Incidence of Foreign Bodies in Aerodigestive Tract in Vindhya Region: Our Experience

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Abstract Foreign bodies in aerodigestive tract are frequent occurrence and may lead to life threatening situation due to obstruction caused in respiratory passages. To present foreign body ingestion cases observed in a 5-year period at the S.S. Medical College and G.M. Hospital, Rewa (MP). The present study is a retrospective analysis including 108 patients of foreign bodies of aerodigestive tract of Vindhya region who presented to the S.S. Medical College and G.M. Hospital, Rewa from January 2008 to August 2012. About 92 patients of total 108 patients had evidence of foreign body in food passage with age ranging from 9 month to 85 years. Most patients 65 (70.65 %) belong to <10 year age group. Radiological evidence was found in 76 (82.6 %) patients. Most common foreign body was found to be coin 75 (81.52 %). The commonest site of lodgement was cricopharynx. About 16 patients of total 108 patients had evidence of foreign body in airway with age ranging from 9 months to 72 years. Most cases 8 (50 %) belong to <10 year age. Maximum cases showed vegetative foreign body with right bronchus (58.33 %) as commonest site of lodgement. Early detection by meticulous history, imaging modality and prompt management remains basis for favourable outcome and prevents future complications.

Keywords Aerodigestive tract · Foreign body · Oesophagoscopy · Radiological evidence

Introduction

Foreign bodies (FBs) in aerodigestive tract are frequent occurrence and may lead to life threatening situation due to obstruction caused in respiratory passages. In adults, food is by to make the most common foreign body of the aerodigestive tract [1, 2]. Young children exploring their environments with their mouths are at risk for the ingestion and aspiration of small not-edible objects [3].

Oesophageal foreign bodies may cause a lot of symptoms ranging from odynophagia or dysphagia to complete oesophageal obstruction with overflow of secretions and aspiration. Sometimes respiratory distress or stridor occurs due to compression of the trachea wall by large objects lodged in the oesophagus.

Foreign body aspiration (FBA) is a serious health problem in paediatric patients causing significant morbidity and mortality. A high index of suspicion and timely intervention can reduce morbidity as well as mortality especially in the paediatric age group. Time lag between the aspiration and expert attention is very important with regard to overall morbidity and mortality.

During the time, many treatments for removal of airway and oesophageal foreign bodies have been proposed but rigid endoscopy has proven to be the safest and most efficient therapy. Flexible endoscopes have burdens utility and represent the best method for retrieving objects which have passed into the stomach and halted in progression, but limited by the types of instruments available to grasp the foreign body.

Material and Methods

The present study is a retrospective analytical review of 108 patients of foreign bodies in aerodigestive tract of

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vindhya region who presented to the S.S. Medical College and G.M. Hospital, Rewa from January 2008 to August 2012. The relevant data were collected with regard to age and sex distribution, type, dimension, consistency, location, duration between incident and presentation, clinical presentation, radiological findings, management and complications.

All patients underwent X-ray soft tissue neck and upper chest in anteroposterior and lateral view for determining the location of foreign body. X-ray abdomen was performed in patients with no radiological evidence of foreign body in neck and chest.

Results

Among 108 patients, foreign bodies in food passage were found in 92 (85.19 %) patient and in airway in 16 (14.81 %) patients.

The predominance of males was observed in both foreign body ingestion and foreign body inhalation i.e. 60 (65.22 %) and 11 (68.75 %) cases respectively (Table 1).

Most patients 65 (70.65 %) of foreign body ingestion belong to <10 year age group with age ranging from 9 month to 85 years. Foreign body (FB) ingestion is a frequent occurrence in children with a peak in children older than 3 years [4, 5]. Most cases 8 (50 %) of foreign body in airway belong to <10 year age group with age ranging from 9 months to 72 years (Table 2).

As per socioeconomic status maximum patients of foreign body ingestion belong to lower middle class 39 (42.4 %) followed by lower class 26 (28.3 %), upper middle 22 (23.9 %) and upper class 5 (5.43 %). Similar observation was seen in foreign body inhalation patients i.e. lower middle 8 (50 %), lower 4 (25 %), upper middle 3 (18.75 %) and upper 1 (6.25 %) class.

Most of the patients 102 (94.4 %) had given a prior history of foreign body ingestion or inhalation which aided in diagnosis.

The usual time of presentation in patients with FB in digestive tract varied from 3 h to 1 month. In 70 (76.09 %) cases, diagnosis was formulated within 3–6 h after the ingestion and in 19 (20.65 %) cases with a delay greater than 6 h but not longer than 24 h; only in 3 (3.26 %) cases,

the FB was detected after more than 24 h. Duration of foreign body lodgement in airway ranged from 6 h to 15 days. 9 (56.25 %) cases reported within 6–24 h, 4 (25 %) cases within 1–3 day and 3 (18.75 %) cases within 3–15 days.

In patients with foreign body in digestive tract, the most common symptoms were dysphagia 45 (48.9 %), odynophagia 32 (34.78 %), foreign body sensation 20 (21.73 %) and vomiting 14 (15.2 %). About 40 (43.47 %) patients were asymptomatic. With foreign bodies in the tracheobronchial passages, the most common sign and symptom were rhonchi and other attenuated sounds 5 (31.25 %) and dyspnea 6 (37.5 %) respectively. Other sign were decreased air entry in 2 (12.5 %) and hyperresonance in 1 (6.25 %) cases. The other symptom observed was cough in 4 (25 %) cases.

Most common foreign body in digestive tract was found to be coin in 75 (81.52 %) cases and least common toothbrush bristles in 2 (2.18 %) cases. Maximum cases in airway showed vegetative foreign body 9 (56.25 %) and least cases showed supari in 1 (6.25 %) (Table 3).

The commonest site of lodgement in FB digestive tract was cricopharynx 80 (86.96 %) with oropharynx 8 (8.69 %) and hypopharynx 4 (4.35 %) other less common site (Table 4).

The commonest site of lodgement in FB airway tract was bronchus 12 (75 %) mainly in right bronchus (58.33 %). Other sites are trachea 4 (25 %). No foreign body was detected in larynx (Table 5).

In FB digestive tract radiological evidence was found in 76 (82.6 %) patients while in FB airway radiological evidence was found in 5 (31.25 %) patients (Table 6).

The mode of management in all 92 patients with FB in oropharynx was tilley forcep while for FB in hypopharynx and cricopharynx was direct laryngoscopy and rigid oesophagoscopy and forcep removal while for FB inhalation cases rigid bronchoscopy and forcep removal was performed.

Discussion

Aspiration of foreign body into the tracheobronchial tree is not an uncommon problem in the paediatric population and the management of every case is challenging. In present

Table 1 Gender-wise distribution of case study

S. no.	Gender	Digestive tract		Airway	
		No.	Percentage	No.	Percentage
1.	Male	60	65.22	11	68.75
2.	Female	32	34.78	5	31.25
		92	100	16	100

Table 2 Age-wise distribution of case study

S. no.	Age	Digestive tract		Airway	
		No.	Percentage	No.	Percentage
1.	<10	65	70.65	8	50
2.	11–20	9	9.78	2	12.5
3.	21–30	4	4.35	0	0
4.	31–40	5	5.43	3	18.75
5.	41–50	3	3.26	0	0
6.	51–60	2	2.18	1	6.25
7.	61–70	1	1.09	1	6.25
8.	>70	3	3.26	1	6.25
		92	100	16	100

Table 3 Distribution of cases as per type of foreign body

S. no.	Type	Digestive tract		Airway	
		No.	Percentage	No.	Percentage
1.	Coin	75	81.52	4	25
2.	Vegetative foreign body	6	6.52	9	56.25
3.	Artificial dentures	5	5.43	0	0
4.	Toothbrush bristles	2	2.18	0	0
5.	Fish bone	4	4.35	0	0
6.	Safety pin	0	0	2	12.5
7.	Supari	0	0	1	6.25
	Total	92	100	16	100

Table 4 Distribution of cases as per site of lodgement

S. no.	Digestive tract			Airway		
	Site	No.	Percentage	Site	No.	Percentage
1.	Oropharynx	8	8.69	Larynx	0	0
2.	Hypopharynx	4	4.35	Trachea	4	25
3.	Cricopharynx	80	86.96	Bronchus	12	75
		92	100		16	100

Table 5 Distribution of cases as per site of lodgement in bronchus

S. no.	Site	No.	Percentage
1.	Right	7	58.33
2.	Left	5	41.67
	Total	12	100

study incidence of foreign body in digestive tract was more as compared to airway similar to study by Brooks [6].

In our study the incidence of foreign body in air passage is very low as compared to food passage, may be due to illiteracy, poverty and lack of specialist medical personnels in the rural areas. In the paediatric patients as the symptoms are respiratory in FB air passage thus patient consults

to general physician and paediatrician which leads to further delay in diagnosis and remains undiagnosed especially in cases of vegetative FB.

Foreign body (FB) ingestion is a frequent occurrence in children, especially in their first 6 years of life as observed in present study. Various reasons for this event can be pointed out, stressing that all the characteristics such as

sex, age, socioeconomic level and parents' influence are closely interrelated [7]. The leading factors to the injuries caused by FB in aerodigestive tract include children's behaviour, anatomical characteristics, and physiological features such as immature swallowing coordination, development of chewing capacity, and higher respiratory rates [8]. In the teen years concomitant psychiatric problems, mental disturbances and risk taking behaviours may lead to foreign body ingestion. People with poor vision or sensory abnormalities in the oral cavity are more prone to suffer from foreign bodies.

Due to the decreased sensation of food in the oral cavity in denture wearers, small foreign bodies such as fish bones are commonly found lodged in the oropharynx. In addition, haste during eating can lead to large boluses of meat lodging in the oesophagus. A prior history of oesophageal pathology such as tracheo-oesophageal fistula increases the risk for impaction of food stuffs in the oesophagus, and oesophageal strictures or obstructing masses may present as an oesophageal foreign body.

Many a times FBs are forcefully inserted for homicidal attempt of female child in rural areas [9] and ingested by prisoners for committing suicide. Foreign bodies enter the aerodigestive tract because of disturbances in physical function, impairments due to extreme youth or age, or contamination of food with foreign bodies. A thorough inspection of the food passage is thus warranted when evaluating these problems.

Prior history before investigations plays important role in diagnosis which aided in diagnosis in most of cases in present study. Children commonly come to medical attention after a care giver witnesses the ingestion of foreign body or after child reports an ingestion to care givers. Children may have vague symptoms which manifest later and do not suggest foreign body immediately.

In most instances, patients are able to relate to history of foreign body accident, but paediatric patients are often unable to give such information due to their too young age. When any patient have history of ingested foreign body, investigation is mandatory regardless of the age or apparent absence of signs and symptoms [10].

The signs and symptoms of foreign body ingestion or aspiration may be different and often very not-specific. Oesophageal foreign bodies may cause a lot of symptoms ranging from complete oesophageal obstruction with overflow of secretions and aspiration, to mild odynophagia or dysphagia. These symptoms are caused by the compression of the tracheal wall by large objects lodged in the oesophagus. In the pharyngoesophagus, the most common symptoms were dysphagia and foreign body sensation. Among the signs, odynophagia and pooling of saliva were most frequently associated with a retained foreign body [11].

The most common presentations of a foreign body in the airway were dyspnea and cough, which are similar to study by Kim et al [12]. Among the signs, rhonchi and other attenuated sounds was most common. There are no pathognomonic signs of a retained foreign body; however, the presence of a triad of inspiratory stridor, wheezing, and decreased air entry in a child at play with a history of sudden cessation of breath is highly suggestive of an airway foreign body [13].

The most common site of lodgment is the cervical oesophagus [6, 12, 14] as the cricopharynx is the narrowest part of the food passages and the relatively weak peristalsis in the upper oesophagus makes this site especially vulnerable. This is in accordance with present study. Oesophageal foreign bodies are most frequently located at the level of the cricopharyngeus muscle, the narrowest portion of the oesophagus [13, 15].

In the tracheobronchial passages, our study shows the predominant site as right bronchus similar to other studies [6, 12, 14].

Although radiographs may not confirm or rule out the presence of a foreign body, the advantages of finding one on a radiograph far outweigh the disadvantages of missing one. In patients suspected of having ingested or aspirated foreign object, plain two dimensions radiographs of the neck and chest must be taken for pre-operative diagnosis and evaluation. Often, for radio-opaque foreign body a radiogram should be taken in the greatest diameter of the object helping in defining the anatomy prior to retrieval. If the history of ingestion of a foreign body which is likely to be radio-opaque is given but it is not noted on films of the neck and chest, a radiogram of the abdomen may reveal its progression into the stomach or beyond. They also give information regarding the condition of the cervical spine for rigid endoscopy.

The FB Coin in the oesophagus occupy classical position in coronal plane due to the fact that it is anteroposteriorly flattened. Therefore on an anteroposterior view of neck–chest the whole coin can be seen showing a totally radio-opaque shadow. On a lateral plate vertical slit like structure is seen (Fig. 1a, b). In tracheal foreign bodies anteroposterior view shows vertical opaque slit and lateral neck plate shows complete coin (Fig. 1c, d). Sometimes foreign bodies like fish bone, denture, pin, stones, vegetative foreign bodies like Gokhru (*Xanthium strumarium*) etc also present with radiological evidence (Figs. 2a, b, 3a–c). Chest radiography may reveal a variety of findings like unilateral air trapping, emphysematous changes as in partial obstruction (Fig. 3d), atelectasis, secondary pneumonic consolidation, and inspiratory obstruction or a combination of the findings may also be noted.

Details of FB characteristics and the dynamics of the traumatic events involved in FB inhalation are important

Table 6 Radiological evidence of case study

S. no.	Radiological evidence	Digestive tract		Airway	
		No.	Percentage	No.	Percentage
1.	Present	76	82.6	5	31.25
2.	Absent	16	17.4	11	68.75
	Total	92	100	16	100

Fig. 1 X-ray neck soft tissue anteroposterior and *lateral view* showing FB coin (a, b) cricopharynx (c, d) trachea

to understand the pathogenic pathway. The procedures should be attempted after the completion of the appropriate studies, the assembly of experienced personnel, the

location and arrangement of the proper equipment, and proper preparation of the patient. If areas cannot be visualized indirectly or digitally palpated, then direct

Fig. 2 X-ray soft tissue neck *lateral view* showing foreign body in cricopharynx a fish bone, b artificial denture

Fig. 3 X-ray showing **a** FB pin right bronchus **b** FB multiple stones bronchus **c** FB Gokhru (vegetative FB) **d** Emphysema (right side)

(endoscopic) examination must be done when a foreign body is suspected.

Conclusion

This study gives an insight into prevalence of foreign body in aerodigestive tract. Patients who say a foreign body is present are right until it is overwhelmingly clear there is no foreign body. The examination must be thorough. Negative radiological evidence does not rule out a foreign body. Radiological evaluation is the single most important diagnostic tool, but does not preclude endoscopy. Rigid endoscopy with forceps removal under general anaesthesia is the preferred management modality.

Early detection by meticulous history, imaging modality and prompt management remains basis for favourable outcome. Prompt endoscopic intervention is the gold standard for all complicated or high-risk situations, with particular relevance to sharp and pointed foreign bodies, such as denture with protruding hooks, shaving blades, and open safety pins, which increase the danger of perforation. The final results of this study

show that injuries usually happen under adults' supervision and highlight that FBs involved in the incident belong to classes of objects not conceived for children's use and not suitable for their age. Therefore, educational strategies regarding safe behaviours have a key role in FB injuries prevention.

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Conflict of interest None.

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