

## **OBSERVATIONAL STUDY OF DIAGNOSIS AND MANAGEMENT OF UPPERAERO DIGESTIVE FOREIGN BODY**

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### **Abstract**

**Introduction:** Chevalier Jackson defined a foreign body as “an object or a substance that is foreign to its location” In human beings foreign bodies have always attracted the minds of the surgeon. Every attempt is made to take out the foreign body, even when it is harmless. Foreign-body ingestion and aspiration are common, especially in children. Taking into account the risk of infection and digestive perforation, it often requires an endoscopic removal under conditions of maximal safety and minimal trauma, especially for sharp-pointed objects. A positive history, detailed clinical examination and radiograph lead to a diagnosis.

**Materials and Methods:** The sample size is calculated based on the previous year operation theatre records which gave an approximate data of how many patients with foreign body in the upper aero digestive tract were operated, which was around 30-35 and about 10-15 cases will be assessed in prospective arm. Hence the sample size for this study is kept at a maximum of 50 cases. All the patients presenting with foreign body in the upper aero digestive tract in the outpatient department, who satisfy the inclusion and exclusion criteria will be included in the study. Informed consent will be taken from each patient and the study will be explained to each one of them. Detailed clinical history of all these patients will be taken and relevant information regarding their presenting complaints and past illnesses will be recorded. Detailed clinical examination will be done and radiological investigation like x-Ray or CT scan as indicated. Based on the radiological investigations the surgical technique will be decided and the necessary surgical intervention will be performed as per the existing standards of care and protocols. Patient's identity will be anonymized.

**Results:** Out of 50 patients studied, maximum patients presented with esophageal foreign bodies i.e. 50% and airway foreign bodies are 32 % and nasal foreign bodies 18%. Patients presenting with foreign bodies in the upper aerodigestive tracts were predominantly males, constituting up to 60% of all patients. The most common type of foreign body found was metallic, around 56 %, coin(25%) being the most common. In children, mainly in the under 5 age group, coins were most common whereas in adults, fish-bones and mutton bones were most

common. Most common site in esophagus is cricopharynx i.e.44%, followed by an area just below the cricopharynx i.e. 28% in overall distribution.

**Conclusion:** In this study, foreign bodies were more common in children than in adults and in males than in females. Airway foreign bodies were more common in children and digestive tract foreign bodies were more common in adults. The most common age for throat and airway foreign bodies was in the 1st decade. Foreign bodies in the digestive tract were more commonly found in males and airway foreign bodies, in females. Rapid or careless eating was the most common causative factor for foreign body in the digestive tract, and carelessness on the part of caretaker was the cause in airway foreign bodies. In the digestive tract, Fish bone was the most common foreign body in adults and Coins in children. Groundnut was the most common foreign body in the airway. Majority of patients with foreign body, present within 1 day, but children with objects in the nose and bronchus have shown delayed presentation Food particles were the commonest nasal foreign bodies.

**Key Words:** Chevalier Jackson, Foreign-body ingestion, bronchus, nose.

## INTRODUCTION

Chevalier Jackson defined a foreign body as “an object or a substance that is foreign to its location” In human beings foreign bodies have always attracted the minds of the surgeon. Every attempt is made to take out the foreign body, even when it is harmless.<sup>1</sup>

Foreign-body ingestion and aspiration are common, especially in children. Taking into account the risk of infection and digestive perforation, it often requires an endoscopic removal under conditions of maximal safety and minimal trauma, especially for sharp-pointed objects. A positive history, detailed clinical examination and radiograph lead to a diagnosis.<sup>2</sup>

Most cases of respiratory tract foreign bodies present with symptoms like stridor, choking, excessive cough, and hoarseness. Oesophageal foreign body symptoms that may arouse suspicion are dysphagia, food refusal, weight loss, drooling, emesis/hematemesis, foreign body sensation, chest pain, sore throat, stridor, cough, unexplained fever, altered mental status etc<sup>3</sup>.

The mucosa of the larynx, trachea, and bronchi rapidly adapts to the presence of foreign bodies so signs and symptoms may not be present in long standing foreign bodies.<sup>3</sup>

Foreign body aspiration has three stages. Initially, there is a choking episode along with coughing, gagging, and occasionally complete airway obstruction. It is followed by an asymptomatic interval when the reflexes become fatigued and irritation subsides. This

stage accounts for the large number of cases with delayed diagnoses. Around 20–50% of foreign bodies are not detected for more than one week. The third stage is characterized by symptoms of complications. Chronic cough, haemoptysis, pneumonia, lung abscess, fever, and malaise may develop at this point.<sup>4</sup>

Radiology plays an important role in detecting occult radiopaque foreign bodies. Chest/abdominal radiographs are important as most foreign bodies ingested by children are radiopaque (in contrast to inhalation, in which most are radiolucent). If the swallowed object may be radiopaque, a single frontal radiograph that includes the neck, chest, and entire abdomen is usually sufficient to locate the object. If the object is below the diaphragm, further radiographs are generally unnecessary. If the object is in the esophagus, frontal and lateral chest radiographs are necessary to precisely locate and better identify the object and to be sure that the foreign body is not, in fact, two adherent objects. If the ingested object is radiolucent, the object's location may be inferred from effects (e.g., airway compression) seen on plain radiographs. Such findings, however, are not reliable. Radiolucent objects in the esophagus may be better visualized by repeating the study after having the child drink a small amount of dilute contrast. This should not be done if endoscopy is planned. Special care must be taken if the esophagus could possibly be obstructed or perforated. When a foreign body is strongly suspected on clinical grounds, visualization by endoscopy, which has the added advantage of allowing removal of the object, may be the most efficient method of management, CT scan or MRI is rarely indicated but may enhance the detection of foreign bodies or complications in special cases.<sup>2</sup> Virtual bronchoscopy is the must in case of suspected case of foreign bodies in trachea-bronchial tract.

Per-oral rigid endoscopy is the gold standard for removal of foreign body in both the airway and the oesophagus. In case of airway foreign bodies, a well-ventilated, unconscious and relaxed patient affords the best prospects for the successful removal of a foreign body from the airway. Rigid bronchoscopy using ventilation bronchoscopes offers good visualization and is the preferred mode of treatment.<sup>3</sup>

Recent advance in the radiology, lighting, flexible endoscope, lens system photography and improvement in anaesthesia made benefit of endoscopy to more patients than even before.

The present study surveys 50 cases of foreign bodies present in food and air passages. The cases were evaluated after detailed history, and clinical examination, radiological investigation and method of retrieval of foreign bodies, post-operative management, any complication and follow up.

## AIMS OF THE STUDY

- To determine commonest foreign bodies in the upper aero digestive tract with respect to different age groups and its effect on final outcome.
- To study the different sites of upper aero digestive tract involved in this condition and its impact.
- To study the presentation of complication of foreign bodies in the upper aero digestive tract and its management
- To study the presentation of complications arising from the various surgical techniques employed in treating this condition and their management.

## MATERIALS AND METHODS

**STUDY DESIGN:** Observational study

**PLACE OF STUDY:** Single site

**STUDY PERIOD:** 6 months prospective (FROM ECARP Approval to November 2018) and 2 years retrospective (June 2015 to May 2017)

**SAMPLE SIZE:** 50

The sample size is calculated based on the previous year operation theatre records which gave an approximate data of how many patients with foreign body in the upper aero digestive tract were operated, which was around 30-35 and about 10-15 cases will be assessed in prospective arm. Hence the sample size for this study is kept at amaximum of 50 cases.

**SAMPLE TECHNIQUE:** Consecutive sampling.

### STUDY SETTING

#### PROSPECTIVE ARM

All the patients presenting with foreign body in the upper aero digestive tract in the outpatient department, who satisfy the inclusion and exclusion criteria will be included in the study. Informed consent will be taken from each patient and the study will be explained to each one of them. Detailed clinical history of all these patients will be taken and relevant information regarding their presenting complaints and past illnesses will be recorded. Detailed clinical examination will be done and radiological investigation like x-Ray or CT scan as indicated. Based on the radiological investigations the surgical technique will be decided and the necessary surgical intervention will be performed as per the existing standards of care and protocols. Patient's identity will be anonymized.

#### RETROSPECTIVE ARM:

All patients who were operated for foreign body in the upper aero digestive tract at site (from June 2015 to May 2017), whose details were extracted from the operation register. The details of presentation, investigations and surgical procedures were acquired from the medical record

department. The data collected will be entered into a chart and analysed. The patient's identity will not be revealed. Waiver of consent will be taken for the same.

**ASSESSMENT PARAMETER:** Post-operative Radiological documentation; X-ray, Type of foreign body; Organic or inorganic, Site of foreign body; Digestive tract or airway.

#### **INCLUSION CRITERIA**

All patients diagnosed with foreign bodies in the upper Aero-digestive tract.

#### **EXCLUSION CRITERIA**

Patients not consenting for the study. Patient managed conservatively.

#### **STATISTICAL ANALYSIS**

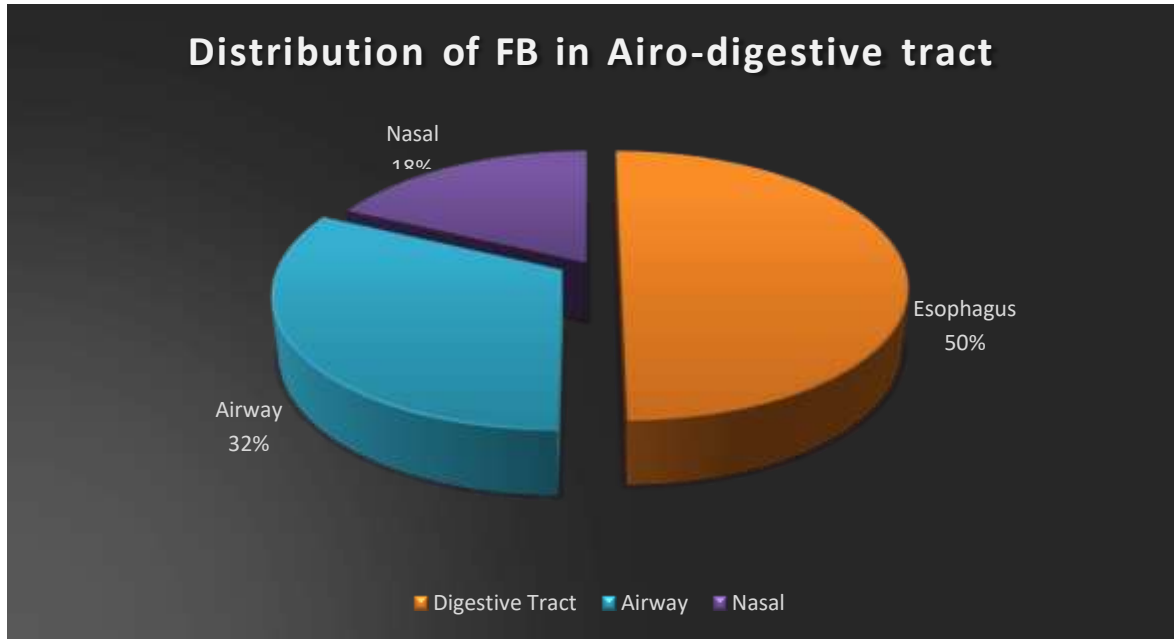
Study type will be retrospective and prospective observational study. Data will be entered in Microsoft Excel 2010 and will be analysed using SPSS software version 22. Analysis will be done using Descriptive statistical analysis, Chi square test and fisher exact test. Qualitative data like sex, surgical procedure, post-operative x-ray, and post-operative complication will be represented in the form of frequency and percentage. Association between different variables will be studied using chi square test. Quantitative data like age will be represented using mean  $\pm$  S.D., and IQR (Inter quartile range) Quantitative and qualitative data will be represented by appropriate charts and diagram.

## **RESULTS**

**TABLE 1: Overall distribution of foreign bodies**

<b>Over all Distribution of FB</b>	<b>No</b>	<b>Percentage</b>
Esophagus	25	50%
Airway	16	32%
Nasal	9	18%
Total	50	100%

**CHART 1: Overall distribution of foreign bodies:**

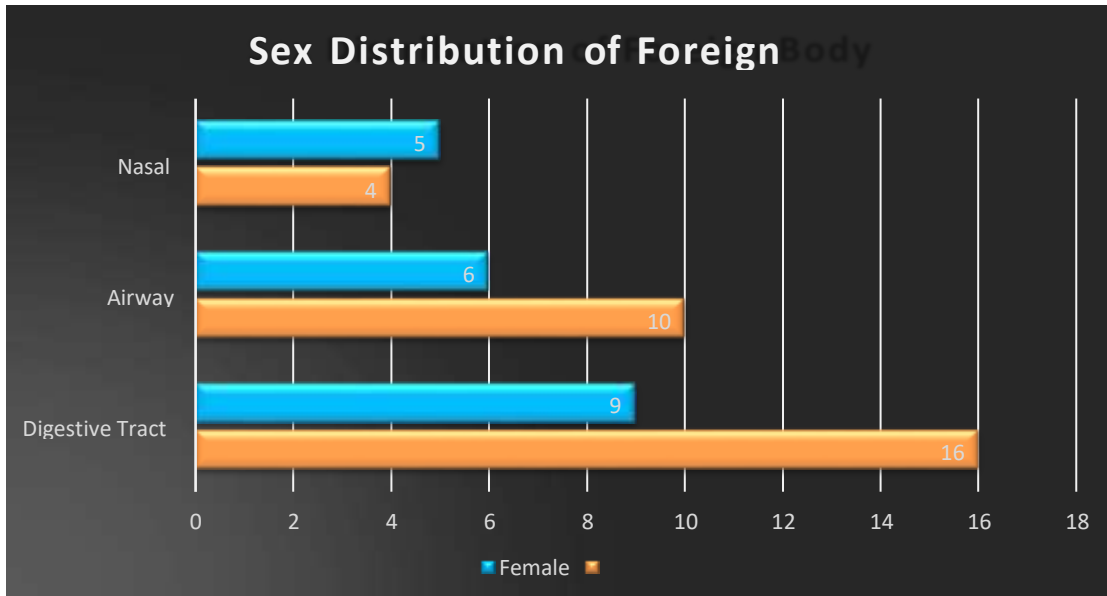


Out of 50 patients studied, maximum patients presented with esophageal foreign bodies i.e. 50% and airway foreign bodies are 32 % and nasal foreign bodies 18%.

**TABLE 2: Sex Distribution of Foreign Body**

Over all Distribution of FB	Male	Female
Esophagus	16	9
Airway	10	6
Nasal	4	5
Total	30	20

**CHART 2: Sex Distribution of Foreign Body**

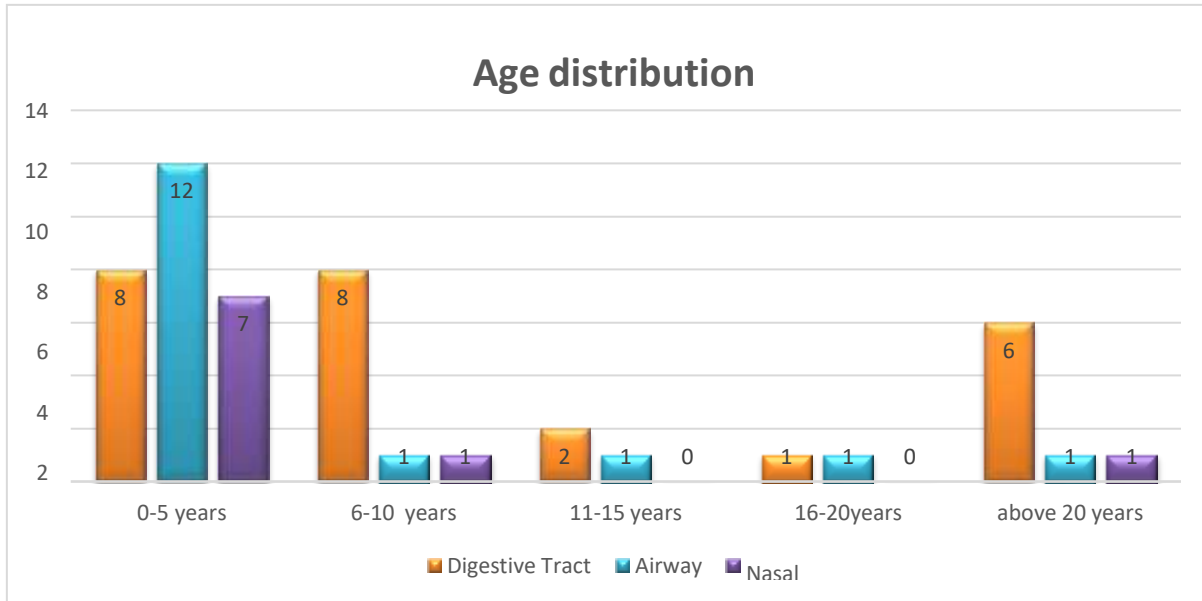


Patients presenting with foreign bodies in the upper aerodigestive tracts were predominantly males, constituting up to 60% of all patients.

**Table 3: Age distribution according sites**

Age distribution	Esophagus	Airway	Nose	TOTAL(Percent)
0-5 years	8	12	7	54%
6-10 years	8	1	1	20%
11-15 years	2	1	0	6%
16-20years	1	1	0	4%
above 20 years	6	1	1	16%
Total	25	16	9	100%
Percentage	50%	32%	18%	

**CHART 3: Age distribution**



In all type of foreign body presentations, 0-5 yrs. age group are most susceptible i.e. around 54% followed by 6-10 yrs. age group with 20%.

**TABLE 4: Types of foreign body**

Types of FB	Total
metallic	28
non-metallic	22



**CHART 4: Types of Foreign body**

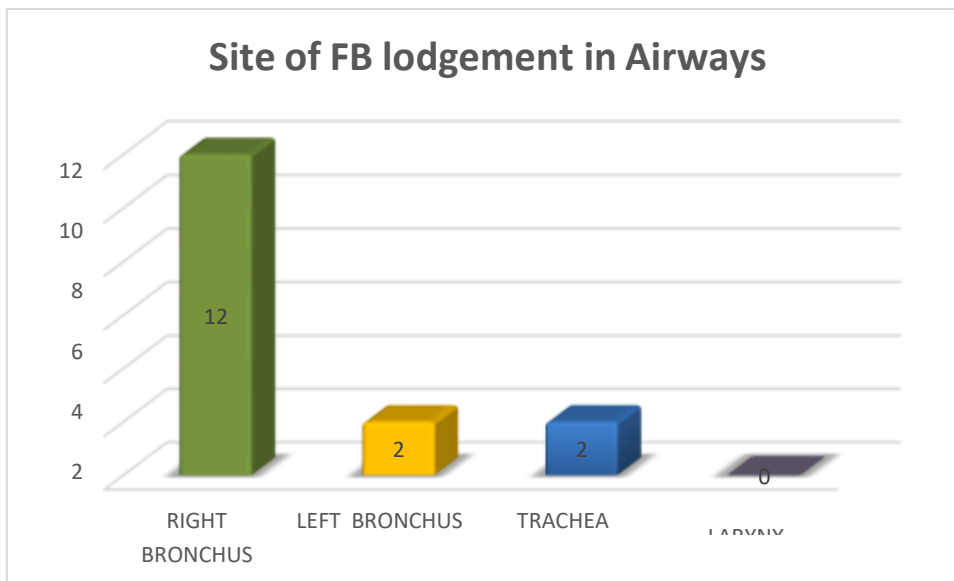


The most common type of foreign body found was metallic, around 56 %, coin(25%) being the most common. In children, mainly in the under 5 age group, coins were most common whereas in adults, fish-bones and mutton bones were most common.

**TABLE 5: Sites of lodgement of foreign body in airway**

SITE FOR FB LODGEMENTIN AIRWAYS	Total	Percentage
RIGHT BRONCHUS	12	75%
LEFT BRONCHUS	2	12.5%
TRACHEA	2	12.5%
LARYNX	0	0%

**CHART 5: Site of foreign body lodgement in airway**

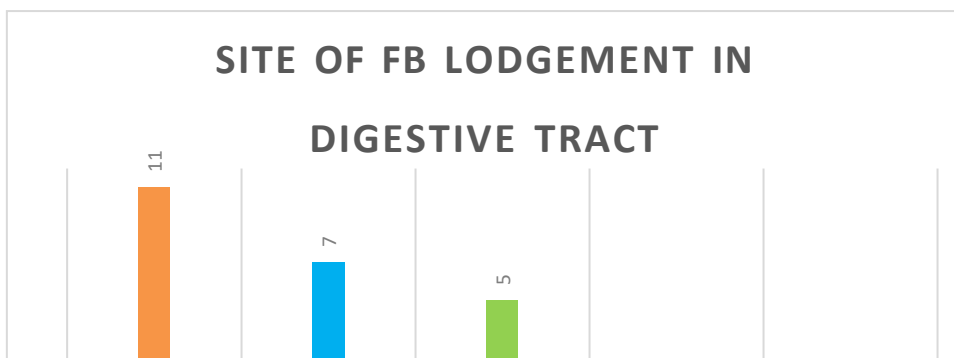


Most common site among airway foreign bodies is the right bronchus i.e. 75 % in overall distribution, followed by left bronchus and trachea with 12.5% each.

**TABLE 6: Site of foreign body lodgement in Esophagus**

Site of foreign body lodgement in digestive tract	Total	Percentage
CRICOPHARYNX	11	44%
BELOW CRICOPHARYNX	7	28%
ESOPHAGUS	5	20%
TONSILLAR FOSSA	1	4%
SUBCUTANEOUS PLANE OF NECK	1	4%

**CHART 6: Site of foreign body lodgement in digestive tract**



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1

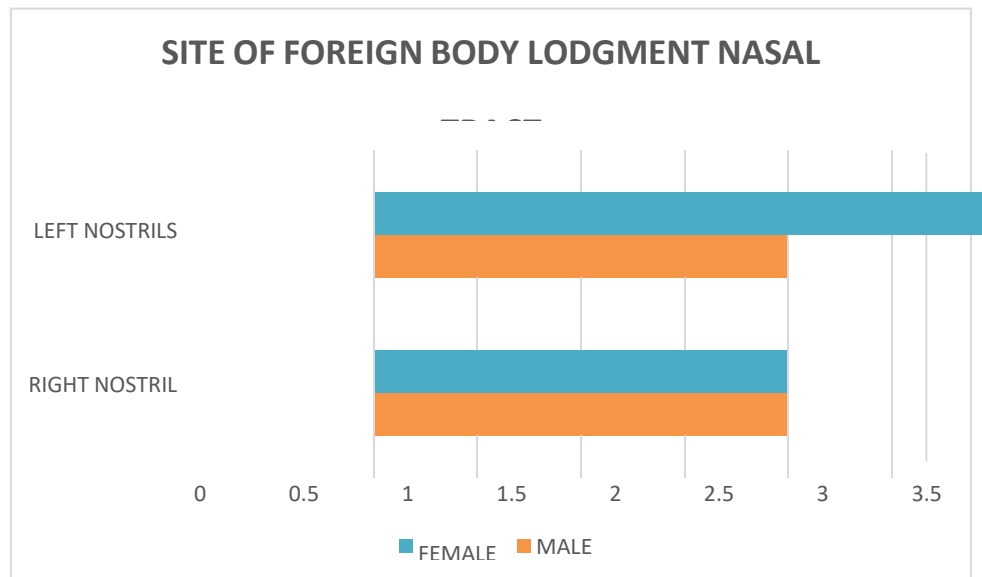
CRICOPHARYNX  
 OESOPHAGUS  
 TONSILLAR FOSSA  
 SUBCUTANEOUS...

Most common site in esophagus is cricopharynx i.e.44%, followed by an area just below the cricopharynx i.e. 28% in overall distribution.

**TABLE 7: Site of foreign body lodgement in nose**

Site of foreign body lodgement in nose	MALE	FEMALE
RIGHT NOSTRIL	2	2
LEFT NOSTRILS	2	3
Total	4	5
Percentage	44.44%	55.60%

**CHART 7: Site of foreign body lodgement in nose**

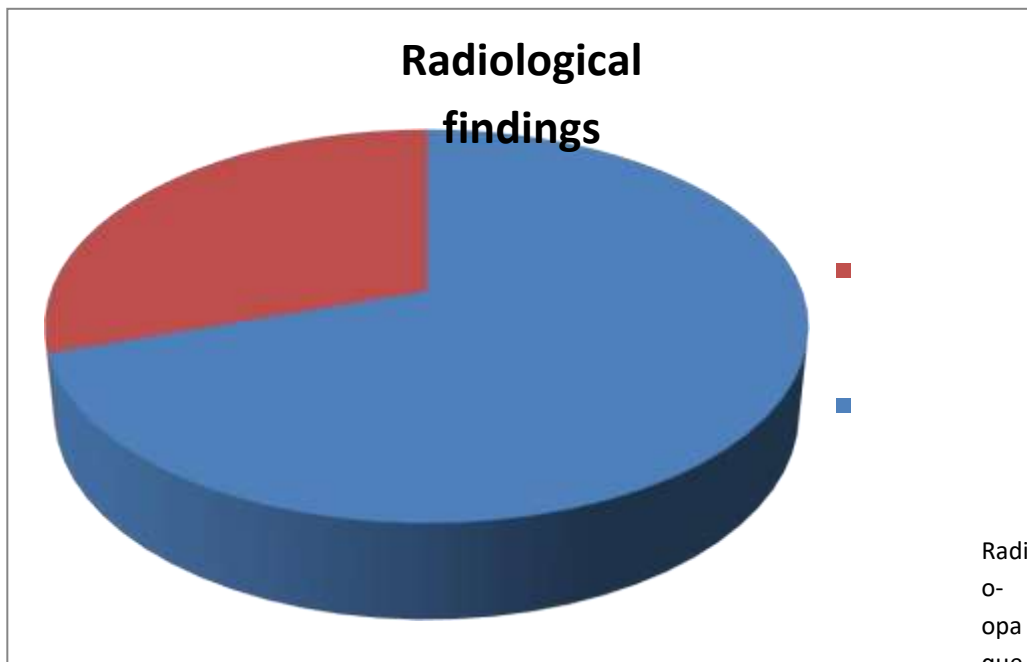


Nasal foreign body are more common in the left nostril with 60 %. Nasal foreign bodies were found to be more common in females than in males in this study.

**TABLE 8: Radiological finding**

RADIOLOGICAL FINDINGS	TOTAL
Radio-Opaque	35
Radiolucent	15

**CHART 8: Radiological finding**



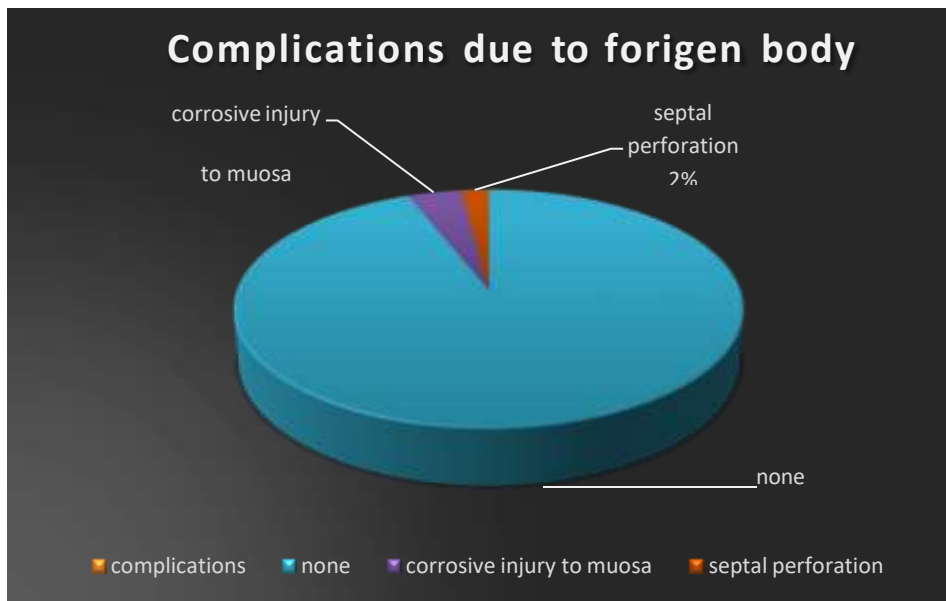
70% of foreign bodies were found to be radio-opaque whereas 30% were radiolucent. Radiological investigation was very useful tool in misguiding history and suspected foreign body.

**TABLE 9: Complication due to foreign body**

Complications	Total
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None	47
Corrosive injury to mucosa	2
Septal perforation	1

**CHART 9: Complication due to foreign body**



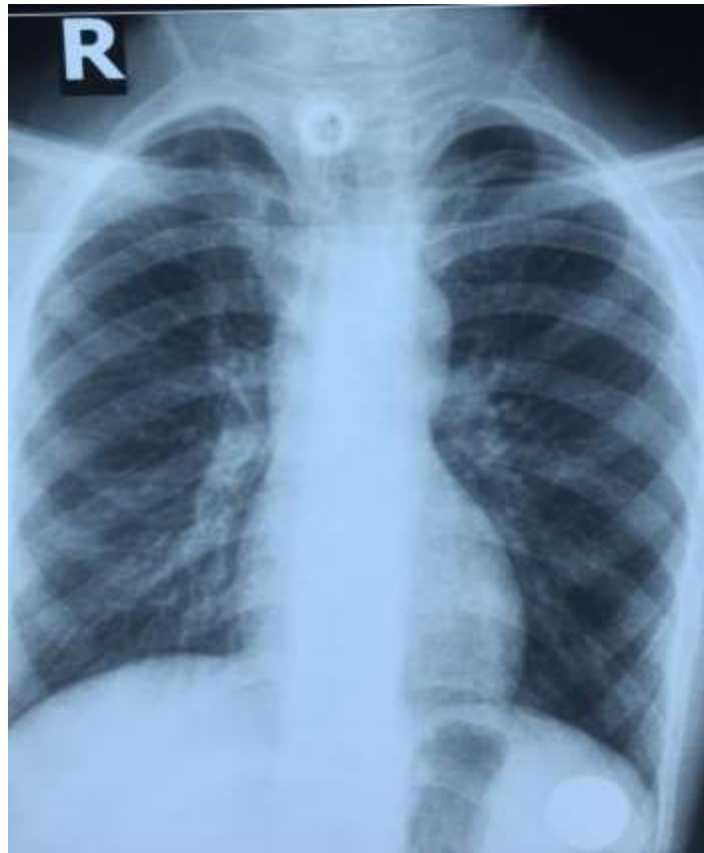
Most of the foreign body presented without any complications. In few cases like button battery foreign body there was corrosive injury in 4% and septal perforation in 2% cases.



**FIGURE 1 – SANDER’S JET VENTILATION**



**FIGURE 2 – INTRA-OP TRACHEAL FOREIGN BODY**



**FIGURE 3: FOREIGN BODY: TRACHEOSTOMY TUBE**



**FIGURE 4: REMOVED TRACHEOSTOMY TUBE.**

## **DISCUSSION**

This study is based on a total number of 50 patients who presented with an aerodigestive tract foreign body and underwent further management as per our treatment protocol.

### **AGE DISTRIBUTION:**

Out of all 50 patients, most common age group is 0 – 5 years, the peak age was around 3 years, which correlates well with study done by Francois M et al and Balbani APS et al in airway foreign body. In case of digestive tract foreign body, 0-5 years age group is most common, Studies by Jackson et al, Hung and Lin, Massachusetts hospital and Black RE et al have shown that children younger than 10 years are most vulnerable, as in our study. Baharloo F et al has found peak incidence at 2 years in children.<sup>6</sup>

### **SEX DISTRIBUTION:**

The sex distribution in digestive tract foreign bodies was in favour of males (64%), compared to females (36%). In airway, distribution was more in males (62.5%), compared to females (37.5%). In studies by Brooks et al, Jackson et al, Kim et al and Hung W and Lim there was no significant difference in sex distribution.<sup>7</sup>

### **SITE DISTRIBUTION:**

Most common site is digestive tract (50%) in which cricopharynx (44%) is most common. This also correlates well with the study of Murty PSN et al, Abdul Azeez A et al and several others<sup>37</sup>.

Nasal foreign body are 18% with left nostril being more common (55.56%) Airway foreign bodies are 32% with right bronchus (75%) being most common. TYPE OF FOREIGN BODY Metallic (56%) foreign body are more common than non-metallic (44%). Most common metallic foreign body is coin (25%) followed by button battery. Most common non-metallic foreign body are mutton and chicken bones (35%) Similar observation was also seen in the study of Kamat et al, in the coastal belts of South India (39%) and by Ravi Seshadri.

## **SYMPTOMOLOGY**

In the airway tract, the majority of foreign bodies were in the age between 1 and 2. The types of foreign bodies were a variety in which nuts and seeds were the commonest in children. This observation is also seen in the study by Chee LW and Sethi DS and Baharloo F et al.

The most common symptom was difficulty in swallowing (77%), followed by throat pain (72%). This observation correlates well with the study of Murty PSN et al and Abdul Aziz A et al. Pain localization is better in pharyngeal foreign bodies than in the oesophagus, as observed by Cannoly et al. Side of throat pain or foreign body sensation correlated well with the side impaction. Pooling of saliva was seen in 58%, but not as found in the study of Jones NS et al (85%).<sup>7</sup>

## **RADIOLOGICAL FINDINGS**

Out of all the patients presenting with foreign bodies, 70% were radio-opaque. Hence, radiological investigations were a guiding tool for a definitive diagnosis.

## **COMPLICATIONS DUE TO FOREIGN BODY**

92% of cases presented without any complications. Very few cases presented with complications due to foreign bodies. Out of all, 2 % presented with corrosive injury to esophageal mucosa due to button battery ingestion which was the most common complication encountered. Septal perforation was seen in 1% cases in nasal cavity foreign body.<sup>8</sup>

In our study, we found 1 foreign body which had migrated from the esophagus to the subcutaneous tissue of the neck. The patient presented with long standing symptoms and evidence of trauma was found in the esophagus which confirmed the initial location of the foreign body. This is a very rare occurrence and constituted only 0.5% of my study.

In this study, complication such as oesophageal perforation was nil. In a study by Binder L et al, Chaikhonni A et al and Garcia C et al such cases occurred.<sup>9</sup>

## **COMPLICATIONS DUE TO PROCEDURE**

There were no obvious complications in the all cases. Endoscopic removal played the major role in management of foreign bodies (67%) and 33 % was by direct removal. The percentage of esophagoscopies done was 42% and bronchoscopies was 24% overall. In children, direct laryngoscopy was resorted to in 22%. Open procedure was required in less than 0.5%.<sup>10</sup>



## CONCLUSION

In this study, foreign bodies were more common in children than in adults and in males than in females. Airway foreign bodies were more common in children and digestive tract foreign bodies were more common in adults. The most common age for throat and airway foreign bodies was in the 1st decade. Foreign bodies in the digestive tract were more commonly found in males and airway foreign bodies, in females. Rapid or careless eating was the most common causative factor for foreign body in the digestive tract, and carelessness on the part of caretaker was the cause in airway foreign bodies. In the digestive tract, Fish bone was the most common foreign body in adults and Coins in children. Groundnut was the most common foreign body in the airway. Majority of patients with foreign body, present within 1 day, but children with objects in the nose and bronchus have shown delayed presentation Food particles were the commonest nasal foreign bodies. Nasal block and unilateral nasal discharge were the commonest complaints. Rhonchi, crepitations and decreased air entry were present in more than half of the airway foreign bodies. Most common site of foreign body impaction is cricopharynx in the digestive tract, right bronchus in airway and left nasal cavity in the nose. Rigid bronchoscopic removal remains the procedure of choice in removal of foreign body in the trachea and bronchus, rigid esophagoscope used for removal of oesophageal foreign bodies. Corrosive injury to mucosa is most common complication due to foreign body itself. The only limitation to our study was the unavailability of a flexible endoscope which could serve to be of some importance in management of certain cases. We found radiological investigations to be a helpful tool in the diagnosis of radio-opaque foreign bodies.

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