

The use of fiberoptic bronchoscope to remove aspirated tracheobronchial foreign bodies: Our experience

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ABSTRACT

Background: Foreign body (FB) aspiration is a common emergency in our practice. The routine method of removal is via rigid bronchoscopy (RB) under general anesthesia. This is the preferred procedure particularly in children who form the major affected population. Fiberoptic bronchoscopy (FOB) has also been used for FB removal in many countries, though in Iraq, the standard mean remains rigid bronchoscopy. **Objective:** Herein, we present 5 cases of FB inhalation in adults in whom FOB was used for removal. The aim is to test its feasibility with literature review. **Setting:** the department of thoracic surgery/Sulaimania Teaching Hospital/Sulaimania/Iraq. **Study Design:** a prospective study of 5 patients. **Patients and methods:** 5 patients (3 females and 2 males) with different bronchial or laryngeal FBs in whom FOB was used as a method for removal are presented. The age ranged from 16 to 71 years. The clinical and radiographic features are recorded. In all these patients, initial FOB examination under local anesthesia transorally or via tracheotomy stoma was done. When removed by this method failed, RB under GA was used and when this failed, thoracotomy was the last resort. **Results and Conclusions:** FBs encountered in this paper consisted of pins (n = 2), sewing needle (n = 1), speech valve (n = 1) and a medical leach (n = 1). Three FBs (medical leach, speech valve and one pin) were successfully removed by FOB. A pin in RMB was visualized but failed to be removed by FOB and therefore, RB was required for its retrieval, while a needle in left lower lobe was invisible by both

FOB and RB and thus surgery was necessary to remove it. We conclude that in adolescent or adult patients with bronchial FBs, FOB should be tried first for removal. If this fails then RB can be used. To increase its success, FOB should be combined with certain accessories like special FB forceps and fluoroscopy.

Keywords: Aspirated Foreign Bodies; Fiberoptic Bronchoscopy

1. INTRODUCTION

Gustav Killian, a laryngologist in Germany, removed a FB from an airway in 1897. The procedure was done in an awake patient using a RB and topical cocaine as local anesthetic. This marked the beginning of history of RB. In 1966, Shigeto Ikeda from Japan introduced the first flexible fiberoptic bronchoscope at the International Congress on Diseases of the chest held in Copenhagen [1]. Each instrument has its own advantages and limitations [1]. The standard technique to remove bronchial foreign bodies in children used to be RB. This applies to our practice in Iraq and worldwide [2-4]. The situation seems to be different in adult patients whom infrequently present with FB aspiration. Review of relevant studies from different parts of the world reveals that FOB is a safe and an effective method in the management of this problem [5-7]. In Iraq, plenty of studies were done on bronchial FBs managed by RB in all except one study [8] which involved 12 patients with bronchial FBs removed by FOB; though details were lacking. Herein, we present 5 adult Iraqi patients with different bronchial and laryngeal FBs successfully removed by FOB. The aim of this paper is to present our small experience with a review of the recent literature worldwide.

2. PATIENTS

5 patients (3 females and 2 males) aged 16 - 71 years admitted to the unit of Thoracic Surgery/Sulaimania Teaching Hospital with bronchial or laryngeal FBs to whom FOB was used for FB removal are studied. See **Figures 1-5**.

3. METHODS

History and physical examination were performed to all patients. The presenting signs and symptoms were recorded. Plain chest radiograph (PA and lateral views) were done to all to locate the radio-opaque FBs. FOB was used as the initial method of FB removal. It was done using Olympus video FOB except one patient who had been examined by the standard FOB (SFOB) when no videoscope was available in the unit. Local anesthesia was used. The patients were examined in sitting position.

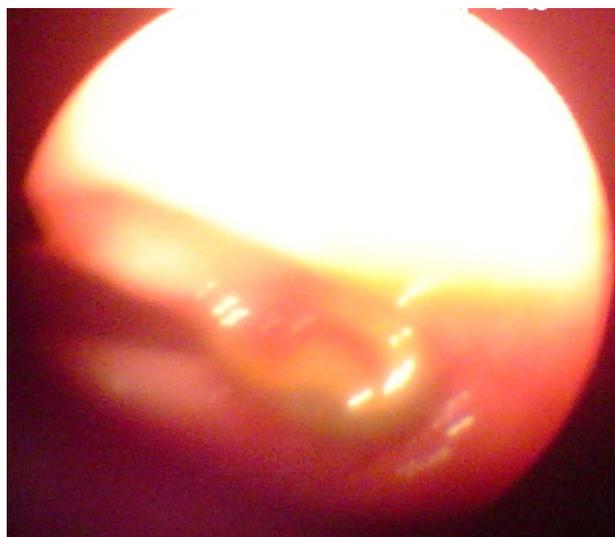


Figure 1. A leech attached to vocal cords.

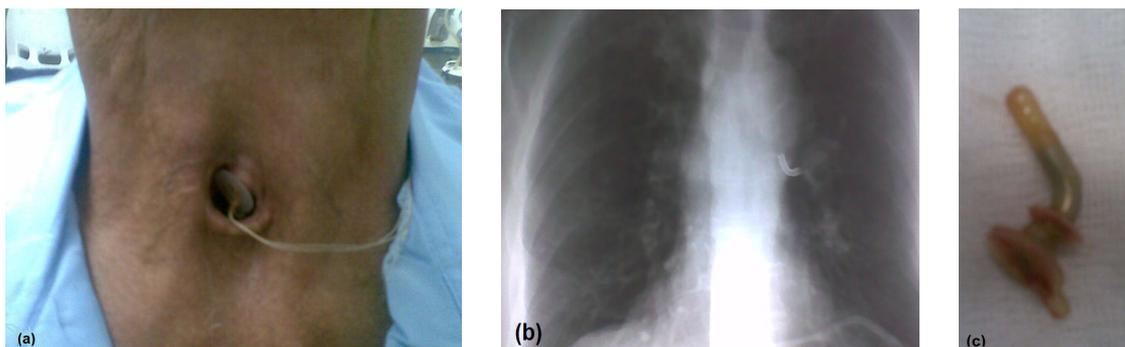


Figure 2. (a) A piece of speech valve in a patient with permanent tracheotomy for laryngeal cancer; (b) Visible on CXR in LMB; (c) Removed by FOB.

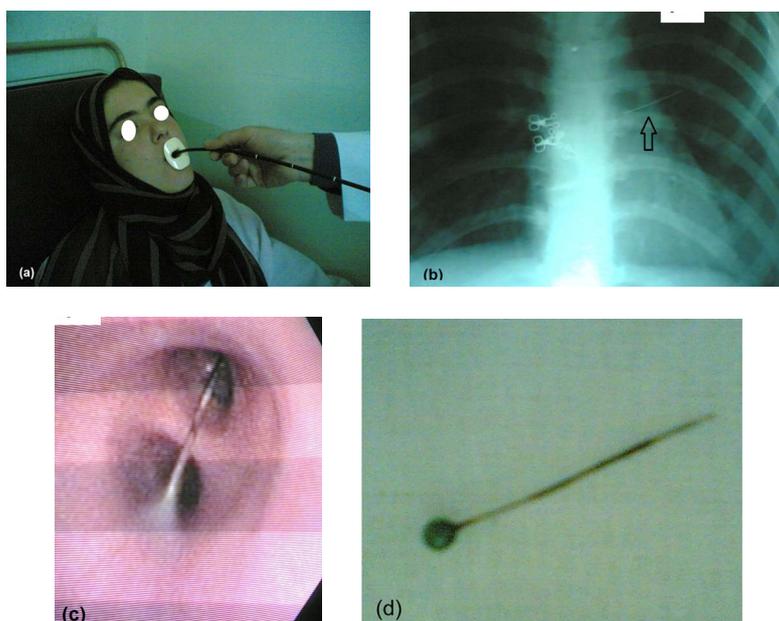


Figure 3. (a) A teenager girl; (b) Aspirated a pin into LMB visible on CXR; (c) and (d) Retrieved via FOB under local anesthesia.

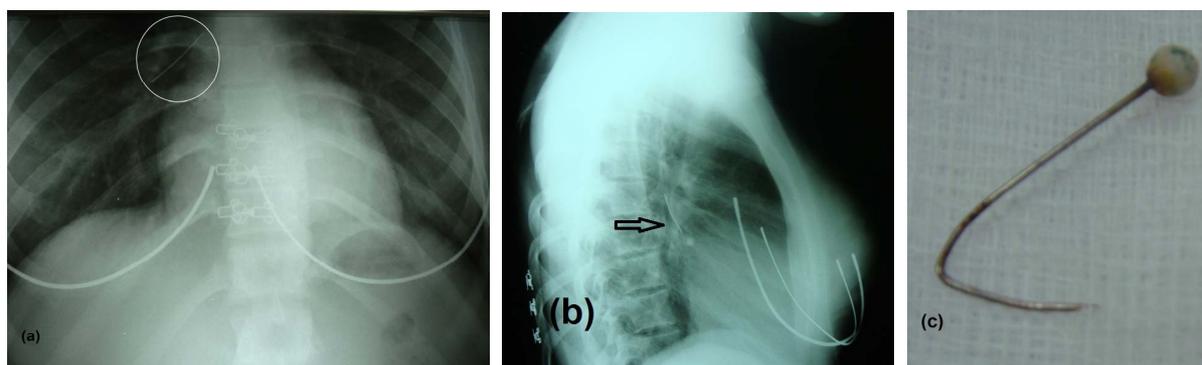


Figure 4. (a) and (b) A pin in RMB visualized but failed to be removed by FOB; (c) Thus RB under general anesthetic was necessary for its removal.

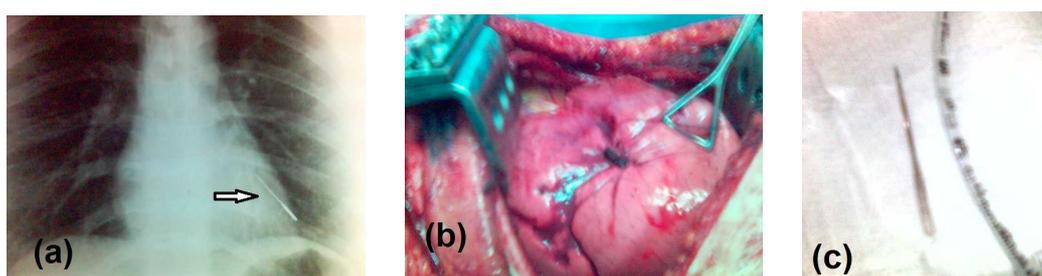


Figure 5. (a) A sewing needle in LLL; neither FOB nor RB visualized it; (b) and (c) Thus thoracotomy was needed for its removal.

The FOB was introduced through a mouth gag except one patient with previous laryngectomy and permanent tracheotomy for cancer in whom the FOB was introduced through the tracheotomy stoma. The FBs were removed using the flexible biopsy forceps introduced via the instrumentation channel as we had not the proper FB forceps. RB or RB and surgery were used in case of failure of FOB.

4. RESULTS

All patients were teenagers except one old man. The presenting symptoms were SOB, cough and hoarseness of just few hours. All FBs were visible on CXR apart from one. The FBs were pins ($n = 2$), sewing needle ($n = 1$), speech valve ($n = 1$) and medical leach ($n = 1$). FOB visualized 4 FBs (80%) and was successful in removing 3 (60%: a pin, speech valve and the medical leach). It visualized but failed to remove a pin (20%); this required RB for removal. In one patient (with a needle in LLL), both FOB and RB failed to visualize the FB and thus left thoracotomy was needed to incise the lung parenchyma and remove the FB.

The details of patients, management are shown in **Table 1**.

5. DISCUSSION

Regarding the Iraqi studies relevant to the subject of

this paper, Muhammad TD *et al.* reported on 12 patients with bronchial FBs removed by FOB [8], but there were no relevant details. Therefore, the present study might be the first detailed report on this subject. The number of patients with adult FBs managed by FOB in this study is small if compared with studies from different parts of the world. All patients were initially examined by video FOB except one (in which the standard FOB was used). Three FBs were located in left bronchial tree, one in RMB and one in the larynx. All were visible to FOB except the sewing needle which was deeply seated in LLL. RB was necessary to remove 1 FB and surgery was necessary in another one. No complications were recorded.

The types of FBs encountered in this paper were of 3 types: leech, pins and a needle and a tracheotomy speech valve. Each represents a unique category with specific predisposing factors and management issues.

The leech is a haemophagic parasite, living on occasional meals of blood obtained by attaching to fish, amphibians and mammals. Live leeches when ingested not only act as FBs in aerodigestive tract but also harm by sucking blood causing severe anaemia [9]. The leech as a FB and a parasite in the human respiratory tract occurs principally in the Mediterranean countries, in Africa and Asia. It reaches the respiratory tract when water is drunk directly from rivers, lakes, etc. Treatment consists of endoscopic removal of the parasite, which may be tech-

nically difficult, especially when the leech is in the region of the larynx. Our patient was a teenager with a leech attached to vocal cords removed by FOB under LA. Sunarays Akhtar and Inam ul Hak reported 4 children aged 5 to 9 years from Baluchistan with laryngeal leeches removed by direct laryngoscopy under GA [9].

Table 2 displays the results of using FOB for removal of bronchial FBs from USA [5,10], Mexico [11], Spain [7], Croatia [12], Turkey [13-15], Jordan [16,17], Sultanate of Oman [18], Taiwan [6], Vietnam [19] and Honk Kong [1].

Studies from countries close to Iraq showed that a headscarf pin was a common subject retrieved by FOB [13,14,16-18]. This is similar to our study in which 3 out

of 5 FBs were pins. The headscarf is a kind of head cover, worn for religious intentions. In Islamic countries, girls start to wear a headscarf with the onset of puberty [15] and sometimes even earlier. The head scarf pins are used for attaching the layers of the headscarf to each other in order to keep it in a steady position around the head [15]. The aspiration takes place when the straight pin is held in the mouth [18]. This recently recognized aspiration hazard can be minimized using adhesive bands or snap fasteners, instead of pins when wearing a headscarf [14,15].

Regarding the method of removal, FOB was very successful and safe in most of these studies. Al-Ali M.A. *et al.* from Jordan reported results close to ours; 75% success, 19% RB required and one patient managed surgically

Table 1. Details of management.

Case No.	Gender	Age (yr)	S & S	Type of FB	Site	Method of removal	Outcome	Figures
Case 1	M*	17	Hoarseness	Medical leech	Attached to vocal cords	FOB	Good	1
Case 2	M	71	Cough, SOB	Piece of speech valve	LMB [^]	FOB	Good	2(a)-(c)
Case 3	F**	17	Cough, SOB	Pin	LMB	FOB	Good	3(a)-(d)
Case 4	F	18	Cough, SOB	Pin	RMB ^{^^}	RB (FOB failed)	Good	4(a)-(c)
Case 5	F	16	Cough, SOB	Sewing needle	LLL ^{^^^}	Surgery (invisible to FOB & RB)	Good	5(a)-(c)

*M: male, **F: female; [^]LMB: left main bronchus; ^{^^}RMB: right main bronchus; ^{^^^}LLL: left lower lobe.

Table 2. Results of relevant studies.

	Author(s)	Country	Year	No. of pts.	FOB (n & %)	Type of FB	RB (n & %)	Surgery
1	Muhammad T.D. <i>et al.</i> [8]	Iraq	2010	100	12 out of 15(80%)	?	87 out of 88 (98.9%)	1(1%)
2	Abdul-Ameer M.H. [4]	Iraq	2010	248	0	-	248 (100%)	0
3	El-Kushman H.M. <i>et al.</i> [16]	Jordan	2007	60	32 out of 32 (100%)	Pins	28 out of 28 (100%)	0
4	Al-Ali M.A. <i>et al.</i> [17]	Jordan	2007	16	12 (75%)	Pins	3 (19%)	1 (6%)
5	Murthy P.S. <i>et al.</i> [18]	Sultanate of Oman	2001	6	No details	Pins	No details	No details
6	Gencer M. <i>et al.</i> [13]	Turkey	2007	23	23 (100%)	Pins	0	0
7	Hasdiraz L. <i>et al.</i> [14]	Turkey	2006	98	4 out of 16 (25%)	Pins	93 out of 94 (99%)	1 (1%)
8	Kaptanoglu M. <i>et al.</i> [15]	Turkey	1999	63	2 (3.2%)	Pins	57 (90%)	1 (1.6%)
9	Donado Una J.R. <i>et al.</i> [7]	Spain	1998	56	53 (95%)	Food items in 71%	2 (3.6%)	1 (1.8%)
10	Mise K. <i>et al.</i> [12]	Croatia	2009	86	90.7% (SFOB) 8.1% (FOB via ETT)	Mainly animal & fish bones	0	1 (1.2%)
11	Lan R.S. <i>et al.</i> [6]	Taiwan	1989	33	33 (100%)	Solid matter	0	0
12	Chin-Wing Y.U. [1]	Hong Kong	2012	The author states that most FBs in adults can be removed with FOB, RB is occasionally needed.				
13	Lan Huu Nguyen <i>et al.</i> [19]	Vietnam	2010	100	98 (98%)	Sapote fruit		
14	Ramirez-Figueroa J.L. <i>et al.</i> [11]	Mexico	This is a very interesting study. 59 children aged 9 m - 16 yr with different FBs all received FOB. It was successful in 91.3% of patients.					
15	Boyd M. <i>et al.</i> [10]	USA	2009	The author concludes that FOB is effective both in the diagnosis & treatment of FBs.				
16	Swanson K.L. <i>et al.</i> [5]	USA	2001	The author believes that FBs often can be removed with a FOB under LA.				

[17]. El-Kushmal *et al.* achieved 100% success rate with FOB, moreover, rigid videobronchoscopy was used by the same authors from Jordan in a group of 28 patients and could achieve a 100% success as well [16].

Looking at the Turkish experience with headscarf pin aspiration, we find that a 100% success was achieved by Gencer M. *et al.* [13] while it was much lower in the other 2 studies (25% [14] and 3.2% [15]). The RB, on the other hand was more frequently used and more successful in the latter 2 studies (99% [14] and 90% [15]). These differences may be related to different training and skills of the authors. Surgery was the last resort and very occasionally needed in the reviewed studies, a finding similar to ours [14,15,17].

The experience in the west highly supports the utility and safety of FOB for removal of bronchial FBs [5,10,11]. Both Swanson K.L. *et al.* and Boyd M. *et al.*; American authors, conclude that FOB is effective both in the diagnosis & treatment of FBs [5,10]. The study from Mexico is even more interesting. Fifty nine children aged 9 months to 16 years with different bronchial FBs were all bronchoscoped using FOB to remove FBs. It was successful in 91.3% of patients. The authors thus conclude that FOB must be taken into account as an initial therapeutic method for FB removal in infants and children [11].

The other reviewed studies from Asia and Europe report excellent results with FOB and bronchial FBs [1,6,7,12,19]. Chin-Wing Y.U. from Honk Kong states that most FBs in adults can be removed with FOB; RB is occasionally needed [1].

The second patient in this study was a man of 71 with total laryngectomy and permanent tracheotomy done for cancer of the larynx 10 years earlier. He had presented with an aspirated piece of speech valve. This FB was removed successfully by FOB through the tracheotomy stoma. The literature confirms the difficulties encountered in the fixation of prostheses for voice rehabilitation after laryngectomy [20].

6. CONCLUSION

Though RB is a time tested safe and effective procedure for FB removal which is in use all over the world; FOB can also be used safely provided the operator has adequate skill in RB, the latter should be readily available in case a difficulty is encountered with FOB. It is especially helpful when an adult patient has a doubtful diagnosis of FB aspiration and the risk of GA necessary for RB is to be avoided. To increase its success rate, FOB use should be coupled with the necessary equipments like special FB forceps and fluoroscopy.

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