

Management of Foreign Bodies in the Aerodigestive Tract

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Abstract Foreign body (FB) aspiration and ingestion are frequently encountered by emergent otolaryngology services. The authors describe their experience in the management of FB cases in the aerodigestive tract. We carry a retrospective study about 626 patients who came or were referred to our department between 1996 and 2007 with a history or suspicion of a FB in the aerodigestive tract (except nasal and oropharyngeal FB). All of them have undergone rigid endoscopy under general anaesthesia. Children younger than 10 years were the most involved (36.9%) followed by patients between 71 and 80 years old (11.3%). The FB were visible on clinical examination in 39 cases. Chest and neck X-ray, showed radio-opaque FB in 302 cases (48.7%). A total of 626 rigid endoscopies were performed. FB were encountered in 549 patients (87.7%). The most involved sites were the oesophagus (51.9%) followed by the tracheobronchial tree (33.9%) and the hypopharynx (13.5%). Bones (22%) and coins (20.1%) were the most frequently encountered FB. Successful removal was achieved in 521 cases (94.9% of the FB found). The complication rate after rigid endoscopy was 1.3%. FB in the aerodigestive tract are frequent and may lead to severe complications. Removal through the rigid endoscope still has its place as the most reliable method. Prevention and public education for this serious problem should be considered.

Keywords Foreign body · Aerodigestive tract · Endoscopy · Oesophagoscopy · Bronchoscopy

Introduction

Foreign body (FB) aspiration and ingestion are frequently encountered by emergent otolaryngology services. It occurs frequently in children and the elderly and causes rarely severe morbidity or complications. Peroral rigid endoscopy is the standard approach for removal of them in both the airway and the oesophagus. Flexible endoscopies are nowadays more and more performed, especially by paediatricians and pneumologists. Prevention remains the most essential way to manage the FB cases.

In this study, we describe our experience in the management of aerodigestive foreign bodies.

Materials and Methods

A total of 626 patients who came or were referred to our department with a history or suspicion of a FB in the aerodigestive tract (except nasal and oropharyngeal FB) between 1996 and 2007, and who have undergone rigid endoscopy, were included in this study. The data about these patients were collected from available admission charts. Age and sex distribution, clinical presentation, type and location of FB, removal technique and complications encountered were analysed.

Appropriate radiographic evaluation was performed, including chest and neck X-ray. All endoscopies were performed under general anaesthesia. Laryngeal and hypopharyngeal FB were removed under rigid laryngoscope with fiberoptic light carrier. Oesophageal FB were

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removed under rigid esophagoscope with distal illumination. FB in the tracheobronchial tree were removed through the rigid bronchoscope with proximal illumination. All FB were removed with an alligator grasping forceps with double action jaws. Flexible endoscope was used in case of too distal bronchial FB.

Intravenous antibiotherapy was administrated and nasogastric feeding tube was put when there where oesophageal mucosa erosion or perforation. Immediate postoperative period included surveillance during 24 h, especially after bronchoscopy. A chest X-ray was performed after each Oesophagoscopy or bronchoscopy.

Results

The patients’ age distribution is shown in Fig. 1. Children younger than 10 years were the most involved (36.9%) followed by patients between 71 and 80 years old (11.3%) (Fig. 1). Sex-ratio was 1.07. A history of oesophageal stenosis was found in 10 cases, and mental retardation in 9 cases. Adult patients were consulting for symptoms of acute oesophageal obstruction (dysphagia, aphagia, hypersialorrhea), rarely for dyspnea or acute coughing. In the majority of children, the FB ingestion or aspiration was witnessed or strongly suspected by a bystander after the sudden onset of symptoms. The FB were visible on clinical examination in 39 cases. Chest and neck X-ray, showed radio-opaque FB in 302 cases (48.7%) (Fig. 2).

A total of 626 rigid endoscopies were performed, all of them under general anaesthesia. Oesophagoscopy was performed in 333 cases (53.2%), bronchoscopy in 215 (34.3%), hypopharyngoscopy and direct laryngoscopy in 78 cases (12.5%).

FB were encountered in 549 patients (87.7%). The most involved sites were the oesophagus (51.9%) followed by the tracheobronchial tree (33.9%) and the hypopharynx (13.5%). Sub-glottic FB were found in four cases (0.7%). No FB were found in 77 patients (12.3%).

Bones were the most frequently encountered FB (22%), followed by coins (20.1%), peanuts, seeds and beans

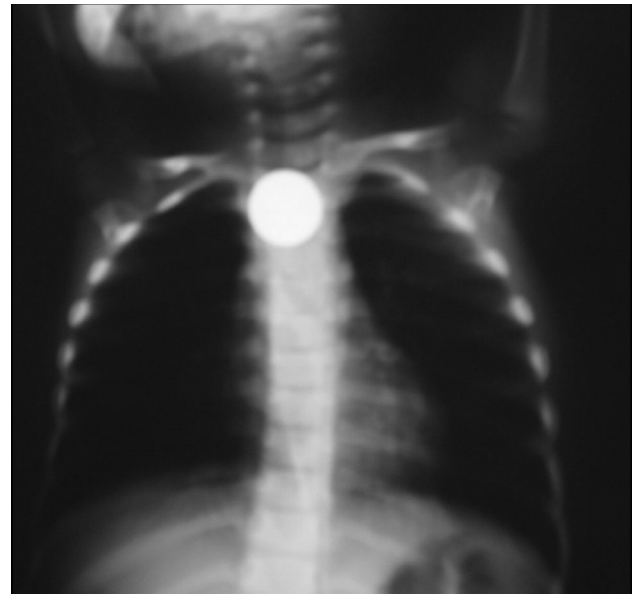


Fig. 2 FB (coin) in the upper oesophagus

(18.5%). Interestingly, coins represented the most frequent FB in the oesophagus (39.3%), peanuts and seeds in the tracheobronchial tree (59.1%) and bones in the hypopharynx (40.5%) (Table 1).

According to age, 96.2% of tracheobronchial FB were found in children between 1 and 3 years of age, and 60.9% of these FB were localised in the right bronchi. On the other hand, 67.7% of oesophageal FB were encountered in adults.

Successful removal was achieved in 521 cases (94.9% of the FB found). Bronchial FB could not be removed with the bronchoscope in 11 cases (2%) because they were very distal. For these patients, removal was achieved with the flexible endoscope. Furthermore, we found an oesophageal stenosis in eight cases, and we performed biopsy of the mucosa in five cases, but the histological examination showed no malignancy in all of them.

Postoperative X-ray showed a remaining radio-opaque FB passed into the gastrointestinal tract in 17 cases (3.1%

Fig. 1 Age distribution of patients with aerodigestive FB

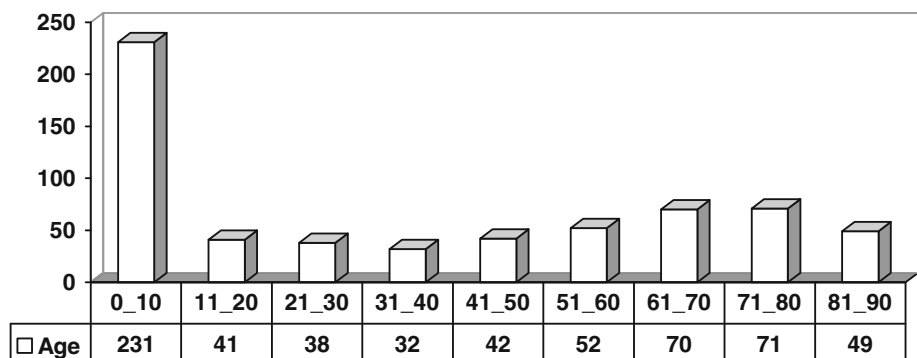


Table 1 Types and localisations of the foreign bodies

FBs	Oesophagus	Trachea-bronchi	Hypopharynx	Larynx	Total (%)
Bones (fish, chicken...)	108	0	30	0	138 (22)
Coins	112	7	7	0	126 (20.1)
Peanuts, seeds, beans	0	110	3	3	116 (18.5)
Food	20	26	9	0	55 (8.8)
Sharp objects (needles, pins...)	21	5	11	0	37 (5.9)
Toy parts, plastic objects	8	14	7	1	30 (4.8)
Metallic objects	5	9	5	0	19 (3)
Stones	0	12	0	0	12 (1.9)
Miscellaneous	11	3	2	0	16 (2.5)
No FB found	48	29	0	0	77 (12.3)
Total	333	215	74	4	626

of the FB found). In these cases, the clinical control 2 weeks after ingestion did not reveal any complication.

The complication rate in our patient series was 1.3%. Five patients had oesophageal mucosa erosion after Oesophagoscopy. Iatrogenic oesophageal perforation with mediastinitis occurred in one case. All of these patients were fed with nasogastric tube for a minimal period of 10 days and received intravenous antibiotherapy including amoxicillin–clavulanic acid or cefapirin or cefotaxime. Evolution was favourable in all these cases with full recovery. On the other hand, one child has presented neurological sequelae after cerebral hypoxia caused by an obstructive tracheal FB. Another 3 year-old girl has presented severe hypoxia related to a subglottic FB which caused an immediate apnea; and despite removing the FB and hospitalisation in intensive care unit, the girl died few days later.

Discussion

FBs in the aerodigestive tract are an emerging problem in both children and adults.

In our series, age distribution revealed a high frequency of FBs of both the airway and the oesophagus in children. This distribution is similar to that found in other studies [1, 2]. For this reason it is important to prevent from putting potentially dangerous and life-threatening objects in their mouths. On the other hand, the second peak is generally observed in patients over age 70 [3]. According to the localisation, the ratio of paediatric patients is high in the cases of tracheobronchial FB. For pharyngeal and oesophageal FB, the patients involved are from all the age groups [2, 4].

A radiological investigation (X-ray) is necessary for every patient suspected of having an aerodigestive FB, especially in children in which only a minority of these accidents are witnessed by a bystander and the penetration

syndrome is reported only in 60% of cases [5, 6]. CT scan is recommended to see deeper soft tissues in cases with complications. In the absence of symptoms, the diagnosis is easy with radio-opaque FB, whether radio-lucent FB represent a much more difficult diagnostic challenge. A negative radiological investigation does not rule out the presence of a FB in the aerodigestive tract [7] and does not spare from endoscopy when the ingestion or the aspiration is strongly suspected.

Bones represented the most commonly encountered FB in this study. This result was consistent with other studies [2, 4]. Bones, coins and vegetables were accounting for 69.2% of all the FB found. The types of the FB appear to be closely related to age, and depend on the seasons and each population eating habits. Coins, peanuts and toy parts are almost found in children younger than 5 years, whereas bones and food (especially meat) are found almost exclusively in patients of other age groups [8]. According to the localisation, coins, foods and sharp objects are the most common FB lodged in the oesophagus [9–12], vegetables (especially peanuts and seeds) in the airway [5, 10] and bones in the pharynx [2]. Our study showed similar results. Because of anatomical considerations, inhaled FB are more commonly located in the right rather than the left bronchus.

Also, an impacted food bolus in the oesophagus may be associated with an oesophageal stenosis of which the aetiology must be investigated. On the other hand, FB in the nose, although they are more easily and safely removed than those in other sites, could accidentally move to the airway or the oesophagus, resulting in new serious problems. As such, nasal FB should be removed without delay.

Aerodigestive FB must be rapidly diagnosed and treated. This will decrease their morbidity and the length of hospital stay [7]. Indeed, the longer time to detection results in increased diseased state and longer hospital evaluation and treatment [13]. The optimal means of treating FB is prompt removal, which ensures the maximum safety and minimum trauma to the patient. Removal of FB in the aerodigestive

tract under direct visualisation through the rigid endoscope is the safest and the most reliable method, especially with recent improvements in endoscopic illumination and anaesthesia techniques. The flexible endoscope can also be used when the bronchi are too narrow for insertion of a rigid bronchoscope, or when there is a sharp or a penetrating oesophageal FB [14]. Indeed, the flexible endoscope is enough fine that it can reach the distal bronchi, whereas bronchoscope cannot. It also allowed removal of oesophageal FB without risk of severe complications (especially mucosal perforation). In our series, successful removal rate with rigid endoscope was 94.9% of the FB found, and we used successfully flexible bronchoscope in 11 cases.

Other techniques of removal of oesophageal FB include Foley balloon extraction, removal using a magnet and bougienage [12, 14]. These are blind methods of extraction providing no control of the FB as it is removed. They can be used only in selected cases with smooth FB [14].

Failures of peroral rigid endoscopy are generally due to the non visualisation of the FB or because of this one is too distal to remove. It can also fail when the FB migrates extraluminally, an external approach should then be considered. The surgical approach varies according to the location of the FB.

Serious complications caused by rigid endoscopy are extremely rare [15] (1.3% in our series) and include iatrogenic oesophageal perforation, perioesophageal abscess or mediastinitis, which must be controlled by antibiotics and if necessary by incision with drainage. Current mortality rates are less than 1% in most reports [1, 9, 16].

Complications due to the FB itself are rare but may occur. They depend on its type, its localisation and the duration of impaction. Large objects in the laryngotracheobronchial tree can cause obstruction to air passage leading to life-threatening complications. Fatal complications such as oesophageal perforations, mediastinitis and aorto-oesophageal fistula can occur if ingested FB get impacted in the oesophagus [17]. Sharp objects can cause lacerations to the luminal wall, penetrate the mucosa and migrate extraluminally [18]. Batteries contain corrosive substances and may cause necrosis of the mucosa in case of leakage [19, 20].

Conclusion

FBs in the aerodigestive tract constitute a constant hazard in all age groups especially in children and the elderly, which demands immediate action and management. Since a FB may cause acute life-threatening complications and since its chronic impaction can lead to atelectasia, infection, ulceration and necrosis of the mucosa, delayed treatment with observation is not recommended. The

symptomless interval phase may precede a dangerous condition. Removal through the rigid endoscope still has its place as the most reliable method. Flexible endoscope is also an excellent tool especially for diagnosis and management of tracheobronchial FB. Prevention and public education for this serious problem will be necessary.

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