

DISSERTATION ON
**“A CROSS SECTIONAL STUDY ON UPPER
AERODIGESTIVE TRACT FOREIGN BODIES IN A
TERTIARY CARE CENTER IN CHENNAI”**

This Dissertation is submitted to

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BONAFIDE CERTIFICATE

This is to certify that this dissertation entailed “**A CROSS SECTIONAL STUDY ON UPPER AERO DIGESTIVE TRACT FOREIGN BODIES IN A TERTIARY CARE CENTER IN CHENNAI**” submitted by Dr.LEKSHMI R, appearing for M.S. ENT., Branch IV Degree examination in May 2022 is a bonafide record of work done by her under my direct guidance and supervision in partial fulfillment of regulations of the Tamil Nadu Dr. M.G.R. Medical University, Chennai, Tamil Nadu, India.

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LIST OF ABBREVIATIONS

| | | |
|-------|---|------------------------------------|
| FB | : | Foreign body |
| PPV | : | Positive Pressure Ventilation |
| PA | : | Postero-anterior |
| CT | : | Computed Tomography |
| NO/ND | : | Nasal obstruction/ Nasal discharge |
| FBS | : | Foreign body sensation |
| RB | : | Rigid Bronchoscopy |
| ER | : | Endoscopic removal |
| RE | : | Rigid esophagoscopy |
| DR | : | Direct removal |
| R | : | Removed |
| NR | : | Not removed |
| RPA | : | Retropharyngeal abscess |
| NFB | : | Nasal Foreign Bodies |
| TBFB | : | Tracheobronchial foreign bodies |
| DTFB | : | Digestive Tract Foreign Bodies |

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INTRODUCTION

A foreign body is any object that is not normal to the place where it is found. Even though foreign body in the aero digestive tract is a common accident, it has potential for grave consequences, constituting an important cause of morbidity and mortality^[1]. The term foreign body entered medical language in the middle of 18th century. The number of texts on this increased rapidly till 1880, followed by another peak around 1918. In the late 19th and early 20th century, Chevalier Jackson dedicated his works to develop methods for safe removal of foreign bodies using the newly available oesophagoscope and bronchoscope. We are forever indebted to Dr Jackson and to those who have carried on his legacy such as Dr Sylvan Stool for the development of techniques for safe extraction of foreign bodies and, more importantly, for continued advocacy of product safety regulation to reduce the overall threat to children in the home.

According to the National Safety Council statistics, foreign body associated airway obstruction is the 4th leading cause of unintentional death; around 5051 deaths documented in 2015^[3]. It is the leading cause of accidental death in children under 16 years of age. Choking and suffocation taken together constitute the third leading cause of accidental death with most cases occurring in children under age three years and in older adults. Geriatric population are also vulnerable to foreign body

aspiration and ingestion attributing to dementia and poor vision. It is estimated that there are at least twice as many problematic ingestions as aspirations with the majority occurring in children under age six. Accidental ingestion or aspiration tends to be twice as common in boys ^[4]. Infants and toddlers are programmed to explore the world orally and unfortunately, the ability to move and grasp objects occurs well before the development of molar crushing teeth and the fluid coordination of swallowing with laryngeal sphincter control.

When a patient comes with a history of foreign body, proper evaluation using radiographs is required without considering their age and presence or absence of signs and symptoms. Rarely the only presenting complaint will be that of serious complications such as recurrent pneumonia, atelectasis, lung / retropharyngeal or mediastinal abscess, or massive hemorrhage due to a vascular fistula without history of foreign body ^[4]. The treatment of choice is prompt endoscopic retrieval. It is occasionally possible to retrieve a nasal, oropharyngeal or hypopharyngeal foreign body in a cooperative patient with only local anaesthesia. Rigid endoscopy has proven over time to be the safest and most efficacious therapy ^[5].



FIG 1: Chevalier Jackson with his collection of foreign bodies



FIG 2: Gustav Killian performing tracheoscopy

TYPES OF FOREIGN BODIES

1. Organic – Inorganic
2. Radio opaque – Radio lucent
3. Vegetative – Non vegetative
4. Exogenous – Endogenous
5. Animate – Inanimate

NASAL CAVITY FOREIGN BODIES

Children aged 2–4 years present more commonly with nasal foreign bodies, likely because at this age they are more ambulatory and come in contact with more objects which may be accommodated by the nasal cavity [6,7,8]. Foreign bodies may enter the nasal cavity anteriorly (more common) or posteriorly.

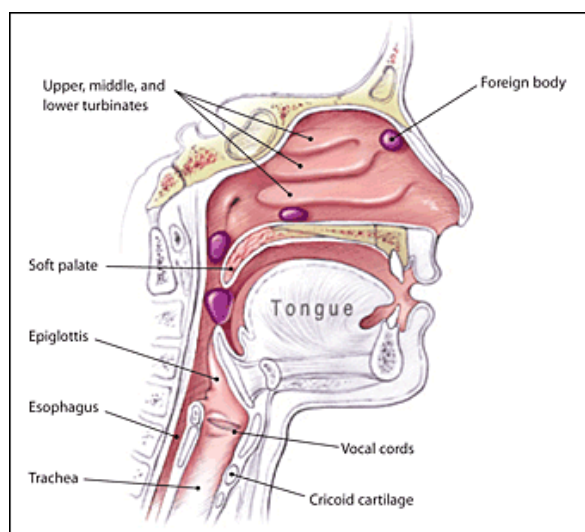


FIG 3: Common sites of nasal foreign body impaction

Vomiting or forceful coughing may allow for retrograde advancement of objects through the posterior choana. The vast majority of the cases occurred when the child was playing (85%), with the remainder of cases (15%) happening while eating [9].

CLINICAL FEATURES:

- Most of the cases are asymptomatic
- Unilateral foul smelling nasal discharge [HALLMARK FINDING;
But usually seen after a minimum of 4 days]
- Nasal obstruction
- Epistaxis

INVESTIGATIONS

- Anterior rhinoscopy identifies most of the cases of nasal foreign bodies
- X ray - Metallic foreign objects such as screws, coins, and batteries may be identified with radiographs. This is also useful in cases with thick purulent secretions who are not compliant with in-office examination.



Fig 4: Button battery foreign body in right nasal cavity



FIG 5: X-ray nasopharynx lateral view with button battery foreign body

RHINOLITH:

- Rhinoliths are formed by accumulation of mineral salts around an already impacted foreign body, increasing its volume and impeding its identification ^[10].
- The rhinolith nucleus can be either organic, such as a blood clot, a thick secretion, or a crust; or inorganic, which is more common in rhinolith formation.
- **MANAGEMENT:** After identification, the exterior shell of the rhinolith should be fractured and the foreign body extracted. If this cannot be accomplished, it is removed posteriorly through the nasopharynx. In cases with massive rhinolith, a lateral rhinotomy approach is preferred for removal.

MANAGEMENT

Nasal foreign bodies are commonly removed by parents, paediatricians, and emergency physicians using simple instruments such as a pair of tweezers or cotton-tipped applicator. This is usually done as an office procedure without anesthesia. Otolaryngology consultation is warranted in situations where failed extraction attempts have occurred or use of endoscopic instrumentation and sedation is required for safe removal.

In the case of a unilateral nasal foreign body, PPV or high flow oxygen delivered to the patient's mouth with opposite nostril obstructed, which generates pressure to expel the foreign body ^[11,12,13].

COMPLICATIONS

- purulent rhinorrhea
- nasal bleeding
- mucosal inflammation
- pain
- nasal obstruction
- ulceration and perforation of the nasal septum
- nasal or choanal stenosis
- infection, ingestion, and aspiration
- Epistaxis occurs due to sharp or irregularly edged foreign bodies, self-inflicted digital trauma or due to removal attempts by caregivers ^[14].
- Rarely, violation of the anterior cranial fossa may occur due to foreign body, which demands emergency neurosurgical intervention.

Hospitalization is occasionally required to manage complicated nasal foreign bodies. Batteries and other inorganic object like chewing-gum,

magnets, and foam rubber are the most common foreign bodies which caused hospitalization

TRACHEO-BRONCHIAL FOREIGN BODIES

Most inhaled foreign bodies occur in under 3 years age group. Foreign bodies in the tracheobronchial system seem to cause more complications with around 1% mortality ^[15,16,17,18]. Boys are affected more frequently than girls in a ratio of about 2:1.

Vegetable matter like peanut and other seeds are the most commonly seen foreign body in pediatric airway. Most foreign bodies pass through the larynx and trachea to become lodged more peripherally in the airway. However, large foreign bodies or those with sharp, irregular edges may become lodged in the laryngeal inlet. In most cases, however, the foreign body finds its way into one of the main bronchi, the right being more frequently involved than the left in most series.

TRACHEO-BRONCHIAL ANATOMY ^[19]

TRACHEA: The trachea extends from the cricoid cartilage above at the level of the sixth cervical vertebra till the level of sternal angle at the level of 4th thoracic vertebra where it divides into right and left main bronchus. In adults the trachea is approximately 12 to 14 cm in length. There are 16 to 20 'C'-shaped cartilage rings, which are deficient posteriorly. Just above

the tracheal bifurcation, pulsations can usually be seen, where the aortic arch crosses the trachea transversely on its left wall.

The carina is located at the distal end of trachea. It is normally sharp and its antero-posterior dimensions increase during inspiration and decrease during expiration.

BRONCHI: The left and right main bronchus and bronchus intermedius have cartilage rings, usually 9 to 12 in the left main bronchus, 6 to 8 in the right main bronchus and 4 to 6 in the bronchus intermedius. In adults, the course of right main bronchus is more direct than that of the left main bronchus.

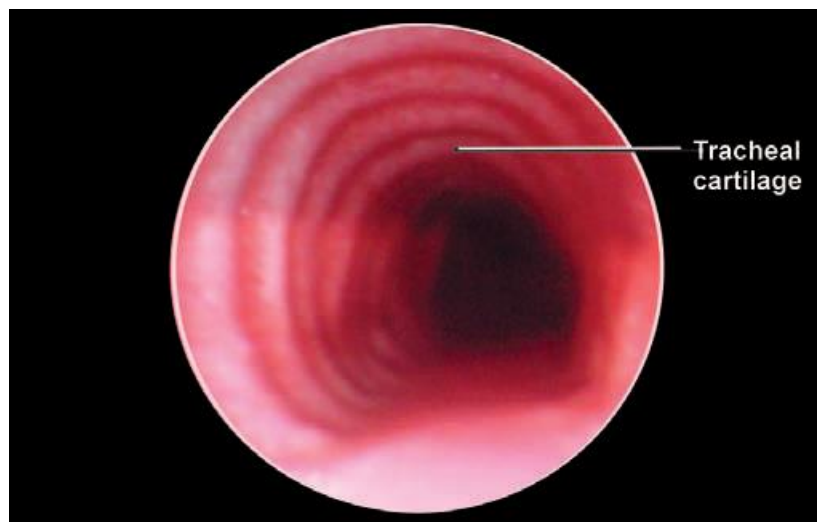


FIG 6: Trachea



FIG 7: Carina



Fig 8: Right and left main bronchus

Incidence of bronchial foreign bodies are higher in right main bronchus –

reasons:

- greater diameter of right main bronchus [2,4]
- smaller angle of divergence from the tracheal axis
- greater airflow through the right lung
- position of the carina to the left of the midline.

CLINICAL FEATURES

Signs and symptoms associated with foreign body aspiration are observed in three stages ^[4].

- **INITIAL STAGE:** History of a choking episode, followed by violent paroxysms of coughing, gagging, and occasionally, complete airway obstruction.
- **ASYMPTOMATIC INTERVAL:** This occurs when the foreign body becomes lodged, the reflexes become fatigued and the immediate irritating symptoms subside.
- **STAGE OF COMPLICATIONS:** It is the stage in which obstruction, erosion, or infection develops to again direct attention to the presence of the foreign body. Cough, haemoptysis, pneumonia, lung abscess, fever, and malaise are the common complications.

LARYNGEAL FOREIGN BODY:

Laryngeal foreign bodies may be completely or partially obstructive. Completely obstructive foreign bodies usually cause choking and sudden death. Objects that are partially obstructive and thus compatible with life are usually flat and thin and lodge between the vocal folds in the sagittal

plane. They commonly presents with hoarseness, croupy cough, stridor, and varying degrees of dyspnea, and may even present with odynophagia.

TRACHEAL FOREIGN BODY:

Foreign bodies of the trachea present in a manner similar to those of the larynx, with the exception that **hoarseness is a less common finding**. The **audible slap** results from the impact of a mobile foreign body against the wall of the trachea on deep inspiration or coughing, and is best heard at the open mouth. The same movement also creates a simultaneous **palpatory thud**, which may be felt with one finger on the trachea. The **asthmatoïd wheeze** is in fact higher in pitch and more intense than that of bronchial asthma ^[2].

BRONCHIAL FOREIGN BODY:

The “*classic triad*” of findings at presentation including cough, wheeze, and unilateral decreased breath sounds was present in most of the patients ^[20]. Respiratory distress and hemoptysis are relatively uncommon findings. Obstructive bronchial foreign bodies classically cause emphysema, atelectasis, pneumonia, and eventually, pulmonary abscess. Organic materials cause more violent reactions like laryngotracheobronchitis, toxemia, cough, and irregular fever.

RADIOLOGY

- Anteroposterior and lateral views of the extended neck for soft tissue visualization
- Posteroanterior and lateral radiographs of the chest.
- Smaller children may undergo a lateral chest radiograph with the arms behind the back, the neck flexed, and the head extended to allow for visualization of the entire airway from the mouth to the carina.
- Dynamic imaging by fluoroscopy is useful for studying partial obstruction of the lung in real time.
- CT scans and bronchograms are rarely used.



FIG 9: Chest x-ray PA view and lateral view showing bronchial foreign body – Metal tracheostomy tube

In cases of tracheobronchial foreign body, history and physical examination determine the indication for bronchoscopy rather than radiographs. Bronchoscopy should be considered the definitive diagnostic

intervention as well as the preferred therapeutic intervention. Radiographs provide additional information in cases with associated pneumonia or other suspected causes of airway obstruction, and should be limited to postero-anterior and lateral films of the chest.

TYPES OF OBSTRUCTION

When a foreign body is present at the orifice of a main bronchus, obstruction may be partial or complete [21,22].

- Partial bypass valve obstruction: Air is exchanged in both inspiration and expiration, resulting in a normal radiographic study.
- Check valve obstruction: It is commonly associated with acute bronchial foreign bodies. In such cases, air can move past the foreign body on inhalation but not on expiration due to the normal physiologic decrease in bronchial diameter. The result is hyperinflation of the obstructed lung and mediastinal shift to the opposite side.
- Complete or stop valve obstruction: Foreign bodies of long standing cause edema and granulation tissue, resulting in obstruction and a chest radiograph which demonstrates collapse of the affected segment.
- Ball valve obstruction, rarely seen in cases of bronchial foreign body, allows egress of air from the lung but prevents entrance of air

on inhalation. Such obstruction leads to atelectasis and mediastinal shift toward the obstructed side.

The universal sign for **choking** is hands clutched to the throat. If the person does not give the signal, look for these indications:

- Inability to talk
- Difficulty breathing or noisy breathing
- Squeaky sounds when trying to breathe
- Cough, which may either be weak or forceful
- Skin, lips and nails turning blue or dusky
- Skin that is flushed, then turns pale or bluish in color
- Loss of consciousness

MANAGEMENT

The treatment of choice for foreign bodies in the upper respiratory tract is prompt endoscopic removal under conditions of maximum safety and minimum trauma. Basic life support manoeuvres to remove a foreign body in children include back blows and chest thrusts in infants and abdominal thrusts in children and adolescents. Postural drainage is better avoided, and bronchoscopic extraction remains the first line therapy for all cases of tracheo-bronchial foreign bodies ^[23]. However, unless actual or

potential airway obstruction is present, a foreign body is not an acute emergency. Bronchoscopic extraction is the preferred first line of management of any airway foreign body because it is both diagnostic and therapeutic.

Heimlich manoeuvre [24]: In cases of complete airway obstruction, Heimlich manoeuvre which involves abdominal thrusts is the mainstay of treatment in older children. But due to potential intra-abdominal injury, back blows and chest thrusts remain the primitive therapy for children under 1 year of age.

FIG 10: Heimlich manoeuver

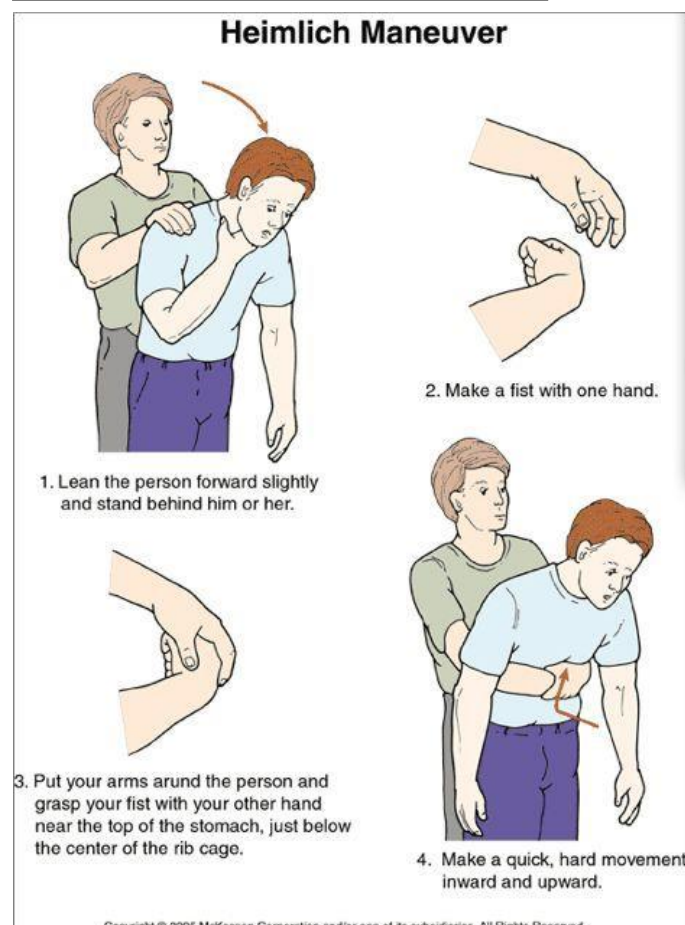
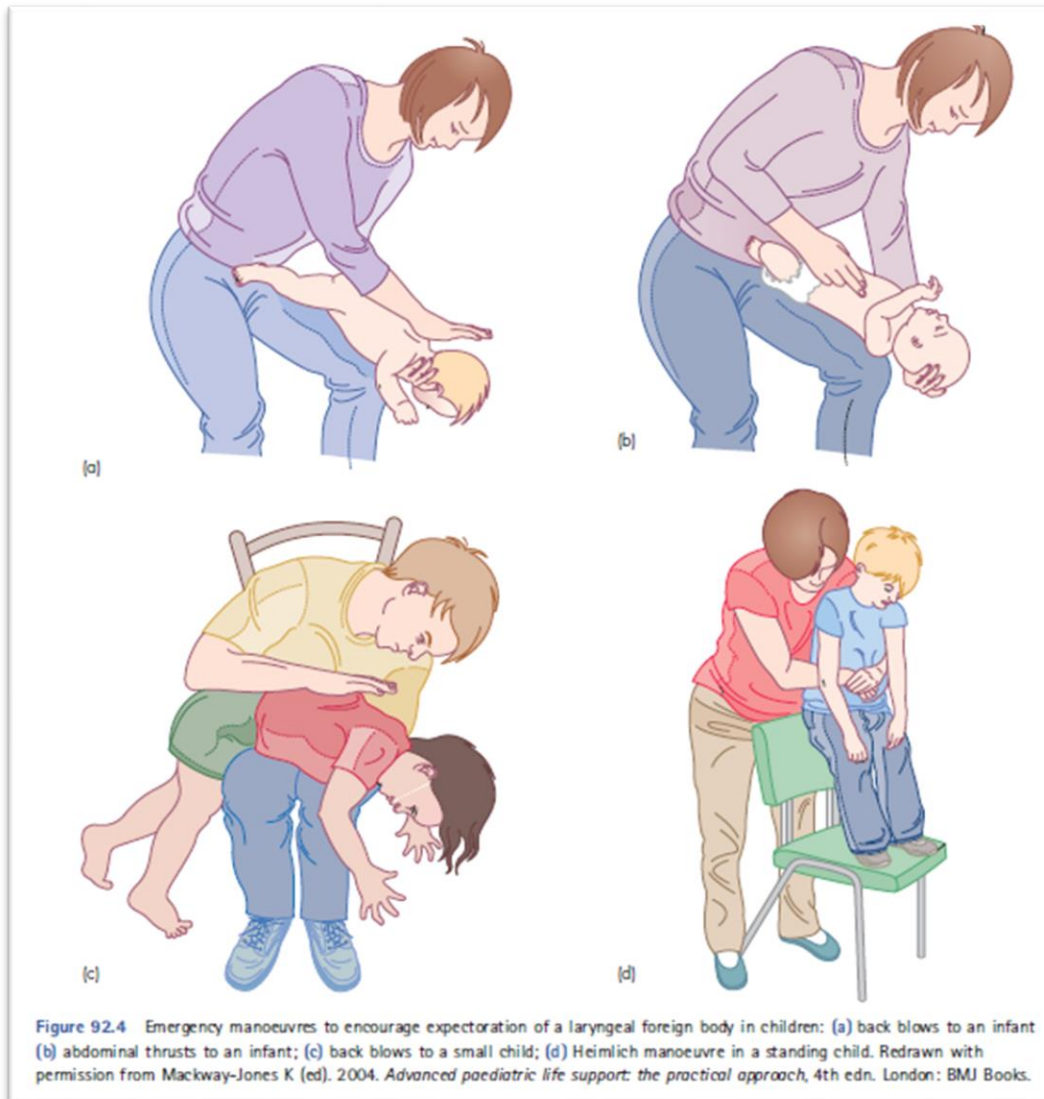


FIG 11: Emergency management for laryngeal foreign bodies in children



- Postural drainage (chest physical therapy) and bronchodilator therapy were proposed by Burrington and Cotton ^[23] as an alternative to bronchoscopic removal of foreign bodies. This technique purports to dislodge the foreign body in order to facilitate its expulsion by the patient's own cough reflex. However, it is better avoided as control of the object is lost, and complete obstruction of the airway may result.

- Emergency needle cricothyrotomy ^[25] is a procedure of last resort to access the airway in an obstructed patient who cannot be intubated or ventilated. A large intravenous catheter (14 to 18 Gauges) is passed through the midline of the inferior edge of the cricothyroid membrane.
- Laryngeal foreign bodies can be removed by direct laryngoscopy, while tracheal or bronchial foreign bodies are best removed by rigid bronchoscopy ^[26].
- Thoracotomy or bronchotomy are done when all other methods fails.

COMPLICATIONS

- Laryngeal edema and traumatic laryngitis ^[27]
- Stridor resulting from foreign body extraction
- Persistent pneumonia and atelectasis in long standing foreign bodies
- Bronchospasm and postobstructive pulmonary edema
- Fatal complications include complete obstruction of the airway and cardiac arrest induced by prolonged hypoxia.

DIGESTIVE TRACT FOREIGN BODIES

Before the mid-1850s, the most common management for suspected oesophageal foreign body impaction was to attempt to push the object into the stomach. The first oesophagoscope used in 1890 by Mackenzie which was later improved by Jackson, Ingals and Mosher ^[5]. Most cases of foreign-body ingestions occur in the paediatric population, with a peak incidence at the ages between 6 months and 6 years. 80% of foreign bodies occur in children and cervical oesophagus is the commonest site. The object most often encountered in children is a coin, in adults – chicken bones and fish bones.

RISK FACTORS

- Children are at risk because they explore their environments with their mouths. Also, the second molars are not well developed, the grinding and swallowing mechanisms are poor and glottic closure is immature ^[29].
- In adults, neurologically impaired patients, edentulous individuals, patients with certain psychiatric illness, mental retardation, impairment caused by alcohol, pica, those seeking some secondary gain with access to a medical facility and individuals at the extremes of age are at higher risk.

SURGICAL ANATOMY OF ESOPHAGUS

Esophagus extends from distal pharynx till the gastric cardia. In term infants, it measures 7–14 cm from the upper esophageal sphincter to the lower esophageal sphincter. This conduit doubles in length by 3 years of age, after which longitudinal growth occurs at 0.65 cm per year until puberty, when the adult length of 25 cm is achieved. The neonatal esophageal diameter is 5–6 mm [30].

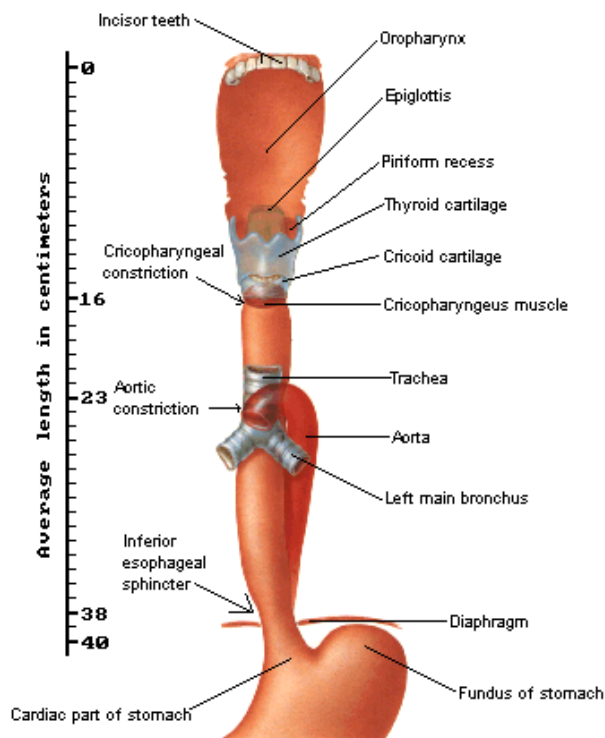


FIG 12: Constrictions of larynx

The esophagus is divided into four segments: cervical, upper, middle, and lower. Four innate constrictions of esophagus [5,28] are described: at the cricoid origin, the aortic arch, the left main bronchus, and the diaphragmatic hiatus. These are the most common sites for foreign body impaction.

RELATIONS OF ESOPHAGUS:

Anterior: Trachea

Laterally: Recurrent laryngeal nerve in tracheo-esophageal groove,

Carotid sheath

Posterior: Retropharyngeal space and cervical spine

LAYERS OF ESOPHAGUS ^[30]

1. Mucosa – Consists of 3 layers - Non-keratinizing stratified squamous epithelium which lies in longitudinal folds down till the gastro-esophageal junction. The lamina propria is the middle mucosal layer, where loose areolar connective tissue is found interspersed with vessels and mucus- secreting glands. Muscularis mucosae consisting of longitudinally oriented smooth muscle bundles forms the 3rd layer.
2. Submucosa - contains loose areolar tissue, lymph glands, and salivary glands
3. Muscularis propria – Outer longitudinal and inner circular layer
4. Adventitia – This is the external fibrous coat which contains vascular and neural structures along with elastic connective tissue.

CLINICAL FEATURES

In contrast to adults who present with a proper history, children can be much vague and may often present without any symptoms. Generally

cricopharyngeal and oropharyngeal foreign bodies are more symptomatic compared to esophageal foreign bodies [26].

- Irritability, poor feeding, drooling, increased work of breathing, vomiting, pain and cough are the usual symptoms in children.
- Stridor and choking can be seen due to compression of tracheal lumen
- In adults - dysphagia, pain, cough, vomiting, increased salivation and persistent foreign body sensation are the symptoms.
- Pain is seen in some patients. It may be a sign of distally impacted foreign body.

Physical examination:

- Oropharyngeal examination: Tonsillar fossa is the most common site of oropharyngeal foreign bodies. Posterior one-third of tongue is a common site of impaction of foreign bodies like fish bone or other sharp objects. All parts of oropharynx should be examined thoroughly.
- Indirect Laryngoscopy or Video-laryngoscopy examination: The presence of pooling of saliva especially in pyriform fossa may indicate a foreign body obstruction lower down. This is called **Jackson's sign** [4]. Pyriform fossa and vallecula are the commonly occurring sites.

- Subcutaneous emphysema found by neck palpation, indicates probable oesophageal perforation. Other sign of esophageal perforation include **Hamman's crunch** (crunching sound synchronous with heartbeat) on auscultation.

RADIOLOGY

- Plane film radiographs – Chest x-ray and xray soft tissue neck both anteroposterior and lateral view are required for identification of radioopaque foreign bodies. Lateral films are also critical to delineate a stack of coins from a single coin and to ensure complete removal post removal. In children, mouth to anus films are used while in adults, if neck and chest x-rays are negative, abdominal films are obtained.

FIG 13: Radio-opaque foreign body cricopharynx – X-ray antero-posterior & lateral view

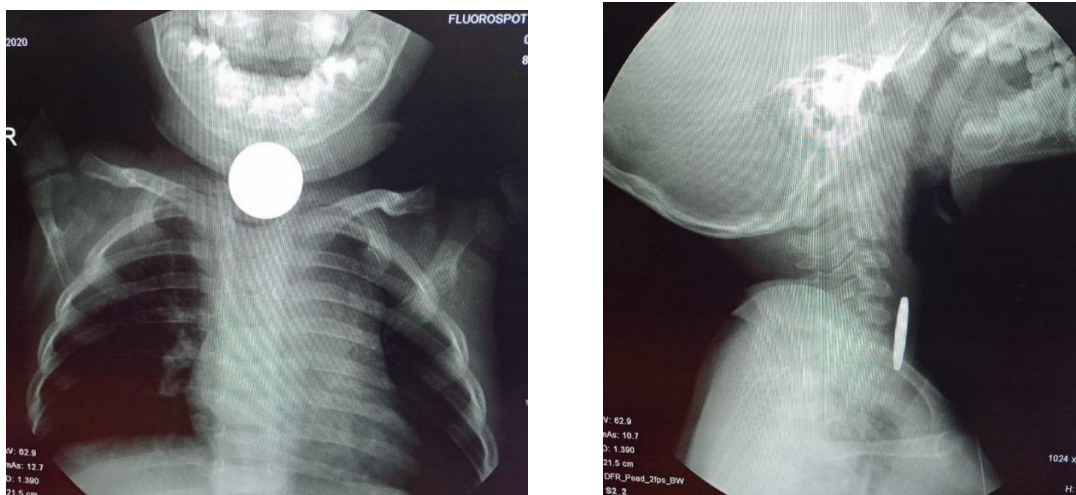


FIG 14: Post-operative status of patient in Fig 13

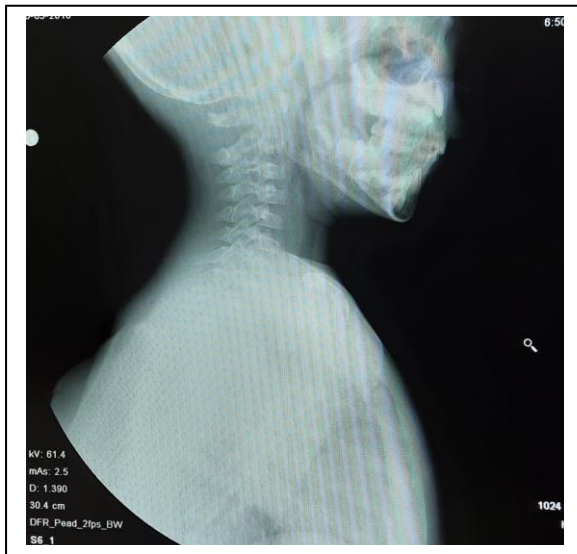
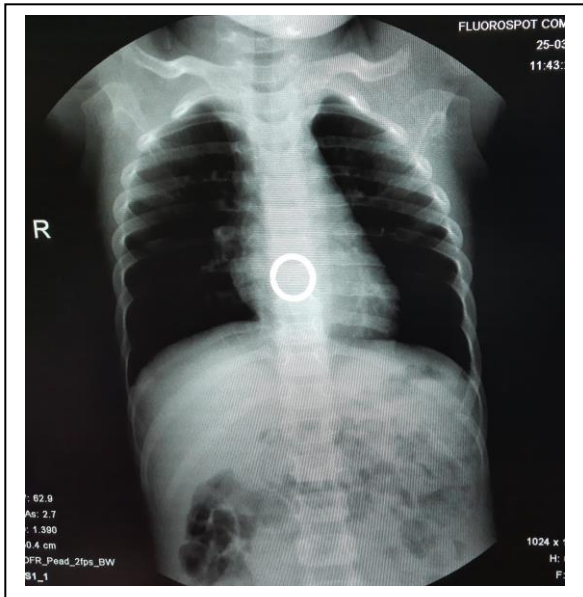


FIG 15: Esophageal foreign body – Metal ring



In complicated cases with pneumomediastinum due to esophageal or airway injury specific sign can be seen – **Double bronchial wall sign** (gas outlining bronchial wall), **Continuous diaphragm sign** (due to gas trapped

posterior to pericardium) and **Naclerio V sign** (V – shaped air collection)^[31].

- Barium esophagograms are useful in radiolucent foreign bodies as persistent filling defects. But there is risk of aspiration of contrast material.
- Computed tomography is useful in detecting periesophageal soft tissue inflammation and abscess formation. Magnetic resonance imaging can also be used.
- A hand-held metal detector is a relatively inexpensive and non-invasive modality reported to be useful in detection and characterization of metal foreign bodies.

MANAGEMENT

The modality of management depends on the following factors:

- Type and location of ingested foreign bodies
- Time interval between ingestion and penetration
- Age of patient
- Presence of symptoms of airway compromise
- Observation may be advised in patients who are clinically stable, without any evidence of respiratory distress and who have no known esophageal anomalies. The goal of observation is spontaneous passage

of the foreign body into stomach. But the period of observation should not be more than 24 hours and it is not advisable in patients presenting after 24 hours or when the patient is having pooling of oral secretions [32].

- Direct removal as an office procedure can be considered for foreign bodies of oral cavity and oropharynx. This can be done under direct or endoscopic visualization.
- Esophagoscopy is considered a safe procedure with excellent success rate. The choice between flexible or rigid esophagoscope is based on the equipment availability and experience of the endoscopist.
 - Flexible esophagoscopy can be done under conscious sedation or local anesthesia.
 - Rigid esophagoscopy requires general anesthesia, but allows better optics and magnification. It also allows a larger variety of grasping forceps.
- Balloon catheter extraction [32] is a technique useful in selected patients with single, smooth, radiopaque foreign body. With the patient in head-down position, catheter is passed nasally or orally past the foreign body under fluoroscopic guidance. Then the balloon catheter is inflated with a radiopaque solution and removed slowly under fluoroscopic guidance.

FLEXIBLE ESOPHAGOSCOPY

Flexible esophagoscopy^[33] may be undertaken with a child under sedation and without intubation or general anesthesia. A variety of flexible graspers, forceps, baskets, and magnets can be passed through the instrument channel to retrieve the foreign body. These instruments generally are smaller compared to those used in rigid esophagoscopy. Newer scopes have a hood which aids in removal of sharp foreign bodies safely. The flexible esophagoscope is most useful for retrieving foreign bodies in the middle-to-lower esophagus, stomach, and duodenum. But it is more expensive and require an assistant to help with suction, video monitoring and forceps handling. But still rigid esophagoscope is a better choice for removing foreign bodies near the mucosal folds near gastroesophageal junction and for removal of sharp foreign bodies.

COMPLICATIONS OF ESOPHAGEAL FOREIGN BODIES

Esophageal perforation is the most common complication of esophageal foreign body. It is a potentially life-threatening condition which may be caused by the foreign body itself or during attempts to retrieve it. Any retained esophageal foreign body (especially large 3 V batteries) can eventually erode through the esophageal wall and cause a fistula with the potential for death from mediastinitis or aortoesophageal fistula. Any

patient with a suspected or known significant esophageal erosion from retained foreign body needs careful surveillance via esophagram and possibly magnetic resonance imaging depending upon the degree of concern. Iatrogenic injury is another major cause which occurs mainly at the pharyngoesophageal junction or oesophagogastric junction. Zenker's diverticulum, Anterior cervical osteophytes, achalasia cardia, oesophageal strictures, patients on long term steroids, corrosive poisoning and malignancies are factors which predispose to iatrogenic perforation.

DANGEROUS FOREIGN BODIES

1. Button batteries are commonly used in hearing aids, watches, calculators and other portable electronic devices. The peak incidence of ingestion occurs at 1-2 yrs. Within one hour they can cause mucosal damage. In 4 hours, leakage of caustic contents cause erosion through the muscular wall and within 6 hours, an oesophageal perforation with mediastinitis, tracheo-oesophageal fistula or death may occur.



FIG 16: Double density sign in button battery foreign body

These batteries cause pathologic changes through direct pressure, electrical current, corrosives leakage, heavy metal poisoning or liquefaction necrosis due to leakage of caustic alkaline. Radiological investigations can identify the BB and emergency removal is advised to prevent complications.

2. Sharp foreign bodies are another type of dangerous foreign body.

Care must be taken while removing the foreign body as there is high risk of injuring the esophagus. Signs of esophageal perforation and mediastinitis must be looked upon.

REVIEW OF LITERATURE

- Foreign bodies in the Aero Digestive Tract are as old as mankind itself.
- Oldest reference of foreign body is seen in Aesop fables written as early as 560 BCE about a gluttonous wolf who got a fish bone impacted in his throat being rescued by a crane.
- **Hippocrates in 460 BC**, advised introducing a pipe into the larynx in a suffocating patient to assess the airway and foreign body removal. **Avicenna of Bukhara (about 1000 AD)** used a silver pipe for the same purpose.
- **Verdue in 1717**, used **bronchotomy** to remove bone. Before the 20th century emetics, expectorants, purgatives, and bloodletting were practiced as methods of removal.
- **Gustave Killian** is credited with the **first bronchoscopic removal** ^[34] of a foreign body of the airway in **1897** when he removed a pork bone from the right main bronchus after cocaine anesthesia.
- **Chevalier Jackson** in the **early 20th century** is credited with revolutionizing the field of Broncho-oesophagology with the **development of instruments, improved lighting and rigid bronchoscopy training programs** for foreign body removal. His developed the basic principles in evaluation and management of foreign bodies have reduced the mortality from more than **20% to 2%** ^[33].

- **H. H. Hopkins** in **1970s** invented the first conventional **lens system using glass rod** instead of small lenses which allowed greater visualization. This provided the basis for modern flexible and rigid scopes ^[5].
- **Erciyes Tip Dergisi** in **1992** ^[38] reasserted the significance of rigid bronchoscopy /esophagoscopy as a safe and succesful method for removal of foreign body from the upper aerodigestive tract in children. Early diagnosis and punctual management were necessary for fast recovery. They also concluded that a **negative clinical examination or radiograph should not entirely exclude the possibility of a foreign body.**
- **V.Y.W. Lin et al** in **2003** ^[40] in their study on **button battery foreign bodies** proposed that the key to management of button battery ingestion is rapid diagnosis and removal of any lodged object suspicious for a button battery. Complications of a button battery in the upper aerodigestive tract include hemorrhage, stricture and fistula formation as well as perforations leading to mediastinitis. When lodged in the nasal cavity or nasopharynx it can also induce epistaxis, septal perforations, and nasal/choanal stenosis. High degree of suspicion for button battery by the attending physician is necessary for timely management.

- **MS Mallick et al** ^[49] in **2005** conducted a study on late presentation of tracheobronchial foreign body in children. 28 cases of suspected TBFB presented after 1 month were evaluated and bronchoscopy was done. Foreign body was found in 24 cases. They concluded that delay in diagnosis has significant morbidity in children and Public awareness and education must be given regarding this issue.
- **P. Kamath et al** in **2006** ^[36], in his study of 300 patients in South Indian coastal belt, recommended that **no foreign body in the upper aerodigestive tract should be left alone with the hope that it will come out spontaneously** and any delay in diagnosis and management can lead to life-threatening complications. In this study, 86.2% cases were foreign bodies of pharyngoesophagus and 13.7% cases had tracheobronchial foreign bodies. Rigid endoscopies under general anesthesia and forceps removal is the preferred modality of management.
- **S. Y. Kim et al** in **2006** ^[37] in their study of 4682 patients in Korea concluded that fish bones were the most commonly suspected foreign bodies in all age groups. But non-food-type foreign bodies were more common in young and elderly age groups. In this study **location of foreign body was correlated with age and anatomic characters of the patient and the type of the foreign body**. They concluded that these characters must be considered while managing or performing

preventive care in these patients.

- **R. Figueiredo et al in 2006** ^[39] in their study of 420 **nasal foreign bodies** described complications such as epistaxis and vestibulitis. They also proposed that the complication rate is directly related to the lack of experience or proper instruments.
- **Gupta P et al in 2014** ^[35] concluded that early detection by meticulous history, imaging modality & prompt management remains basis for favourable outcome and prevents fatal complications. In this study, children aged less than 10 years were mainly involved. Coin was the most common foreign body in digested tract while whistle was common in airway. 90% of cases were esophageal foreign bodies and 10% were tracheobronchial foreign bodies. Rigid scopy was done in all the cases for removal. Only 2.2% cases showed complications following oesophagoscopy. Tracheo-bronchial foreign-bodies were removed by emergency bronchoscopy. 20% cases had complications post-operatively.
- **AGN Kumar et al in 2018** ^[45] in their study on esophageal foreign bodies concluded that coin and toys are the most common foreign bodies encountered in children while loose fitting dentures were commonly seen in adults. They proposed that early endoscopic removal is necessary to prevent possible complications like mediastinitis and RPA. Rigid esophagoscopy is still preferred.

- **Y. Igarashi et al in 2019** ^[42] proposed a modified classification system for foreign bodies causing life threatening airway obstruction (MOCHI: multi-center observational choking investigation) to improve management and to assess treatment outcomes. Type 1 - Upper airway obstruction by a large foreign body that cannot pass through the vocal cord or a large amount of residue that completely obstructs the airway. Type 2 - Trachea and/or bilateral main bronchus obstruction by a foreign body or a large amount of residue. Type 3 - Unilateral bronchus and/or distal bronchus obstruction by a foreign body, residue, or liquid.
- **Bance et al in 2021** ^[41] on their study regarding x-rays in button battery foreign bodies of nasal cavity suggested that, early plain X-ray can be taken in unwitnessed foreign body insertions, suspected unknown metallic foreign bodies or in patients with disproportionate discharge or pain. This helps in early identification and management of button batteries and prevention of complications.

AIMS AND OBJECTIVES

1. To estimate the prevalence of upper aero digestive tract foreign bodies.
2. To identify the common sites and types of presentation of various foreign bodies.
3. To analyse correlation between foreign bodies and associated complications.

STUDY PLACE: Upgraded Institute of Otorhinolaryngology, Rajiv Gandhi Government General Hospital and Institute of Child Health, Chennai - 600003

STUDY DESIGN: Cross sectional study

STUDY PERIOD: July 2021 to December 2021

SAMPLE SIZE: 80 cases

$$N = \frac{3.84 pq}{d^2}$$

$$P = 25$$

$$Q = 1 - P = 75$$

$$d = 10$$

$$N = 3.84 \times 25 \times 75 / (10 \times 10) = 72$$

Considering 10% Non-response rate, **N = 80**

INCLUSION CRITERIA:

1. Patients of all age groups with history of foreign body ingestion or aspiration.
2. Patients with complications of foreign body even without a history.

EXCLUSION CRITERIA:

1. Patients not willing for study.

ETHICAL COMMITTEE CLEARANCE:

Obtained from institutional ethical committee

MATERIALS AND METHODS

110 patients with history of foreign body ingestion or aspiration or with history of complications suggestive of foreign body who came to the Upgraded institute of otorhinolaryngology, Rajiv Gandhi Government General Hospital and Institute of child health, Chennai from July 2021 to December 2021 are included in the study.

The patients will be evaluated based on a detailed history and thorough clinical examination. Presence of foreign body and its location were confirmed using radiographs and endoscopy in selected cases where the physical examination was inconclusive. After confirmation, foreign bodies were removed either under local anesthesia or general anesthesia using an appropriate method. Post-operative x-rays were taken for confirmation. Patients were observed for any complications.

EVALUATION OF THE PATIENT

After proper physical examination, radiological investigations are done if necessary and proceeded with appropriate method of removal.

I. NASAL CAVITY FOREIGN BODIES:

In majority of cases, foreign body is visualized by anterior rhinoscopy. If the foreign body is not visualized, endoscopic evaluation is done. In selected cases with metallic foreign bodies like button battery, x-rays can be used for evaluation.

Removal of Nasal Foreign Body [43]:



FIG 17: Ideal position for nasal body removal

Methods of removal:

- Ideally, the child should be in an upright position restrained on the parents lap with the parents legs crossed over the child's and the child's head should rest against the parent's chest while holding the child's arms down. Appropriate vasoconstriction and local anesthesia should be applied. To protect the airway, the object is approached from behind and pulled anteriorly.
- If the foreign body could not be removed, patient has to be shifted to operating room with airway protected. Foreign body can be removed under endoscopic visualization.



FIG 18: Various instruments for nasal foreign body removal



FIG 19: Nasal foreign body hook

II. DIGESTIVE TRACT FOREIGN BODIES

In cases with oropharyngeal foreign bodies, clinical examination along with videolaryngoscopy would be enough to identify the foreign body. In cases of cricopharyngeal or esophageal foreign bodies, radiological evaluation would be necessary. X-ray neck and chest – antero-posterior and lateral view are taken.

Methods of removal:

1. In cases of oropharyngeal foreign bodies, direct removal of the foreign body under endoscopic visualization is preferred. This can be done as an office procedure.

2. RIGID ESOPHAGOSCOPY [2,5,44]:

In cases with esophageal or cricopharyngeal foreign bodies, rigid esophagoscopy should be done as soon as possible and should not be delayed beyond 24 hrs to reduce risk of perforations and strictures. Rigid scopes are available in various sizes, shapes and lengths. The Robert Jesberg scopes have oval openings, while the Jackson type scopes have round openings and are more suitable for cases with obstructions and strictures. It has one large central channel which accommodates the instruments and one or two smaller channels. The distal tip is thick and smooth increasing the ease of introduction of the instrument and decreasing the likelihood of mucosal trauma. Telescopes which are attached to the oesophagoscope helps in better visualization during manipulation and removal of the foreign body.

STEPS:

- Preoperative evaluation and investigations
- Discuss with parents and obtain informed written consent
- General anesthesia is necessary for rigid esophagoscopy. To prevent the risk of aspiration, anesthesiologist may prefer rapid sequence induction with cricoid pressure until the airway is secured through intubation. But this should not be done for sharp foreign bodies.



FIG 20: Rigid esophagoscopy - position

- Sniffing Position ^[45]: Patient is positioned with neck slightly flexed and head extended. This position corrects the curvature of esophagus making the scopy easier.
- Esophagoscope of appropriate size is selected. Short esophagoscopes, like Forbes esophageal speculum, can be ideal for foreign bodies lodged in the proximal esophagus at the level of the cricopharyngeus muscle. Longer esophagoscopes are necessary for removal of more distal foreign bodies. The largest possible scope should be used to allow maximum visualization and ease of instrumentation.
- While inserting the esophagoscope, fingers of non-dominant arm is used to protect lips and teeth.
- Advance the scope along the posterior pharyngeal wall keeping in the midline. Alternatively, the scope can be passed along the right corner of the mouth and floor of mouth, following the lateral wall of right pyriform fossa. Then readjusting the scope engages the larynx and elevating it anteriorly exposes the cricopharynx.

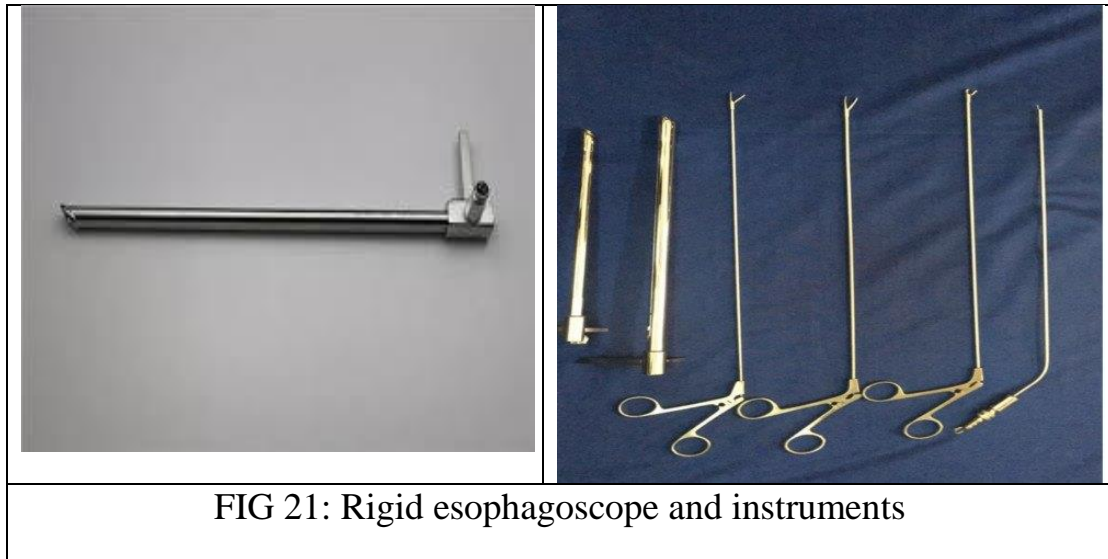


FIG 21: Rigid esophagoscope and instruments

- Elevate the tip of the scope against the posterior surface of cricoid and slowly advance the tip into esophagus keeping the lumen in view. Telescope is introduced along with the sheath.
- A long metal sucker can be used to clear esophageal secretions.
- Once the foreign body is visualised, a grasper is introduced into the sheath. A grasper attached to telescope can be used. The foreign body is grasped, and the sheath and telescope are removed together.
- The esophagoscope may be reintroduced to assess the esophagus for any injury from the foreign body.
- A post-procedure chest radiograph has to be taken **6 hours** after removal to confirm removal and also to rule out esophageal injuries.

The advantages of rigid esophagoscopy ^[32]:

- 1) Excellent visualization of the esophagus
- 2) Variety of types and sizes of extraction instruments can be used
- 3) Ability to examine the esophagus directly after removal of the foreign body
- 4) Virtually 100% success rate

The major disadvantage of rigid oesophagoscopy is that it requires general anaesthesia, increasing the cost and morbidity of the procedure and it is also associated with a higher incidence of complications, such as dental trauma and oesophageal perforation. It is also not amenable to patients who have trismus and cervical spine problems.

COMPLICATIONS:

1. Mucosal tears or lacerations – Managed by antibiotics and nasogastric tube feeding.
2. Oesophageal perforation – This may lead to mediastinitis, sepsis and multiorgan failure (**Mackler's triad** – vomiting, severe chest pain and subcutaneous emphysema). This is a surgical emergency. Conservative management may be considered in stable patients with no evidence of systemic sepsis.
3. Other complications ^[32] - Haemorrhage, trauma to lips and tooth, laryngeal or oesophageal edema secondary to manipulation in the

postcricoid area or esophagus which usually resolve within 48hrs, arrhythmias, aspiration pneumonia, pneumothorax, cervical spine injury and aortic aneurysm rupture.

III. BRONCHIAL FOREIGN BODIES

Bronchial foreign bodies were evaluated using radiological investigations. X-ray chest antero-posterior and lateral view is taken in all cases – to identify the foreign body and also to rule out complications like lung collapse, emphysema or pneumonic changes. If foreign body could not be identified CT scan of chest or flexible bronchoscopy were done to confirm the diagnosis.

RIGID BRONCHOSCOPY ^[46]

Rigid bronchoscopy is the optimal first step when clinical suspicion is high. If any of the 3 diagnostic tool (history, examination or radiography) is positive, bronchoscopy is indicated. Flexible bronchoscopes lack the ability to ventilate, whereas rigid bronchoscopes can be ventilated. Rigid bronchoscopes consists of a solid tube that is open on each end with side holes along the distal aspect of the scope. These holes enables ventilation to the contralateral lung when working on an obstructing lesion in a main bronchus. There are also multiple ports on the proximal end that can be used for various forms of ventilation: jet ventilation (PREFERRED),

intermittent volume ventilation, continuous insufflation, and spontaneous ventilation.

- ANESTHESIA: Pulmonary ventilation should be continued throughout the procedure. **Jet ventilation** ^[46,47] is preferred. This is based on air entrapment. It is accomplished by connecting a high-pressure oxygen jet through the side port at the proximal end of the scope. The modified Sanders Jet ventilator delivers oxygen at a pressure of 25 to 30 lb/in² at approximately 10 to 20 breaths per minute. This allows ventilation to occur along with oxygenation. It is preferable to keep the patient in spontaneous breathing, to prevent positive pressure ventilation, which may induce distal migration of the foreign body.
- POSITION: The patient should be positioned in the supine position with a pillow underneath the head and a shoulder roll in place. Classically the **boyce position** is used, with flexion of all cervical joints except the atlanto-occipital joint, which is extended. This position optimally aligns the pharynx, larynx, and trachea.
- Bronchoscope is always commenced through mouth.

(A)



FIG 22:

(A) Rigid bronchoscope

(B) Side holes at the distal aspect of bronchoscope for cross ventilation

(C) Proximal end of bronchoscope

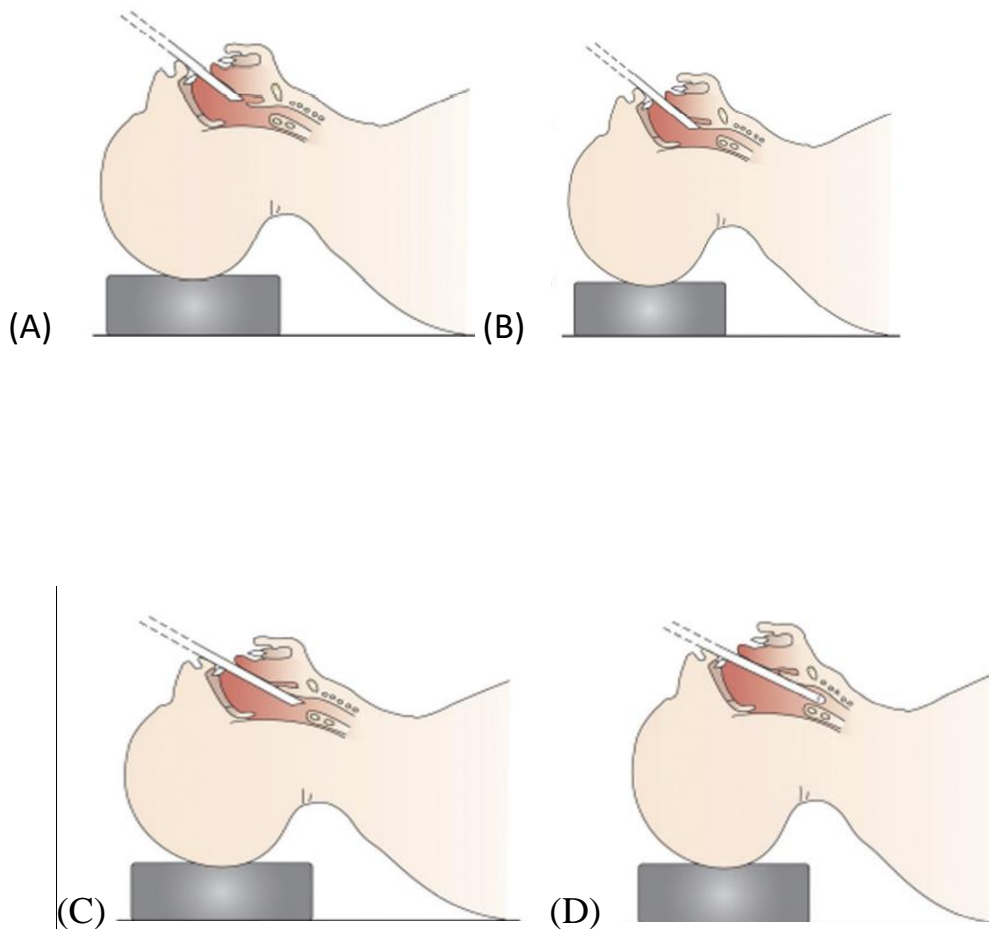
(C)

(B)



- A right-handed surgeon protects the teeth with the left thumb in the mouth and inserts the scope into the right side of the mouth, advancing to the base of the tongue at the posterior median groove. The scope is directed downwards (FIG 23-A). Then, the proximal end is slowly proceeded downwards in a more horizontal fashion while carefully protecting the patient's teeth. Elevating the tongue and advancing slowly will bring the epiglottis into view (FIG 23-B). Proper observation of the epiglottis is the

FIG 23: Steps in rigid bronchoscopy ^[46]



crucial step in proceeding to intubate the cords. The scope is then advanced posteriorly to lift the epiglottis gently, exposing the glottis (FIG 23-C). As the cords are approached, the bronchoscope should be rotated 90 degrees so that it traverses the cords with the minimum diameter. Proceeding further, the distal tip of the scope traverses the glottis and enters the trachea first (FIG 23-D). Once the airway is entered, the scope is rotated back to the original orientation. The tracheobronchial tree is completely inspected, as multiple foreign bodies may be present. Suction is used to remove secretions from around the foreign body. When a foreign body is seen, its shape, position, and forceps spaces are assessed.

Then the foreign body is grasped using forceps and removed by anchoring against the scope. Immediately after removal bronchoscope is again inserted to rule out the presence of other foreign bodies and intraoperative complications like bleeding.

- Post-operative x-rays were taken to rule out residual foreign bodies and the presence of complications.

RESULTS AND ANALYSIS

A total of 110 patients were taken into the study.

TABLE 1: TYPES OF FOREIGN BODIES

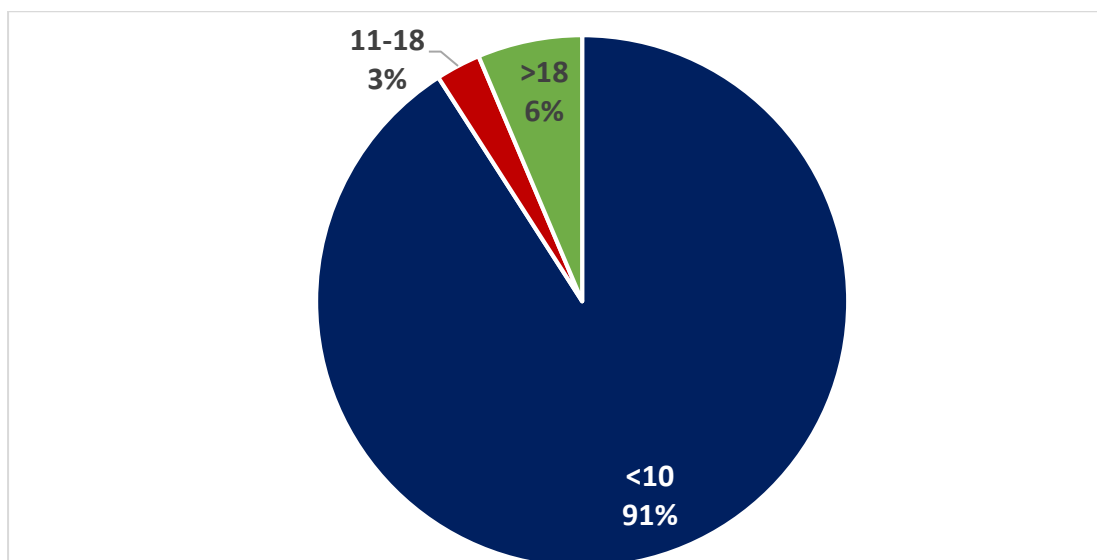
| TYPE | Frequency | Percent |
|-------------------------|-----------|---------|
| Amla seed | 1 | 0.9 |
| Bead | 4 | 3.6 |
| Betel nut | 1 | 0.9 |
| Button battery | 10 | 9.1 |
| Camphor | 1 | 0.9 |
| Cellotape | 1 | 0.9 |
| Chicken bone | 4 | 3.6 |
| Chickpea | 1 | 0.9 |
| Coin | 39 | 35.5 |
| Corn | 1 | 0.9 |
| Cotton ball | 2 | 1.8 |
| Earring | 2 | 1.8 |
| Fishbone | 3 | 2.7 |
| Grape seed | 1 | 0.9 |
| Hairclip | 1 | 0.9 |
| LED Bulb | 1 | 0.9 |
| Metal piece | 2 | 1.8 |
| Metal ring | 1 | 0.9 |
| Metal tracheostomy tube | 3 | 2.7 |
| Mutton bone | 1 | 0.9 |
| Naphthalene ball | 3 | 2.7 |

| | | |
|---------------|-----|-------|
| Pea | 1 | 0.9 |
| Peanut | 14 | 12.7 |
| Safety pin | 1 | 0.9 |
| Seed | 1 | 0.9 |
| Slate pencil | 1 | 0.9 |
| Stick | 2 | 1.8 |
| Tamarind seed | 3 | 2.7 |
| Thermocol | 1 | 0.9 |
| Wheat grain | 1 | 0.9 |
| Total | 110 | 100.0 |

Among all the foreign bodies removed, coin is the most common which accounts for 35.5% of the cases. Peanut (12.7%) is the second most common and button battery (9.1%) is the third most common foreign body.

TABLE 2: AGE DISTRIBUTION OF FOREIGN BODIES

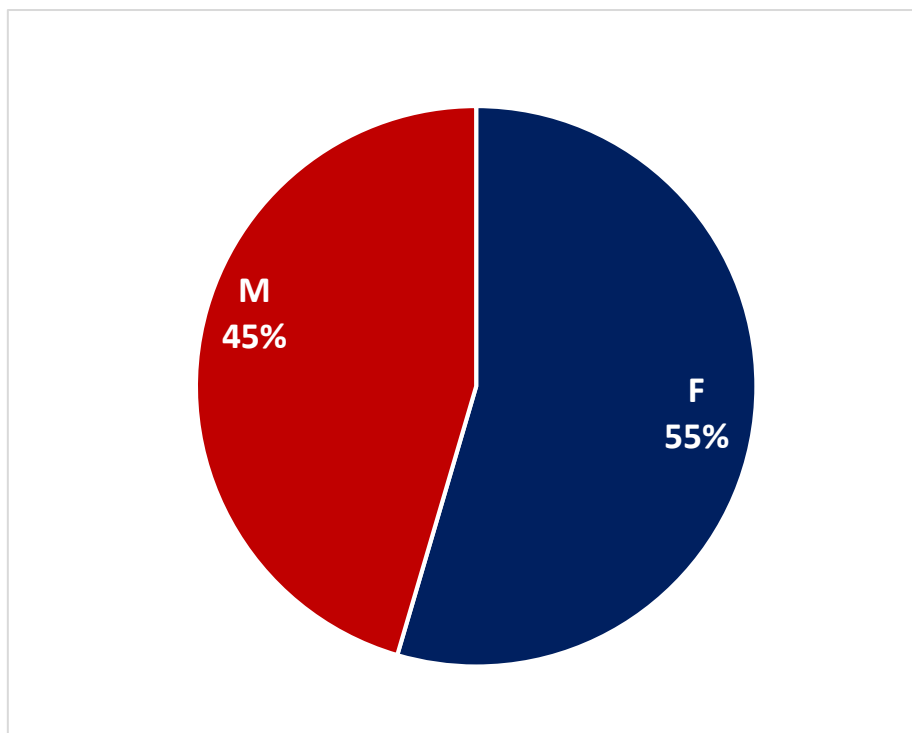
| AGE GROUP | Frequency | Percent |
|-----------|-----------|---------|
| <10 | 100 | 90.9% |
| 11-18 | 3 | 2.7% |
| >18 | 7 | 6.4% |
| Total | 110 | 100.0% |



Among all the patients, 103 (94%) were patients less than 18 years. While 7 patients (6%) were adults more than 18 years. Children with age less than 10years account for more than 90% of cases.

TABLE 3: SEX DISTRIBUTION AMONG PATIENTS

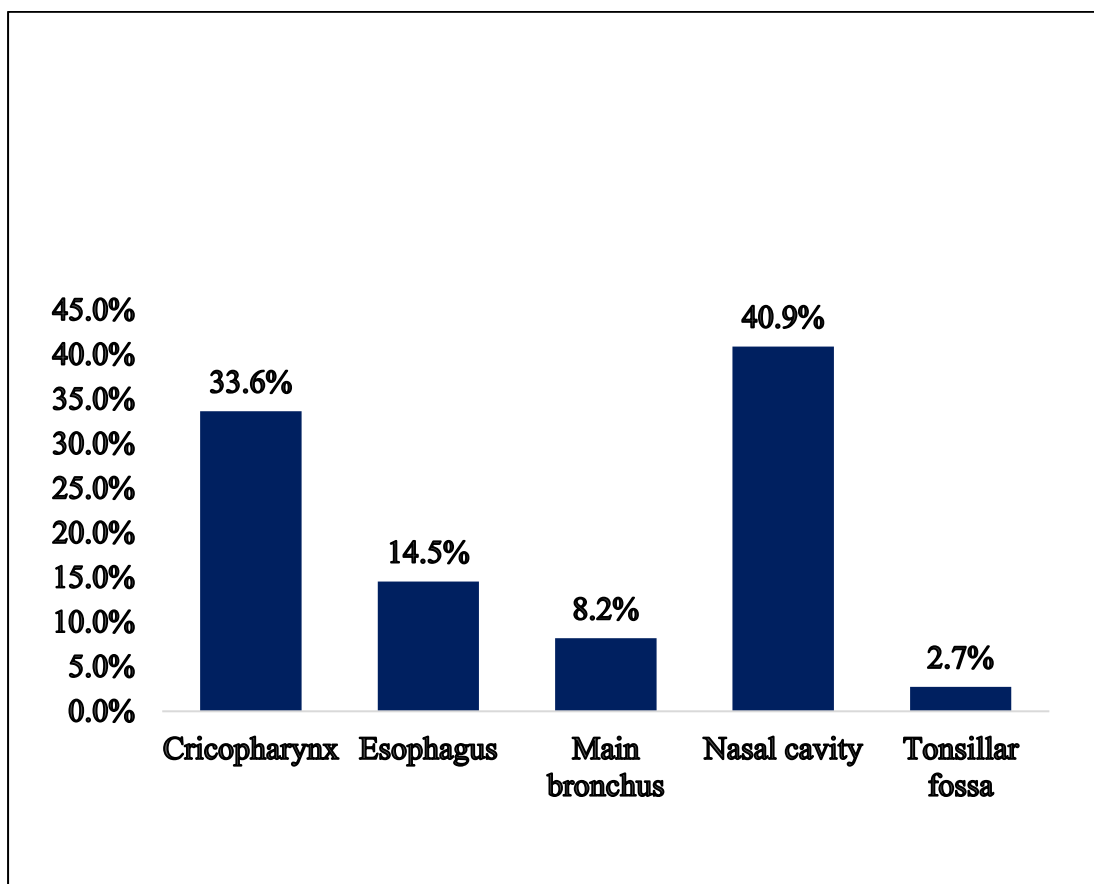
| SEX | Frequency | Percent |
|------------|------------------|----------------|
| F | 60 | 54.5% |
| M | 50 | 45.5% |
| Total | 110 | 100.0% |



In our study females (55%) were affected more than men (45%).

TABLE 4: SITE OF FOREIGN BODIES

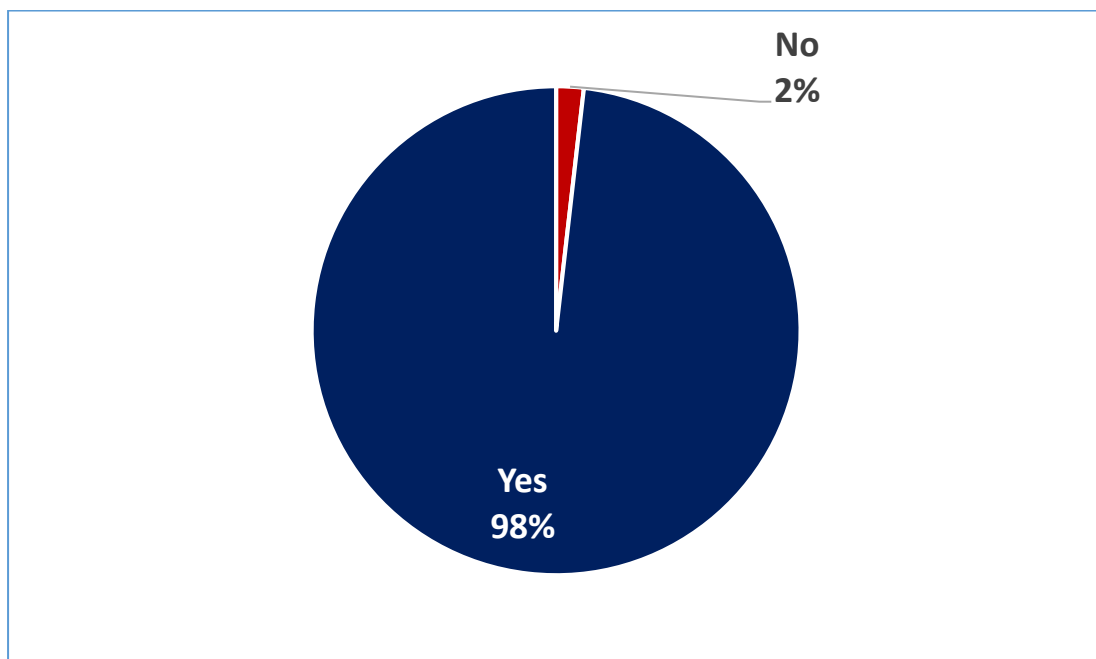
| SITE | Frequency | Percent |
|-----------------|------------------|----------------|
| Cricopharynx | 37 | 33.6% |
| Esophagus | 16 | 14.5% |
| Main bronchus | 9 | 8.2% |
| Nasal cavity | 45 | 40.9% |
| Tonsillar fossa | 3 | 2.7% |
| Total | 110 | 100.0% |



Nasal cavity is the most common site of foreign body impaction which includes 45 (40.9%) cases. Among digestive tract foreign bodies, cricopharynx (33.6%) is the most common site which is the second most common site overall.

TABLE 5: PRESENCE OF HISTORY

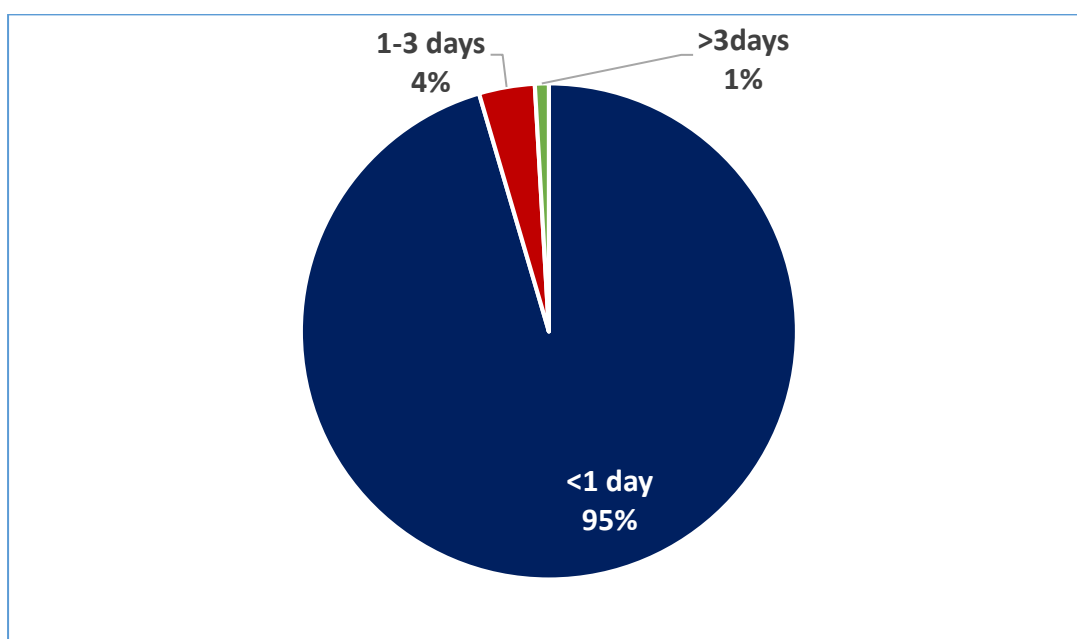
| HISTORY | Frequency | Percent |
|----------------|------------------|----------------|
| No | 2 | 1.8% |
| Yes | 108 | 98.2% |
| Total | 110 | 100.0% |



98% of patients had history of foreign body ingestion or aspiration. While in 2% of cases foreign body was an incidental finding.

TABLE 6: TIME OF PRESENTATION OF FOREIGN BODIES

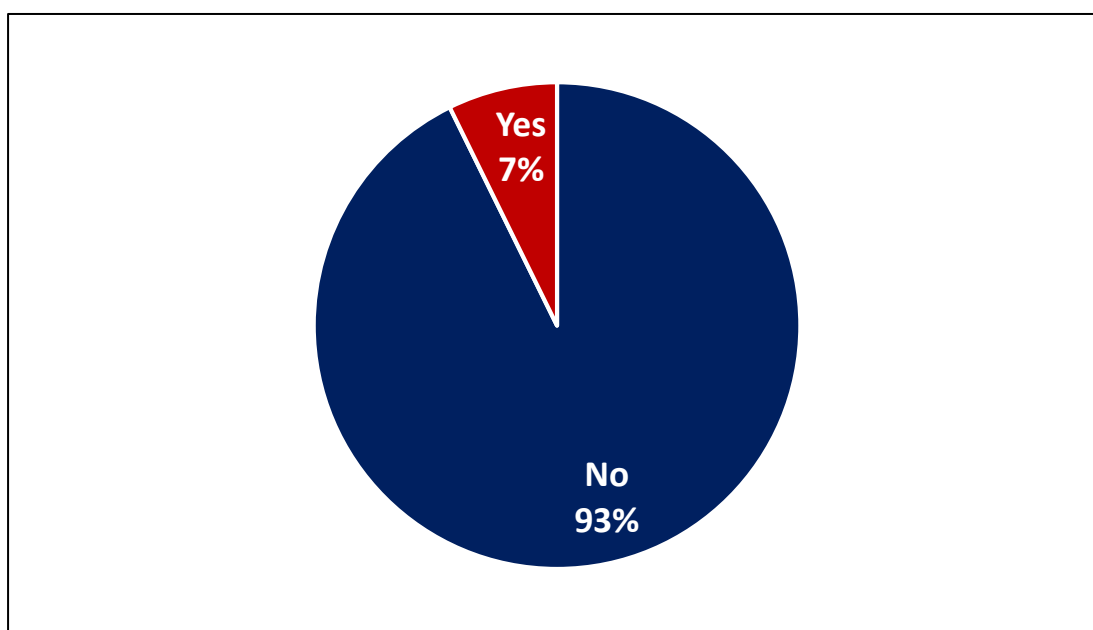
| TIME OF PRESENTATION | Frequency | Percent |
|-----------------------------|------------------|----------------|
| <1 day | 105 | 95.5% |
| 1-3 days | 4 | 3.6% |
| >3days | 1 | 0.9% |
| Total | 110 | 100.0% |



95.5% of cases presented on the same day of foreign body impaction. Only 1% of patients were presented after 3 days.

TABLE 7: HISTORY OF DYSPNEA

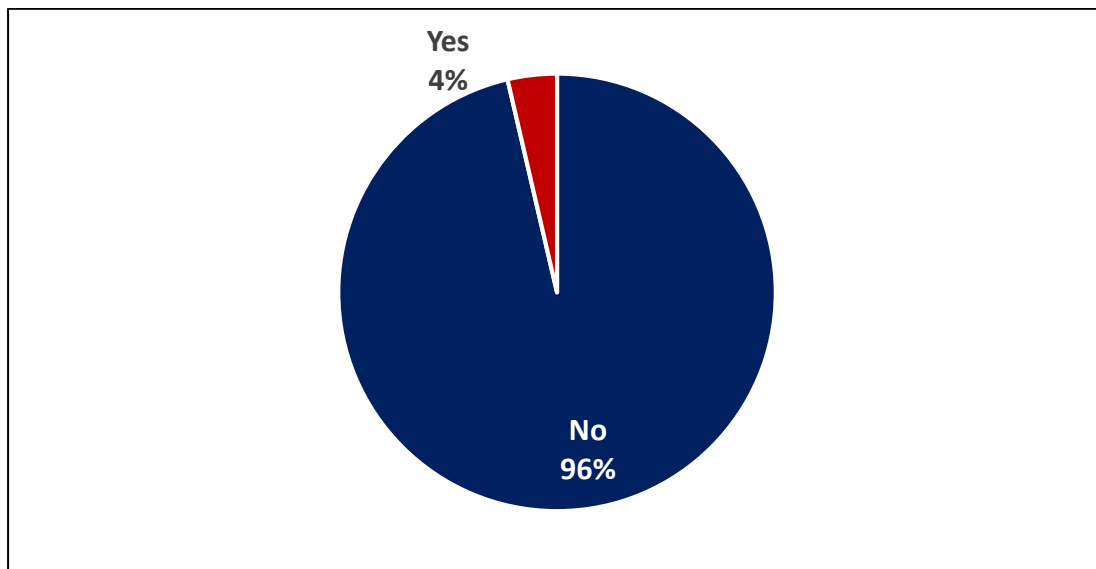
| DYSPNEA | Frequency | Percent |
|----------------|------------------|----------------|
| No | 102 | 92.7% |
| Yes | 8 | 7.3% |
| Total | 110 | 100.0% |



History of dyspnea was seen in 8 (7.3%) patients and all the patients had airway foreign bodies.

TABLE 8: HISTORY OF COUGH

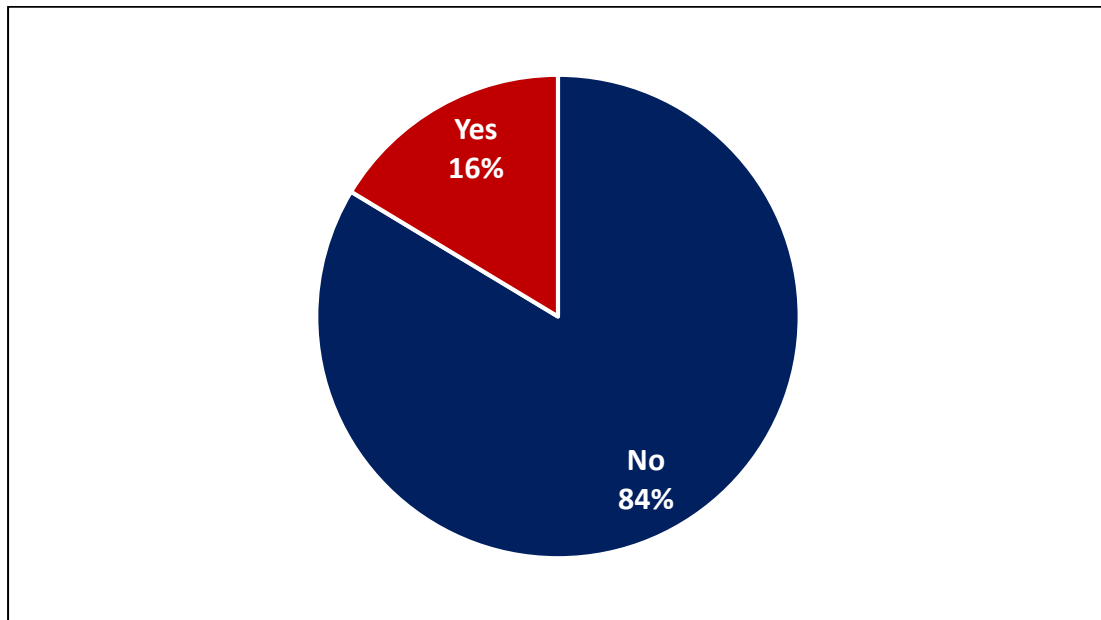
| COUGH | Frequency | Percent |
|--------------|------------------|----------------|
| No | 106 | 96.4% |
| Yes | 4 | 3.6% |
| Total | 110 | 100.0% |



History of cough was present in 4 (3.6%) patients and all the patients had airway foreign bodies.

TABLE 9: HISTORY OF NASAL OBSTRUCTION OR NASAL DISCHARGE

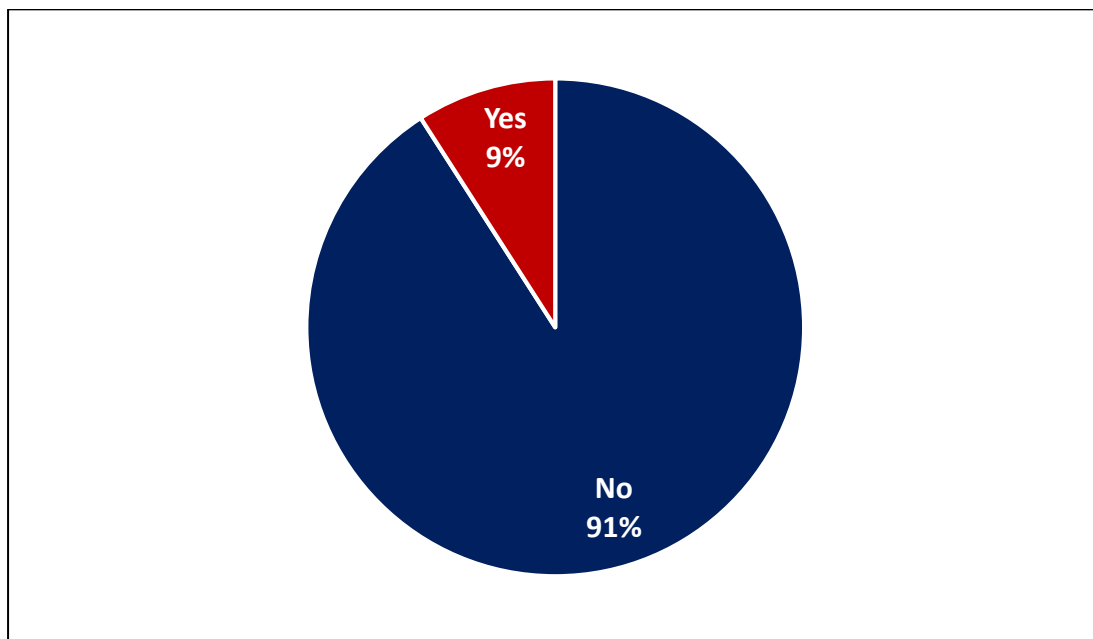
| NO/ND | Frequency | Percent |
|--------------|------------------|----------------|
| No | 92 | 83.6% |
| Yes | 18 | 16.4% |
| Total | 110 | 100.0% |



History of nasal obstruction and nasal discharge was seen in 18 (16.4%) patients

TABLE 10: HISTORY OF EPISTAXIS

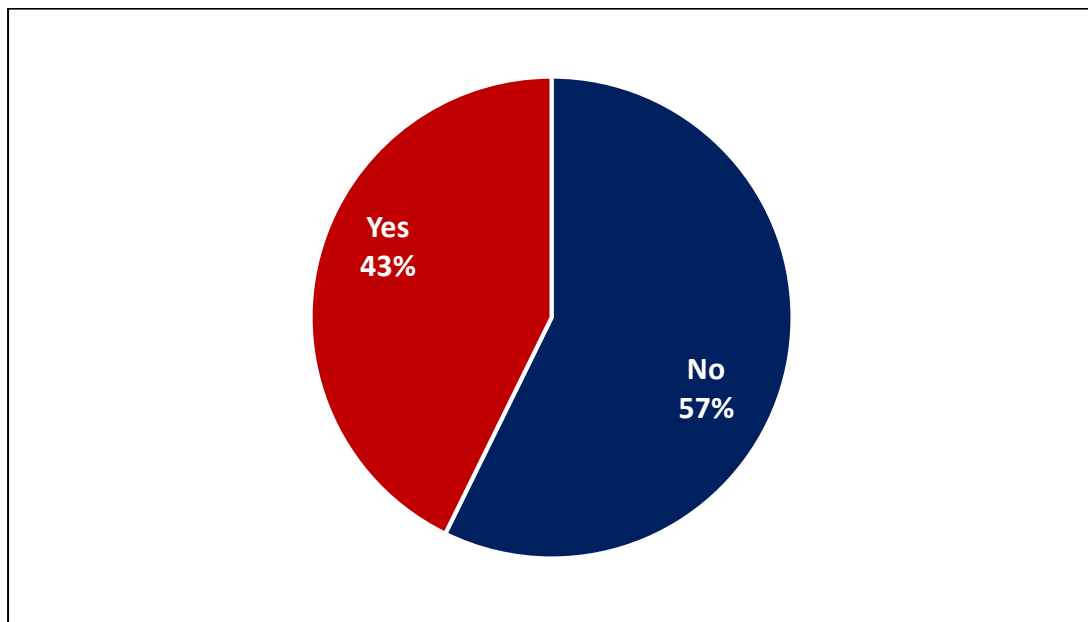
| EPISTAXIS | Frequency | Percent |
|------------------|------------------|----------------|
| No | 100 | 90.9% |
| Yes | 10 | 9.1% |
| Total | 110 | 100.0% |



History of epistaxis was seen in 10 (9.1%) patients.

TABLE 11: HISTORY OF DYSPHAGIA

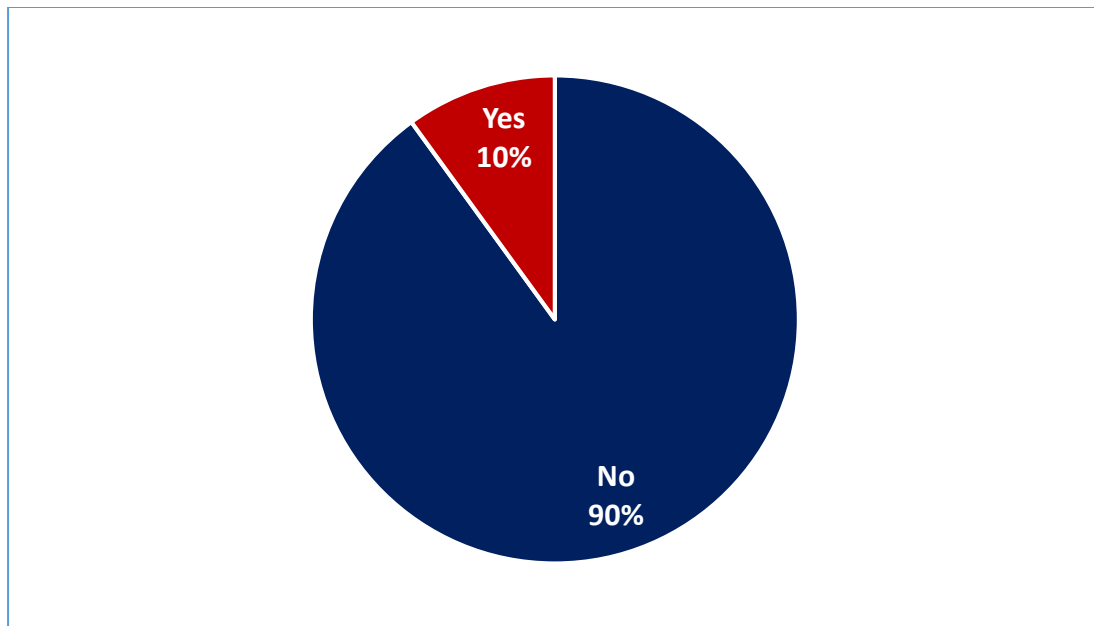
| DYSPHAGIA | Frequency | Percent |
|------------------|------------------|----------------|
| No | 63 | 57.3% |
| Yes | 47 | 42.7% |
| Total | 110 | 100.0% |



History of dysphagia was seen in 47 (42.7%) patients and all of them had digestive tract foreign body.

TABLE 12: HISTORY OF VOMITING

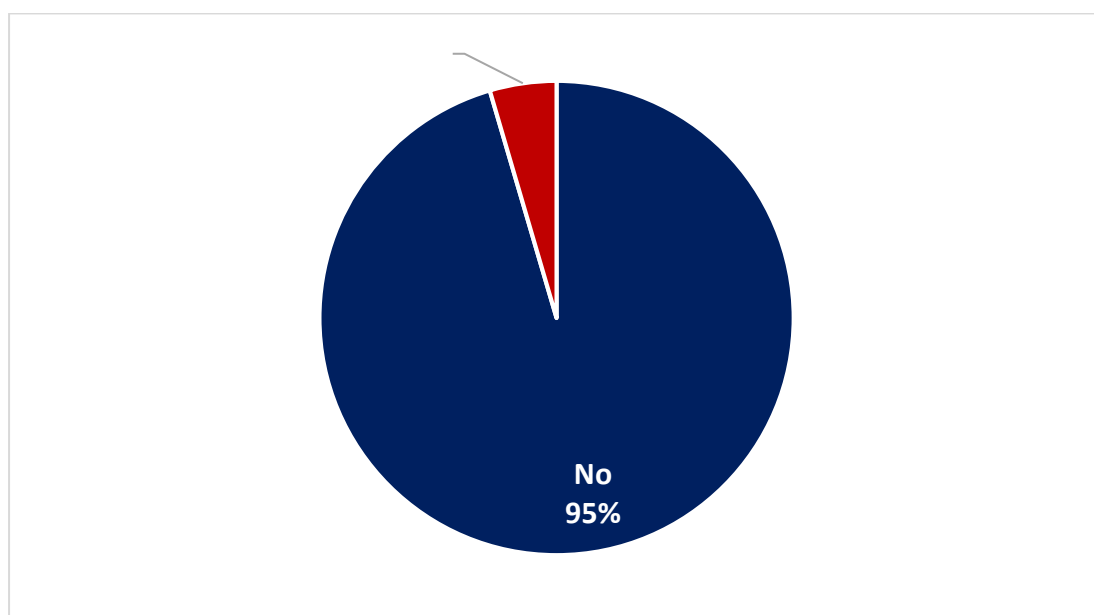
| VOMITING | Frequency | Percent |
|-----------------|------------------|----------------|
| No | 99 | 90.0% |
| Yes | 11 | 10.0% |
| Total | 110 | 100.0% |



History of vomiting was seen in 11 (10%) patients.

TABLE 13: HISTORY OF FEVER

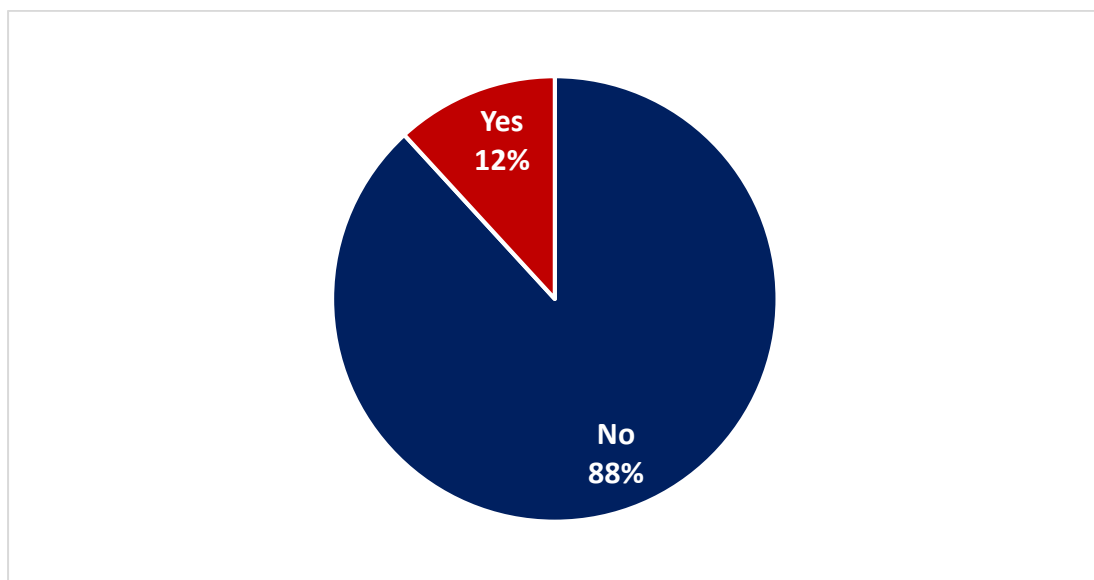
| FEVER | Frequency | Percent |
|--------------|------------------|----------------|
| No | 105 | 95.5% |
| Yes | 5 | 4.5% |
| Total | 110 | 100.0% |



History of fever was seen in 5 (4.5%) of patients.

TABLE 14: HISTORY OF FOREIGN BODY SENSATION

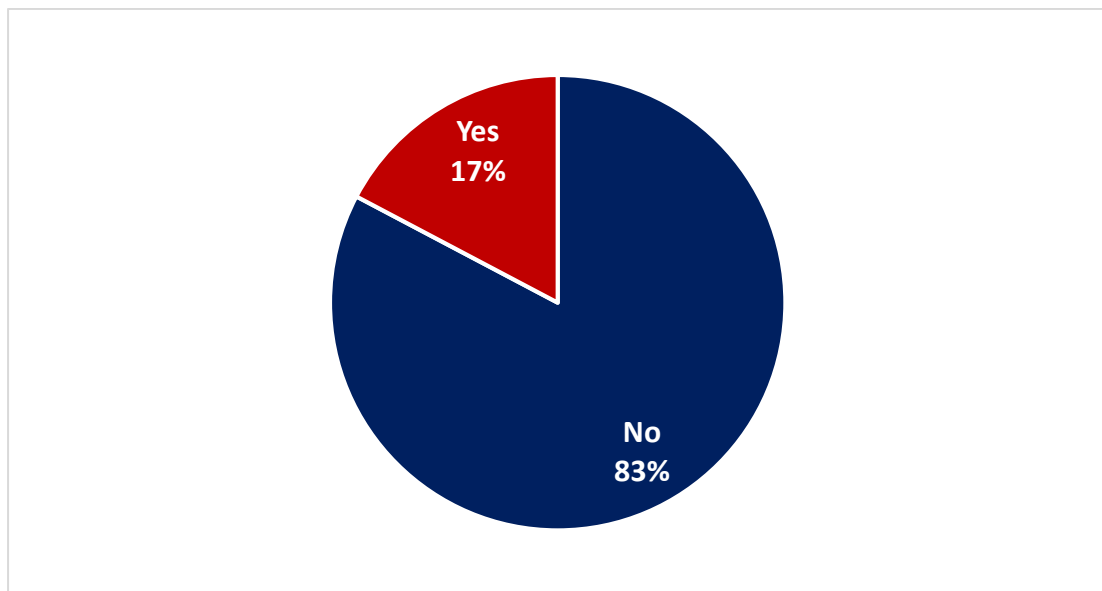
| FBS | Frequency | Percent |
|------------|------------------|----------------|
| No | 97 | 88.2% |
| Yes | 13 | 11.8% |
| Total | 110 | 100.0% |



History of foreign body sensation of throat was present in 13 (11.8%) of patients.

TABLE 15: HISTORY OF THROAT PAIN

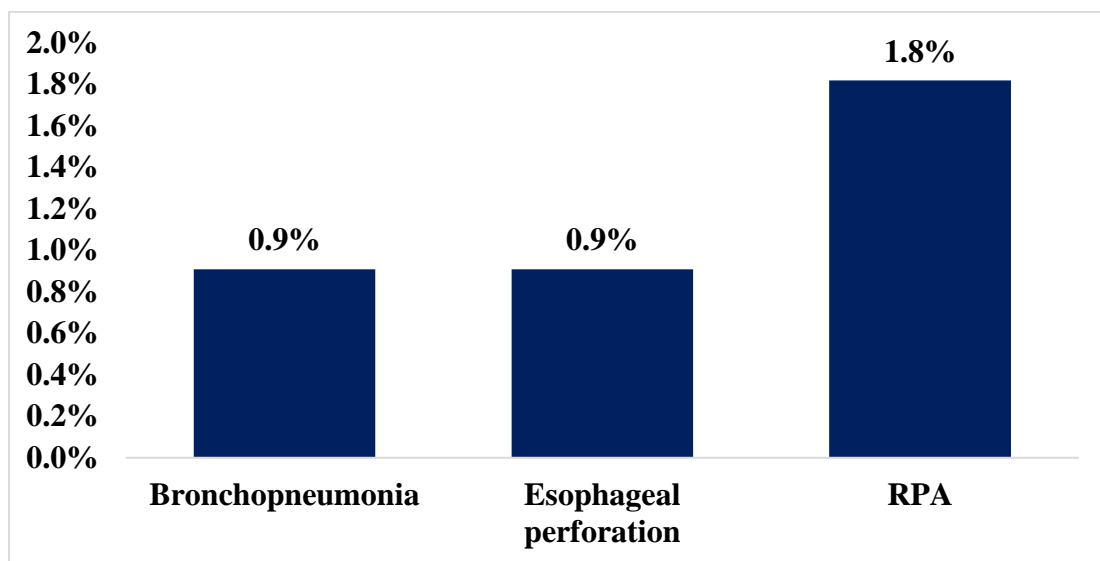
| THROAT PAIN | Frequency | Percent |
|--------------------|------------------|----------------|
| No | 91 | 82.7% |
| Yes | 19 | 17.3% |
| Total | 110 | 100.0% |



History of throat pain was present in 19 (17.3%) of patients.

TABLE 16: PRESENCE OF COMPLICATIONS

| COMPLICATIONS | Frequency | Percent |
|-------------------------------|------------------|----------------|
| Bronchopneumonia | 1 | 0.9% |
| Esophageal perforation | 1 | 0.9% |
| RPA | 2 | 1.8% |
| Nil | 106 | 96.4% |
| Total | 110 | 100.0% |

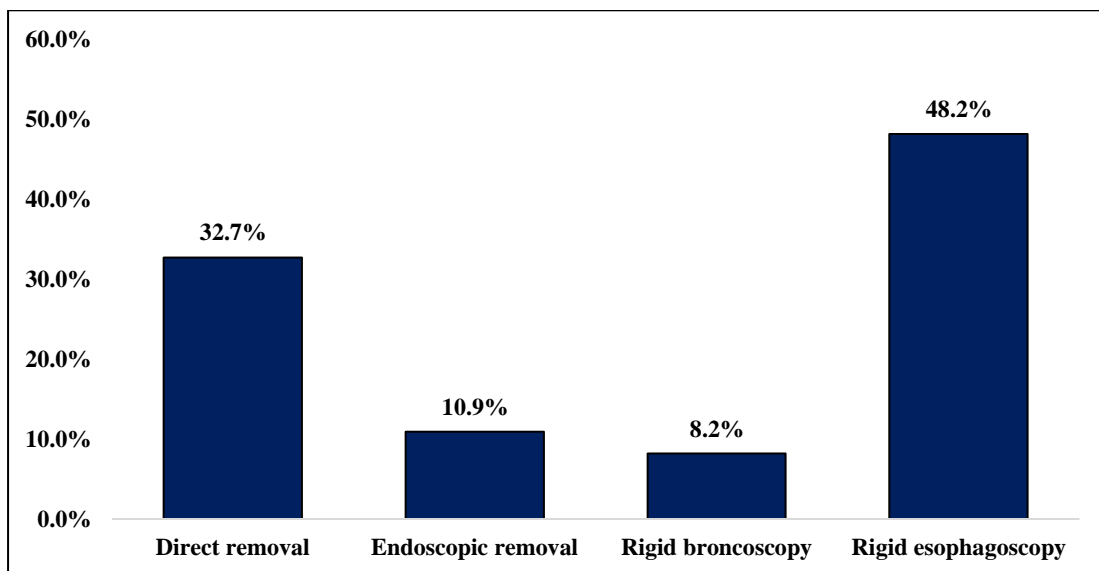


Out of 110 patients observed, only 4 patients presented with complications.

Among complications, retropharyngeal abscess found in 2 patients is the most common.

TABLE 17: METHODS OF FOREIGN BODY REMOVAL

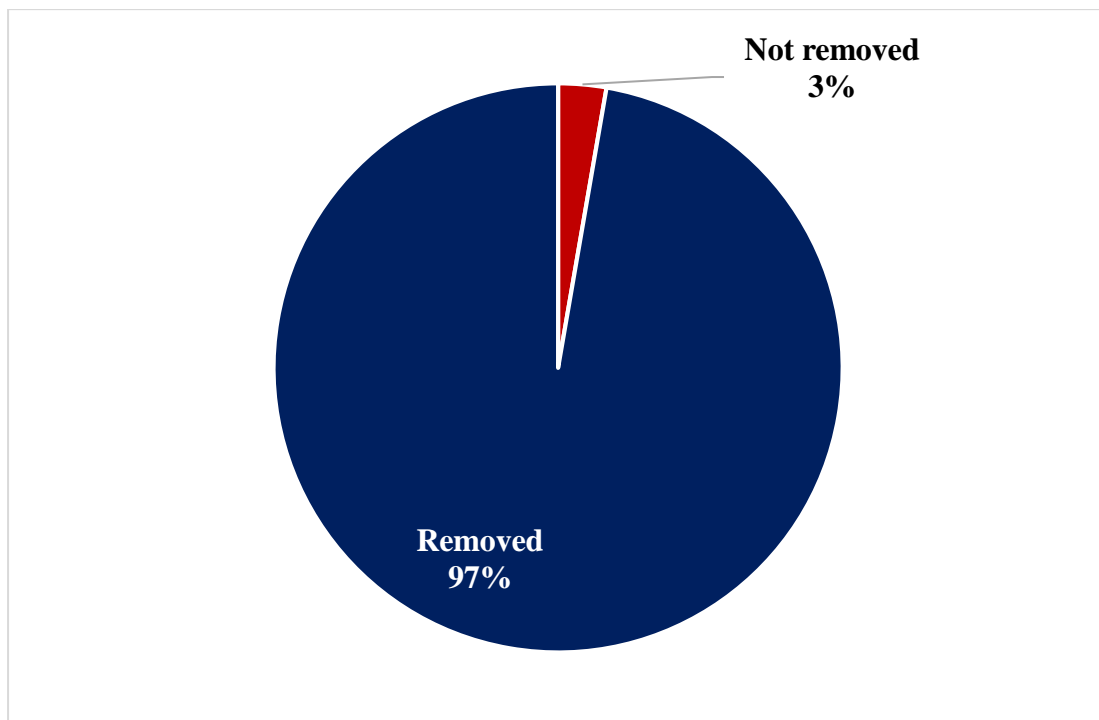
| PROCEDURE | Frequency | Percent |
|---------------------|------------------|----------------|
| Direct removal | 36 | 32.7% |
| Endoscopic removal | 12 | 10.9% |
| Rigid broncoscopy | 9 | 8.2% |
| Rigid esophagoscopy | 53 | 48.2% |
| Total | 110 | 100.0% |



Rigid esophagoscopy (48.2%) is the most common method employed while

TABLE 18: STATUS OF FOREIGN BODY

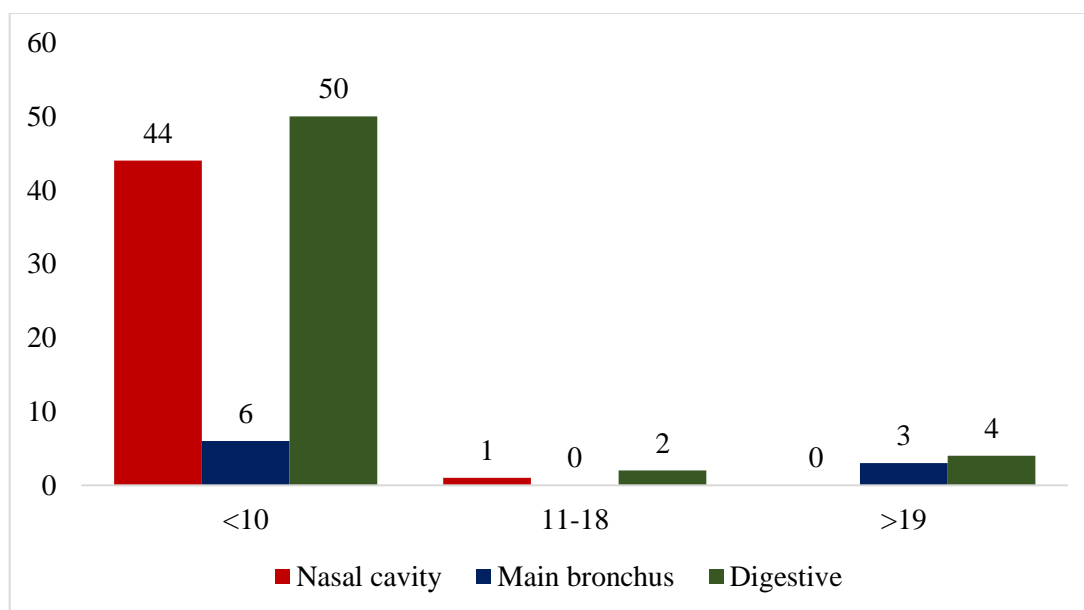
| STATUS OF FB | Frequency | Percent |
|---------------------|------------------|----------------|
| Not removed | 3 | 2.7% |
| Removed | 107 | 97.3% |
| Total | 110 | 100.0% |



After appropriate procedure, only in 3% of patients foreign body could not be removed.

TABLE 19: COMPARISON BETWEEN AGE & SITE OF FOREIGN BODY

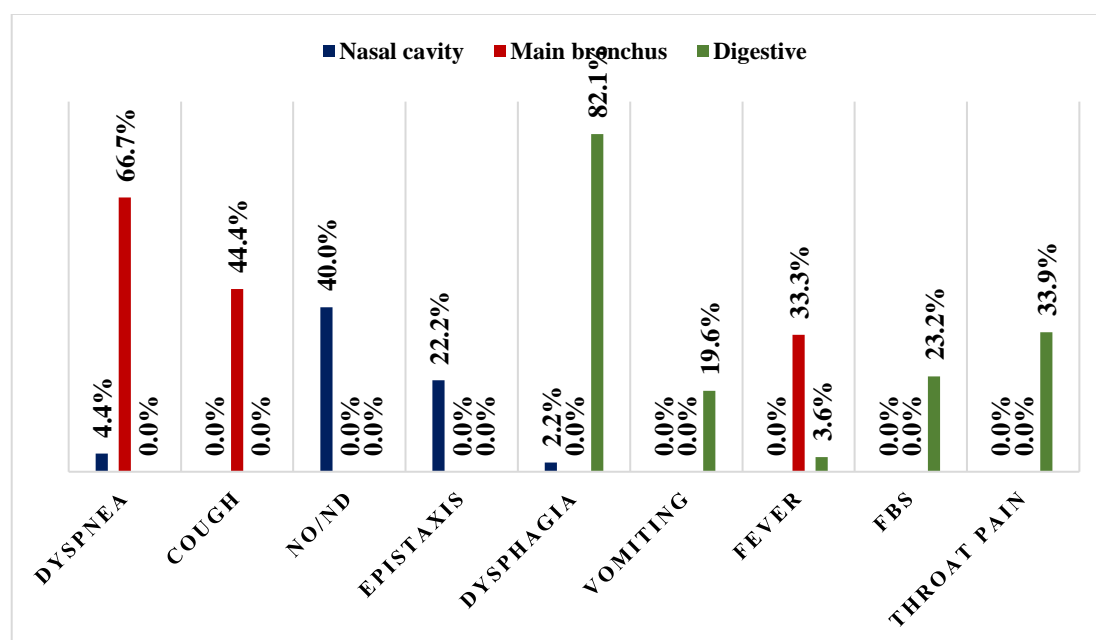
| | | | SITE | | | Total | P value |
|-----------|-------|--------------------|--------------|---------------|-----------|--------|---------|
| | | | Nasal cavity | Main bronchus | Digestive | | |
| AGE GROUP | <10 | Count | 44 | 6 | 50 | 100 | 0.006 |
| | | % within AGE GROUP | 44.0% | 6.0% | 50.0% | 100.0% | |
| | 11-18 | Count | 1 | 0 | 2 | 3 | |
| | | % within AGE GROUP | 33.3% | 0.0% | 66.7% | 100.0% | |
| | >19 | Count | 0 | 3 | 4 | 7 | |
| | | % within AGE GROUP | 0.0% | 42.9% | 57.1% | 100.0% | |
| Total | | Count | 45 | 9 | 56 | 110 | |
| | | % within AGE GROUP | 40.9% | 8.2% | 50.9% | 100.0% | |



Correlation between age of the patient and site of foreign body is statistically significant. (P-value: 0.006)

TABLE 20: SITE OF FOREIGN BODY WITH SYMPTOMS

| | SITE | | | | | | P value |
|-------------|--------------|-------|---------------|-------|-----------|-------|---------|
| | Nasal cavity | | Main bronchus | | Digestive | | |
| DYSPNEA | 2 | 4.4% | 6 | 66.7% | 0 | 0.0% | <0.0001 |
| COUGH | 0 | 0.0% | 4 | 44.4% | 0 | 0.0% | <0.0001 |
| NO/ND | 18 | 40.0% | 0 | 0.0% | 0 | 0.0% | <0.0001 |
| EPISTAXIS | 10 | 22.2% | 0 | 0.0% | 0 | 0.0% | <0.0001 |
| DYSPHAGIA | 1 | 2.2% | 0 | 0.0% | 46 | 82.1% | <0.0001 |
| VOMITING | 0 | 0.0% | 0 | 0.0% | 11 | 19.6% | 0.003 |
| FEVER | 0 | 0.0% | 3 | 33.3% | 2 | 3.6% | <0.0001 |
| FBS | 0 | 0.0% | 0 | 0.0% | 13 | 23.2% | 0.001 |
| THROAT PAIN | 0 | 0.0% | 0 | 0.0% | 19 | 33.9% | <0.0001 |

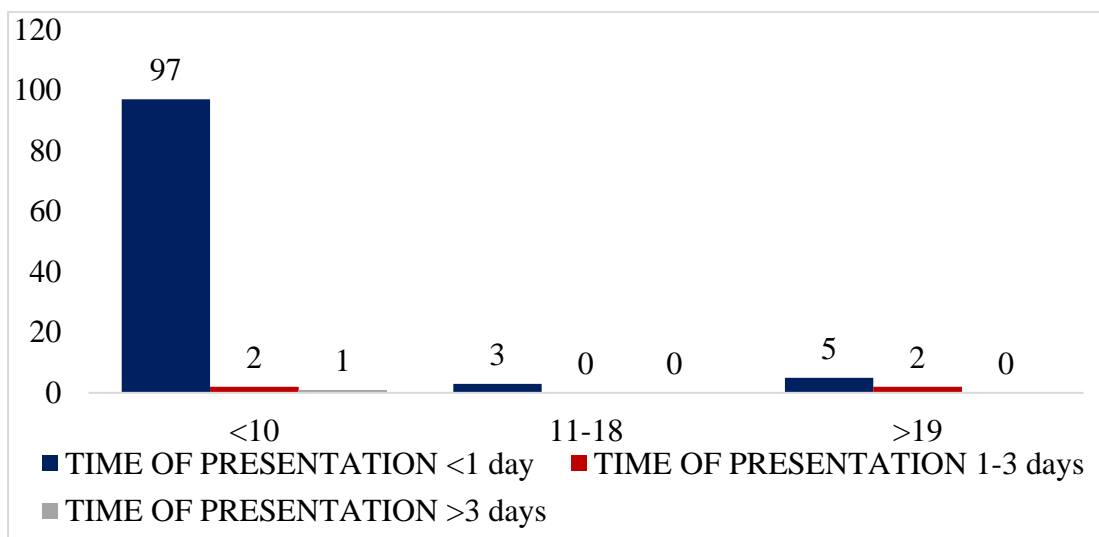


Most common symptom in tracheobronchial foreign bodies is dyspnea (66.6%). While most common symptoms in nasal and digestive tract foreign bodies are nasal obstruction/ nasal discharge (40.0%) and dysphagia (82.1%) respectively.

Correlation between site of foreign body and presenting complaint found to be statistically significant.

TABLE 21: AGE GROUP WITH TIME OF PRESENTATION

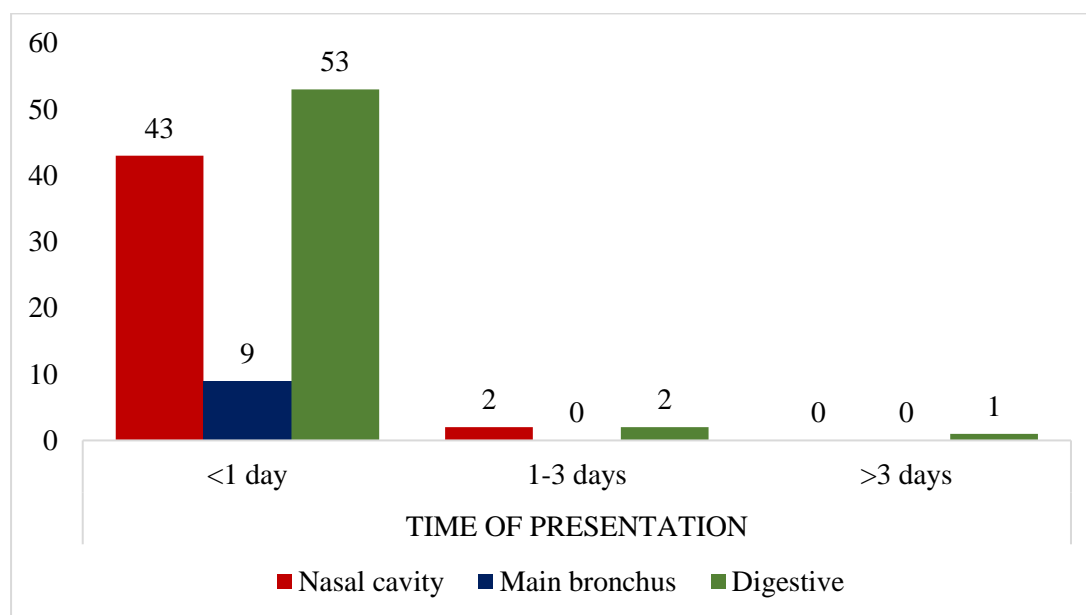
| | | | TIME OF PRESENTATION | | | Total | P value |
|-----------|-------|--------------------|----------------------|----------|---------|--------|---------|
| | | | <1 day | 1-3 days | >3 days | | |
| AGE GROUP | <10 | Count | 97 | 2 | 1 | 100 | 0.010 |
| | | % within AGE GROUP | 97.0% | 2.0% | 1.0% | 100.0% | |
| | 11-18 | Count | 3 | 0 | 0 | 3 | |
| | | % within AGE GROUP | 100.0% | 0.0% | 0.0% | 100.0% | |
| | >19 | Count | 5 | 2 | 0 | 7 | |
| | | % within AGE GROUP | 71.4% | 28.6% | 0.0% | 100.0% | |
| Total | | Count | 105 | 4 | 1 | 110 | |
| | | % within AGE GROUP | 95.5% | 3.6% | 0.9% | 100.0% | |



Correlation between age of the patient and time of presentation is statistically significant with p-value 0.010.

TABLE 22: COMPARING SITE WITH TIME OF PRESENTATION

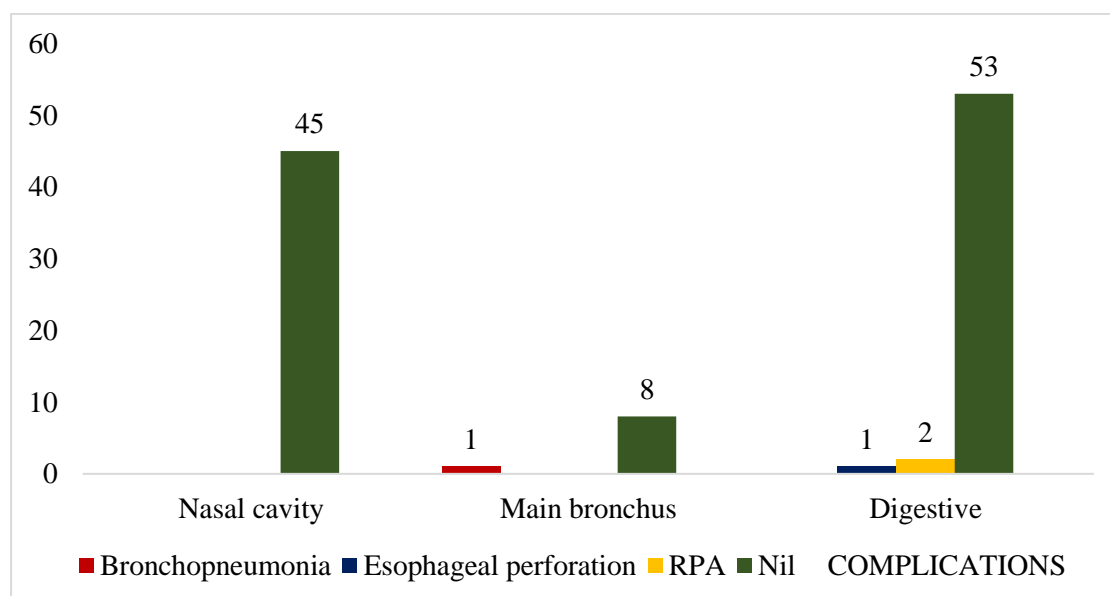
| | | | TIME OF PRESENTATION | | | Total | P value |
|-------|---------------|---------------|----------------------|----------|---------|--------|---------|
| | | | <1 day | 1-3 days | >3 days | | |
| SITE | Nasal cavity | Count | 43 | 2 | 0 | 45 | 0.845 |
| | | % within SITE | 95.6% | 4.4% | 0.0% | 100.0% | |
| | Main bronchus | Count | 9 | 0 | 0 | 9 | |
| | | % within SITE | 100.0% | 0.0% | 0.0% | 100.0% | |
| | Digestive | Count | 53 | 2 | 1 | 56 | |
| | | % within SITE | 94.6% | 3.6% | 1.8% | 100.0% | |
| Total | | Count | 105 | 4 | 1 | 110 | |
| | | % within SITE | 95.5% | 3.6% | 0.9% | 100.0% | |



Correlation between site of foreign body and time of presentation is statistically insignificant with p-value 0.845.

TABLE 23 : SITE OF FOREIGN BODY WITH COMPLICATION

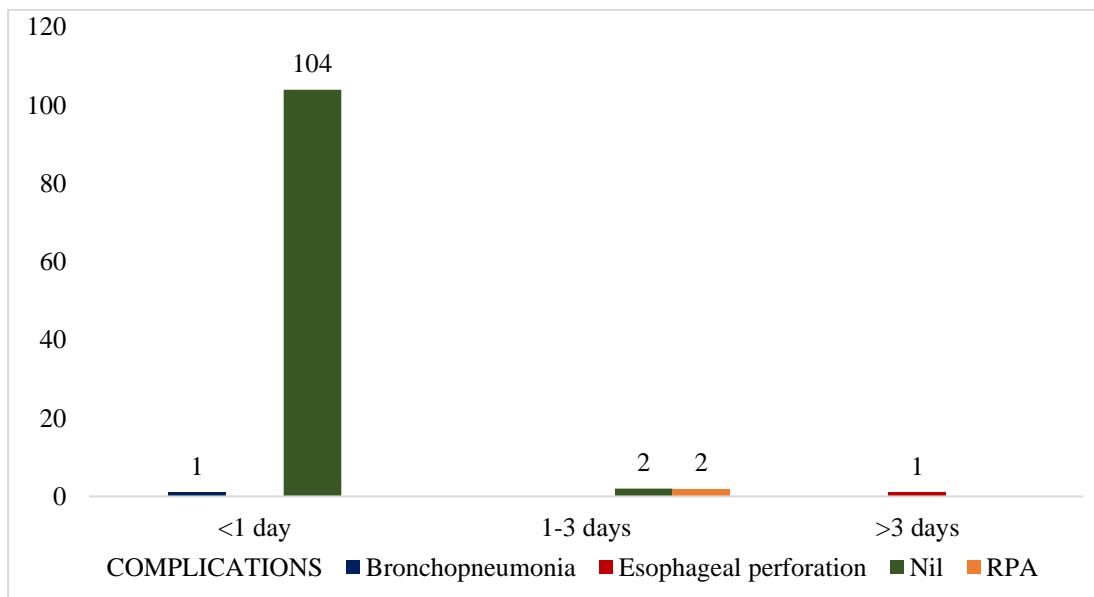
| | | | COMPLICATIONS | | | | Total | P value |
|-------|---------------|---------------|------------------|------------------------|------|--------|--------|---------|
| | | | Bronchopneumonia | Esophageal perforation | RPA | Nil | | |
| SITE | Nasal cavity | Count | 0 | 0 | 0 | 45 | 45 | 0.027 |
| | | % within SITE | 0.0% | 0.0% | 0.0% | 100.0% | 100.0% | |
| | Main bronchus | Count | 1 | 0 | 0 | 8 | 9 | |
| | | % within SITE | 11.1% | 0.0% | 0.0% | 88.9% | 100.0% | |
| | Digestive | Count | 0 | 1 | 2 | 53 | 56 | |
| | | % within SITE | 0.0% | 1.8% | 3.6% | 94.6% | 100.0% | |
| Total | | Count | 1 | 1 | 2 | 106 | 110 | |
| | | % within SITE | 0.9% | 0.9% | 1.8% | 96.4% | 100.0% | |



Correlation between site of foreign body and onset of complications was found to be statistically significant ($P = 0.027$).

TABLE 24: TIME OF PRESENTATION WITH COMPLICATIONS

| | | | COMPLICATIONS | | | | Total | P value |
|-----------------------|----------|-------------------------------|-------------------|--------------------------|--------|--------|---------|----------|
| | | | Broncho pneumonia | Esophag eal perforati on | Nil | RPA | | |
| TIME OF PRESEN TATION | <1 day | Count | 1 | 0 | 104 | 0 | 105 | <0.00 01 |
| | | % within time of presentation | 1.0% | 0.0% | 99.0 % | 0.0 % | 100.0 % | |
| | 1-3 days | Count | 0 | 0 | 2 | 2 | 4 | |
| | | % within time of presentation | 0.0% | 0.0% | 50.0 % | 50.0 % | 100.0 % | |
| | >3 days | Count | 0 | 1 | 0 | 0 | 1 | |
| | | % within time of presentation | 0.0% | 100.0% | 0.0 % | 0.0 % | 100.0 % | |
| Total | | Count | 1 | 1 | 106 | 2 | 110 | |
| | | % within time of presentation | 0.9% | 0.9% | 96.4 % | 1.8 % | 100.0 % | |



Correlating time of presentation of the patient with the incidence of complications has a p-value of <0.0001 which is statistically significant.

DISCUSSION

A total of 110 patients were considered for this study on upper aerodigestive tract foreign bodies. Among these 56 cases (51%) were digestive tract foreign bodies while 54 cases (49%) were airway foreign bodies. Within the digestive tract, cricopharynx forms the most common site with 37 cases (33.6%). While nasal cavity is the most common site of airway foreign bodies with 45 cases (40.9%).

AGE DISTRIBUTION

In our study, out of the 110 cases, 103 (94%) were less than 18 years of age in which **children less than 10 years** account for 100 cases (90.9%). While 7 patients (6%) were adults with age more than 18 years [TABLE 2]. This correlates with the study of Gupta P et al (2014) where cases with age <10 years was found to be 91%, 11-20 years was 7% and >20 years was 2% ^[35]. This also correlates with Kumar AGN et al where 82% of participants were less than 14 years.

Among children less than 10 years, both airway and digestive tract foreign bodies have equal incidence (50 cases each). Within airway foreign bodies (54 cases – 49%), nasal cavity foreign bodies which constitute 45 cases occur mainly in children with age less than 10 years (44 cases). While

bronchial foreign bodies (9 cases) are seen in both adults and children. Also, digestive tract foreign bodies are seen in both adults and children, even though in our study, not a single case of tonsillar fossa foreign body was encountered in an adult. Among the total number of 7 adult cases, 3 were bronchial, 3 cricopharyngeal and 1 esophageal foreign body. In our study, the **age group of the patient** was compared with the **site of foreign body** [TABLE 19] and the p – value came out to be **0.006** which is statistically significant.

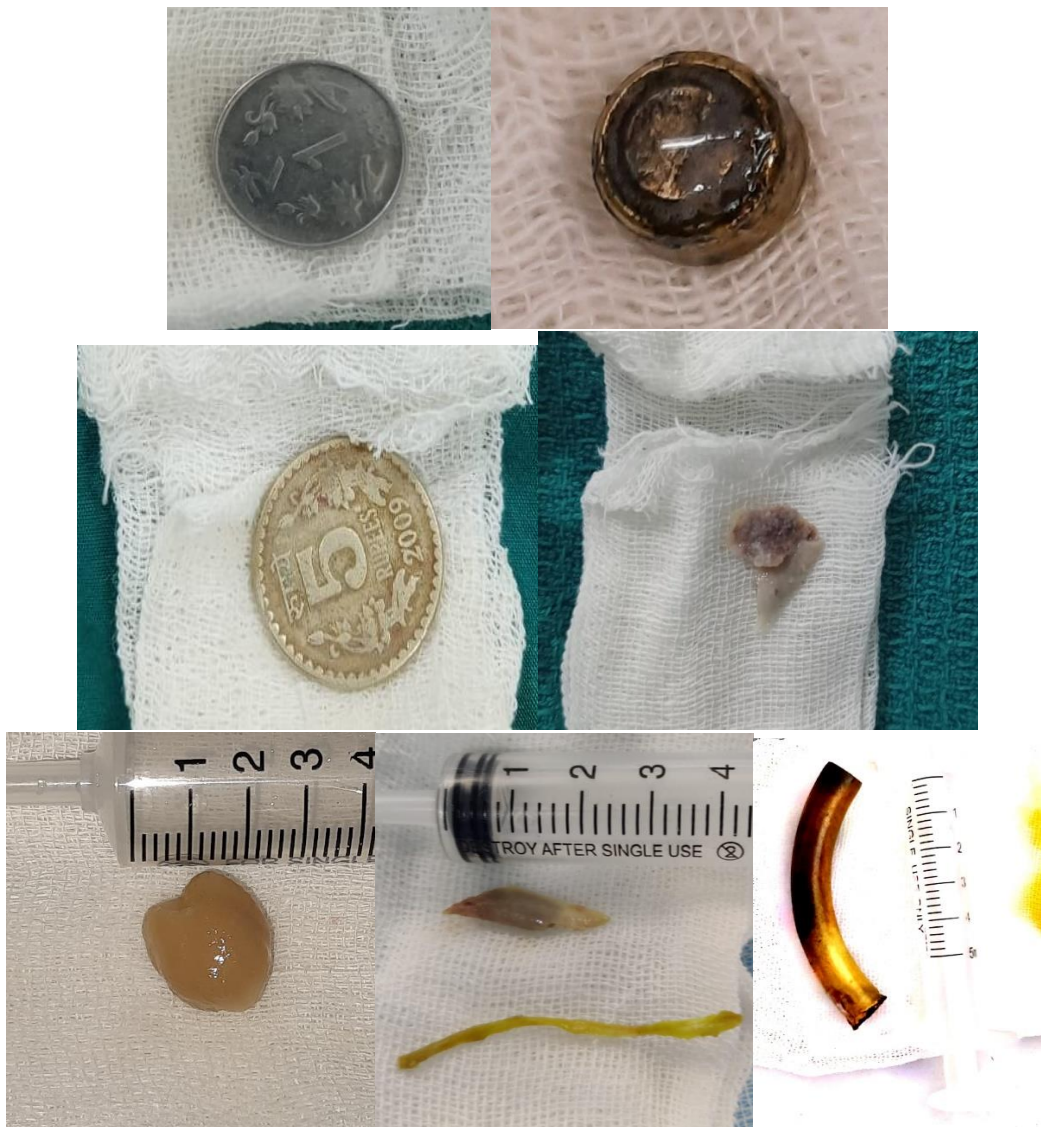
This correlates with the conclusion of S. Y. Kim et al in 2006 which states that location of foreign body is related to the age of the patient and type of foreign body [37].

SEX DISTRIBUTION

In our study, 60 cases (55%) were females and 50 cases (45%) cases [TABLE 3]. Among children less than 18 years of age, which constitute 103 cases, 48 (46.6%) were males and 55 (53.3%) females. Among adults, which include 7 cases, there were 2 males and 5 females. No significant difference in sex distribution was noted in studies conducted by Brooks et al, Jackson et al, Kim et al and Hung W and Lim [37].

TYPES OF FOREIGN BODIES

A variety of foreign bodies were observed in our study. Animate foreign bodies were not encountered in our study. All the cases had inanimate foreign bodies which may be organic or inorganic. The various foreign bodies encountered in





Our study are:

1. Organic – Peanut, Chicken bone, Amla seed, Betel nut, Chickpea, Corn, Cotton ball, Fishbone, Grape seed, Mutton bone, Pea, Peanut, Tamarind seed, Stick and Wheat grain.
2. Inorganic – Coin, Button battery, Camphor, Cello tape, Earring, Hairclip, LED bulb, Metal piece, Metal ring, Metal tracheostomy tube, Naphthalene ball, Pen end cap, Remote button, Safety pin, Slate pencil and Thermocol piece.

Among all the foreign bodies removed, **coin** is the most common which accounts for 39 cases (**35.5%**). Peanut (12.7%) is the second most common seen in 14 cases and button battery (9.1%) is the third most common foreign body seen in 10 cases [TABLE 1]. All cases of **coin** foreign body were seen either in cricopharynx or esophagus and it was mainly seen in children under 10 years of age except for a 12 year old child presented with crico-pharyngeal coin foreign body. **Peanut** was extracted from 14 cases out of which 11 were found in nasal cavity and 3 were found in bronchus. This was exclusively seen in children less than 10 years. This observation is also seen in the study by Chee LW and Sethi DS and Baharloo F et al where nuts and seeds were the most common foreign body in children. **Button battery** was seen in both airway and digestive tract. Out of the 10 cases with button battery, 7 were removed from nasal cavity and 3 from digestive tract. Most common foreign body seen in adults is **metal**

tracheostomy tube (3 cases – 2.7%) and all of them were seen in bronchus. This is in contrast to finding of Kumar AGN et al ^[45] where dentures are the most common ingested foreign body in adults. In our study not a single case of loose dentures foreign body was observed.

CLINICAL PRESENTATION

Out of the 110 patients considered for this study, 108 cases (**98.2%**) came with history of foreign body ingestion or aspiration [TABLE 5]. While the remaining 2 cases (1.8%) were admitted with other complaints and foreign body was identified as an incidental finding. Among this, 105 cases (95.5%) of cases presented on the same day of foreign body impaction and all of them had positive history. 4 cases (3.6%) presented after 24 hours but before 3 days. Only 1 patient (0.9%) presented after 3 days and this patient had no known history of foreign body ingestion or aspiration [TABLE 6].

In our study, out of 100 cases under 10 years of age, 97% of cases presented on the same day, while only one case presented after 3 days. Out of the 3 cases with age between 11 – 18 years, 100% of the cases presented within 24 hours. In adults with age more than 18 years, out of the total 7 cases, 5 cases (71.4%) presented within 24 hours while 2 cases (28.6%) presented after 24 hours but within 3 days.

Comparing the **age of patient** and the **time of presentation** p-value came out to be **0.010** [TABLE 21].

CLINICAL FEATURES

In our study, 24 cases (**21.8%**) came without any symptoms. Among this 19 cases (17.2%) are nasal cavity foreign bodies which came with history of witnessed or suspected foreign body aspiration [TABLE 7 – 15, TABLE 20].

- **Dysphagia** is the most common symptom encountered during our study accounting for 47 cases (42.7%) and almost all the cases had digestive tract foreign body except one case. Among digestive tract foreign bodies which include 56 cases, 82.1% of cases had history of dysphagia with a p-value of **<0.0001**. This observation correlates well with the study of Murty PSN et al and AGN Kumar et al where dysphagia and throat pain is the most common in ingested foreign bodies.
- Other common symptoms identified in digestive tract foreign bodies are **throat pain** and **foreign body sensation of throat** which occurs in an overall frequency of 17.3% (19 cases) and 11.8% (13 cases) respectively and are seen only in digestive tract foreign bodies. Among the cases with digestive tract foreign bodies, 33.9% of cases had throat pain and 23.2% had foreign body sensation of throat. Both

these findings had a p-value of **<0.0001** and **0.001** respectively which are statistically significant.

- Another presenting complaint exclusively seen in digestive tract foreign body is **vomiting** which was seen in 11 patients with an overall frequency of 10%. Among the digestive tract foreign bodies, it was seen in a frequency of 19.6% (p-value: **0.003**) and was statistically significant.
- Most common presenting complaint in nasal foreign body is **nasal obstruction and nasal discharge** which was seen in 18 cases (16.4% overall). Among the NFB, it had a frequency of 33.3% with a p-value of **<0.0001** and is statistically significant. This is followed by **epistaxis** which is seen in 20 cases (22.2%) with P-value of **<0.0001**. This is in contrast to Baharloo F et al where cough and choking sensation is the most common symptom in airway foreign body.
- Dyspnea is seen in 8 (7.3%) cases out of which 6 are TBFB and 2 are NFB. Another common symptom in trachea-bronchial foreign bodies is cough which is seen in 4 (3.6%) cases. Among TBFB, **Dyspnea** occurred in a frequency of 66.7% with p-value **<0.0001** and **Cough** was seen in a frequency of 44.4% with p-value of **<0.0001**. Both are found to be statistically significant.

- **Fever** was the only symptom found in both airway and digestive tract. Fever was seen in 5 (4.5%) cases. It was seen in 2 (3.6%) cases of DTFB and among TFBFB it was seen in 3 (33.3%) of cases. No case of nasal foreign body presented with fever. The p-value was found to be **<0.0001** which is statistically insignificant.

EVALUATION OF THE PATIENT

- Complete physical examination was done in all cases and radiological investigations were done in selected cases.
- Radiological evaluation was done in all cases of cricopharyngeal, esophageal and tracheobronchial foreign bodies. It was done in selected cases of nasal foreign bodies with metallic foreign bodies like button battery. Out of the 110 cases taken for study, x-rays were taken in 68 cases (61.8%) and all of them were positive for foreign bodies.

SITE OF FOREIGN BODY

Nasal cavity is the most common site of foreign body impaction which includes 45 cases (40.9%). Second most common site is the cricopharynx seen in 37 cases (33.6%) is the most common site of foreign body in digestive tract [TABLE 4]. This also correlates well with the study of Murty PSN et al ^[49], Abdul Azeez A et al and several others. In the airway,

bronchial foreign bodies were seen in 9 cases (8.2%). In the digestive tract, esophageal foreign bodies were seen in 16 cases (14.5%) and tonsillar fossa foreign bodies in 3 cases (2.7%).

In our study, among 45 cases of nasal foreign bodies, 43 cases (95.6%) presented on the same day while the remaining 2 cases (3.7%) presented within 3 days. All 9 cases of tracheobronchial foreign bodies presented on the same day of aspiration (100%). Among 56 cases of digestive tract foreign bodies, 53 cases (94.6%) presented on the same day, 2 cases (3.6%) presented within 3 days and the remaining 1 case (1.8%) presented after 3 days. On comparing the **site of foreign body** and **time of presentation**, p-value is **0.845** which is statistically insignificant [TABLE 22].

COMPLICATIONS

Out of 110 patients observed, only 4 patients presented with complications. Among this, the most common was retropharyngeal abscess which was found in 2 patients (1.8%) [TABLE 16]. This is also observed by Hung W et al and Singh et al. While bronchopneumonia and esophageal perforation was seen in 1 case each (0.9%). All the cases were managed conservatively. Among tracheobronchial foreign bodies, only 1 case (11.1%) with bronchopneumonia was found to have complication. While among digestive tract foreign bodies, 2 cases (3.6%) had retropharyngeal abscess

and 1 case (1.8%) had esophageal perforation. No case with nasal foreign body presented with any complications. Correlation between **site of foreign body** and **incidence of complications** were found to be statistically significant with p-value **0.027** [TABLE 23].

Among all the 105 cases presented within 24 hours, only one case (1.0%) with bronchopneumonia was found to be complicated. Among the 4 cases presented between 1-3 days, 2 cases (50.0%) had retropharyngeal abscess. Only one case who was presented after 3 days was later found to have esophageal perforation (100%). The correlation between **time of presentation** and **incidence of complications** was found to be statistically significant with p-value **<0.0001** [TABLE 24].

MANAGEMENT

In our study, rigid esophagoscopy used in 53 cases (48.2%) is the most common method employed. This is used in both cricopharyngeal and esophageal foreign bodies. Direct removal used in 36 cases (32.7%) as an office procedure was employed in both nasal cavity and oropharyngeal foreign bodies. Endoscopic removal done in 12 cases (10.9%) was used for selected cases of nasal cavity foreign bodies which was not amenable to direct removal. In all the cases of bronchial foreign body (9 cases – 8.2%), rigid bronchoscopy was done. [TABLE 17]

POST-OPERATIVE STATUS

After appropriate procedure, out of the total 110 cases, foreign body was removed in 107 cases (97.3%) and only in 3 cases (2.7%) foreign body could not be removed [TABLE 18]. All the 3 cases digestive tract foreign body for which rigid esophagoscopy was done. Post operatively, all the three patients were kept under observation and the foreign bodies were passed through stools within 48 hours.

CONCLUSION

- In this study, foreign bodies were more common in children than in adults. In females and males foreign bodies have almost equal incidence.
- In children, both airway and digestive tract foreign bodies are found to have equal incidence. Among this nasal foreign bodies were exclusively seen in children. In adults, digestive tract foreign bodies were found to be slightly more than tracheobronchial foreign bodies.
- The most common age for any foreign body is in the 1st decade.
- In children, trying to taste new compact objects out of curiosity and carelessness of the caretaker was the most common causative factor of foreign bodies. In adults, trachea-bronchial foreign bodies are mainly due to inadequate tracheostomy care which leads to aspiration of broken metal tracheostomy tube.
- In the digestive tract, chicken bone was the most common foreign body in adults while coins are more common in children. Groundnut was the most common foreign body in the airway which was seen in both nasal cavity and bronchus.
- Majority of patients with foreign body, present within 1 day and all of them had positive history. Late presentation was seen more

commonly in adults and it was statistically significant.

- Dysphagia was the most common symptoms in DTFBs. Nasal obstruction and nasal discharge were the common symptoms in nasal foreign bodies, while in TBFBs, dyspnea and cough were the common findings. Fever was seen in both TBFB and DTFB, but more significantly associated with TBFB. Correlation between these symptoms and site of foreign body was found to be statistically significant.
- Not even a single case of undetected bronchial foreign body which presented as lower respiratory tract infection was encountered in our study.
- Most common site of foreign body impaction is nasal cavity followed by bronchus in the airway, while cricopharynx is the most common site in digestive tract followed by esophagus and tonsillar fossa.
- Rigid endoscopic removal remains the procedure of choice in removal of foreign body in the trachea, bronchus and oesophagus.
- Retropharyngeal abscess was the most common complication encountered in digestive tract foreign bodies followed by esophageal perforation. Bronchopneumonia was the only complication seen in our study due to tracheobronchial foreign bodies.

- Early diagnosis and extraction of foreign body is necessary to prevent complications. Thus a high degree of suspicion by the attending physician and public education is necessary for timely intervention and prevention of morbidity.

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PROFORMA

A CROSS SECTIONAL STUDY ON UPPER AERO DIGESTIVE TRACT FOREIGN BODIES IN A TERTIARY CARE CENTER IN CHENNAI

PATIENT DETAILS

NAME:

AGE/SEX:

IP/OP NO:

ADDRESS:

CONTACT NO:

PRESENTING COMPLAINTS:

HISTORY OF PRESENTING ILLNESS:

PAST HISTORY:

GENERAL EXAMINATION:

LOCAL EXAMINATION:

INVESTIGATIONS:

Blood investigations:

Radiology:

PROCEDURE DONE:

FINAL DIAGNOSIS:

POST-OPERATIVE STATUS:

PATIENT CONSENT FORM

Title of the Project : “ A cross sectional study on upper aero digestive tract foreign bodies in a tertiary care center in Chennai ”

Institution : Upgraded Institute of
Otorhinolaryngology, Madras
Medical College,
Chennai – 600003.

Name : Date :
Age : IP No. :
Sex : Project Patient No. :

The details of the study have been provided to me in writing and explained to me in my own language.

I confirm that I have understood the above study and had the opportunity to ask questions.

I understood that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without the medical care that will normally be provided by the hospital being affected.

I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s).

I have been given an information sheet giving details of the study. I fully consent to participate in the above study.

| | | |
|------------------------------|--------------------|---------------|
| _____ Name of the subject | _____ Signature | _____ Date |
|------------------------------|--------------------|---------------|

| | | |
|-----------------------------------|--------------------|---------------|
| _____ Name of the Investigator | _____ Signature | _____ Date |
|-----------------------------------|--------------------|---------------|

INFORMATION SHEET

- We are conducting “**A cross sectional study on upper aero digestive tract foreign bodies in a tertiary care center in Chennai**” at the Upgraded Institute of Otorhinolaryngology, Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai – 600003.
- In this study Case records of patients with history of ingestion or aspiration of foreign bodies in the Upgraded institute of otorhinolaryngology, RGGGH & MMC who satisfy the inclusion criteria that are studied.
- At the time of announcing the results and suggestions, name and identity of the patients will be confidential.
- Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.
- The results of the special study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

Signature of Investigator

Signature of Participant

Date:

ஆராய்ச்சி தகவல் தாள்

ஆய்வு செய்யப்படும் தலைப்பு :

A CROSS SECTIONAL STUDY ON UPPER AERO DIGESTIVE TRACT FOREIGN BODIES IN A TERTIARY CARE CENTER IN CHENNAI

ஆராய்ச்சியாளர் பெயர் :

பங்கேற்பாளர் பெயர் :

சென்னை ராஜீவ் காந்தி அரசு மருத்துவமனைக்கு, இந்த ஆராய்ச்சியின் நோக்கம்.

நீங்கள் இந்த ஆராய்ச்சியில் பங்கேற்க நாங்கள் விரும்புகிறோம். இந்த ஆராய்ச்சியால் உங்கள் சிகிச்சைக்கு பாதிப்பு ஏற்படாது என்பதை தெரிவித்துக் கொள்கிறோம்.

இந்த ஆராய்ச்சியின் முடிவுகளை அல்லது கருத்துக்களை வெளியிடும் போதோ அல்லது ஆராய்ச்சியின் போதோ தங்களது பெயரையோ அல்லது அடையாளங்களையோ வெளியிடமாட்டோம் என்பதையும் தெரிவித்துக்கொள்கிறோம்.

இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின் பேரில் தான் இருக்கிறது. மேலும் நீங்கள் எந்நேரமும் இந்த ஆராய்ச்சியிலிருந்து பின்வாங்கலாம் என்பதையும் தெரிவித்துக்கொள்ளலாம்.

இந்த ஆராய்ச்சியின் முடிவுகளையும் நோயின் தன்மைப்பற்றியும் ஆராய்ச்சியின் போது அல்லது ஆராய்ச்சியின் முடிவின் போது தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்துக்கொள்கிறோம்.

ஆராய்ச்சியாளர் கையொப்பம்

பங்கேற்பாளர் கையொப்பம்

தேதி:

சுய ஒப்புதல் படிவம்

ஆய்வு செய்யப்படும் தலைப்பு :

A CROSS SECTIONAL STUDY ON UPPER AERO DIGESTIVE TRACT FOREIGN BODIES IN A TERTIARY CARE CENTER IN CHENNAI

ஆராய்ச்சி நிலையம் : இராஜீவ் காந்தி அரசு பொது மருத்துவமனை மற்றும்
சென்னை மருத்துவக் கல்லூரி,
சென்னை - 600 003.

பங்கு பெறுபவரின் பெயர் :

உறவுமுறை :

பங்கு பெறுபவரின் எண். :

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களைப் பெறவும் வாய்ப்பளிக்கப்பட்டது.

நான் இவ்ஆய்வில் தன்னிச்சையாகத்தான் பங்கேற்கிறேன். எந்தக் காரணத்தினாலோ எந்தக் கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்ஆய்வில் இருந்து விலகிக் கொள்ளலாம் என்றும் அறிந்து கொண்டேன்.

இந்த ஆய்வு சம்மந்தமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும்போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளைப் பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன்.

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக் கொள்ளவும் அதைப் பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கிறேன்.

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்குக் கொடுக்கப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன், இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதியளிக்கிறேன். என் உடல் நலம் பாதிக்கப்பட்டாலோ அல்லாத எதிர்பாராத வழக்கத்திற்கு மாறான நோய்க்குறி தென்பட்டாலோ உடனே அதை மருத்துவ அணியிடம் தெரிவிப்பேன் என உறுதி அளிக்கிறேன்.

பங்கேற்பவரின் கையொப்பம்..... இடம்..... தேதி
கட்டைவிரல் ரேகை

பங்கேற்பவரின் பெயர் மற்றும் விலாசம்.....

ஆய்வாளரின் கையொப்பம்..... இடம்..... தேதி

ஆய்வாளரின் பெயர்.....

**INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI 600 003**

EC Reg.No.ECR/270/Inst./TN/2013/RR-16
Telephone No.044 25305301
Fax: 011 25363970

CERTIFICATE OF APPROVAL

To
Dr.LEKSHMI R,
MS (ENT) Post Graduate,
Upgraded Institute of Otorhinolaryngology,
Madras Medical College &
Rajiv Gandhi Government General Hospital,
Chennai - 600003.

Dear Dr.LEKSHMI R,

The Institutional Ethics Committee has considered your request and approved your study titled "**A CROSS SECTIONAL STUDY ON UPPER AERO DIGESTIVE TRACT FOREIGN BODIES IN A TERTIARY CARE CENTER IN CHENNAI**"- **NO.28072021**. The following members of Ethics Committee were present in the meeting held on **07.07.2021** conducted at Madras Medical College, Chennai 3.

1. Prof.P.V.Jayashankar,MS Orth.,D.Orth.,M.Ch Orth (Liverpool) :Chairperson
2. Prof.N.Gopalakrishnan,MD.,DM., FRCP, Director, Inst.of Nephrology,MMC,Ch. : Member Secretary
3. Prof. K.M.Sudha, Prof. Inst. of Pharmacology,MMC,Ch-3 : Member
4. Prof. Alagarsamy Jamila ,MD, Vice Principal, Stanley Medical College, Chennai : Member
5. Prof.Rema Chandramohan,Prof.of Paediatrics,ICH,Chennai : Member
6. Prof.S.Lakshmi, Prof. of Paediatrics ICH Chennai :Member
7. Tmt.Arnold Saulina, MA.,MSW., :Social Scientist
8. Thiru S.Govindasamy, BA.,BL,High Court,Chennai : Lawyer
9. Thiru K.Ranjith, Ch- 91 : Lay Person

We approve the proposal to be conducted in its presented form.
The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.


Member Secretary – Ethics Committee
MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003.



Document Information

| | |
|--------------------------|---|
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| SL. NO | NAME | AGE | SEX | SITE | TYPE | PROCEDURE | STATUS OF FB | HISTORY | TIME OF PRESENTATION | | | CLINICAL FEATURES | | | | | | | | COMPLICATIONS | | |
|--------|-----------------|-----|-----|-------------------|-----------------|-----------|--------------|---------|----------------------|----------|--------|-------------------|-------|-------|-----------|-----------|----------|-------|-----|---------------|-------------|--------------------|
| | | | | | | | | | <1 day | 1-3 days | >3days | DYSPNEA | COUGH | NO/ND | EPISTAXIS | DYSPHAGIA | VOMITING | FEVER | FBS | | THROAT PAIN | |
| 1 | AJMAL | 4 | M | L main bronchus | Betel nut | RB | R | YES | + | | | - | + | - | - | - | - | - | - | - | - | |
| 2 | CHARUKESH | 7 | M | R Nasal cavity | Button battery | ER | R | YES | | + | | - | - | + | + | - | - | - | - | - | - | |
| 3 | SAKTHINATHAN | 5 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | - | |
| 4 | ANUSHKA | 8 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | + | - | - | |
| 5 | SOMU | 17 | M | Cricopharynx | Chicken bone | RE | R | YES | + | | | - | - | - | - | + | - | - | + | + | - | |
| 6 | AYAN | 2 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | + | - | - | - | - | |
| 7 | TEJASRI | 4 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | - | |
| 8 | DIVIJA | 2 | F | Esophagus | Metal ring | RE | R | YES | + | | | - | - | - | - | - | - | - | - | - | - | |
| 9 | MAHENDRAN | 6 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | + | - | - | |
| 10 | KAVIYA VARTHMAN | 2 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | - | |
| 11 | DHESIKA | 3 | M | R Nasal cavity | Button battery | DR | R | YES | + | | | - | - | + | - | - | - | - | - | - | - | |
| 12 | VALAKATHA | 54 | F | R main bronchus | Metal tracheost | RB | R | YES | + | | | + | + | - | - | - | - | - | - | - | - | |
| 13 | SHASHWANTH | 9m | M | Esophagus | Button battery | RE | NR | NO | | | + | - | - | - | - | + | + | + | - | - | - | Esophageal perfora |
| 14 | VARSHIKA | 2 | M | Esophagus | Earring | RE | R | YES | + | | | - | - | - | - | - | + | - | - | - | - | |
| 15 | VARUNSAI | 1 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | + | - | - | - | - | |
| 16 | VARSHINI | 6 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | - | |
| 17 | NIROSHINI | 6 | F | L main bronchus | Peanut | RB | R | YES | + | | | + | - | - | - | - | - | + | - | - | - | |
| 18 | RIKESH | 2 | M | Cricopharynx | Chicken bone | RE | R | YES | + | | | - | - | - | - | + | + | - | + | + | - | |
| 19 | DHANSHIKA | 2 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | - | |
| 20 | SRIVELAN | 4 | M | R Nasal cavity | Tamarind seed | ER | R | NO | | + | | - | - | + | + | - | - | - | - | - | - | |
| 21 | DEEP | 62 | F | L main bronchus | Metal tracheost | RB | R | YES | + | | | + | - | - | - | - | - | - | - | - | - | |
| 22 | NANDHAN | 2 | M | R main bronchus | Peanut | RB | R | YES | + | | | + | - | - | - | - | - | - | - | - | - | |
| 23 | RITHIKA | 7 | F | L tonsillar fossa | Fishbone | DR | R | YES | + | | | - | - | - | - | - | - | - | + | + | - | |
| 24 | TAMILAMUTHAN | 6 | M | Cricopharynx | Coin | RE | NR | YES | + | | | - | - | - | - | - | + | - | - | - | - | |
| 25 | JAISON | 3 | F | R Nasal cavity | Bead | DR | R | YES | + | | | - | - | + | - | - | - | - | - | - | - | |
| 26 | AKHILESH | 3 | M | L nasal cavity | Remote button | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | - | |
| 27 | SARVESHWARAN | 4 | M | L nasal cavity | Amla seed | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | - | |
| 28 | AYSHA | 3 | F | R Nasal cavity | Slate pencil | DR | R | YES | + | | | - | - | + | + | - | - | - | - | - | - | |
| 29 | GLAVEN | 3 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | - | - | - | - | - | - | |
| 30 | ASHOK JOEL | 3 | M | L nasal cavity | Cotton ball | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | - | |
| 31 | MUGILAN | 5 | M | L nasal cavity | Button battery | DR | R | YES | + | | | - | - | + | + | - | - | - | - | - | - | |
| 32 | SASIKUMAR | 4 | M | R Nasal cavity | Button battery | ER | R | YES | + | | | - | - | + | - | - | - | - | - | - | - | |
| 33 | KANNAYIRAM | 45 | F | Cricopharynx | Chickpea | RE | R | YES | + | | | - | - | - | - | + | - | - | + | + | - | |
| 34 | JEYAVANTH | 3 | M | L nasal cavity | Peanut | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | - | |
| 35 | KANISHKA | 4 | F | R Nasal cavity | Tamarind seed | ER | R | YES | + | | | - | - | - | - | - | - | - | - | - | - | |
| 36 | POOJA | 5 | F | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | - | |
| 37 | SREENIDHI | 9 | F | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | - | |
| 38 | SREENITHA | 4 | F | L nasal cavity | Peanut | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | - | |
| 39 | MONISHA | 5 | F | R Nasal cavity | Earring | ER | R | YES | + | | | - | - | - | + | - | - | - | - | - | - | |

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|----|--------------|----|---|-------------------|-----------------|----|----|-----|---|---|--|---|---|---|---|---|---|---|---|---|-----|
| 40 | TEERAN | 9m | M | Cricopharynx | LED Bulb | RE | R | YES | + | | | - | - | - | - | - | + | - | - | + | |
| 42 | KAVITHA | 3 | F | R Nasal cavity | Pea | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 43 | BAKHYA | 5 | F | R Nasal cavity | Bead | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 44 | KAVISRI | 8 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | + | - | |
| 45 | SAMEERA | 5 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | + | + | |
| 46 | ARIF | 5 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | + | - | - | - | |
| 47 | THOMSON | 3 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 48 | EKAMBARAM | 60 | M | Cricopharynx | Mutton bone | RE | R | YES | | + | | - | - | - | - | + | - | + | + | + | RPA |
| 49 | NOORJA | 3 | F | R Nasal cavity | Stick | DR | R | YES | + | | | - | - | + | + | - | - | - | - | - | |
| 50 | OVIYA | 4 | F | R Nasal cavity | Button battery | ER | R | YES | + | | | - | - | + | - | - | - | - | - | - | |
| 51 | KARTHIGA | 3 | F | L nasal cavity | Bead | DR | R | YES | + | | | - | - | + | - | - | - | - | - | - | |
| 52 | SAINIHARIKA | 3 | F | R Nasal cavity | Metal piece | ER | R | YES | + | | | - | - | - | + | - | - | - | - | - | |
| 53 | AYSHA | 6 | F | L tonsillar fossa | Fishbone | DR | R | YES | + | | | - | - | - | - | - | - | - | - | + | |
| 54 | SHIVA | 2 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | - | + | - | - | - | |
| 55 | PRAGATHI | 4 | F | R Nasal cavity | Tamarind seed | DR | R | YES | + | | | + | - | + | - | - | - | - | - | - | |
| 56 | HARI PRAKASH | 2 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 57 | KUMARI | 6 | M | R Nasal cavity | Seed | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 58 | THENDRAL | 4 | F | R Nasal cavity | Naphthalene ba | DR | R | YES | + | | | - | - | + | - | - | - | - | - | - | |
| 59 | ALLEN | 4 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 60 | NIRANJAN | 2 | M | R main bronchus | Peanut | RB | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 61 | KASI | 60 | M | R main bronchus | Metal tracheost | RB | R | YES | + | | | + | + | - | - | - | - | - | - | - | |
| 62 | SANJITH | 8 | M | R Nasal cavity | Button battery | ER | R | YES | + | | | - | - | + | - | - | - | - | - | - | |
| 63 | JINCY | 7 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 64 | GURUDARSHIKA | 3 | F | R Nasal cavity | Bead | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 65 | JACQUILINE | 2 | F | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | - | - | - | - | + | |
| 66 | LAKSHYAN | 4 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 67 | THARUN | 6 | M | L nasal cavity | Naphthalene ba | DR | R | YES | + | | | + | - | + | - | - | - | - | - | - | |
| 68 | PRIYAN | 3 | M | Cricopharynx | Button battery | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 69 | DEEPAK | 2 | M | L nasal cavity | Camphor | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 70 | SHIVANI | 6 | F | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | - | + | - | - | + | |
| 71 | EESHA | 4 | F | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 72 | LAKSHAN | 2 | M | Cricopharynx | Safety pin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | + | |
| 73 | DARSHIKA | 4 | F | R Nasal cavity | Naphthalene ba | DR | R | YES | + | | | - | - | + | - | - | - | - | - | - | |
| 74 | SHERLIN | 2 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 75 | SANTHOSH | 8 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 76 | NAVEEN | 8 | M | Esophagus | Coin | RE | NR | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 77 | BHAGYAM | 60 | F | Cricopharynx | Chicken bone | RE | R | YES | + | | | - | - | - | - | + | - | - | + | + | |
| 78 | ABISHENA | 8 | F | R Nasal cavity | Stick | ER | R | YES | + | | | - | - | - | + | - | - | - | - | - | |
| 79 | SANTHOSH | 5 | M | L nasal cavity | Peanut | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 80 | SANJANA | 8 | F | L nasal cavity | Cellotape | ER | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 81 | AARYA | 4 | F | R Nasal cavity | Peanut | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 82 | PAVAN | 5 | M | R Nasal cavity | Thermocol | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 83 | MANI | 3 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |

| | | | | | | | | | | | | | | | | | | | | | |
|-----|--------------|----|---|-------------------|----------------|----|---|-----|---|---|--|---|---|---|---|---|---|---|---|---|------------------|
| 84 | SIDHARTH | 6 | M | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 85 | JYOTHI | 3 | F | L nasal cavity | Metal piece | DR | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 86 | SAMYUKTHA | 13 | F | L nasal cavity | Coin | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 87 | ASHWINI | 8 | F | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 88 | KRISHNA | 8 | M | R Nasal cavity | Peanut | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 89 | DHANUSRI | 3 | F | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | + | + | - | - | - | |
| 90 | HEMASHRI | 6 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | + | + | |
| 91 | NANTHIKA | 4 | F | Cricopharynx | Button battery | RE | R | YES | + | | | - | - | - | - | + | - | - | + | - | |
| 92 | AISHWARYA | 2 | F | B/L nasal cavity | Wheat grain | ER | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 93 | VINSHIKA | 8 | F | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 94 | JEBASTIN | 3 | M | R Nasal cavity | Peanut | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 95 | BALAMURUGAN | 2 | M | Esophagus | Hairclip | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 96 | SUDHA | 38 | F | Esophagus | Chicken bone | RE | R | YES | | + | | - | - | - | - | + | - | - | - | + | RPA |
| 97 | MINUTHA | 4 | F | R Nasal cavity | Peanut | DR | R | YES | + | | | - | - | + | - | - | - | - | - | - | |
| 98 | ANANYA | 2 | F | L nasal cavity | Cotton ball | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 99 | PRANAV | 1 | M | L main bronchus | Grape seed | RB | R | YES | + | | | - | - | - | - | - | - | + | - | - | |
| 100 | DHANSIKA | 6 | F | Esophagus | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | + | |
| 101 | ADAM JEFFREY | 3 | M | L main bronchus | Pen end cap | RB | R | YES | + | | | + | + | - | - | - | - | + | - | - | Bronchopneumonia |
| 102 | ABINAYA | 12 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | + | + | |
| 103 | JORDAN | 3 | M | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | - | |
| 104 | PRAGATHI | 2 | F | R Nasal cavity | Peanut | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 105 | RITHIKA | 3 | F | R Nasal cavity | Button battery | ER | R | YES | + | | | - | - | + | + | - | - | - | - | - | |
| 106 | DEEKSHITHA | 2 | F | L nasal cavity | Peanut | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 107 | AFIA | 2 | F | L tonsillar fossa | Fishbone | DR | R | YES | + | | | - | - | - | - | + | - | - | - | + | |
| 108 | GANASREE | 3 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | + | |
| 109 | PRANISH | 3 | M | R Nasal cavity | Peanut | DR | R | YES | + | | | - | - | - | - | - | - | - | - | - | |
| 110 | KARTHIGA | 5 | F | Cricopharynx | Coin | RE | R | YES | + | | | - | - | - | - | + | - | - | - | + | |