol for sedation at a dose of 1 mg/kg. The patient's sedated state was sustained by adjusting the propofol dosage based on their natural breathing rhythm. Throughout the procedure, monitoring was employed to ensure supervision.

Flexible bronchoscopy showed complete stenosis of the lingula, moderate mucopurulent secretions were found in the right and left bronchial tree. Hyperaemic mucosal changes, multifocal oedema of the left bronchial tree (Fig. 2A). We found a denture in the left lower lobe then extracted it by flexible bronchoscopy using bronchoscope forceps (Fig 2B). After extraction using bronchoscope forceps, we monitored bleeding in the left bronchi and bronchial washings and dentures were successfully removed (Fig 3). The patient was treated with antibiotics, bronchodilators and mucolytics.

3. Discussions

The aspiration of foreign bodies into the airway can lead to significant morbidity and mortality due to the obstruction of air passages, impeding proper oxygenation and ventilation. Many patients with foreign body aspiration present with a triad of clinical symptoms: choking, persistent cough, and unilateral wheezing or reduced air movement on one side. A precise history detailing episodes of acute choking followed by coughing or wheezing is valuable in confirming the diagnosis of foreign body aspiration. The retention of foreign objects and delayed diagnosis of such aspiration can pose substantial challenges for interventional bronchoscopists, resulting in chronic wheezing, ongoing cough, and severe complications including pneumonia, atelectasis, abscess formation, hemoptysis, and bronchiectasis [5]. This is exemplified in the presented case, where there was complete stenosis of the left bronchus.

Most of the radiological findings are alveolar infiltrates or atelectasis. Although both of these findings are a direct consequence of aspiration of a foreign body, there is radiological suspicion in only about 18% of cases. In previous studies, this rate ranged from 25% to 47% of cases [6]. Large, calcified-density foreign bodies are easier to detect on radiological examinations than small foreign bodies.

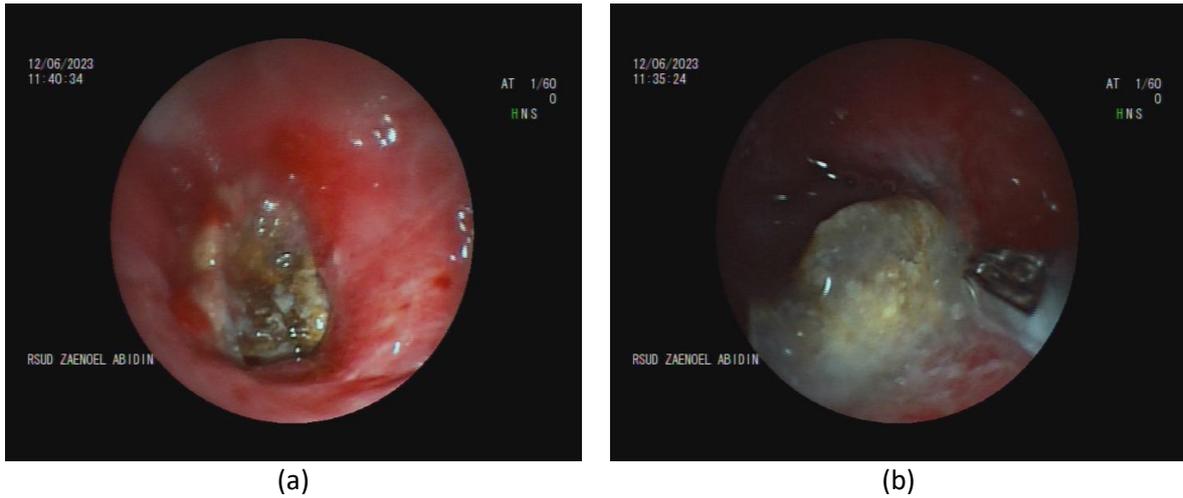


Figure 2. Flexible bronchoscopy with forcep (a) total stenosis and hyperaemic mucosa; (b) removal of dentures using a bronchoscope basket.



Figure 3. Dentures that have been successfully removed.

Several methods are available for the aspiration of foreign bodies. Typically, the preferred approach involves rigid bronchoscopy due to its advantages, such as better control of the airway, enhanced protection of mucous membranes, more effective management in a centralized location, and the use of larger instruments. However, in recent years, an increasing number of case series and systematic reviews have advocated for flexible bronchoscopy as the technique of choice. This preference stems from its simplicity, greater accessibility, comprehensive airway examination, and its applicability even in patients with cervical injuries or those who are currently intubated [6–8]. A study by Jose N. et al. demonstrates a notably high success rate of 94% for flexible bronchoscopy, which is comparatively higher than findings from earlier studies. The documented effectiveness of flexible bronchoscopy in successfully

removing aspirated foreign bodies varies between 61% and 100%, with an average success rate of 89.6% [9].

When employing a flexible bronchoscope, there exists a potential risk that the aspirated foreign body may shift during the extraction procedure. This risk is influenced by factors like the size, shape irregularity, hardness, and consistency of the foreign object. To prevent such migration, the bronchoscopist should strive to encircle the foreign body entirely when utilizing a basket or exert firm pressure to securely grasp the foreign body when employing forceps. Within bronchoscopy, six instruments are available for removing foreign bodies from the airways, including forceps, baskets, nets, snares, balloons, and cryoprobes [3]. In the present case, bronchoscope forceps were employed. During the removal process using flexible bronchoscopy, the most

critical obstruction to be mindful of is the glottis, which represents the narrowest segment of the airway [10].

4. Conclusions

Flexible bronchoscopy proves to be a secure and efficient method for extracting foreign bodies from the airways, yielding a commendable success rate of 94% without any linked complications. The clinical manifestations often manifest as three distinct patterns: choking, persistent coughing, and unilateral wheezing or reduced airflow on one side. Within this case study, we outlined a rare occurrence of prolonged foreign body presence. Our recommendation is to opt for flexible bronchoscopy combined with bronchoscope forceps. The prevalent radiological observations typically encompass radiolucent alveolar infiltrates and atelectasis, characterizing the majority of foreign body cases.

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