Unusual Tracheobronchial Foreign Bodies: Clinical Presentation and Management in Adults

Original Article

Malika El Omri, Maroua Naouar, Mouna Bellakhdhar, Emna Bergaoui, Jihene Houas, Abir Meherzi, Monia Ghammam,Wassim Kermani and MohamedAbdelkefi

Department of Otorhinolaryngology, Head and Neck Surgery, Farhat Hached University Hospital, Sousse, Tunisia

ABSTRACT

Introduction: Tracheobronchial foreign body (TFB) aspiration in adults is rare;however, its prevalence increases with age. As in children, it is a life-threatening respiratory emergency.

Materials and Methods: This is a retrospective study of 30 cases collected in our Ear Nose and Throat department over a 12-year period (2010-2022).

Results: There were 27 women and 3 men with a mean age of 20 years, ranging from 17 to 37 years. Three patients were intubated and ventilated for polytrauma after a traffic accident. The average consultation time was 1.2 days. Penetration syndrome was the main presenting symptom in all cases. The imaging showed a radiopaque foreign body in all cases. FB was on the left site in 21 cases (70%), on the right site in 5 cases (17%), and on the laryngotracheal axis in 4 cases (13%). Extraction was performed by rigid bronchoscopy in all cases, after a single attempt in 26 cases (86.6%) and after 2 attempts in 4 cases. The foreign body was a headscarf pins in 26 cases, a stone in 2 cases, a vice in one case and a tooth in one case. The immediate result was good in all cases.

The purpose of this study was to evaluatethe diagnostic and therapeutic approach to inhalation oftracheobronchial foreign bodies in adults.

Conclusions: Tracheobranchial foreign body aspiration is a rare accident in adults, although its prevalence increases with age due to certain predisposing factors. The occurrence of a penetration syndrome, even in the absence of a highly suggestive radioclinical examination, requires endoscopic exploration for diagnostic and therapeutic purposes.

Key Words: Adults, airway obstruction, bronchoscopy, foreign body aspiration.

Received: 06 December 2023, **Accepted:** 25 January 2024

Corresponding Author: Malika El Omri, MD., Department of Otorhinolaryngology, Head and Neck Surgery, Farhat Hached University Hospital, Sousse, Tunisia, **Tel.:** +21656043690, **E-mail**: omri.malika6@gmail.com

ISSN: 2090-0740, 2024

INTRODUCTION

Tracheobronchial foreign bodies (TFB) caused by accidental inhalation is ancommonly encountered and challenging emergency. In adults, they are less frequent, but much more varied, very often unrecognised and, therefore, often difficult to diagnose.

Their nature depends enormously on the dietary and educational habits of the populations studied[1]. Their management has benefited from advances in endoscopy and resuscitation[2]. Endoscopic extraction must be performed as early as possible to avoid serious consequences, sometimes leading to extensive lung resection[3]. Understanding this critical problem will enable it to be prevented and managed[4].

The purpose of this study was to evaluate the diagnostic and therapeutic approach to TFB aspiration in adults.

MATERIAL AND METHODS

This is a retrospective study of 30 cases collected in our Ear Nose and Throat (ENT) department and resuscitation department of the same hospital over a 12-year period (2010-2022).

To carry out this study, we identified all cases of patients suspected of inhaling TFB from the medical records of the ENT department and the resuscitation department.

We used clinical criteria (penetration syndrome, persistent lung disease resistant to treatment) and radiological criteria (standard radiology or computed tomography (CT) scan).

Inclusion criteria were:adults >16 years of age, consulting an emergency department of The ENT Department or hospitalized in an intensive care unit for suspected TFB inhalation.

 DOI: 10.21608/ejentas.2024.253680.1698

Exclusion criteria was normal bronchoscopies.

All cases underwent rigid bronchoscopy under anesthesia in our department.

RESULTS

There were 27 women and 3 men. The average age of our patients was 20 years, ranging from 17 to 37 years. 3 patients were intubated and ventilated for polytrauma following a road traffic accidentin the resuscitation department of the same hospital. The average consultation time was 1.2 days. Penetration syndrome was the main revealing symptom in all cases. The clinical examination was normal in all cases. The chest radiography (CXR) (Figure 1) showed a radiopaque FB in all cases. Chest CT scanwas performed in 2 cases (6,6%) (Figure 2).The location of the foreign body(FB) was the left bronchus in 21 cases (70%), the right bronchus in 5 cases (16.6%) and the trachea in 4 cases (13.4%). Flexible bronchoscopy was carried out as first-line treatment in only one case. Rigid bronchoscopy was performed as first-line treatment in 29 patients (96.7%), and revealed bronchial inflammation in 20 cases (68.9%), an inflammatory granuloma in 4 cases (13.7%), and a FB in all cases, in the trachea in 4 cases (13.7%), and on the right in 5 cases: the main bronchus in 3 cases (60%), the intermediate trunk in 1 case (20%) and at the level of the basal pyramid in 1 case (20%); on the left in 21 cases: the main bronchus in 5 cases (23.8%) and at the level of the segmental bronchus in 16 cases (76.1%). Extraction of FB was performed by rigid bronchoscopy in all cases: after only one attempt in 26 cases (86.6%), after a second attempt in 4 cases (13.3%). The natureof the FB (Table 1, Figure 3) varied, but was largely dominated by headscarf pins, particularly in young girls. The mean time taken to extract the FB was a few hours. The immediate result was good and CXR control was normal in all of our patients.

Fig.1: Chest X-Ray (frontal view) showing a linear radiopaque opacity projecting opposite the left bronchial tree (headscarf pin)

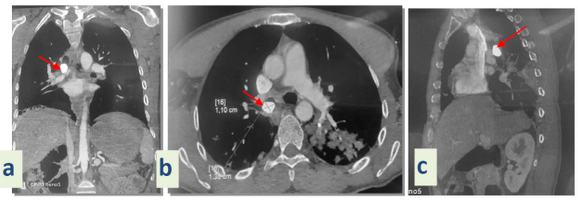

Fig. 2: CT sections of the chest (a : frontal, b: axial, c : sagittal) showing a FB (stone) in the right main bronchus

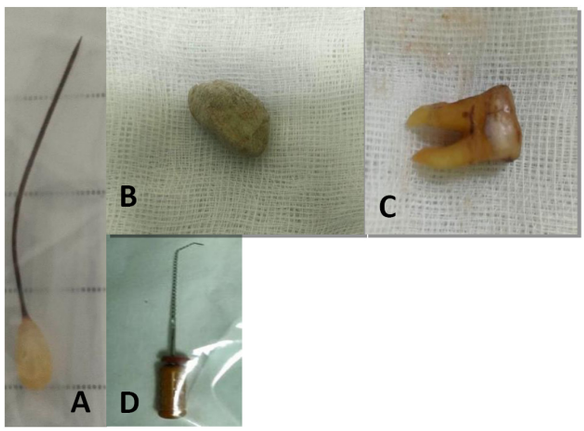

Fig. 3: Foreign bodies in our serie:Headscarf pin (A), Stone (B), Tooth (C), Vice (D)

Table 1: Nature of foreign body in our serie

Foreign body	Number of cases	Percentage (%)
Headscarf pins	26	86,6
Stone	2	6,6
Tooth	1	3,3
Vice	1	3,3

DISCUSSION

TFB aspirationis particularly common in early childhood, with males predominating in 2/3 of cases[5].

According to some studies, incidence increases after the fourth decade of life, reaching a peak in the seventh decade[6]. In adults, penetration syndrome is often unrecognised and difficult to diagnose, leading to confusion with tumor pathology[5]. It is a diagnostic and therapeutic emergency[7].

In our series, TFB were more prevalent in young adults, with an average age of 20 years and extremes ranging from 17 to 37 years.

The factors influencing the risk of TFB aspiration differ according to age.It is common to describe two frequency peaks in children: The first one is during the prehension period starting at the age of six months, with a high in the second year of life, as soon as the prehension is acquired, peaking at around two years of age[8]. In children under the age of three, more than 75.4% of inhalation accidents occur

while playing or eating[9,10]. In adults, retrospective studies have suggested that the main causes are reduced alertness due to drunkenness, sedatives, general anesthesia, trauma or physical disability, psychopathy, sudden emotions during meals and certain professions (dressmakers, shoemakers, carpenters, etc.)[2].

In our study, the average consultation time was 12 days. However, in other studies, consultation times were longer, particularly in the study by Watanabe[11], who reported an average of 90 days. These findings are explained by many factors, including the fleeting nature of penetration syndrome, which can go unnoticed, and the absence of specialized services in certain regions of our country[12].

The type of FB depends greatly on the sociocultural and educational habits of the populations studied. In our series, the nature of FB varied but remained largely dominated by headscarf pins, particularly in young girls. In fact, in Islamic countries, women and girls make extensive use of straight pins to secure their headscarves[13]. This is a fairly complex practice. The woman holds the pin between her teeth, using both hands to adjust the scarf over her head. Accidental aspiration usually occurs while speaking, coughing, laughing, or taking a deep breath while the head is tilted backward[14]. When FB reaches the bronchial tree, it is the right main bronchus that is most often affected, due to its obliquity (bronchial angles with the tracheal axis are similar in children and adults, with 30° on the right and 45° on the left) and its marginally greater calibre than that of the left main bronchus.These findings are not consistent with our results, which concluded that FB was found in the left main bronchus in 21 cases (70%).

The key element in the diagnosis is the appearance of a penetration syndrome. In the literature, its frequency varies between 23 and 83.7%[12,15,16]. It manifests itself as a sudden attack of suffocation accompanied by an expulsive, barking cough. This is the pathognomonic inhalation syndrome. However, the clinical picture may be more discreet, resulting in a muddled symptomatology that is responsible for a delay in diagnosis, especially in adults in whom FB tends to lodge in the distal bronchi[17]. Penetration syndrome was the main presenting symptom in all cases in our series.

In suspected cases of TFB aspiration, conventional CXRis the imaging modality of choice with a sensitivity and specificity of 68-73% and 45-67%, respectively[18]. Standard frontal and lateral views of the chest should be obtained. This finding applies only to radiopaque FB[15-17], which was the case for all patients in our study. In a recent study, emergency room,CXR identified the presence of a FB in the tracheobronchial tree in only 22.6% of patients. The percentage of negative radiographs in patients with suspected TFB aspiration varies between 5-30% in children and 8-80% in adults[19]. If FB is radiolucent, nonspecific radiological findings may be the unique clue to TFBaspiration, such as obstructive emphysema or atelectasis[13,19]. These often reflect prolonged residence of FB in the bronchi, leading to an inflammatory reaction[19,20]. Failure to recognize a TFB leads to a noisier symptomatology consisting of asthmatic bronchitis, bronchopneumonia, intractable coughs, hemoptysis, and lung abscesses, leading to suspicion of a tumor pathology[10,17,21-23].

Although not recommended for the initial evaluation of TFBaspiration, chest CT scanhas been demonstrated to detect unsuspected aspirated foreign bodies. Typically, these findings have occurred in adults with persistent respiratory symptoms or recurrent pneumonia. It has been suggested that this modality can be useful in patients with a high level of suspicion of TFB aspiration with normal CXR. Chest CT scan is not always specific even if it is known to be more sensitive than CXR. Consequently, negativechest CT scanshould never be used as a substitute for direct visualization of the airways[19].

The prompt removal of the FB is necessary to avoid complications. Rigid bronchoscopy under general anesthesia remains the procedure of choice for the extraction of FB at all ages, with a success rate of more than97%[19,24]. But given its potentially serious incidents (0.96%), especially desaturation, laryngospasm, emphysema, and laryngeal edema, some authors suggest rigid bronchoscopy as a second-line procedure after flexible bronchoscopy under local anesthesia, for both exploratory and therapeutic purposes[2]. Thoracoscopy or thoracotomy can be used to extract thoracic and mediastinal FB[25].

In situations where attempts to ventilate are unsuccessful, an emergent tracheostomy may be considered prior to FB extraction in a respiratory emergency such as major laryngeal dyspnea or after FB extraction for safety reasons to prevent suffocating subglottic edema[1,26]. This tracheotomy allows a high tracheal opening to be created and a 0° optic with a diameter of 4 mm to be inserted, enabling the foreign body to be visualized and extracted using micro forceps[26].

In our study, no deathsor complications were noted. Our results are in line with the literature showing a low rate of death. The authors consider that delays in management, postoperative laryngeal or pulmonary edema, inadequate technical facilities, and postoperative clinical monitoring are the main causes of death[12,16,26].

CONCLUSIONS

TFBaspiration is a rare accident in adults, although its prevalence increases with age due to certain predisposing factors. The occurrence of a penetration syndrome, despite the absence of a highly suggestive radio-clinical examination, requires endoscopic exploration for diagnostic and therapeutic purposes. Extraction surgery is a final alternative in the case of failure or irreversible parenchymal lesions.

CONFLICT OF INTERESTS

There are no conflicts of interest.

REFERENCES

1. Jang G, Song JW, Kim HJ, Kim E,Jang JG,Cha S. Foreign-body aspiration into the lower airways in adults; multicenter study. PLoS One. 2022 Jul 6;17(7): e0269493.

2. Benjelloun H, Zaghba N, Bakhatar A, Yassine N, Bahlaoui A. Les corps étrangers trachéobronchiques chez l'adulte. Pan Afr Med J. 2014; 19: 220.

3. Hebbazi A, Afif H, El Khattabi W, Aichane A, Bouayad Z. L'épingle à foulard: un nouveau corps étranger intrabronchique. Revue des Maladies Respiratoires. septembre 2010;27(7):724-728.

4. Foltran F, SimonettaBallali, Maria Passali F, Kern E, Morra B, Cesare Passali G *et al*. Foreign bodies in the airways: A meta-analysis of published papers. International Journal of Pediatric Otorhinolaryngology. 2012;76(1):12-19.

5. Caidi M, Kabiri H, Lazrek I, El Maslout A, Ben Osman A.Chirurgie des corps étrangers intrabronchiques. Ann Chir.2002;127:456-60.

6. Zaghba N, Benjelloun H, Bakhatar A, Yassine N, Bahlaoui A. Épingle à foulard : un corps étranger intrabronchique qui n'est plus inhabituel. RevPneumol Clin. 2013; 69(2): 65-69

7. Gokirmak M, Hasanoglu HC, Koksal N, Yildirim Z, Hacievliyagil SS, Soysal O. Retrievingaspirated pins by flexible bronchoscopy. J Bronchol. 2002;9:10-14.

8. Ag Mohamed A. Corps étrangers laryngo-trachéobronchiques : à propos de 20 cas. Bulletin de la Société de pathologie exotique. 1993; 86 (5): 369-371.

9. Ulas A, Aydin Y, Eroglu A. Foreign body aspirations in children and adults. Am J Surg. 2022 Oct;224(4):1168-1173.

10. Caidi M, Kabiri H, Lazrek I, El Maslout A, Ben Osman A. Chirurgie des corps étrangers intrabronchiques. Ann Chir. 2002; 127(6): 456-60.

11. Sancho-Chust JN, Molina V, Vañes S, Pulido AM, Maestre L, Chiner E. Utility of Flexible Bronchoscopy for Airway Foreign Bodies Removal in Adults. J Clin Med. 2020 May 10;9(5):1409.

12. Abbas A, Khaleel J. Tracheobronchial Foreign Body InhalationExperience of 234 Case Series. Med J Babylon. 20(2):p 406-411, Apr–Jun 2023.

13. El Ouazzani H, Ebonge S, Jmili N, Achachi L, El Ftouh M, El FassyFihry MT. Incident anecdotique lors de l'utilisation d'un aérosol de bronchodilatateur. Rev Fr Allergol. 2010; 50(8): 634-636.

14. Timbo SK, Keita MA, Doumbia-Singare K, Togola-Konipo F, Traore L, Guindo B *et al*. Handicap et corps étrangers ORL : A propos de quatre observations originales. Mali Med. 2010; 25(2):50-5.

15. Sehgal IS, Dhooria S, Ram B, *et al*. Foreign Body Inhalation in the Adult Population: Experience of 25,998 bronchoscopies and systematic review of the literature. Respir Care 2015;60:1438-48.

16. Dong YC, Zhou GW, Bai C, *et al*. Removal of tracheobronchial foreign bodies in adults using a flexible bronchoscope: experience with 200 cases in China. InternMed 2012;51:2515-9.

17. Yüksek T, Solak H, Odabas D, Yeniterzi M, Ozpinar C, Ozergin U. Dangerous pencils and a new technique for removal of foreign bodies. Chest1992;102:96-6.

18. Swanson KL. Airway Foreign Bodies: What's New?. Semin Respir Crit Care Med. 2004; 25(4): 405-411.

19. Boyd M, Chatterjee A, Chiles C, Chin R. Tracheobronchial foreign body aspiration in adults. South Med J. 2009 Feb;102(2):171-4.

20. Kara K, Ozdemir C, Onur S, Satici C, Akyil F, Sokucu SN. Late Diagnosis of Foreign Body Aspiration in Adults: Case Series and Review of the Literature. Respir Care. 2023 Nov7:respcare.10723.

21. Bajaj D, Sachdeva A,Deepak D. Foreign body aspiration. J Thorac Dis. 2021 Aug; 13(8): 5159–5175.

22. Halvorson DJ, MerritRm, Mann C, Porubsky ES. Management of subglottic foreign bodies. Ann OtolRhinol Laryngol.1996;105:541-4.

23. Lianca Mu, Ping He, Deqiang Sun. Inhalation of bodies in Chinese: a review of 400 cases. Laryngoscope 1991;101:657-60.

24. Albirmawy OA, Elsheikh MN. Foreign body aspiration, a continuously growing challenge: Tanta University experience in Egypt. Auris Nasus Larynx. 2011; 38: 88-94.

25. Arsalane A, Zidane A, Atoini F, Traibi A, Kabiri E H. The surgical extraction of foreign bodies after the inhalation of a scarf pin: two cases. RevPneumolClin. 2009 Oct;65(5):293-6.

26. Lin L, Lv L, Wang Y, *et al*. The clinical features of foreign body aspiration into the lower airway in geriatric patients. Clin Interv Aging 2014;9:1613-8.