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Original Article

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# Tracheobronchial Foreign Bodies Aspirations in Adults: A 25-Years Experience

Bayram Altuntas[1], Yener Aydin[1], Atilla Eroglu[1]

***ABSTRACT***

***Objective:*** *The incidence of tracheobronchial aspirations of foreign bodies in adults is lower than in children. In this article, we aimed to present our experience in tracheobronchial aspiration of foreign bodies in adults during 25-years.* ***Methods:*** *From January 1990 to January 2015, 122 patients older than 16 years with suspected tracheobronchial aspiration of foreign body were included in this study. Patients' data cards were retrospectively assessed according to age, gender, clinical symptoms and physical examination findings, localization and type of foreign body, radiologic findings and therapeutic options.* ***Results:*** *Ninety-six of the patients were female (78.7%) and 26 were male (21.3%). The age range was 17-70 years and mean age was 30.3 years. Rigid bronchoscopy was performed in all patients. Foreign bodies were seen in 112 patients (91.8%). Foreign bodies were extracted by rigid bronchoscopy in 109 patients. Thoracotomy and pneumotomy were performed in the remaining 3 patients. The most common foreign body was pin (83%). The chief symptom was cough (100%). The most common anatomic location of foreign bodies was right bronchial system (60.7%). The main radiologic finding was radiopaque image of the related foreign body (88.4%). Right lower lobectomy was performed in two patients because of bronchiectasis.* ***Conclusion:*** *If tracheobronchial aspirations of foreign bodies are not treated in early period, irreversible and suppurative lung diseases may occur as results of aspirations in later years. The education of societies about this subject is principal precaution in reducing the frequency of tracheobronchial aspirations of foreign bodies.*

***Key words:*** *Bronchoscopy, foreign body, atelectasis*

***Yetişkinlerde Yabancı Cisim Aspirasyonları: 25 Yıllık Bir Tecrübe Yetişkinlerde Yabancı Cisim Aspirasyonları***

***ÖZET***

***Amaç:*** *Trakeobronşiyal yabancı cisim aspirasyonlarının insidansı yetişkinlerde çocuklardan daha düşüktür. Bu çalışmada biz, 25 yıllık dönemde yetişkinlerde trakeobronşiyal yabancı cisim aspirasyonları hakkında tecrübelerimizi sunmayı amaçladık.* ***Yöntem:*** *Ocak 1990 yılından Ocak 2015 yılına kadar, 16 yaşından büyük şüpheli yabancı cisim aspirasyonlu 122 hasta bu çalışmaya dahil edildi. Hasta kartları, retrospektif olarak yaş, cinsiyet, klinik semptom ve fizik muayene bulguları, yabancı cismin lokalizasyonu, radyolojik bulgular ve tedavi yöntemlerine göre değerlendirildi.* ***Bulgular:*** *Hastaların 96'sı bayan (%78.7) ve 26'sı erkekti (%21.3). Yaş aralığı 17-70 yıl ve ortalama yaş 30.3 yıldı. Tüm hastalara rijid bronkoskopi yapıldı. Yüz on iki hastada yabancı cisim bulundu (%91.8). Yüz dokuz hastada yabancı cisim rijid bronkoskopiyle çıkarıldı. Kalan üç hastada torakotomi ve pnömotomi yapıldı. En sık yabancı cisim turban iğnesiydi (%83). Ana semptom öksürüktü (%100). Yabancı cisimlerin en sık lokalizasyonu sağ bronşiyal sistemdi (%60.7). En sık radyolojik bulgu ilgili yabancı cismin radyoopak görüntüsüydü (%88.4). Bronşektaziden dolayı 2 hastaya lobektomi yapıldı.* ***Sonuç:*** *Trakeobronşiyal yabancı cisim aspirasyonları, eğer erken dönemde tedavi edilmezlerse, daha sonraki yıllarda aspirasyonun bir sonucu olarak kalıcı ve süpüratif akciğer hastalıkları meydana gelebilir. Toplumların bu konu hakkında eğitimi, trakeobronşiyal yabancı cisim aspirasyonlarının sıklığını azaltmada esas önlemdir.*

***Anahtar kelimeler:*** *Bronkoskopi, yabancı cisim, atelektazi*

*Ataturk University, Medical Faculty, Department of Thoracic Surgery[1], Erzurum, Turkey*

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***Correspondence:*** *Bayram Altuntas*
*Ataturk University, Medical Faculty, Department of Thoracic Surgery, Erzurum, Turkey*

*E-mail: draltuntas@hotmail.com*

## INTRODUCTION

Tracheobronchial aspirations of foreign bodies are less common in adults than in children (1). Although foreign bodies in airways can cause asphyxia in children, this situation is rarely seen in adults because of their large diameter of the airway (2,3). If misdiagnosed as bronchopneumonia and asthma, the diseases requiring surgical intervention such as bronchiectasis and abscess may occur in later years (4). Aspirated foreign body varies according to geographic areas (5,6). Furthermore, poor mental, psychiatric and neurological status, voice and dental prosthesis use, and drugs used as sedatives play important roles in tracheobronchial aspirations in adults (7,8). In this study, we aimed to present our experience in tracheobronchial aspirations of foreign bodies and rigid bronchoscopy in adults during 25-years. To the best of our knowledge, this paper is the largest series in the literature.

## MATERIAL AND METHODS

We retrospectively evaluated 805 patients with presumptive diagnosis of tracheobronchial aspiration of foreign bodies who were admitted to our department from January 1990 to January 2015. Patients older than 16-years were included in this study. Detailed histories and standard chest plains were taken and all patients were examined prior to bronchoscopy procedure. Rigid bronchoscope and various forceps were used under general anaesthesia in all patients. The flexible bronchoscope and scopy with C-arm were used only when rigid bronchoscope failed. After bronchoscopic exploration, the foreign body was removed and then both bronchial trees were washed with saline, and secretions were suctioned. Finally, tracheobronchial system was examined, carefully. When the foreign body could not be removed by bronchoscopy, thoracotomy was performed. Patients with irreversible pulmonary damage as bronchiectasis underwent lobectomy. When respiratory distress occurred due to laryngeal oedema, tracheotomy was performed. .

## RESULTS

A hundred and twenty-two of 805 patients were older than 16-years. Rigid bronchoscopy was performed in all patients due to suspicious foreign body aspiration. Ninety-six of the patients were female (78.7%) and 26 of patients were male (21.3%) and mean age was 30.7 years (17-70 years). Foreign bodies were found in 112 patients (91.8%). The most common initial symptom was coughing in the medical history of patients (100%, n:122). Diminished breath sounds (n=5, 4.09%), rhonchi (n:3, 2.4%), fever and purulent sputum (n:2, 1.6%) were the most common findings. There was only one patient with dyspnoea (0.8%). Ninety-eight percent of the patients were symptomatic within first 24 hours before hospitalization. Time interval of the symptoms ranged from thirty minutes to four years. All patients (100%) had a positive aspiration history.

The chest plain showed radiopaque objects in 99 patients (88.4%). Hyperaeration and bronchiectatic changes were seen in 3 (2.4%) and 2 (1.6%) patients, respectively. Seventeen patients had normal chest plain (13.1%). Before bronchoscopy, routine chest plain was not taken in a patient because of respiratory distress. Aspirated foreign body in this patient was a voice prosthesis and he was a patient with laryngectomy. The anatomic locations of the foreign bodies were trachea, the right bronchial system and the left bronchial system in 14 (12.5%) , 68 (60.7%), 30 (26.8%) patients, respectively (Table 1) (Figure 1-5). Fifty-three of the foreign bodies (47.3%) were localized in right lower lobe. Foreign body was not found in 10 (8.1%) patients. Pins were the most common foreign bodies (n:93, 83%), and headscarf pin alone accounted for 80.3% of the total (n:90) (Table 2).

Indications of bronchoscopy were as follows: Positive medical history, examination findings related to the as-

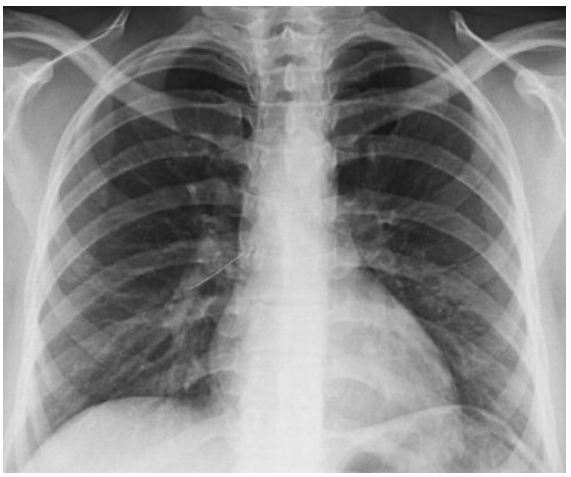

***Figure 1**. A 26-years old female patient, headscarf pin is seen in the right main bronchus*

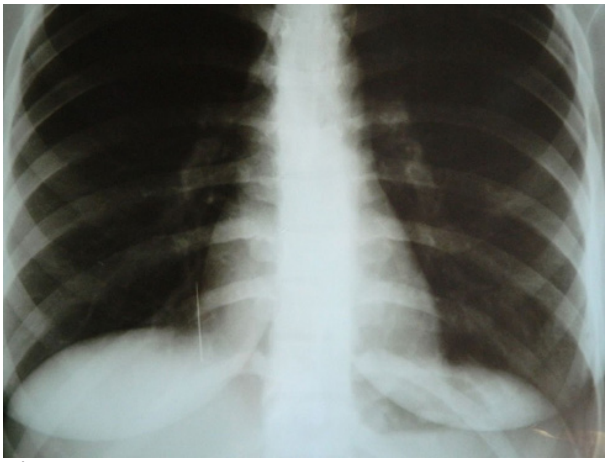

***Figure 2**. A 18-years old female patient. Headscarf pin was located in right lower lobe bronchus. Thoracotomy and bronchotomy were performed because that bronchoscopy procedures and scopy failed.*

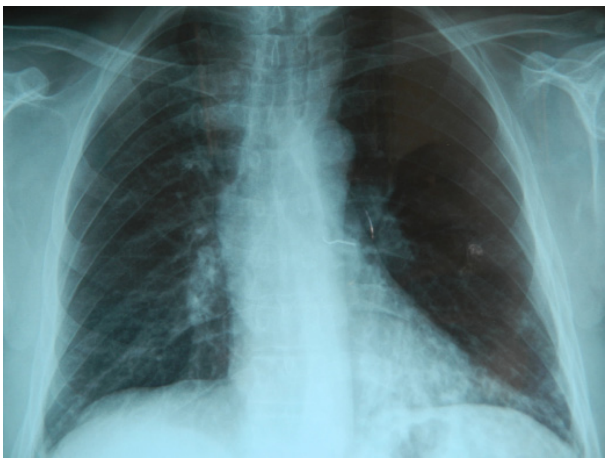

***Figure 4**. A 53-years old male patient. A dental prosthesis settled in the left main bronchus.*

piration, radiologic findings proving or supporting the existence of a foreign body and recurrent pulmonary infections. Foreign bodies could be removed by rigid bronchoscopy under general anaesthesia in 109 patients. We used the scopy with C-arm and fiberoptic bronchoscopy in 13 of 112 patients to determine the location of the foreign body. Aspirated foreign bodies were pins in these 13 patients. In ten of 13 patients, pins were extracted successfully. In the remaining three patients, foreign bodies were extracted through thoracotomy and pneumotomy because that bronchoscopy procedures and scopy failed. Extracted objects were headscarf pins in these three patients. Right lower lobectomy was performed in two patients because of bronchiectasis. One of these patients was 18 years old male and the other was 22 years old female. Eighteen-years-old patient had a history of aspiration 3 years ago and other had a history of aspiration 4 years ago. Aspirated foreign bodies were pen caps in these two patients. Intravenous corticosteroid and aerosol therapy were applied when bronchoscopy procedure prolonged. Despite this, laryngeal oedema occurred in two patients due to prolonged procedure and trache-

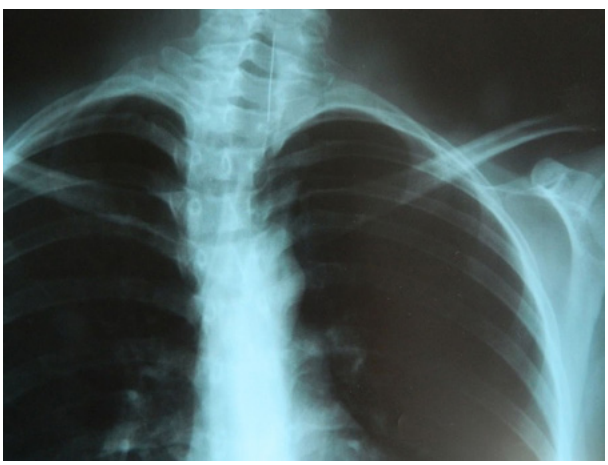

***Figure 3**. A 19-years old female patient, headscarf pin is seen in the trachea.*

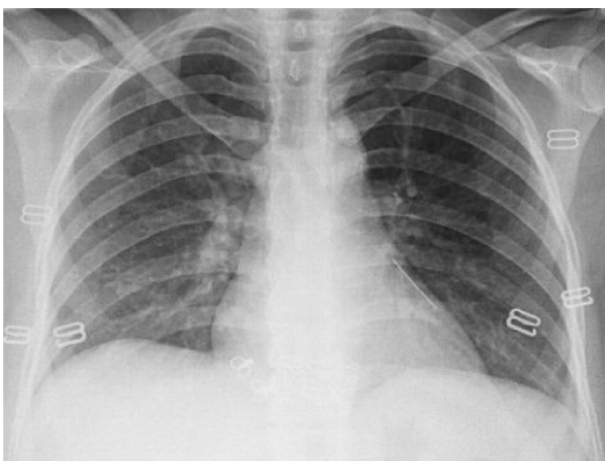

***Figure 5**. A 33-years old female patients. Headscarf pin is seen in the left lower bronchus.*

**Table 1**: Localizations of foreign bodies

| Localization | n | % |
|---|---|---|
| Trachea | 14 | 12.5 |
| Right bronchial system | 68 | 60.7 |
| Main | 13 | 11.6 |
| Intermediary | 2 | 1.8 |
| Lower | 53 | 47.3 |
| Left bronchial system | 30 | 26.8 |
| Main | 10 | 9 |
| Upper | 1 | 0.9 |
| Lower | 19 | 16.9 |
| Total | 112 | 100 |

**Table 2**. Types of aspirated foreign bodies

| Type | n | % |
|---|---|---|
| Pins | 93 | 83 |
| Dental prosthesis | 2 | 1.8 |
| Voice prosthesis | 1 | 0.9 |
| Plastic objects | 6 | 5.3 |
| Sunflower seeds | 3 | 2.7 |
| Fragment of bone | 4 | 3.6 |
| Piece of meat | 2 | 1.8 |
| Watermelon | 1 | 0.9 |
| Total | 112 | 100 |

otomy was performed in these patients. The extracted foreign bodies were headscarf pins and they have settled in the sub-segment of posterior segment bronchus of right lower lobe in these two patients. Hospitalization durations were 1, 2 and longer than 2 days in 111 (91%), 4 (3.3%) and 7 (5.7%) patients, respectively. The longest hospital stay was 22 days and the mean hospital stay was 1.5 days. Cardiopulmonary arrest related to asphyxia and hypoxemia was not seen. Mortality was not seen in any patients, too.

## DISCUSSION

The frequency of tracheobronchial foreign body aspirations in adults is less common than in children. The incidence in adults accounted for 15% of all tracheobronchial foreign body aspirations and the peak incidence in adults is 6$^{th}$ and 7$^{th}$ decades (9). The types of aspirated foreign bodies usually related to dietary habits of family and way of living in paediatric population (3,10-12). In adult patients, neuropsychiatric and mental condition, presence of oral prosthesis, use of sedative medication and religious beliefs of populations are the most influential factors in aspirations of foreign bodies (5,7,8,13). In our study, the peak incidence of tracheobronchial foreign body aspirations was 2$^{nd}$ and 3$^{rd}$ decades. In Turkey, especially in Eastern Anatolia, headscarf pins are extensively used by Muslim females to secure the headscarf, because the head covering of females is an important obligation in Islam. Therefore, tracheobronchial foreign body aspirations are usually seen in early decades and young women, and the most common aspirated foreign body is headscarf pin in our region (3). Although, neuropsychiatric and mental statuses are important reasons in foreign body aspirations in adults, our patients were normal in these respects. However, two of our patients had dental prosthesis and one patient had voice prosthesis.

Type and size of foreign body, anatomic location, passing time after aspiration are closely related to the presentation and severity of clinical symptoms. Initial symptom is usually coughing and its intensity diminishes after a while because of the forward movement of bodies (4). The most important symptom in tracheobronchial aspirations is respiratory distress and this situation is seen when big and solid foreign bodies settled in the main airways. Nevertheless, respiratory distress is rarely seen in adults due to large diameter of tracheobronchial tree of adults (3). Tracheobronchial aspirations of foreign bodies, if not diagnosed or misdiagnosed, lung abscess, bronchiectasis and destroyed lobe may be seen as results of foreign body aspirations. These suppurative diseases can cause haemoptysis, purulent sputum, chronic cough and fever (3). Two patients underwent right lower lobectomy due to bronchiectasis (1.8%) in our series. The first of the last two patients was an 18 years-old male with a medical history of foreign body aspiration 3 years ago. The second was a 22 years-old female patient with a history of aspiration 4 years ago. Before lobectomy, rigid bronchoscopy was performed and pen caps were extracted in both patients. Cardiopulmonary arrest related to foreign body aspirations did not occur in any patient.

Although, initial diagnostic technique is chest X-rays in patients with suspected foreign body aspirations, these radiographs do not have diagnostic value every time.

Opaque bodies can easily be identified in the chest X-ray (14). Indirect chest X-ray evidences as atelectasis, hyperaeration and pneumonic infiltration may support the existence of radiolucent bodies (15). Furthermore, even there are foreign bodies in airways, chest X-rays may not be abnormal. In our series, opaque bodies were seen in chest plain in 99 patients (88.4%). The chest X-rays showed hyperaeration and bronchiectatic changes in 3 (2.4%) and 2 (1.6%) patients, respectively. Seventeen patients did not have abnormality in chest plain (13.1%).

Rigid bronchoscopy is the first option in the management of tracheobronchial foreign body aspirations. Nevertheless, some authors suggested fiberoptic bronchoscopy (14,16,17). We think that rigid bronchoscopy is safer and more effective in the removal of foreign body. Because, ventilation can be done during procedure and foreign bodies can be easily extracted through the wide opening of instrument. Thus, perforation risk will be minimal, especially during the removal of sharp and pointed objects. Sometimes, bronchoscopy procedures and scopy may be ineffective and open surgery may be required for removal of tracheobronchial bodies. In our series, scopy and fiberoptic bronchoscopy were used in 13 of 112 patients. Headscarf pins were aspirated by these 13 patients. In ten of them, pins were removed successfully and other three patients underwent re-bronchoscopy after one day but objects could not be removed. Thoracotomy and pneumotomy were performed and foreign bodies were extracted in these 3 patients (2.7%).

Thoracotomy and bronchotomy to remove the foreign body in airways were described firstly in 1898 (18). From that date until today, different thoracotomy incidences in the removal of the tracheobronchial foreign bodies especially settled in the distal bronchia have been reported in many series. These incidences of the thoracotomy in tracheobronchial foreign body aspiration are between 1.6%-6% (19-22). Thin foreign bodies as headscarf pins tend to settle in the distal airways at the time of aspiration (3). Additionally, in patients who admitted to the hospital later, these pins may be settled in the more distal sites because of these foreign bodies can move forward. Despite, pins do not cause airways obstruction, the incidence of thoracotomy in aspiration of this objects is higher than other foreign body aspirations (3). In our series, five of the patients, who aspirated pins, admitted to the hospital after the first 24 hours and 3 of them underwent thoracotomy and bronchotomy. Furthermore, in two patients with headscarf pin aspiration, foreign bodies moved forward while waiting for bronchoscopy and scopy was used to determine the localization of objects. Objects could be extracted by these methods in these two patients.

The most common site of foreign body localization is the right main bronchus because of the fact that it is like a continuation and appendage of trachea (4). The majority of the foreign bodies are located in distal bronchia because of large calibre of airways in adults (23). Although, thin foreign bodies such as pins tend to proceed to the distal airway, they can settle in more proximal site such as trachea (3). Because, severe cough reflex that occurred after aspiration can cause the pin penetration into the trachea.

Complications of settled foreign bodies in the airways are atelectasis, hyperinflation, pneumonia, haemoptysis, bronchiectasis, destroyed lobe, abscess, respiratory distress and cardiopulmonary arrest (3,4). Pneumomediastinum, pneumothorax, haemorrhage, laryngeal oedema and cardiac arrest are the complications of bronchoscopy (24,25). In the literature, intravenous steroids are recommended to reduce the incidence of laryngeal oedema when procedure takes a long time (10). In a manner consistent with the literature, intravenous and aerosol corticosteroid treatment were applied to our patients when bronchoscopy procedure took a long time. Unfortunately, despite this medication, laryngeal oedema related to longstanding procedure was seen in two patients and they underwent tracheotomy at the post-bronchoscopic period. These patients admitted to the hospital 12 hours after the aspiration. Headscarf pins have settled in the sub-segment of posterior segment bronchus of right lower lobe in these patients. These objects were extracted by scopy and rigid bronchoscopy.

Tracheobronchial aspirations of foreign bodies are significant health problems worldwide. Rigid bronchoscopy is the basis of management of this terrible event. If not managed early, it may result in pulmonary parenchymal damage and lung resection may be required in later years. The training of communities and personal carefulness on this subject are the main steps to decrease the incidence of tracheobronchial foreign body aspirations and morbidity/mortality related to unwanted circumstances. Furthermore, to reduce the incidence of open surgery, bronchoscopy must be performed without spending time in patients with proximally located thin and metallic foreign body.

**REFERENCES**


1. Bist SS, Varshney S, Kumar R, Saxena RK. Neglected Bronchial Foreign Body in an Adult. JK Science 2006;8(4):222-4.
2. Uskul TH, Turker H, Arslan S, Selvi A, Kant A. Use of Fiberoptic Bronchcoscopy in Endobronchial Foreign Body Removal in Adults. Turkish Respir J 2007;8(2):39-43.
3. Eroglu A, Kurkcuoglu IC, Karaoglanoglu N, Yekeler E, Aslan S, Basoglu A. Tracheobronchial foreign bodies: A 10-years experience. Ulus Travma Derg 2003;9(4):262-6.
4. Oncel M, Sunam GS and Samı Ceran. Tracheobronchial aspiration of foreign bodies and rigid bronchoscopy in children. Pediatr Int 2012;54:532-5.
5. Al-Sarraf N, Jamal-Eddine H, Khaja F, Ayed AK. Headscarf pin tracheobronchial aspiration: a distinct clinical entity. Interact Cardiovasc Thorac Surg 2009;9(2):187-90.
6. Ragab A, Ebied OM, Zalat S. Scarf pins sharp metallic tracheobronchial foreign bodies: Presentation and management. Int J Pediatr Otorhinolaryngo 2007;71: 769-73.
7. Tariq SM, George J, Srinivasan S. Inhaled foreign bodies in adolescents and adults. Monaldi Arch Chest Dis 2005;63:193-8.
8. Limper AH, Prakash UB. Tracheobronchial foreign bodies in adults. Ann Intern Med 1990;15:604-9.
9. Chen CH, Lai CL, Tsai TT, Lee YC, Perng RP. Foreign body aspiration into the lower airway in Chinese adults. Chest 1997;112:129-33.
10. Mallick MS. Tracheobronchial foreign body aspiration in children: A continuing diagnostic challenge. African J Paediatr Surg 2014;11(3):225-8.
11. Black RE, Johnson DG, Matlak ME. Bronchoscopic removal of aspirated foreign bodies in children. J. Pediatr. Surg. 1994; 29: 682-4.
12. Mu LC, Sun DQ, He P. Radiological diagnosis of aspirated foreign bodies in children: review of 343 cases. J Laryngol Otol 1990; 104: 778-82.
13. Gullupinar B, Sarihan A, Ersoy G. Oh No! Pin Again! A Case of Foreign Body Aspiration. J Clin Anal Med 2015;6(2): 236-8.
14. Al-Azzawi AI. Utility Of Fiberoptic Bronchoscopy for Retrieval of Aspirated Headscarf Pins. Euro Scient J 2013;9(9): 218-27.
15. Hadda V, Venkatnarayan K, Madan K, Mohan A and Khilnani GC. An Enlarging Airway Foreign Body. Int J Respir Pulm Med 2015;2:1.
16. Loo CM, Hsu AL, Eng P, Ong YY. Case Series of Bronchoscopic Removal of Tracheobronchial Foreign Body in Six Adults. Ann Acad Med Singapore 1998;27:849-53.
17. Debeljak A, Sorli J, Music, Kecelj P. Bronchoscopic removal of foreign bodies in adults: experience with 62 patients from 1974-1998. Eur Respir J 1999;14:792-5.
18. Curtis BF. Posterior Thoracotomy For Foreign Body in The Right Bronchus. Ann Surg 1898;28(5):605-10.
19. Dixit S, Agarwal R, Kumar N, Verma RK, Krishna V, Sahni JL. Management of tracheobronchial foreign bodies-experience of cardiothoracic department of cardiology institute. Indian J Thorac Cardiovasc Surg 2011;27:33-5.
20. Ganie FA, Wani ML, Ahangar AG, Lone GN, Singh S, Hafeezulla L, Wani SN. The Efficacy of Rigid Bronchoscopy for Foreign Body Aspiration. Bull Emerg Trauma 2014;2(1):52-54.
21. Kaptanoglu M, Dogan K, Onen A, Kunt N: Turban pin aspiration; a potential risk for young Islamic girls. Int J Pediatr Otorhinolaryngol 1999;48:131-5.
22. Rizk N, Gwely NE, Biron VL and Hamza U. Metallic hairpin inhalation: a healthcare problem facing young Muslim females. J Otolaryngol Head Neck Surg 2014;43:21.
23. Lin L, Lv L, Wang Y, Zha X, Tang F, Liu X. The clinical features of foreign body aspiration into the lower airway in geriatric patients. Clinical Interventions in Aging 2014:9 1613-8.
24. Svedstrom E, Puhakka H, Kero P. How accurate is chest radiography in the diagnosis of the tracheobronchial foreign bodies in children. Pediatr Radiol 1989;19:520-2.
25. Friedman EM. Tracheobronchial foreign bodies. Otolaryngol. Clin North Am 2000;33:179-85.