CASE REPORT

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Removal of Impacted Foreign Body by Bronchoscopic Modalities

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ABSTRACT

Foreign Body (FB) aspiration is a life threatening event. Long interval between aspiration and removal can result in formation of granulation tissue around the FB. It can significantly affect the lung structure and manifest as a medical problem requiring surgery and increasing the related complications. It may also limit the visual field and extraction maneuver by flexible bronchoscope.

In this case series we report 4 cases of FB aspiration in which FB is covered with granulation tissue and we also discuss different strategies to successful removal of these objects. ***(Tanaffos 2009; 8(4):60-64)***

Key words: *Foreign body, Bronchoscopy, Aspiration*

INTRODUCTION

Tracheobronchial foreign bodies (FB) may be associated with significant morbidity and mortality if misdiagnosed (1).

Related complications can vary from pneumonia, atelectasis and abscess formation to secondary dislocation with a fatal airway obstruction (1).

Most FBs are aspirated by children under 10 years of age (2) more than 50% of which being under three (3). As a life-threatening condition, foreign body aspiration requires prompt intervention.

Rigid bronchoscopy has been the therapeutic method of choice during the last several years for FB removal (4). Also, fiberoptic bronchoscopy can be used as a less invasive initial technique for FB removal in infants and children with 91.3% success rate (5). Only a few number of patients with FB aspiration need surgical intervention such as tracheotomy or bronchotomy when FB extraction is not possible due to the distal location of the object in the tracheobronchial tree where bronchoscope cannot reach or as a result of severe impaction of FB by granulation tissue (6).

In any condition, our aim is to use a less invasive modality for patients` relief and avoid wasting time. This goal can be achieved easily and quickly by using interventional procedures.

There are some techniques for rapid extraction of FB applied through rigid/flexible bronchoscopy.

In this study, we introduce Fiberoptic Bronchoscopy (FOB)/rigid bronchoscopy assisted

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with interventional modalities. For each patient, after confirming the diagnosis of FB aspiration based on personal history, clinical findings, CXR and/or CT scan, we performed bronchoscopy with additional modalities for FB removal (as explained below) with successful results.

CASE PRESENTATION

Case 1:

A 40 year-old woman with a history of chronic cough and dyspnea for 2 months was referred to our ward. FB aspiration was diagnosed. Flexible bronchoscopy was performed which showed right middle lobe bronchus was totally occluded by granulation tissue resembling a tumoral mass. (Figure 1)

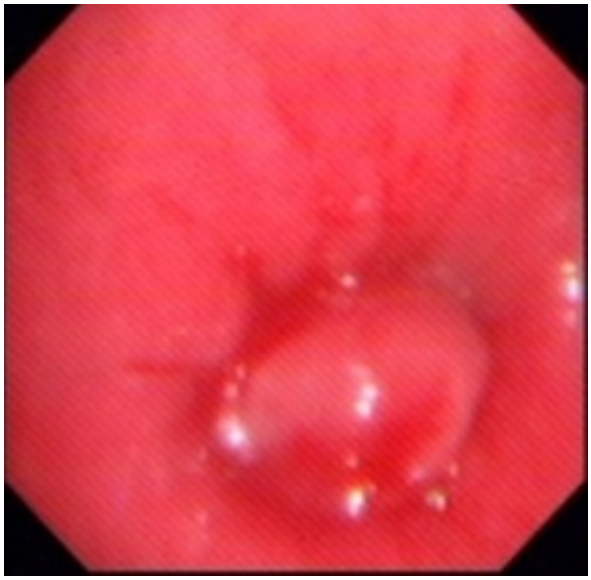

Figure 1. Foreign body was impacted by the granulation tissue.

After initial evaluation, we decided to destruct the granulation tissue to make the FB visible and extractable. Then, we used neodymium yttrium aluminum garnet (Nd-YAG) laser via Optilase 1100 device, with the power of 20-30 watt, pulse interval of 0.3 and pulse wide of 0.3 on the lesion to destruct the granulation tissue. Afterwards, FB was extracted by grasping forceps successfully (Figure 2). The FB was a sunflower seed.

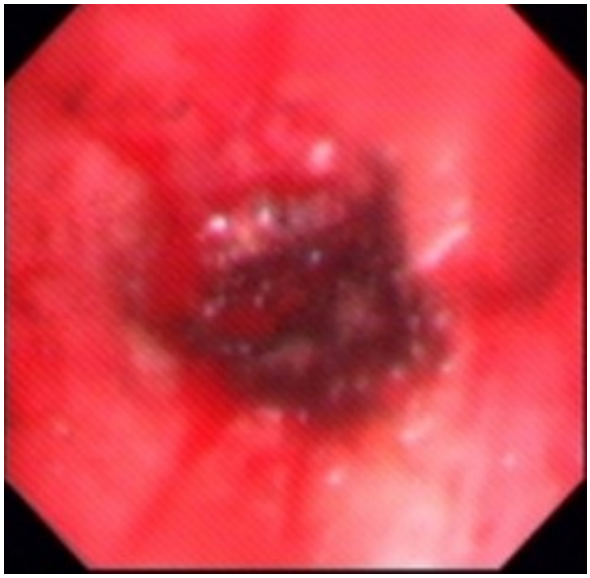

Figure 2. After foreign body extraction.

Case 2:

A 50 year-old man presented to our ward with a one month history of cough and dyspnea and 5 days of fever and chills. After primary evaluation by CXR and CT scan, FB aspiration was diagnosed as the main cause of pneumonia.

We performed fiberoptic bronchoscopy and found that left upper lobe bronchus was totally occluded by the foreign body and granulation tissue. Nd-YAG laser was used for the removal of the granulation tissue and the FB was extracted by grasping forceps easily. The FB was a chicken back bone.

Case 3:

A 7 year-old boy with a history of car accident, head trauma and GCS=9 was referred to our ward. FB was seen on CXR. No atelectasis or post obstructive pneumonia was detected. No abnormal finding other than loss of consciousness was detected on physical examination. We used rigid bronchoscopy to prepare the field for intervention with a flexible bronchoscope; the FB was localized.

It was the patient's tooth and was located in the

proximal part of the right lower lobe bronchus. Through flexible bronchoscope, we made several attempts by different forceps to extract the FB which all failed due to the formation of granulation tissue around the object and impaction of the foreign body. At this time, we decided to use argon plasma coagulation around the FB to destruct the granulation tissue. By doing so, the FB was released and easily extracted by basket forceps.

Case 4:

A 5 year-old boy with a history of FB aspiration and cough during the last month was referred to our ward. The FB was seen on CXR. We examined the bronchus by flexible bronchoscope and found the FB in the left lower bronchus (Figure3). Rigid bronchoscopy was performed to prepare the field and then we used flexible bronchoscope through the rigid lumen. Both flexible and rigid forceps failed to remove the FB because it was engulfed by the granulation tissue.

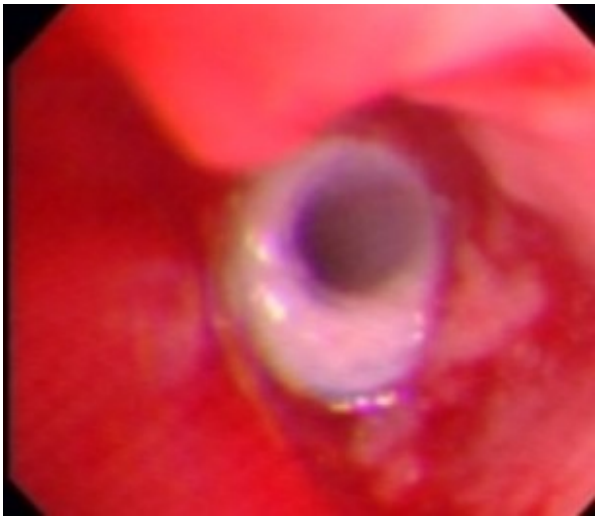

Figure 3. Impacted foreign body .

We knew that the FB was made of plastic and we thought that APC might be dangerous to use around it. Instead, we decided to remove the granulation tissue by using cryotherapy. We froze the granulation tissue without thawing and conveniently removed it. It was a successful procedure and FB was released. Since the lumen was too small in diameter, the grasping forceps did not open inside the bronchus and we had to pass the biopsy forceps through the central hole of the FB and then open it to bring out the FB after release. (Figure 4)

Figure 4. Schematic view of grasping forceps.

DISCUSSION

FB aspiration can be a harmful event because of apparent initial signs like chocking as well as potential side effects such as pulmonary destruction after prolonged aspiration. FB aspiration has a triad of wheezing, coughing and unilaterally reduced respiratory sounds in 40% of patients (7). Mehta and Rafanan believe that FB aspiration most commonly presents with cough, hemoptysis, fever, or dyspnea (11) and also can mimic asthma attack as we reported two cases of FB aspiration whose signs and symptoms impersonated asthma. These patients had been under treatment for asthma for several months (8).

The main diagnostic step is based on medical history and clinical presentations at the first visit.

For FB removal, it is very important to choose the most suitable procedure. Prakash et al. (9) suggested that when the FB is too distal in tracheobronchial tree or in patients under mechanical ventilation or in

those with face and neck trauma, we should use flexible bronchoscopy as the therapeutic procedure.

Folch and Mehta described that flexible bronchoscopy is the procedure of choice for FB removal because of its rapidity, safety, versatility and possibility to be done under moderate sedation (10). Also, Mehta and Rafanan believe that flexible bronchoscopy is the gold standard procedure for diagnosis and localization of FB and any attempt for removal should take place after primary evaluation (11). They also introduced this procedure as a cost effective and less invasive method with 100% success rate in their experience.

As previously reported, we used flexible bronchoscopy as the initial interventional procedure in our routine practice but in some cases (as mentioned above), FB removal by flexible bronchoscopy was impossible due to the impaction of the object by granulation tissue. We also tried removing the object by rigid bronchoscopy but FB extraction was not possible by rigid forceps either.

Argon-plasma coagulation (APC) is a noncontact mode of monopolar electrical coagulation; argon gas is used as a conductive medium (12). Indications for APC are any benign or malignant tissue destruction, coagulation of hemorrhage from a visible source, post-intubation stenosis and treatment of granulomatous lesions in the airways (e.g. lesions in close vicinity to airway stents)

Cryotherapy is a contact mode in which a cryogen gas (carbon dioxide, nitrogen or nitrous oxide) can be used for tissue destruction. Mehta and Rafanan introduced this modality as a useful procedure for FB extraction by hanging on to the FB during the freezing time (11).

Nd-YAG laser is a form of laser with deeper tissue penetration, improved hemostasis and superior photocoagulation (13) which can be used via both rigid and flexible bronchoscopy. In some instances, it is useful for breaking down large FBs into smaller pieces (11) for easier removal.

Extraction of a FB impacted for a long time is very difficult, especially in infants and young children due to the specific anatomy of their tracheobronchial tree being much smaller than adults. Also, the visualization and instrumentation of foreign body by rigid bronchoscopy is much more limited in children.

The funnel-shaped pattern of subglottic area may also cause releasing the grasped FB and reaspiration of the same object.

FB remaining in tracheobronchial tree can cause FB reaction in bronchi and lead to formation of granulation tissue surrounding the FB and not only does it make the FB removal difficult, but also causes bleeding and limitation in visual field. Therefore, some intervention is needed to prevent it.

In some medical centers, glucocorticoids are injected for several sessions starting a few days before the intervention.

According to our policy, if the FB is resistant to heat (for example an aspirated tooth), argon plasma coagulation or laser therapy can be initially applied to destroy the granulation tissue and then FB removal by forceps can be carried out. For FBs with rounded surface, cup forceps is the modality of choice and for FBs with an irregular surface, alligator forceps is more suitable for their removal.

If the tracheobronchial diameter is too narrow for the forceps tip to open as wide as we need, we can pass an extraction balloon via a guide wire near the FB. By inflating the balloon, retraction of the FB would be possible and after that the FB should be gripped by a basket forceps to prevent re- aspiration of the object in the subglottic area (especially in children).

If the FB is sensitive to heat, and may start to melt, we can use cryotherapy for FB removal. In this method, the lesion temperature is lowered to -70 C but without thawing and at this time the cryo probe

will be retracted and the granulation tissue will be extracted without significant bleeding.

Cryotherapy can also be used for extraction of an aspirated chewing gum by retracting the cryo probe during the freezing time. (11)

In Islamic countries, rosary beads are among the most common aspirated foreign bodies in children. The beads are usually impacted in distal portion of bronchial lumen because of their shape. A biopsy forceps can be passed through the central lumen of the bead and by opening the forceps and retraction of both bronchoscope and forceps we can extract the impacted FB easily.

After FB removal, we usually prescribe systemic glucocorticoids and inhaled epinephrine (especially in young children).

REFERENCES

1. Tomaske M, Gerber AC, Weiss M. Anesthesia and periinterventional morbidity of rigid bronchoscopy for tracheobronchial foreign body diagnosis and removal. ***Paediatr Anaesth*** 2006; 16 (2): 123- 9.
2. Ibrahim Sersar S, Hamza UA, AbdelHameed WA, AbulMaaty RA, Gowaeli NN, Moussa SA, et al. Inhaled foreign bodies: management according to early or late presentation. ***Eur J Cardiothorac Surg*** 2005; 28 (3): 369- 74.
3. Bittencourt PF, Camargos PA. Foreign body aspiration. ***J Pediatr (Rio J)*** 2002; 78 (1): 9- 18.
4. Sayuti R, Fadzil A, Ahmad R. Impacted foreign body in secondary bronchus:Chest percussions during therapeutic bronchoscopy. ***Int J Pediatr Otorhinolaryngol*** (Extra) 2008; doi:10.1016/j.pedex.2008.07.001
5. Ramírez-Figueroa JL, Gochicoa-Rangel LG, Ramírez-San Juan DH, Vargas MH. Foreign body removal by flexible fiberoptic bronchoscopy in infants and children. ***Pediatr Pulmonol*** 2005; 40 (5): 392- 7.
6. Cataneo AJ, Cataneo DC, Ruiz RL Jr. Management of tracheobronchial foreign body in children. ***Pediatr Surg Int*** 2008; 24 (2): 151- 6.
7. Wiseman NE. The diagnosis of foreign body aspiration in childhood. ***J Pediatr Surg*** 1984; 19 (5): 531- 5.
8. Jabbardarjani HR, Herth F, Kiani A, Arab A, Masjedi MR. Central airway Obstruction Masquerading as Difficult to treat asthma. ***J Bronchiol Intervent Pulmonol*** 2009; 16 (1): 6- 9.
9. Prakash UB, Midthun DE, Edell ES. Indications for flexible versus rigid bronchoscopy in children with suspected foreign-body aspiration. ***Am J Respir Crit Care Med*** 1997; 156 (3 Pt 1): 1017- 9.
10. Folch E, Mehta AC. Airway interventions in the tracheobronchial tree. ***Semin Respir Crit Care Med*** 2008; 29 (4): 441- 52.
11. Mehta AC, Rafanan AL. Extraction of Airway Foreign Body in Adults. ***Journal of Bronchology*** 2001; 8(2): 123- 31.
12. Bolliger CT, Mathur PN, Beamis JF, Becker HD, Cavaliere S, Colt H, et al. ERS/ATS statement on interventional pulmonology. European Respiratory Society/American Thoracic Society. ***Eur Respir J*** 2002; 19 (2): 356- 73.
13. Seijo LM, Sterman DH. Interventional pulmonology. ***N Engl J Med*** 2001; 344 (10): 740- 9.