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Case Report

Fluoroscopy-guided metallic foreign body removal: A case report

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ABSTRACT

A foreign body (FB) was detected in the right lower zone on the chest X-ray of a 24-year-old woman who presented to the OPD with a cough and sputum. With the help of virtual bronchoscopy, the FB was localized in the posterior segment of the right lower lobe. It was located with the help of a flexible bronchoscope and fluoroscopy and retrieved with the help of snare and endobronchial biopsy forceps. After ensuring clinical stability, the patient was discharged the next day. Bronchoscopic FB removal from segmental and subsegmental bronchi is difficult. Fluoroscopy permits the bronchoscopic retrieval of FB from these relatively inaccessible regions and of the lung and averts the need for thoracotomy.

1. Introduction

Foreign body aspiration is an uncommon occurrence in the adult population. Nonetheless, it needs immediate medical attention as it has the potential to cause long-term sequelae. It is commoner among children than in adults.[1] Adults with depressed cough reflexes like inebriated states, unconsciousness, bulbar paralysis, and neuropsychiatric disorders are predisposed to foreign body aspiration. The clinical presentation varies with the location of FB. Proximally located FB may be symptomatic whereas a certain few may be incidentally detected. The FB may cause partial or complete obstruction of the airways. This may lead to post-obstructive emphysema or lobar collapse with post-atelectatic empyema. Rigid bronchoscopy has traditionally been the modality of choice; however, it can only visualize proximal airways and need for general anesthesia. With the advent of FOB, such procedures can be done under local anesthesia and short sedation. FB retrieval equipment like Dormi baskets or FB removal forceps are adapted to be used with FOB. Due to its shorter learning curve and widespread usage, FOB-guided FB removal has become common practice.

Foreign bodies need to be removed, as they can cause granulation tissue formation, pneumonia, and empyema formation. FOB can visualize the airway up to the segmental level. Small foreign bodies lodged in subsegmental regions, therefore, cannot be removed with FOB alone. Fluoroscopy is an imaging technique that provides a 2-dimensional real-time view of the lungs up to peripheral parts of the airways. Thus, it is an ideal imaging modality for FB retrieval. A multidisciplinary approach involving pulmonologists, radiologists, and anesthesiologists ensures procedural success. We present here a case of FB removal with FOB and fluoroscopy.

2. Case Report

A 24-year-old lady was referred to the respiratory OPD due to chest X-ray changes. A foreign body was incidentally detected in the right lower zone on the chest X-ray while being worked up for dysmenorrhea (Figure 1). Apparently,

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the patient had aspirated the FB during sleep almost 1 month before presentation.

2.1. Investigations

Distal migration of the FB was noted on studying serial X-rays (Figure 2). High-resolution computerized tomography of the thorax demonstrated the FB in the right bronchus intermedius (Figure 3). Virtual bronchoscopy demonstrated the FB in th. FOB attempted but failed to locate the FB. Therefore, FOB under fluoroscopy was done to retrieve the FB. The FOB was positioned in the right lower lobe bronchus. The snare was passed through the working channel into the posterior segment of the right lower lobe (Figure 4 and video). Under fluoroscopic vision, the FB was pulled into the right lower lobe bronchus. Later, it was grasped with the bronchoscopic biopsy forceps (Figure 5 and video). The scope, the forceps, and the FB were removed en bloc. The FB was a part of the nose-pin. The patient was discharged the same day and followed up with a chest X-ray (Figure 6a,b). Post-procedural X-ray was performed (figure). After ensuring the absence of procedure-related complications, the patient was discharged.

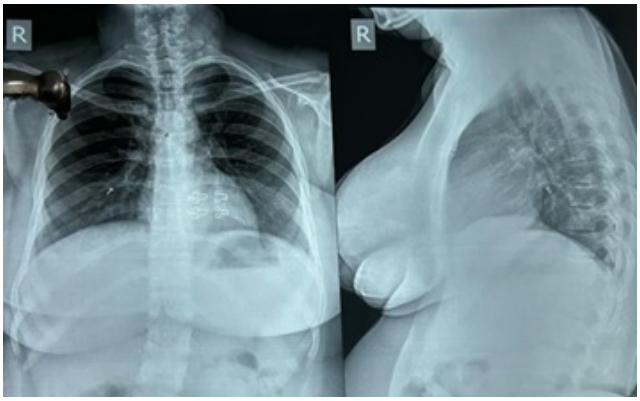

Figure 1: Chest- ray showing a metallic FB in the right lower zone

3. Discussion

The respiratory system consists of the trachea-bronchial tree and the alveoli. The trachea-bronchial tree is made up of the trachea, main or lobar bronchi, and the bronchioles. From the trachea onwards, the airway undergoes dichotomous branching giving rise to 23 generations of airways. The first 16 generations only conduct air into the lungs. The trachea is the largest airway and divides into the right and left main bronchi. The right main bronchus is more in line with the trachea and the left main bronchus is at an angle to the trachea. The diameter of the right bronchus (15mm) is more than that of the left (13mm)(1). This predisposes the right-sided airways for aspiration (FB and other material) and

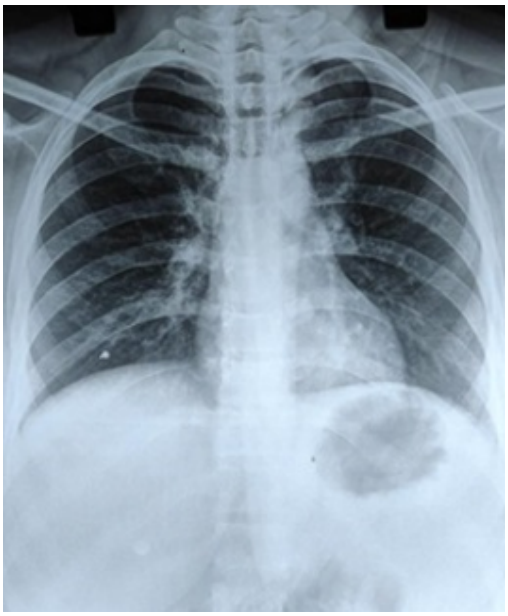

Figure 2: Distal migration of FB

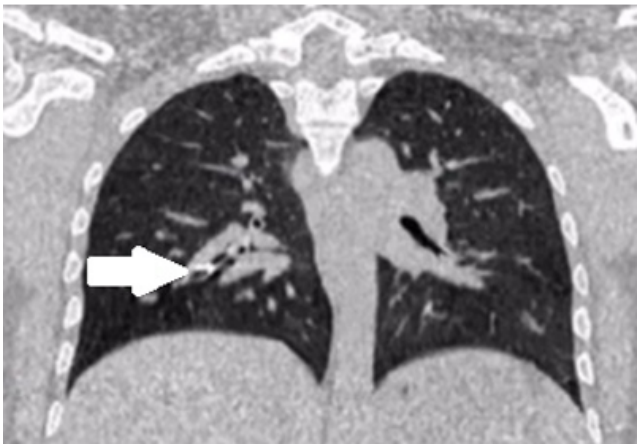

Figure 3: HRCT of the thorax (Sagittal view). White arrow indicating the FB in the bronchus intermedius.

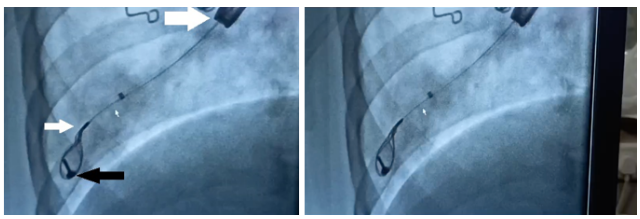

Figure 4: Figure and video: Fluoroscopic image (stills)-left side and video right side; Large white arrow indicates the broncho scope, small white arrow is showing the snare and the black arrow indicates the FB

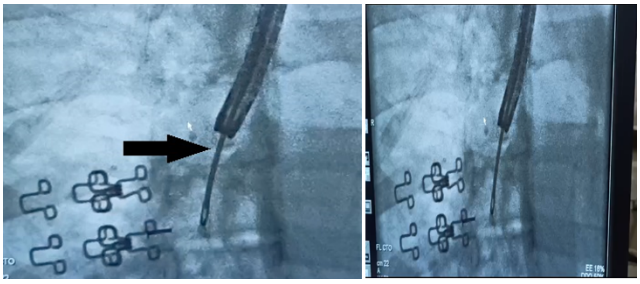

Figure 5: Figure and video: Black arrow indicates the broncho scopic biopsy forceps holding the FB.

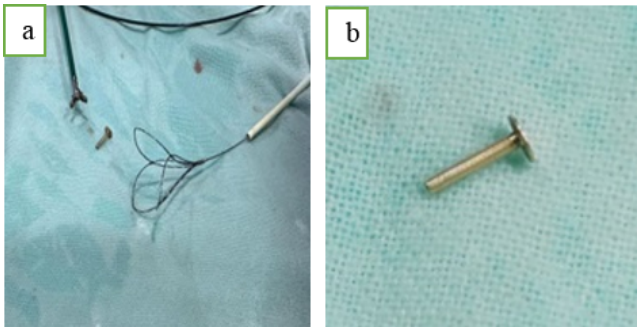

Figure 6: a: Bronchoscopy forceps (left), Foreign body (centre) and snare (right); **b:** Nose ring screw (the foreign body)

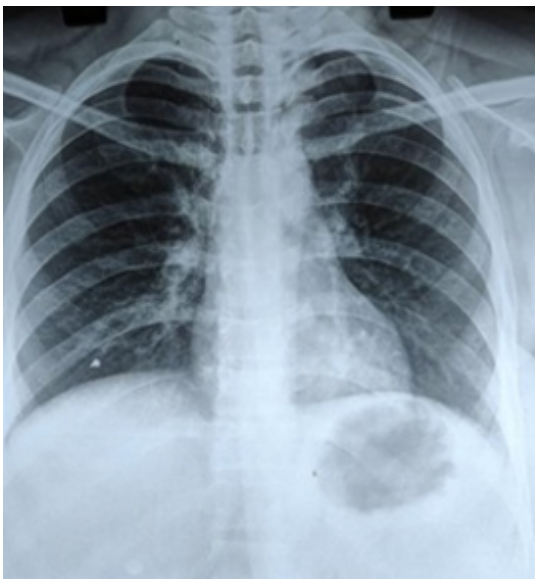

Figure 7: Post FB retrieval chest X-ray

unilateral intubation. The lung parenchyma is divided into 18 bronchopulmonary segments. The posterior segment of the right upper lobe and the superior segment of the right lower lobe are the usual site of FB aspiration in the supine position. In our case, the patient apparently aspirated the FB in the supine position.

Foreign bodies can be of different types. FB can be organic and inorganic.[2] Common organic FB are peanuts, teeth, and chicken bones, and inorganic FB are pins or screws. The clinical presentation of FB aspiration in adults is varied. As the cough reflex is well-developed in adults, FB aspiration is rare in adults. Therefore, it occurs in old age, altered mental status, brain tumors, history of cerebrovascular accidents, and neuropsychiatric disease.[3] Our patient was a young adult and didn't suffer from any neuropsychiatric disease. In an observational study involving 138 patients with FB aspiration, 70.3% didn't have any predisposing factor.[3] The risk factors for aspiration tend to increase with age.[3] Most patient complain of choking, breathlessness, cough and fever. Fever may be due to post-atelectatic pneumonia or empyema. Most patient don't remember the FB aspiration episode. In this case, the foreign body was incidentally detected while being worked-up for dysmenorrhea.

Chest X-ray is often the first line of investigation. It may be normal or present with consolidation, atelectasis or obstructive emphysema. Obstructive emphysema develops due to partially occluding FB which selectively allows air to enter the lung and prevents its exit. The patient may present with pneumonia and empyema to healthcare facility and a FB may be diagnosed retrospectively.[4] FB can be seen radiologically only if they are radiopaque. This is usually the case with metallic FB. While computerized tomography (CT) of the thorax is needed to precisely localize the FB, virtual bronchoscopy aids to demarcate the path needed to reach it. FB retrieval can be done with rigid and flexible bronchoscopy. Rigid bronchoscopy traditionally has been the standard of care for FB retrieval by virtue of better vision, large working channel and better airway management.[5] Over the period, flexible bronchoscopy has demonstrated its usefulness in FB removal. FOB can be performed under local anesthesia and with mild sedation. The patient is always spontaneous breathing. Unlike rigid bronchoscopy, FOB can visualize lobar and segmental bronchi. FOB adapted instruments like dormi basket, foreign body removal forceps, and electromagnetic forceps are used for FB retrieval. Solid and hard objects are removed with the help of toothed forceps like alligator forceps whereas rubber tipped forceps help to grasp smooth and sharp objects.[2]

FOB is limited by its inability to visualize airway beyond the segmental bronchi. Therefore, FB lodged beyond the segmental bronchus need additional imaging for removal. Fluoroscopy uses X-rays to produce a real-time image. In

our case, as the FB was lodged in the posterior segment of the right lower lobe, it couldn't be visualized with FOB. Under fluoroscopic vision, it was seen distal to the tip of the FOB (Figure 4). Through the working channel, snare was passed and navigated towards the foreign body. FB was pulled into the right bronchus intermedius. Biopsy forceps was now passed through the working channel and the FB was removed en bloc with the scope. Various studies have demonstrated the usefulness of FOB in foreign body removal. Only in a minority of cases, a change over to rigid bronchoscopy was required.[6,7] Bleeding, mucosal trauma, distal migration of FB and anesthesia associated adverse reactions are the common complications associated with the procedure. Complication rate increases with delay in diagnosis and removal procedure.[7] Our patient didn't experience any post-procedural complications.

4. Conclusion

Fibreoptic bronchoscopy can locate and remove FB from the proximal airways to the segmental bronchi. Fibreoptic bronchoscopy coupled with fluoroscopy can successfully remove the distally located FB.

5. Source of Funding

None.

6. Conflict of Interest

None.

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None.

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