

DISSERTATION ON

**“A STUDY ON UPPER AERODIGESTIVE TRACT  
FOREIGN BODIES”**

Submitted in partial fulfillment of the requirements for

**M.S DEGREE BRANCH – IV OTORHINOLARYNGOLOGY**

of

**THE TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY**



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## **CERTIFICATE**

This is to certify that this dissertation entitled “**A STUDY ON UPPER AERODIGESTIVE TRACT FOREIGN BODIES**” submitted by **Dr.ARCHANA BALASUBRAMANIAN**, appearing for **M.S.E.N.T, BRANCH IV** Degree examination in March 2010, 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. I forward this to The Tamil Nadu Dr.M.G.R. Medical University , Chennai ,Tamil Nadu , India.

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## **INTRODUCTION**

A foreign body is an endogenous or exogenous substance, incongruous with the anatomy of the site where it is found. **Chevalier Jackson defined a foreign body as “an object or a substance that is foreign to its location”<sup>1</sup>.** Foreign body ingestion and aspiration can affect persons of any age, but the vast majority of these accidents occur in children under the age of five<sup>1</sup>. It is estimated that 150 deaths occur annually in children, due to asphyxiation<sup>3</sup>. Foreign bodies in the airway, pharynx and oesophagus continue to be a diagnostic and therapeutic challenge to practising otolaryngologists. Despite improvements in public awareness and emergency care, death due to aspiration is a leading cause of death in children. A high index of suspicion for foreign body aspiration or ingestion is needed, because a foreign body can mimic other medical conditions, particularly without a witnessed event. Hence there can be a delay in management, that may lead to complications. According to the National safety council, suffocation from foreign body ingestion and aspiration is the third leading cause of accidental death in children younger than one year and the fourth leading cause in children between 1 and 6 years<sup>8</sup>.

Accidental ingestion or aspiration tends to be twice as common in boys<sup>4</sup>. In patients with multiple oesophageal foreign body impactions, 80 % have an oesophageal anomaly on further evaluation<sup>3</sup>.

When any patient gives a history of a foreign body, investigation is warranted regardless of their age or apparent absence of signs and symptoms. Rarely serious complications such as recurrent pneumonia, atelectasis, lung / retropharyngeal or mediastinal abscess, or massive hemorrhage due to a vascular fistula may occur before a thorough investigation is launched<sup>4</sup>. In patients suspected of having ingested or aspirated a foreign object, appropriate x-rays are taken. Radiographs in airway foreign bodies are frequently normal in the first 24 hours after the initial event, but may become abnormal over time<sup>1</sup>. The treatment of choice is prompt endoscopic retrieval. It is occasionally possible to retrieve a nasal, oropharyngeal or hypopharyngeal foreign body in a co-operative patient with only local anaesthesia. Rigid endoscopy has proven over time to be the safest and most efficacious therapy<sup>3</sup>.

## **AIMS OF THE STUDY**

1.To find out the etiology and prevalence of upper aerodigestive tract foreign bodies.

2.To find out the age and gender distribution of aerodigestive tract foreign bodies and the common types and the most common sites of foreign body impaction.

3.To study the various types of presentations of foreign bodies, investigations and treatment modalities available and what were used in our institution.

4.To find out the percentage of foreign bodies causing complications.



## **REVIEW OF LITERATURE**

Foreign bodies in the Aero Digestive Tract are as old as mankind itself<sup>1</sup>. Among the oldest reference is the one cited by the Greek fablist Aesop in 560 BC, the episode of the gluttonous wolf with an impacted bone, which was skillfully removed by the crane, per via naturale. Hippocrates in 460 BC, conceived the intubation as ideal and Verdue in AD 1717, used bronchotomy to remove bone. Before the 20<sup>th</sup> century emetics, expectorants, purgatives, and bloodletting were practiced as methods of removal. Killian is credited with the first bronchoscopic removal of a foreign body of the airway in 1897 when he removed a bone from the trachea of a man with a 9mm rigid tube<sup>32</sup>. Chevalier Jackson (Fig 1) in the early 20<sup>th</sup> century is credited with revolutionizing the field of Broncho-oesophagology with the development of instruments and techniques for foreign body removal<sup>33</sup>. These have reduced the mortality rate associated with foreign body removal from more than 20% to 2%. Little change in technique occurred until the 1970s when Hopkin's rod-lens telescopes became available, vastly improving illumination and visualization<sup>3</sup>.

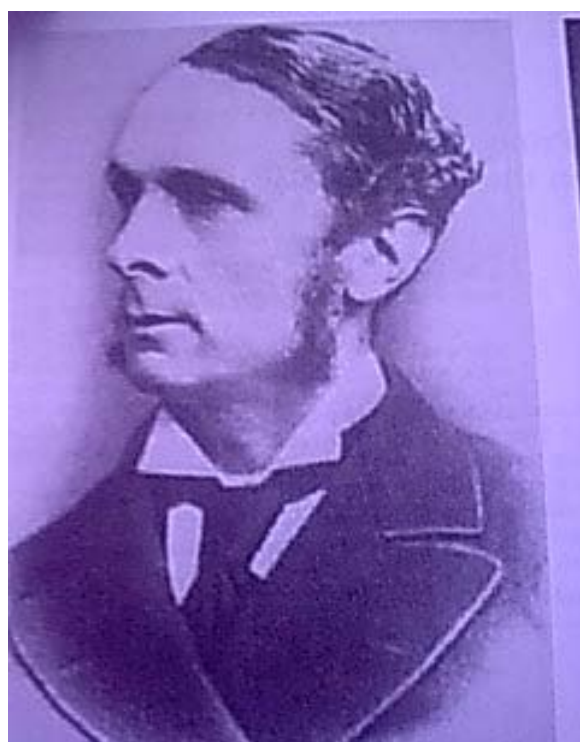
### **TYPES OF FOREIGN BODIES<sup>4</sup> :**

- 1) *Organic* - cotton , paper, seeds, wool / *Inorganic* – metallic pieces, plastic, glass, chalk, rubber.
- 2) *Vegetative / Non-vegetative*

FIG 1 : CHEVALIER JACKSON



FIG 2: MORELL MACKENZIE



3) *Radio-opaque /Radio-lucent*

4) *Exogenous / Endogenous*

5) *Annimate / Inanimate*

### **AIRWAY FOREIGN BODIES :**

These remain a diagnostic challenge to health care professionals. They become life threatening emergencies that require immediate intervention. Every effort must be made to avoid delay in diagnosis as this may lead to major complications<sup>5</sup>. Airway foreign bodies still cause significant mortality and anoxic brain damage<sup>4</sup>. The majority of cases and deaths occur in toddlers younger than 3 years, upto 25% in less than one year age group<sup>3</sup>. **The reasons toddlers are more susceptible are<sup>3</sup>**

- 1) They lack molars necessary for proper grinding of food.
- 2) They have less controlled co-ordination for swallowing and immaturity in laryngeal elevation and glottic closure.
- 3) There is an age related tendency to explore objects by placing it in the mouth.
- 4) They are often running or playing at the time of ingestion.

Patients with altered mental status are at risk for occult aspiration, which may be difficult to diagnose. Round-shaped foods are the most frequently aspirated objects: ground nuts, grapes, raisins, peanuts, seeds, beans etc. Adults are more likely than children to have non-food items aspirated into the airway<sup>1</sup>. In adults, 75% of foreign

bodies lodge in the proximal airways (larynx, trachea, main bronchi). In children, bronchus is the most common site<sup>1,10</sup>.(FIG 3) Foreign body at laryngeal level is often caused by inappropriately executed attempts to finger sweep an oropharyngeal foreign body. Even though asymptomatic on presentation, transient coughing or gagging should raise the index of suspicion for a foreign body. Onset of wheezing in a healthy child or **“recurrence” of asthma** after discontinuation of therapy and persisting bronchopneumonia despite treatment, should heighten suspicion of a foreign body<sup>1,7</sup>.

When the aspiration of foreign body is witnessed by the care taker, the following characteristic symptoms are described: an early **choking or gagging episode followed by a cough spell**<sup>1,4</sup>. As the object moves distally in the airway the symptoms become less apparent or even disappear. Vegetable matter like peanuts cause rapid, severe chemical bronchitis and granulation tissue<sup>4</sup>. Sometimes foreign bodies can change position in the airway and cause intermittent/complete airway obstruction<sup>3</sup>.

**Foreign body accidents usually involve three distinct stages**<sup>4</sup>. The first is the initial event characterized by an episode of coughing, gagging and choking. Following this, the patient typically experiences an asymptomatic interval, as the reflexes accounting for the symptoms of the initial event are fatigued. This stage leads to the misdiagnosis and frequent

delay in diagnosis. The final stage is characterized by complications due to obstruction, erosion or infection.

Foreign objects can be bilateral, with 3.6% of patients in one series<sup>3</sup>. Signs of upper airway obstruction are: dyspnoea, drooling, stridor, and cyanosis. Clinical presentation can range from chronic nonspecific respiratory complaints to acute airway obstruction like noisy breathing, vomiting, and possibly slight hemoptysis. These symptoms, known as the *penetration syndrome*, occur in half of patients aspirating and include a choking sensation accompanied by respiratory distress with coughing, wheezing, and dyspnoea<sup>11</sup>. In some cases, coughing impacts it in the subglottic region. Stridor is a frequent component of an acute aspiration episode in patients of all ages. If the object is sharp and thin it may get embedded between the vocal cords or in the subglottic region. The patient may be unaware of the foreign body in cases of penetrating trauma or blast injuries, besides the intubated, tracheostomised or obtunded patients. Discrepancy in breath sounds between sides of the chest and unilateral wheezing are significant since most objects will impact in the one of the main stem bronchi. The classic diagnostic triad of **unilateral wheeze, cough, and ipsilaterally diminished breath sounds** is observed in less than 50% of cases<sup>3,5,39</sup>. Flexible fiberoptic laryngoscopy can add valuable information on laryngomalacia or other non traumatic etiologies. Foreign bodies, including many types of fish

FIG 3 : BRONCHIAL FOREIGN BODIES

CT SCAN : RIGHT MAIN  
BRONCHUS – FOREIGN BODY



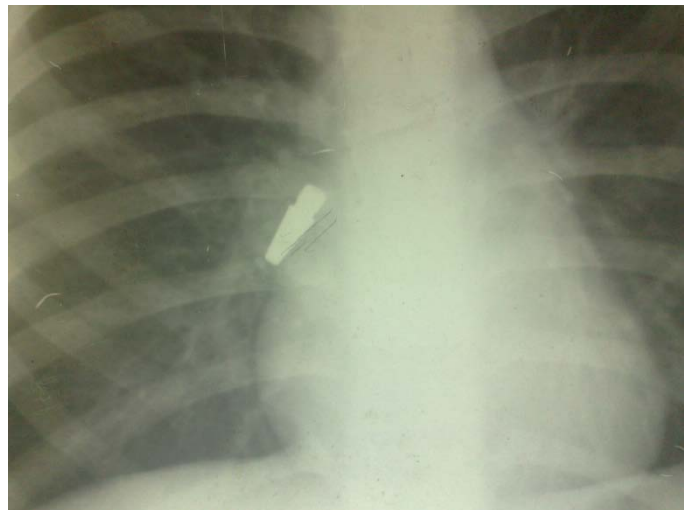
FOREIGN BODY-PIN  
REMOVED



FOREIGN BODY – LEFT MAIN BRONCHUS



FOREIGN BODY – RIGHT BRONCHUS



bones are radio-lucent. Therefore, the decision to pursue surgical intervention should be based on the patient's history and a physical examination. Patients with a retained airway foreign object may present with **complications** such as retropharyngeal/lung abscess and atypical or recurrent pneumonia.

Physical findings depend on the degree of airway obstruction and duration of the object's presence in the respiratory system. Cyanosis is present in 10% of patients, and coughing, audible wheezing, or overt respiratory distress occurs in 25% to 37% of patients with aspirated objects<sup>3</sup>. Patients with upper airway foreign objects may have stridor and sub-sternal retractions may be noted in patients with intra-tracheal foreign bodies<sup>39</sup>. Patients with secondary infection may have fever. Clinical signs of complete obstruction include poor air exchange, ineffective cough, severe distress and cyanosis. Assessment of the neck may reveal accessory muscle use. Tracheal palpation may reveal a thud, indicating movement of a mobile foreign body against the tracheal wall<sup>9</sup>. Abnormal inspiratory sounds may be heard on tracheal auscultation. ***“all that wheezes is not asthma.”***<sup>1,4</sup>

#### **OBSTRUCTIVE EMPHYSEMA<sup>4</sup>:**

Occasionally a foreign body acts as a one-way valve, allowing air into the lung during inspiration, but permitting none to exit during expiration. This is because air passages dilate during inspiration and

contract during expiration. **Signs:** Increased resonance and reduced breath sounds. **X ray :** emphysema on expiratory film, increased radiolucency of lung distal to the foreign body , mediastinal shift to opposite side and separation of ribs from each other.(Fig 5)

**The right main bronchus** is the most common location for an airway foreign body<sup>1,4</sup>. (Fig 4) This is due to:

1. It's greater diameter and smaller angle of branching from the carina when compared to the left main bronchus.
2. There is greater inspiratory air flow to the right lung and
3. The carina is positioned slightly to the left of the midline .

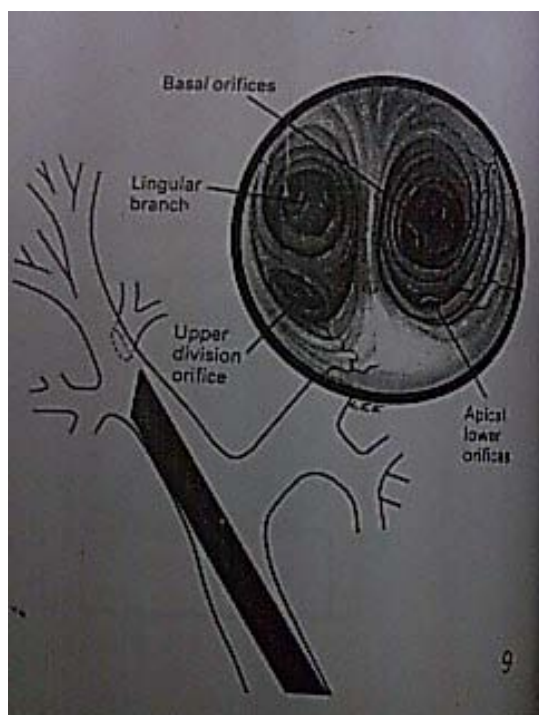
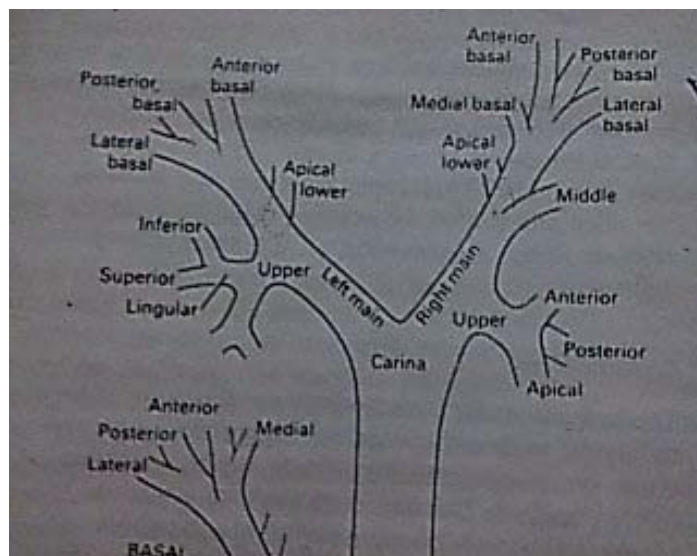
But in young children where the difference is less pronounced, there is more equal distribution of foreign bodies<sup>4</sup>.

Careful auscultation of the chest is the most critical part of the examination<sup>5</sup>. Investigators have reported a high incidence of normal physical findings (14-45%). A negative examination should not be used to rule out the presence of a foreign body, but a positive finding is a valuable tool in establishing the need for bronchoscopy.

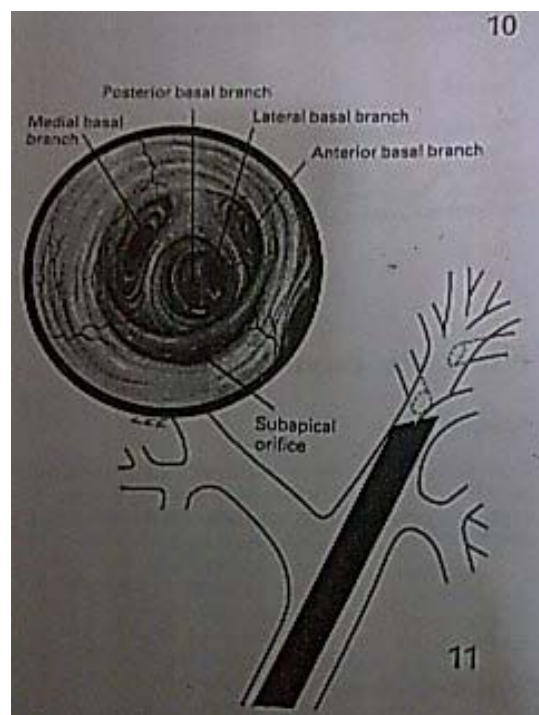
**Laryngeal foreign bodies:** They usually cause complete or partial airway obstruction that has the potential to cause asphyxiation if not relieved promptly with the **Heimlich manoeuvre**<sup>3,40</sup> (Fig 6) or tracheotomy. Partial obstruction at the level of the larynx is usually caused by flat, thin



FIG 4: BRONCHOPULMONARY SEGMENTS

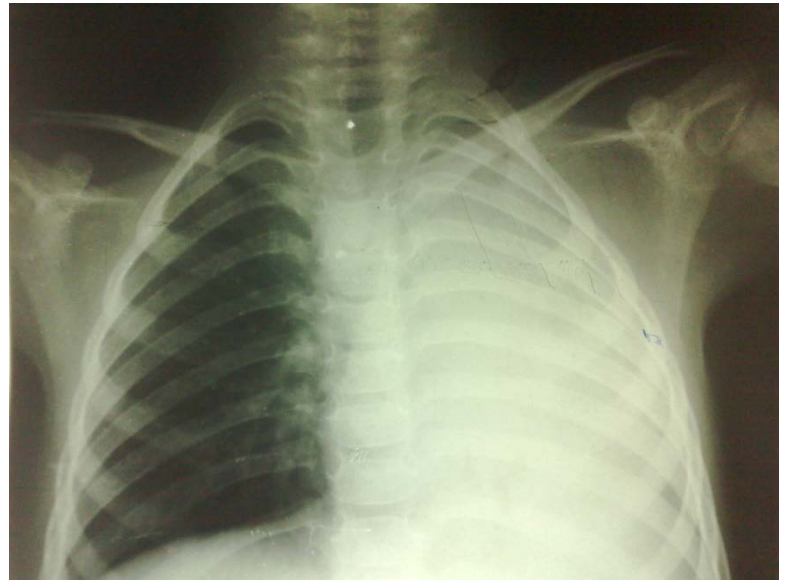


LEFT



RIGHT

FIG 5 : FEATURES OF OBSTRUCTIVE EMPHYSEMA WITH LUNG COLLAPSE



objects that lodge between the vocal folds in the sagittal plane. Symptoms include stridor, cough, hoarseness, dyspnoea and odynophagia.

**Tracheal foreign bodies** : These are rare but are slightly more common than laryngeal foreign bodies. Three features described by Jackson and Jackson <sup>1,3</sup> which can be noticed on examination are the *audible slap* which is best heard at the open mouth during a cough, the *palpatory thud*, and the *asthmatoïd wheeze*, heard with the ear kept at the patient's open mouth.

#### **Types of bronchial obstruction<sup>7</sup> :**

1. Bypass valve
2. Expiratory check / one way valve (most common )
3. Inspiratory check / stop valve

#### **Signs of stop valve obstruction<sup>9</sup>:**

1. Atelectasis of lung distal to foreign body.
  2. Shift of mediastinum to the same side.
  3. Compensatory emphysema of the opposite lung for adequate ventilation
  4. Respiratory distress, cyanosis, cardio respiratory failure.
  5. Absent breath sounds on the affected side.
- Stop valve type of objects completely obstructs the airway. (Fig 5)

#### **Radiology:**

In the stable patient, plain radiography of the neck and chest remains the mainstay of airway foreign body imaging. Most foreign bodies are radio-lucent (80%)<sup>1</sup>. Films taken during expiration can reveal

hyperinflation at the ipsilateral lung. Atelectasis can be seen when the aspirated object completely obstructs the airway. Atelectasis and pneumonia are commonly seen in delayed diagnosis (after 24 hrs)<sup>4</sup>. Air trapping can be seen when **inspiratory and expiratory films** are compared, which may show a flat, fixed diaphragm on the involved side and the heart and mediastinum shift to the uninvolved side during expiration<sup>10</sup>. Bronchiectasis and bronchial stenosis develop later. Radiographs should not be used to rule out the presence of foreign bodies, but to aid in diagnosis<sup>5</sup>. Over one half of tracheal and 25% of bronchial foreign bodies have normal chest x rays<sup>4,5</sup>. Compared with history and physical examination, radiography appears to be the least sensitive in predicting the bronchoscopic findings<sup>5</sup>. Other imaging techniques of potential utility are fluoroscopy, but it may have a lower sensitivity and specificity than chest radiographs<sup>15</sup>. Computerized tomography, (FIG 3) is useful in evaluating patients with suspected airway foreign bodies when plain films are negative.

**Acute airway obstruction (“CAFE CORONARY”)**<sup>34,40</sup>:

Acute airway obstruction is said to cause around 3000 deaths per year. The object, usually a bolus of food, bolted in a restaurant, lodges in the larynx or pharynx, causes acute respiratory embarrassment. If the airway is not restored, irreversible cerebral ischemia occurs within 6 minutes. Survival is based on the actions of passers-by, rather than

FIG 6 : HEIMLICH MANOEUVER



trained medical staff. Attempts to revive the foreign body by fingers, are to be avoided, because it only causes further impaction. The Heimlich manoeuvre may be life saving. The rescuer stands behind the subject and places a clenched fist below the xiphisternum(Fig 6). This is followed by rapid subdiaphragmatic upward thrusts, producing artificial cough of some sort. If this step fails, a cricothyrodotomy may have to be done.

### **Management :**

Management of an airway tract foreign body is removal, which generally leads to rapid recovery of the patient. 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<sup>3</sup>. Blind finger sweeping has resulted in conversion of partial to complete airway obstruction when objects are displaced into the subglottic space. Coughing and gagging indicate partial obstruction. In children older than one year, the Heimlich manoeuvre or sub diaphragmatic thrusts are used. Emergency needle cricothyrodotomy is a procedure of last resort to access the airway in an obstructed patient who cannot be intubated or ventilated<sup>11</sup>. 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. Tracheal and bronchial foreign bodies are best

removed using rigid bronchoscopes<sup>5</sup>. In the rare event of not being able to remove it endoscopically, thoracotomy and bronchotomy may be needed

### **Indications for Endoscopy :**

To prevent a diagnostic delay, a witnessed choking event followed by a period of coughing, should be considered an acceptable indication for bronchoscopy<sup>5</sup>. A good rule of the thumb is that diagnostic bronchoscopy should be performed, if any one of the three diagnostic tools (history, examination or radiography) is positive. Early bronchoscopy in any patient with a suspected foreign body is the key to reduce morbidity and mortality.

It is important that foreign bodies are removed with the least endolaryngeal and endotracheal trauma. It is ideal to use the rigid endoscopes. Telescopes attached to foreign body forceps, make the removal easier. Tomaske and colleagues found in a study that children who underwent bronchoscopy <2hrs fasting, did not have any pulmonary aspirations of gastric contents. But when the child is stable, fasting guidelines should be followed<sup>6</sup>.

Flexible bronchoscopes lack the ability to ventilate, which is afforded by their rigid counterparts. In patients with lesser overall clinical suspicion, fiber optic bronchoscopy may be indicated, but Rigid bronchoscopy(Fig 8) is the optimal first step when clinical suspicion is high. Bronchodilators and postural therapy for dislodgment of airway

foreign bodies is to be condemned, due to the risk of mobilizing the object from its distal position, only to cause its impaction in the narrow subglottis or glottis<sup>1</sup>. Several situations can be regarded as urgent or an emergency, with endoscopy performed as soon as possible: **(1) Actual or potential airway obstruction (2) aspiration of dried beans or peas.** With prolonged periods in the airway, the bean or pea absorbs moisture, thus causing swelling and airway obstruction or the obliteration of forceps spaces, making removal more complicated.

### **Anaesthesia<sup>57</sup>:**

An important anaesthetic consideration is that the bronchoscope competes for space with the anaesthetic device, in the trachea. Pulmonary ventilation needs to be continued during the procedure and this can be achieved in the following ways:

1. Using a small tracheal tube, though the risk is that the bronchoscope may dislodge it.

2. Using the technique of apnoeic ventilation. The patients lungs are ventilated with 100% oxygen until the lung volume is depleted of nitrogen and effectively is full of oxygen and no other gas.

3. **Jet ventilation** using Sanders injector. This is essentially a pressure relief valve and tubing - one end attached to a high pressure oxygen supply on the anaesthetic machine and the other end to the bronchoscope. (Fig 7)



FIG 7: JET VENTILATION

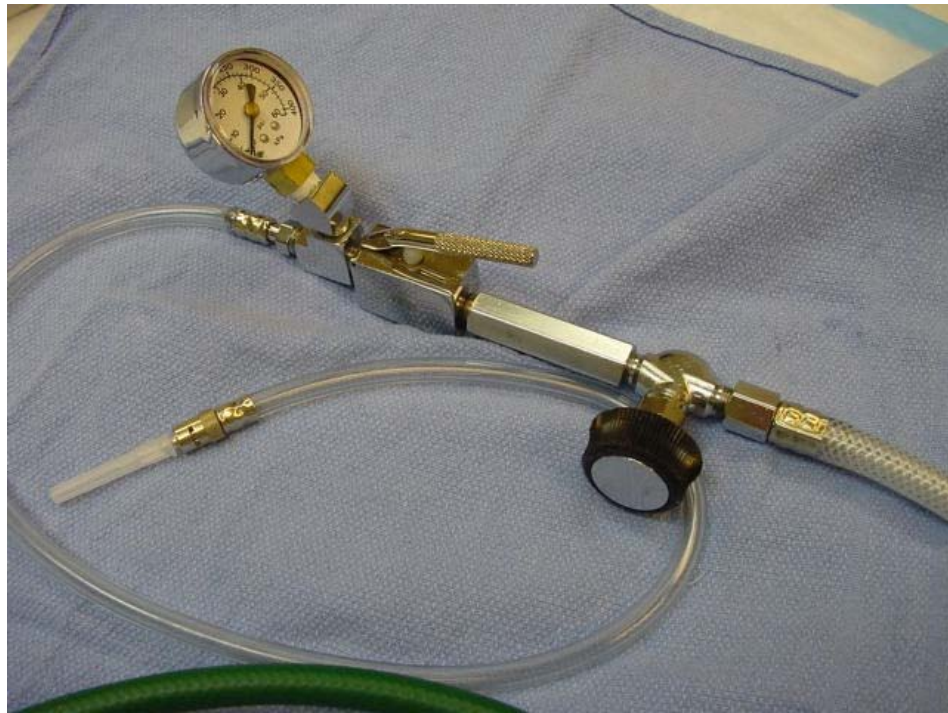
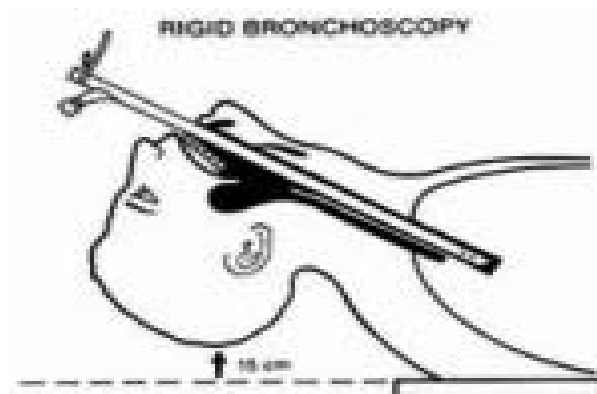
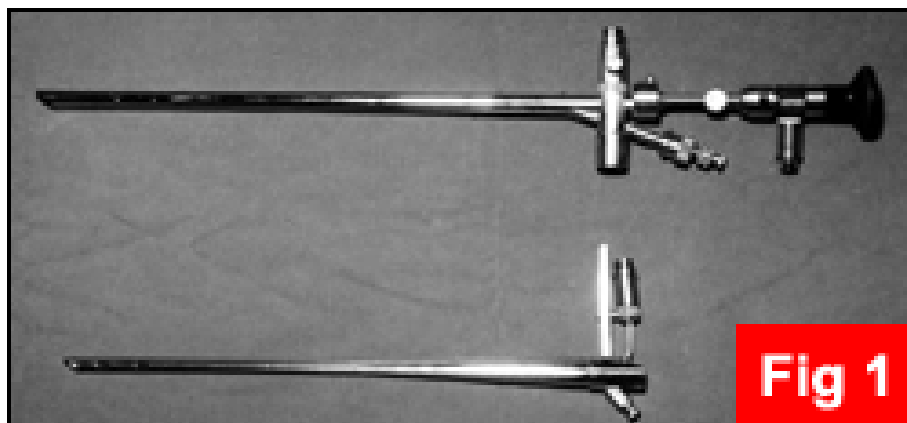


FIG 8 : RIGID BRONCOSCOPE



4. Some bronchoscopes have a side port (Racine adaptor), to which the standard anaesthetic /oxygen tubing can be attached

**Complications of jet ventilation** are<sup>36</sup>:

Rupture of bulla, pneumothorax, pneumomediastinum/pneumopericardium and mediastinal emphysema.

An experienced anesthesiologist is usually required. The plan for the procedure should be discussed and the possible complications reviewed with the entire team, before taking the patient to the operating suite. The endoscopist should then spend adequate time selecting the appropriate instrument with which to grasp the object.

The proper size bronchoscope should be prepared with alternate sizes available when planning the retrieval of an airway foreign body. This is most important in children, where laryngeal and tracheal sizes are highly variable and the effects of swelling from use of too large an endoscope and excessive airway trauma are poorly tolerated<sup>1</sup>. The use of too small a scope can compromise removal and cause excessive leak with ventilation.

It is preferable to keep the patient in spontaneous breathing, to prevent positive pressure ventilation, which may induce distal migration of the foreign body<sup>4</sup>. Further more, during natural inspiration the airway cross sectional area increases and allows better access to impacted foreign bodies.

Laryngoscopy is initially performed to evaluate the larynx and hypopharynx, to expose the larynx for atraumatic bronchoscope insertion, and application of topical anaesthetic<sup>3</sup>. It is also imperative that 4% lignocaine is sprayed to anaesthetise the glottis, trachea and carina before instrumentation. Age appropriate instrumentation is essential to prevent trauma. The patient is placed supine, with head initially placed on the head ring, then removed when the scope has passed through the cords. Draping of the body is avoided to aid in visualizing the respiratory movements. Classically the boyce position is used, with flexion of all cervical joints except the atlanto-occipital joint, that is extended. Injury to the teeth and tongue is to be avoided while introducing and manipulating the scope. The preoperative state of the teeth is to be noted and patient warned of the possible damage.

The bronchoscope is introduced into the right side of the mouth with thumb and index finger held like a pen<sup>4</sup>. The beak of the scope lifts the epiglottis, and is then advanced through the cords, where it is rotated 90 degrees, so that the beak passes sideways. At this stage the pillow or head ring is removed. The scope is rotated back into position. Examination of the bronchial tree is done in a systematic manner. Rotating the head to left, right main and lower lobe, right upper and right middle lobe bronchi are visualised. Then rotating head to right, left main bronchus is seen. The entire tracheobronchial tree should be inspected,

beginning with the non-affected segments to assure adequate respiratory function, while attempts at removal are made. Occasionally, there is the unexpected discovery of an additional foreign body. Once the foreign body is located, all secretions and debris should be cleared from around the object using suction.

The object is then addressed with the previously chosen forceps. The blades of the forceps should be placed around the object with care to avoid driving the object further to the periphery. There should be adequate space around the foreign body needed for application of the forceps (**forceps space**)<sup>1</sup>. Foreign bodies which are prone to fragmentation should be grasped, only firmly enough to assure adequate grip. Once the forceps are secure on the object, the scope, forceps and foreign body are removed as a single unit.

#### **Advantages of Rigid bronchoscopy** (Fig 8)

1. Removal of foreign body is easier
2. Anaesthesia is easier and visualisation is better. Oxygenation can be maintained, reliably.

#### **Advantages of flexible bronchoscopy:**

1. Done under local anaesthesia
2. Video connection and viewing possible

Many endoscopists have been troubled by the slipping of the object from the grasp of the forceps, most commonly at the narrow glottis with

the possibility of complete airway obstruction. If this situation occurs, it is imperative that the obstruction be relieved immediately. This may be accomplished by completing the removal of the object. When this is not feasible, the object should be pushed distally in order to relieve the obstruction, or occasionally, it is necessary to fragment the object. Multiple foreign bodies are said to occur in 5-19% of cases<sup>3</sup>.

Airway foreign bodies must be grasped in a secure manner and controlled during their removal. Slipping of a foreign body during its passage through the trachea or in the larynx may convert partial airway obstruction to total obstruction with an inability to ventilate the patient. In children, this risk is increased in the subglottis because of its intrinsic relative narrowness. Attempts to remove a foreign body with a sharp end may cause additional trauma: **“Advancing points perforate, trailing points do not”**<sup>1</sup>. In unusual circumstances, selected foreign bodies may be removed through a tracheostomy incision or a thoracotomy.

The obstructed bronchus is suctioned to remove secretions, which may aid in more rapid re-inflation of the lung<sup>12</sup>. Granulation tissue can be removed and bleeding controlled with topical vasoactive agents on cotton pledgets<sup>1,8</sup>. In some institutions, Fogarty catheters/Dormia baskets are used to remove the object. In cases of sharp objects and open safety pins, special forceps may be needed, and practice on a dummy may help. Thoracotomy may be required in failed cases.

### **Principles of removal<sup>33</sup>:**

1. Selection of adequate size foreign body forceps
2. Achieving best exposure of foreign body
3. Bronchoscope positioned close to foreign body without touching it and keeping adequate forceps space.
4. The distal end of the forceps used, should pass beyond the midpoint of the foreign body.
5. Small objects are removed through the scope, while larger ones are removed by trailing mechanism.

Smooth foreign bodies in the peripheral bronchus can be removed by passing a Fogarty balloon catheter distal to the object, gently inflating it and withdrawing it<sup>33</sup>. Hollow foreign bodies can be removed by placing one blade of the alligator forceps inside and one outside

Telescopes attached to the endoscopes, aid in better visualization. Pointed foreign bodies such as nails, hooks and pins are almost always situated with the point directed superiorly. The point must be enclosed in the blades of the forceps to prevent perforation of the bronchus. Clerf Arrowsmith safety pin closing forceps is used to close open safety pins and to remove them. Disengagement from the mucous membrane and closure of the pin with closing forceps and then removal through the scope is undertaken. The tip faces downwards and then removed through the scope (retroversion)<sup>33</sup>.

**Following removal** : a second look is needed to ensure that another foreign body has not been overlooked and to remove any fragments, secretions and mucus to speed up resolution of atelectasis or pneumonia<sup>4</sup>. If the procedure was prolonged or a tight fit is noted in the subglottis, steroids are indicated to reduce postoperative laryngeal oedema. Chest physiotherapy may help to mobilise secretions and to prevent infection.

**Complications :**

Delay in diagnosis increases the perioperative morbidity<sup>8</sup>. Total or near total main stem bronchial obstruction, leads to poor alveolar aeration and shunting of pulmonary perfusion away from the affected lung. When the foreign body migrates to the other lung, abrupt respiratory decompensation occurs<sup>32</sup>. Delayed diagnosis also causes pneumonia, atelectasis and granulation tissue formation, which can lead to significant bleeding on removal<sup>4,8</sup>.

**Complications of bronchoscopy are :**

Haemorrhage

Post operative stridor, laryngospasm , bronchospasm

Hypoxia, laryngeal oedema, subglottic oedema ( over sized bronchoscope , prolonged endoscopy ,extensive manipulation, trauma during extraction)

Arytenoid dislocation

Transient arrhythmias and bradycardia, aspiration

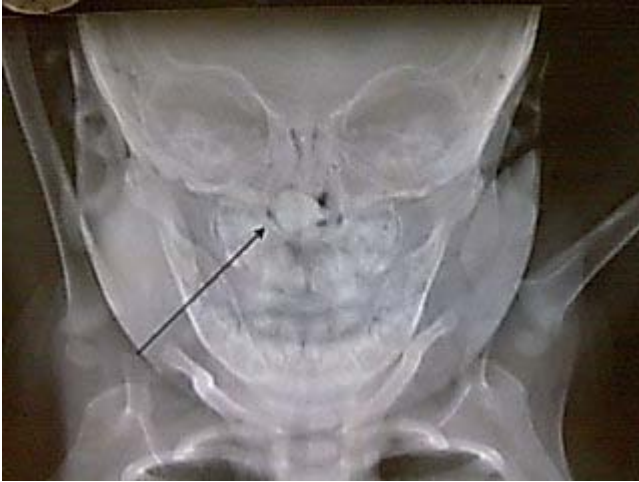
## **NASAL FOREIGN BODIES :**

**The nose is perhaps the most common site for the insertion of foreign bodies by children.** Children put foreign objects into their nostrils or into their siblings nasal orifices. Usually the child or its friend will tell the parent or the caretaker that they have put something into the nose<sup>46</sup>. The foreign bodies most often found include beans, sponge pieces, pebbles(FIG 9), rubber(Fig 10) plastic toy fragments, and other small round objects like cell batteries. Perhaps because most people are right-handed, more than two thirds of nasal foreign bodies were right-sided in one series. Children with nasal foreign bodies tend to be younger, most commonly under 5 years of age<sup>4,46</sup>. **Intranasal alkaline button battery** may cause electrical or chemical burns with liquefaction necrosis<sup>46</sup>. (Fig 11)

Most patients seek medical attention within 24 hour. Nasal foreign bodies may be asymptomatic, sometimes identified as incidental findings on radiographs. In most of the cases, the patient admits or is seen to be placing an intranasal object. Other signs and symptoms are Unilateral, Purulent, malodorous nasal discharge or features of nasal obstruction or even persistent epistaxis<sup>48</sup>. These patients often are misdiagnosed and treated with antibiotics for supposed sinusitis. When the history suggests a foreign body, but none is identified on examination, imaging is required<sup>55</sup>. Because of risks of iatrogenic movement of the foreign body



FIG 9: CHOANAL FOREIGN BODY-STONE



CHOANAL FOREIGN BODY REMOVED



FIG 10: RUBBER – FOREIGN BODY IN THE NASAL CAVITY

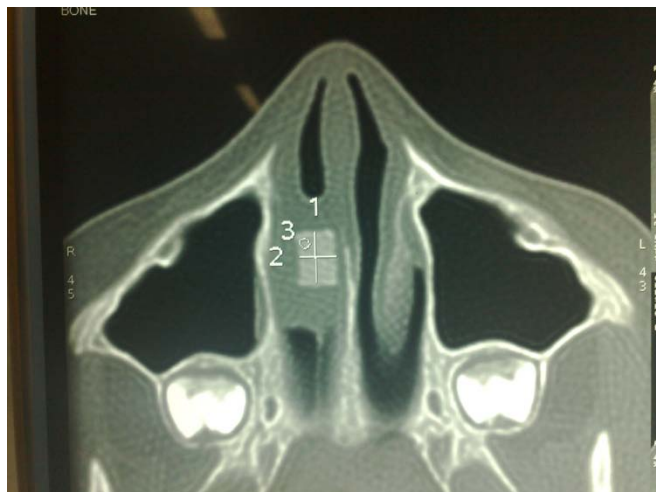


FIG 11 :BUTTON BATTERY



BUTTON BATTERY REMOVED

further posteriorly (Fig 9) or into the airway, children may need to be restrained to permit the examination. Necrosis of the nasal mucosa and septum may accompany button battery impaction.

A short burst of air blown into the mouth of a child, with finger occlusion of the non-obstructed nasal cavity, may force the foreign object out of the nose. The insufflation is preferably applied as a “kiss” from a parent, but also can be provided by a manual ventilation bag<sup>57</sup>. Rarely, computerised tomography or magnetic resonance imaging may be indicated to visualize suspected foreign bodies or their complications. Adequate illumination is essential. Necessary instruments include a blunt-tipped right-angle probe, suction catheter and alligator forceps. The forceps are used when the foreign body is to be directly grasped, and the right-angle probe is used in an attempt to reach proximal to the foreign object and displace it. Suction is primarily necessary for removing purulent secretions and blood that may obscure the field. Occasionally removal may require general anaesthesia, Endoscopy, Caldwell-Luc or lateral rhinotomy<sup>46,55</sup>. **A Rhinolith** - can form around an endogenous or exogenous foreign body, which is a partially or totally calcified mass of tissue in the nasal cavity, where layers of mucin aggregate around the object.<sup>57</sup>

## **FOREIGN BODY INGESTION:**

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** (Fig 2) was later improved by Jackson, Ingals and Mosher<sup>3</sup>.

Oesophageal foreign bodies are considered less precarious than airway foreign bodies. Even so they occur more frequently and are responsible for over 1500 deaths per year. The normal oesophagus has **four anatomical sites of narrowing** – the cricopharynx, aortic arch, left main bronchus and lower esophageal sphincter. Anatomically these are commonly found at cricopharynx, at the cross over of aortic arch, at mid oesophagus and at lower oesophageal sphincter<sup>3,14</sup>. (FIG 12)

Most cases of foreign-body ingestions occur in the paediatric population, with a peak incidence at the ages between 6 months and 6 years<sup>5</sup>. Young children explore their environments with their mouths and are thus at risk for the ingestion and aspiration of non-food items. In this age group the second molars are not well developed and the grinding and swallowing mechanisms are poor and glottic closure is immature<sup>57</sup>. In adults some people are at higher risk to have a foreign body, such as 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

FIG 12 : LEVELS OF NORMAL ANATOMICAL  
OESOPHAGEAL CONSTRICTIONS

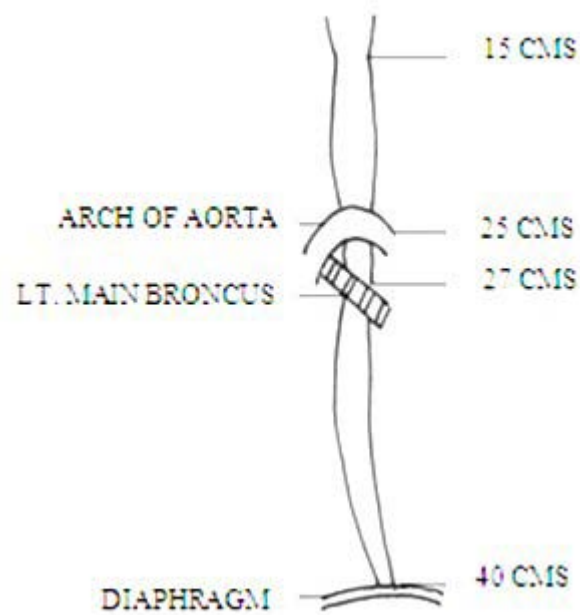


FIG 13 : METAL OESOPHAGEAL FOREIGN  
BODY



FOREIGN BODY REMOVED





FIG 14 : CHICKEN BONE



FIG 15 : FOREIGN BODY  
THROAT



FIG 16 : BUTTON BATTERY -  
CRICOPHARYNX



facility and individuals at the extremes of age<sup>3</sup>. Foreign bodies are grouped according to their size and shape. They can be classified as blunt and sharp objects<sup>3</sup>. 80 % of foreign bodies occur in children and cervical oesophagus is the commonest site. The object most often encountered in children is a coin<sup>1,5</sup>. (Fig 17), in adults – chicken bones (FIG 14) and fish bones. Other common objects are foods, toys, bones, batteries, wood, and glass<sup>3,5</sup>. In children they may get lodged in the tonsils, as these (the tonsil) tend to be bigger at this age. Most obstructions in adults were food bolus impaction and generally occurs in older patients.

### **Clinical features :**

The signs and symptoms of foreign body ingestion are quite diverse and non-specific<sup>5</sup>. Adults tend to intensely describe the event and acknowledge the potential for a foreign body. Children can be much more vague, and in 7 – 35 % they present with no symptoms.

The usual symptoms in children are – irritability, poor feeding, drooling, increased work of breathing, vomiting, pain and cough. Many of these can be misdiagnosed as gastrointestinal disorder or viral illness. Respiratory symptoms are more common in children as their tracheal lumen is narrow and easily compressible and hence include stridor and choking<sup>16</sup>. In general, symptoms are more common if foreign body is at cricopharynx, than if it is lower down in the oesophagus. In adults – dysphagia, pain, cough, vomiting, increased salivation and persistent

foreign body sensation are the symptoms. Spicules of bone are most commonly lodged in the tonsil, tongue base or vallecula<sup>5,21</sup>. History of any known oesophageal anatomic abnormality or prior instrumentations should be asked.

### **Physical examination:**

Symptoms referable to the oesophagus whether the complaint is dysphagia or odynophagia must be taken seriously<sup>5</sup>. Hypersalivation or drooling is a concerning symptom and can be a sign of complete obstruction. In a child respiratory distress, pulmonary infection, wheezing, or stridor should prompt to think of an oesophageal foreign body as a possibility.

Oropharyngeal examination also may provide indirect clues; for example, a missing dental plate on examination should lead to suspicion. Base of tongue, vallecula, supraglottic area, and pyriform sinus should be examined. The presence of pooling of saliva may indicate a foreign body obstruction lower down<sup>4</sup>. This is called Jackson's sign. Subcutaneous emphysema found by neck palpation, indicates probable oesophageal perforation.

The **button battery** (Fig 16) commonly used in hearing aids, watches, calculators and other portable electronic devices<sup>4</sup>, can cause oesophageal rupture. The peak incidence of ingestion occurs at 1-2 yrs. In one hour they 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. Most batteries are of smaller diameter (< 15mm) and usually traverse the gastrointestinal tract with minimal injury<sup>20</sup>. These batteries cause pathologic changes through direct pressure, electrical current, corrosives leakage, heavy metal poisoning or liquefaction necrosis due to leakage of caustic alkaline<sup>3,4</sup>.

**Sharp objects** may perforate the oesophagus (15-35%)(FIG 20 ) Even coins can cause stridor, oesophageal erosion, aorto-oesophageal or tracheo-oesophageal fistula, mediastinitis, or para-oesophageal abscess. Other complications of oesophageal foreign bodies include esophageal oedema, laceration or erosion, hematoma, granulation tissue, retropharyngeal abscess(FIG 27,28), migration of the foreign body into the fascial spaces of the neck, strictures, and proximal oesophageal dilation. Signs of mediastinitis indicate oesophageal perforation<sup>4,16,20</sup>. Perforation of the oesophagus with erosion into the vasculature or pulmonary tree can result in presentations ranging from hemoptysis to pulmonary abscess to life-threatening haemorrhage.

Unlike airway, the diagnostic tool in oesophageal foreign bodies is radiography<sup>5</sup>. Foreign bodies in the oesophagus are much more likely to be radio-opaque. The initial step is generally a chest radiograph and lateral cervical spine x-ray study using soft tissue. The primary utility of

plain radiography lies in detection of radio-opaque objects. Plain radiography has identified metal foreign objects(FIG 13) missed on direct (including endoscopic) examination. Anteroposterior and lateral films are required to localise the foreign body. Lateral films are more superior in identifying radiolucent objects by identifying more subtle findings such as tracheal compression, tracheal deviation and air trapped within the oesophagus(FIG 18). **In children, a “mouth-to-anus” film** is usually obtained, to see the entire oesophagus as well as the abdomen, in case the foreign body has passed into the stomach or beyond<sup>4</sup>. In adults, if neck or chest films are negative, abdominal films are sometimes obtained for reassurance of the presence of the foreign body in the stomach.(Fig 22)

**Calcified airway cartilages are misleading** and contribute to false-positive rates as high as 25%. (cricoid, thyroid and stylohyoid calcifications and osteophytes)<sup>52,5</sup>. Normal ossification of airway cartilages begins in the third decade and progresses with age. The typical curvilinear contour and well-defined margins of bony fragments may help distinguish them from normal laryngeal calcifications. Oesophageal foreign objects usually align themselves in the coronal plane and are posterior to the tracheal air column on lateral view. Oesophageal foreign bodies align parallel to the spine and laryngeal ones align perpendicular to it. Coins in the oesophagus lie in the coronal position in

FIG 17 : OESOPHAGEAL FOREIGN BODY - COIN



FIG 18 : FEATURES SUGGESTIVE OF OESOPHAGEAL FOREIGN BODY – NO OBVIOUS FOREIGN BODY VISUALISED



virtually all cases, because the opening into the oesophagus is much wider in this orientation(Fig 14).

Plain films of the neck and chest have sensitivity of 25% for impacted fish bones. When plain films fail to visualize foreign bodies and suspicion remains high, one option is contrast oesophagography, which can be useful with radiopaque and sometimes with radiolucent foreign bodies<sup>19,21</sup>. If perforation is not a concern, barium may be used as the contrast medium because it provides higher quality images. It yields better results, but risks aspiration and coats the object and oesophagus, reducing effectiveness of subsequent endoscopy. Computerised tomography with coronal and sagittal reconstructions are useful in identifying foreign bodies or characterising further objects seen on plain films, as it can give information about foreign body size, type, location, complications and orientation with respect to other anatomic structures<sup>5,26</sup>.(FIG 24) A relatively inexpensive and non invasive modality reported to be useful in detection and characterization of metal foreign bodies is the hand-held metal detector<sup>33</sup>.

### **Management :**

A specialist in the examination through the orifices above the clavicles, should become a master of both rigid and flexible techniques. Early endoscopy should be considered in cases of potential toxicity (e.g., button battery ingestion), altered anatomy (e.g., prior abdominal surgery),

or sharp foreign bodies<sup>3,4,5</sup>. Cocaine can kill a body packer and an impacted button battery can cause fatal electrochemical tissue damage. In luminal obstruction, the foreign body may become lodged and may exert pressure on the adjacent tissue, causing necrosis and perforation. Pharyngeal foreign bodies visualized by direct or indirect laryngoscopy usually can be removed with a forceps or clamp with caution. For sharp objects, displaced oesophageal stents, or impacted button batteries, efficient and urgent management is required.

Since the first report in 1972, on the removal of a foreign body with a flexible endoscope by Mackenzie et al, there has been an increasing application of this method, because of its advantages, such as avoidance of operations or surgeries for most patients, reduced cost, accessible technical facility, excellent visualization, simultaneous diagnosis of other diseases, and a low rate of morbidity<sup>3</sup>. In cases of impacted food bolus, pharmacological manoeuvres may be tried to move the bolus into the stomach. Glucagon (0.5 to 2 mg) given intravenously has been used to relieve distal food obstructions. It lowers the smooth muscle tone at the lower oesophageal sphincter without inhibiting normal oesophageal peristalsis. Glucagon, if given too rapidly, may cause vomiting and risk rupture of an obstructed oesophagus and should not be used in patients with sharp-edged foreign bodies<sup>1</sup>.

Gas forming agents have been rarely used. Two other agents used for distal food bolus impaction are nitroglycerine and nifedipine. Both of these agents have a relaxing action on the lower oesophageal sphincter, and are safe (if only marginally effective) manoeuvres for therapy of impacted food bolus. Effervescent agents are sometimes effective in accelerating the passage of an obstructing food bolus<sup>3,4</sup>. The administration of carbonated beverages (including soft drinks) results in the passage of the obstructing food bolus in 60% to 80% of patients treated. The use of enzymatic meat tenderizer (papain) to soften a food bolus, a traditional method, is not recommended. Some authorities advocate a period of observation in stable patients. The goal of observation is spontaneous passage into the stomach. This is not indicated in patients who present more than 24 hours after ingestion, or who have pooling and intolerance to oral secretions. The period of observation should not be more than 24 hours, a period of 8 to 16 hours is generally acceptable in asymptomatic children who have oesophageal foreign bodies<sup>53</sup>. Patients with sharp-edged, distal foreign bodies, those who have contraindications to use of the aforementioned agents, and those who do not respond to treatment should be evaluated with endoscopy.

Endoscopy should be performed immediately for patients experiencing significant distress and for children with impaction of an alkaline button battery. Batteries that pass into the stomach should be

followed radiographically and clinically to ensure passage<sup>50</sup>.(FIG 22)

Urgent intervention is also indicated for sharp objects, button batteries, coins in the proximal oesophagus, and impactions that impair the handling of secretions. Although balloon and magnet techniques have been used by radiologists to extract foreign bodies, endoscopy has become the treatment of choice at most institutions. Uncontrolled coagulopathy, cervical spine instability or rigidity, trismus or hypertrophic changes in the cervical spine may exclude the use of Rigid oesophagoscopy, although flexible oesophagoscopy may still be applicable.

#### **Oesophagoscopy and foreign body removal :**

Oesophagoscopy is considered a safe procedure with excellent retrieval rates. The choice of either flexible or rigid endoscopy, depends on the experience of the endoscopist and the equipments available. An essential benefit of both are the ability to examine the oesophageal wall after removal of the foreign body.

#### **Flexible endoscopes**<sup>33</sup>:

These are available in a wide range of diameters, beginning at 5.0 mm. In general, these have two or three channels in addition to an optical channel - one for suctioning secretions or insufflation of the oesophageal lumen and the others for introducing instruments. The main advantage is that it can be done under local anaesthesia, under conscious sedation, in

patients who are a significant risk for general anaesthesia, and also used in patients who have cervical spine diseases. Disadvantages: the diameter of the instrument port is 2.0 to 4.0 mm limiting the size of instruments that can be introduced through it. Hence the size and nature of the foreign bodies that can be removed is limited by the size of the foreign body graspers and suction catheters that can be introduced through it. Furthermore, since the foreign body cannot be retracted into the scope during removal, injury to the mucosa is more. Finally, the post cricoid, pyriform areas and cricopharynx are not well visualized using flexible scopes.

### **Rigid Oesophagoscopes**<sup>1,3,45</sup>:

Rigid scopes are available in various sizes, lengths and shapes, making this technique amenable to various situations. The oval open rigid scopes (Robert Jasberg ) are suited for foreign body removal. The round open ones (Jackson style ) are more suitable for negotiating obstructions and strictures. It has one central channel and one or two smaller channels. The large central channel accommodates a variety of instruments. The distal tip is thick and smooth increasing the ease of introduction of the instrument and decreasing the likelihood of mucosal trauma. Telescopes attached to the oesophagoscope aid in better visualization during manipulation and removal of the foreign body.



In the case of any foreign body, preliminary rehearsal of the intended procedure using a duplicate coin or button, as proposed by Chevalier Jackson, facilitates a subsequent manoeuvre and is more likely to produce successful results<sup>1,33</sup>.

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

If the foreign body is lodged high in the oesophagus, shorter cervical oesophagoscope may be used. Especially in children, to prevent the slippage of foreign body into the oesophagus from the cricopharynx when the muscle relaxant is given during anaesthesia, the patient is put in reverse Trendelenberg position. Longer oesophagoscopes are needed for objects that are present distally. The largest instrument that will pass easily is chosen for maximum visualization and ease of instrumentation. The patient should be positioned in a neutral sniffing position, with the cervical spine straight to allow easy passage over the cervical kyphosis. The scope is passed through the right side of the mouth and directed towards the pyriform fossa and angled towards the sternal notch. If the foreign body is too large to be withdrawn through the lumen

FIG 19 : FOREIGN BODY THROAT -  
BLADE



FIG 20 : OPEN SAFETY PIN



FIG 21 : MID OESOPHAGUS - RING

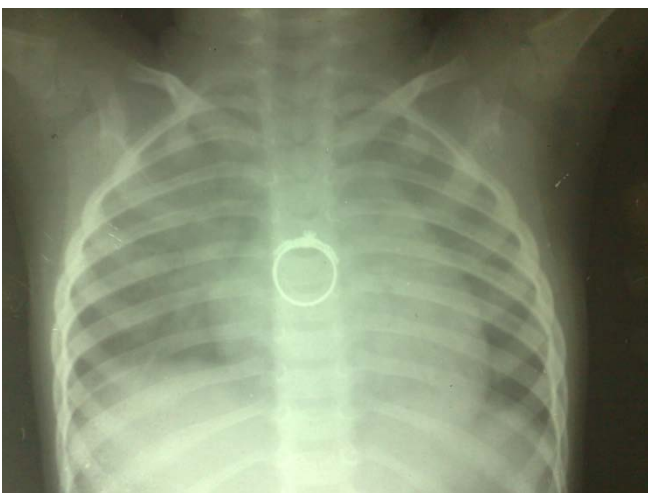


FIG 22 : FOREIGN BODY - ABDOMEN



the oesophagoscope is advanced to shield the foreign body<sup>4</sup>. Sharp objects should be sheathed or rotated, so that the point trails.

During manipulation of the scope, the left hand is used to advance the scope, and the right hand stabilizes the instrument. Injury to the posterior wall is common, if too much pressure is applied by the advancing tip of the scope. Lifting the distal tip with the right thumb as the fulcrum, will avoid injury<sup>4</sup>.

**Sharp objects**<sup>1,33</sup> : extraction of such objects is extremely challenging. Locating the point is crucial. The endoscope is aligned parallel to the long axis of the airway or oesophagus to minimize the likelihood of mucosal injury. The open safety pin (FIG 20) or other sharp or pointed objects should be removed with the dangerous edge ensheathed in the endoscope or with the points trailing. This often requires such techniques as endogastric version or inward rotation. A number of specialized instruments have been designed for such occasions, including pin bending forceps, broad staple forceps, rotation forceps and safety pin closing forceps (Clerf Arrowsmith forceps)<sup>1,4</sup>. If the sharp object is deeply impacted, then open surgical procedure may be the safest approach.

**Fish bone** : Fish bones are a common Upper Aerodigestive and oesophageal foreign body found in adults<sup>47</sup>. Fish bones are sharp objects and they can get lodged in the aerodigestive tract(FIG 23) and cause complications, although this is rare - about 1% to 3%. But the associated

FIG 23 : FISH BONE



TYPES OF FISHBONE REMOVED



complications are potentially catastrophic, including cervical abscess, mediastinitis, esophageal aortic fistula, Oesophago-carotid fistula and lung abscess<sup>1,51</sup>. Fish bones are translucent on physical examination and often radiolucent. They usually **lodge in the tonsils**, due to the presence of many crypts in which it gets caught<sup>1,4</sup>. It may be present in the posterior one third of tongue or the vallecula. It very rarely crosses these sites. Hence examination of the oral cavity and using an indirect laryngoscopic mirror after spraying an anaesthetic agent will identify the fish bone in majority of instances. The patient most often points to a site of irritation in the throat. If not found, then an endoscopic examination can be carried out and radiological investigation resorted to. Patients complain mostly of a foreign body sensation<sup>51</sup>. A sharp pricking sensation is highly predictive. A complete oral examination is mandatory<sup>51</sup>. Plain films may exhibit poor sensitivity when the bone is lodged in the area of maximum soft tissue overlap. There is also poor specificity because of thyroid, cricoid and hyoid calcifications, which can be misleading. One should not rely on a negative radiograph to rule out a retained bone . All patients who complain of a foreign body in the throat should be taken seriously. The current thinking is that in the absence of a proven retained foreign body, the sensations described are due to minor trauma of the digestive tract that are produced when the bone is swallowed<sup>1,51</sup>. Most of the time, these are removed by forceps under

direct vision, some times requiring endoscopic removal and rarely Rigid endoscopy<sup>56</sup>.

**Disc battery ingestion**<sup>4,49</sup>:

The peak incidence of ingestion occurs between 1 – 2 years of age. This requires immediate action. Radiography will locate the object. An immediate oesophagoscopy is performed to remove it and assess the state of the oesophageal mucosa. Mercuric oxide containing batteries can cause systemic mercury poisoning, if they open in the stomach. Prompt radiographic confirmation may show a double density shadow produced by a bilaminar disc battery, and the child should be prepared for endoscopic removal. The removal is difficult because of associated inflammation and the fact that it slips. Following removal, follow up radiography should be performed at regular intervals to exclude late development of stricture.

**Pill ingestion**<sup>1,3</sup> : medications in pill form may lodge within the oesophagus because of increased transit time, dry swallow, adherent swallow or supine swallow. They may cause caustic injury due to prolonged contact time with the mucosa.

Inadvertent swallowing of **Dental prosthesis**<sup>1</sup> can occur in a variety of circumstances to any edentulous person, but the stroke patient is at particular risk. Swallowing dysfunction and impaired oral sensation



FIG 24 : DENTURES IN THE OESOPHAGUS

X-RAY SHOWING DENTURE



ENDOSCOPIC VIEW OF DENTURE



DENTURES REMOVED

CT SCAN SHOWING DENTURE IN THE OESOPHAGEAL LUMEN



are the most common cause. A small prosthesis can be managed as a sharp foreign body(FIG 24), but an impacted dental plate may require an open approach.

In the **illicit practice of body packing**<sup>3,4</sup>(to smuggle heroin or cocaine hidden in swallowed latex bags) oesophageal impaction may occur. Any endoscopic manipulation can cause release of the contents into the gastrointestinal tract resulting in grave morbidity and death.

**Complications** encountered include perforation of the oesophagus with resultant mediastinitis and erosion into vascular structures. Negative endoscopy may also represent the migration of the object from the aero digestive tract necessitating further radiographic studies such as computerized tomography or magnetic resonance imaging in order to define its position better. In such situations, removal of the object may require thoracotomy.

**Post operative care** is usually straightforward and antibiotics or corticosteroids are necessary only for the treatment of complications.

Another removal strategy, best suited for smooth, non-impacted and blunt objects, employs a contrast-filled balloon catheter and fluoroscopy. It was first described in 1966. Contraindications to foley's catheter include total oesophageal obstruction, which prevents passage of the catheter tip distal to the foreign body, oesophageal perforation, sharps and multiple oesophageal foreign bodies. A Foley's catheter is introduced



FIG 25 : X-RAY NECK LATERAL VIEW-  
COIN - CRICOPHARYNX



FIG 26 : X-RAY CHEST LATERAL VIEW  
SHOWING OPEN SAFETY PIN IN  
OESOPHAGUS



FIG 27: RETROPHARYNGEAL  
ABSCESS



FIG 28 : FOREIGN BODY WITH  
RETROPHARYNGEAL ABSCESS



into the oesophagus, and the balloon is passed beyond the foreign body, inflated with radiographic contrast material, and withdrawn under fluoroscopic monitoring. Another strategy for active foreign body removal is Bougienage. Bougienage has been found in one study to be equally safe, more efficient, and much less expensive than endoscopy<sup>33</sup>.

After the removal of an oesophageal foreign body, regardless of the method used, a search is made for a second foreign body as multiple foreign bodies are present in 5 % cases. A follow-up oesophagogram is frequently necessary to evaluate oesophageal anatomy and patency.

#### **Oesophageal perforation**<sup>3,4</sup>:

The commonest complication of oesophagoscopy is perforation due to : 1.absence of serosal layer .2.negative intrathoracic pressure.

Oesophageal perforation is a potentially life-threatening condition. It may be caused by the foreign body itself, the length of time it is present,or during attempts to retrieve it .Most iatrogenic injuries occur at the pharyngoesophageal junction because the wall in this area is thin and there is no serosal layer to reinforce it. Another site is the oesophagogastric junction. Other factors predisposing to iatrogenic perforation include anterior cervical osteophytes, Zenker's diverticulum, oesophageal strictures, achalasia, patients on long term steroids, corrosive poisoning and malignancies. The mortality rate for cervical and abdominal perforations are 23 to 25 % and for thoracic is 40 to 45 %. If

identified within 24 hrs of occurrence, the mortality drops from 45 to 25 %.<sup>3</sup> When a perforation occurs, saliva and gastric contents can enter the mediastinum.

Patients with an upper oesophageal perforation usually present with neck or chest pain, dysphagia, respiratory distress and fever. Odynophagia, nausea, vomiting, hoarseness, or aphonia may also result. Patients with perforation of the lower esophagus may present with abdominal pain, pneumothorax, hydropneumothorax, and pneumomediastinum. The pain often radiates into the back, to the left side of the chest, and to the left or both shoulders. Most patients have mediastinal or cervical emphysema, with a “crunching” sound heard during auscultation (Hamman's sign)<sup>33</sup>. Abdominal examination may reveal epigastric or generalized abdominal tenderness, often with guarding and involuntary rigidity. Patients with severe mediastinitis may present in fulminant shock.

Pain or fever following oesophageal instrumentation should be considered an indication of perforation until proved otherwise. The patient should be observed for at least 8 – 12 hours, when they are kept nil oral and on intravenous fluids. Antipyretics and analgesics are not given during this period as they may mask the symptoms of perforation. Chest radiograph and an upright abdominal radiograph are usually obtained first. Radiographic abnormalities may be detected in up to 90% of

patients such as subcutaneous emphysema, pneumomediastinum, mediastinal widening, pleural effusion, or pulmonary infiltrate. Radiographic changes may not be present in the first few hours after the perforation. Barium sulfate is superior in identifying small perforations; however, it may incite an inflammatory response in tissues. For this reason, water-soluble agents (e.g., Gastrografin) should be used first. Candidates for emergency management are clinically unstable patients, patients with perforations that contaminate the mediastinum or pleura, patients with intra-abdominal perforations, or patients with perforations with associated pneumothorax<sup>1,3</sup>. Broad-spectrum intravenous antibiotics should be initiated early. Patients should be kept nil oral, and a Ryle's tube feeding advocated. Either a low cervical incision or a thoracotomy is then required to repair the perforation if possible and drain the site. Some iatrogenic perforations can be managed conservatively, with close observation in certain low-risk patients who are clinically stable.

### **Complications of oesophagoscopy :**

Oesophageal perforation , haemorrhage , trauma to lips and tooth, laryngeal or oesophageal edema secondary to manipulation in the postcricoid area or esophagus is usually transient and resolve within 48hrs, arrhythmias , aspiration pneumonia , pneumothorax , cervical spine injury and aortic aneurysm rupture<sup>26,29</sup>.

Sharp pointed objects are associated with greater mortality. Vascular accidents and diffuse suppurative processes are the most common cause of mortality. Any foreign body that causes fever, vomiting, abdominal pain, or significant symptoms and Objects that remain in the location for more than 1 week should be considered for surgical removal .The longer the foreign body is present in the aerodigestive tract, the more difficult it is to remove.

## **MATERIAL AND METHODS**

**Study design :** Prospective

**Study period :** July 2007 To September 2009

**Study place :** The study was conducted in Upgraded Institute of Otorhinolaryngology, Government General Hospital, Madras Medical College, Chennai – 03 and in The Institute of Child Health, Egmore, Chennai 08.

**Study population :** All patients with upper aero digestive Tract Foreign body who reported to the department of otorhinolaryngology of Madras Medical College and Institute of Child Health, during the study period.

**Inclusion criteria :** 1. All age groups with history of foreign body aspiration / ingestion.

2. Patients with complications of foreign bodies even without a history.

**Exclusion criteria :** 1. Patients not willing for study.

2. Animate foreign bodies were excluded from the study.

Patients of all ages, including children and adults were included in the study. A total of 350 patients were studied, of which 115 were adults and 235 were children < 12 yrs. A total of 185 were males and 165 were females. A detailed history including situation in which the foreign body was aspirated or ingested, symptoms and clinical features were

elicited by a pre-structured questionnaire. A thorough examination of vitals, ear, nose and throat, abdomen and respiratory system were done in all cases.

In foreign bodies throat, x-ray soft tissue neck antero-posterior and lateral views were taken. x-rays were not taken if the foreign body was visible on clinical examination. Chest x-ray and plain x-ray abdomen were taken for all patients with ingested foreign bodies and computerised tomography of neck and chest were taken if found necessary. x-ray and computerised tomography of nose and nasopharynx were done if needed. Endoscopic assessment was done if x-rays did not reveal a foreign body, in patients with a strong history of foreign body. Appropriate lab tests were done. Procedures done were,

1. **Office procedure:** It was used for foreign bodies lodged in the faucial tonsils, base of tongue and nose. It was done under local anesthesia. Appropriate instrument was used to remove the foreign body.
2. **Nasal endoscopic removal:** this method was used for foreign bodies in the nose and nasopharynx under local/general anaesthesia.
3. **Rigid endoscopy:** Depending on the location of the foreign body, the appropriate endoscope was used; namely, direct laryngoscope, oesophagoscope, and bronchoscope.

All patients who underwent procedure under general anaesthesia, were observed postoperatively for 24 hours and repeat or

check x rays were done in airway foreign bodies after 48 hours .In case of complications, endoscopic/open procedures were performed. They were :

1. **Endoscopic drainage:** for retropharyngeal abscess. Using rigid oesophagoscopy, the site of maximum bulge was palpated and a linear incision was made to drain the abscess. A ryle's tube was inserted and patient started on antibiotics and analgesics.

2.**Tracheotomy** : for patients with central airway foreign bodies, with difficulty in removal by routine bronchoscopy.

3.**Thoracotomy:** For failed bronchoscopic retrieval of obstructing foreign body. A standard thoracotomy incision was used.

All data including age of presentation, the types of foreign bodies, clinical features, radiological and endoscopic findings, procedures done, outcome, hospital stay and complications were noted, tabulated and analysed.

#### **ETHICAL COMMITTEE APPROVAL :**

Institutional Ethical Committee, Government General Hospital, Madras Medical College, Chennai reviewed the experimental design and protocol as well as the letter of information and consent form. Full approval of the board was granted. All patients were given information outlining the experimental protocol and all patients signed a consent form prior to entering the study.



## **RESULTS AND ANALYSIS :**

In this study on aerodigestive tract foreign bodies, among **350 patients**, foreign bodies were more common in children (67%) than adults (33%). {CHART 2} 163 were in the airway and 187 in the digestive tract {GRAPH 1}

**Airway foreign bodies** were more common in children (98%) and digestive tract foreign bodies in adults (60%) {TABLE 3}. The most common age group for nasal foreign body was 2-3 yrs and for tracheobronchial foreign body was 1-2 yrs. {TABLE 1 and 2}

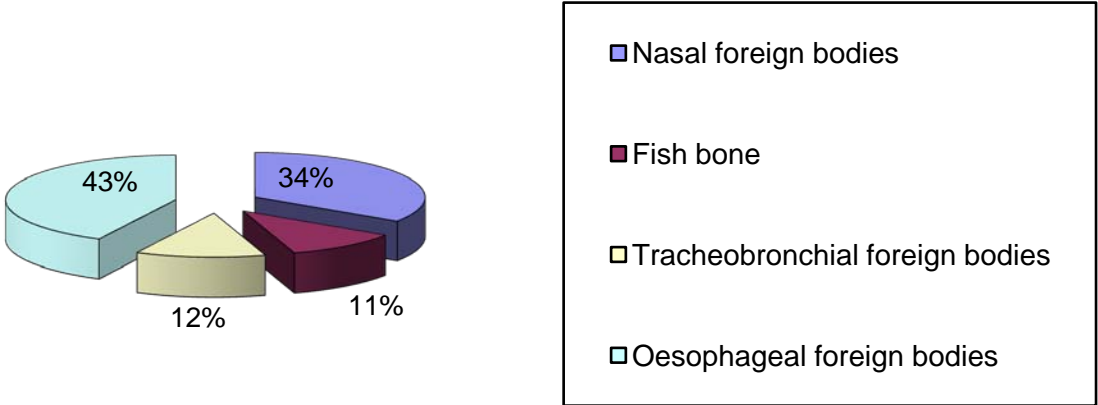
In general, males (52.85%) had a higher prevalence than females (47.14%) {CHART 3}, {GRAPH 3}. In nasal foreign bodies, the child putting the object into its nose was more common (96.66%), than put by another child (3%) {CHART 4}

**The most common incident** leading to digestive tract foreign body was careless eating and in children the second most common was accidental slippage. {GRAPH 4 and 5}

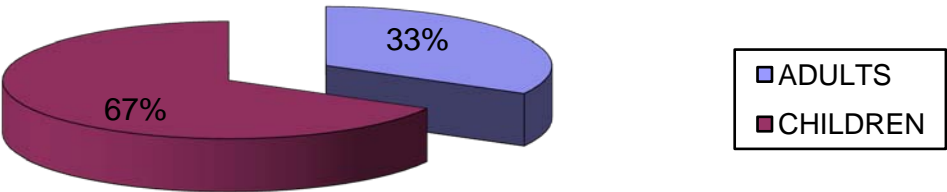
### **History of foreign body ingestion/aspiration:**

The presence of history of foreign body was more accurate in digestive tract (97%) and nasal (95%) than tracheobronchial foreign bodies (86%) {CHART 5}.

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



**CHART 2 : Distribution among adults and children :**



**TABLE 1: Age:**

AIRWAY(163)

DIGESTIVE TRACT(187)

Age(Years)	Number	%
0-12	159	97.54
13-20	3	1.84
21-30		
31-40		
41-50	1	0.61
51-60		
>61		

Age(Years)	Number	%
0-12	76	40.64
13-20	9	4.8
21-30	15	8.02
31-40	27	14.43
41-50	21	11.2
51-60	25	13.36
>61	14	7.4

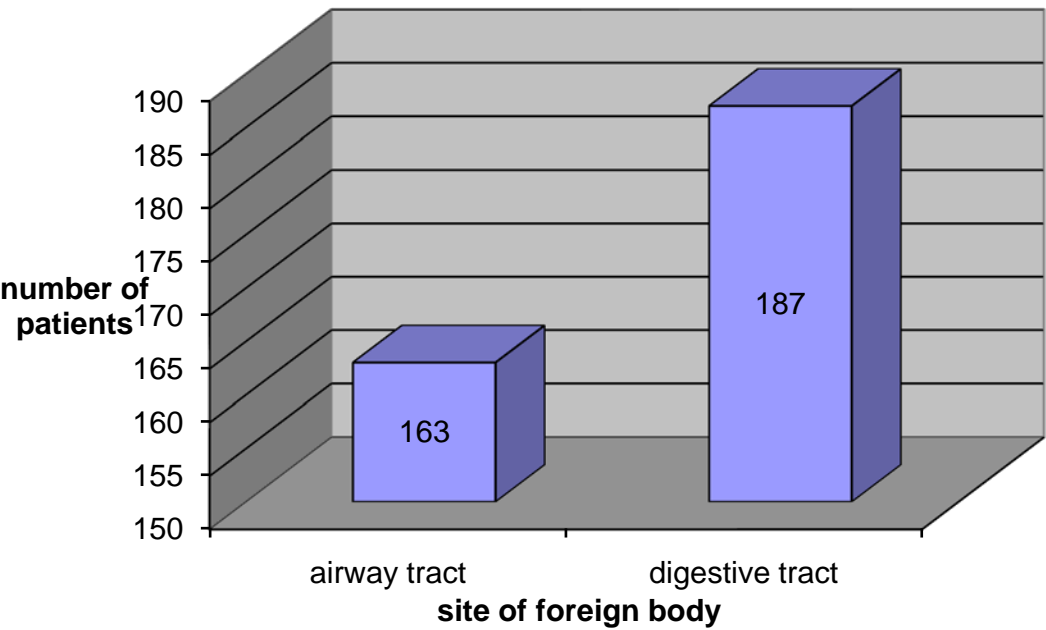
**TABLE 2: Age :**

Age in years	Nasal		Tracheobronchial	
	Number	%	Number	%
0-1	3	2.5	8	18.6
1-2	25	20.8	15	34.88
2-3	42	35	9	20.9
3-4	28	23.3	4	9.3
4-5	10	8.3		
>5	12	10	7	16.27

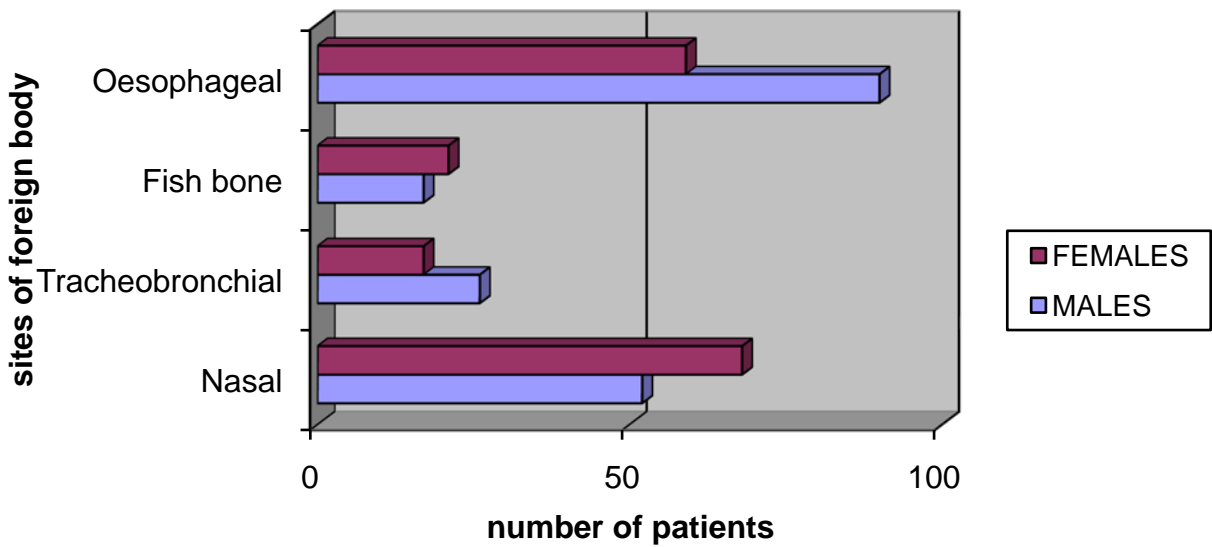
**TABLE 3: Distribution between adults and children:**

	Airway(163)	Digestive tract(187)
CHILDREN	159(97.54%)	76(40.64%)
ADULTS	4(2.4%)	111(59.35%)

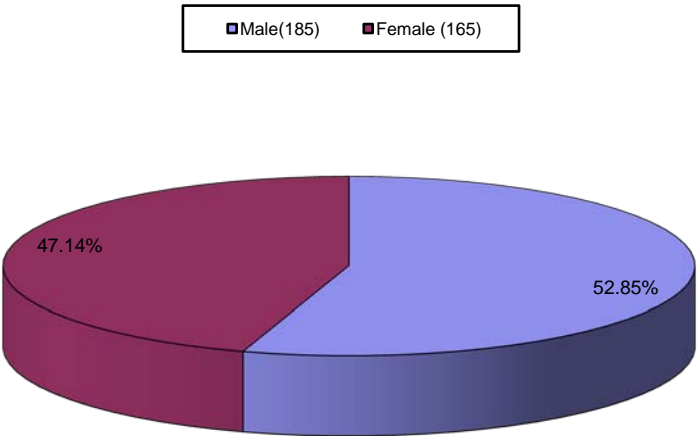
**GRAPH 1: Overall distribution between airway and digestive tract :**



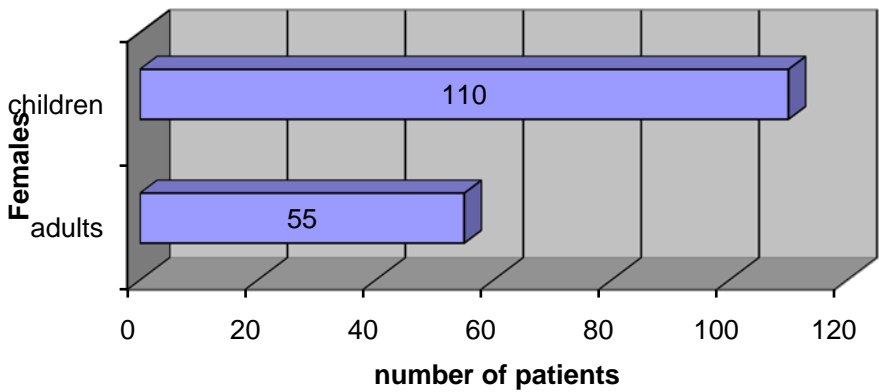
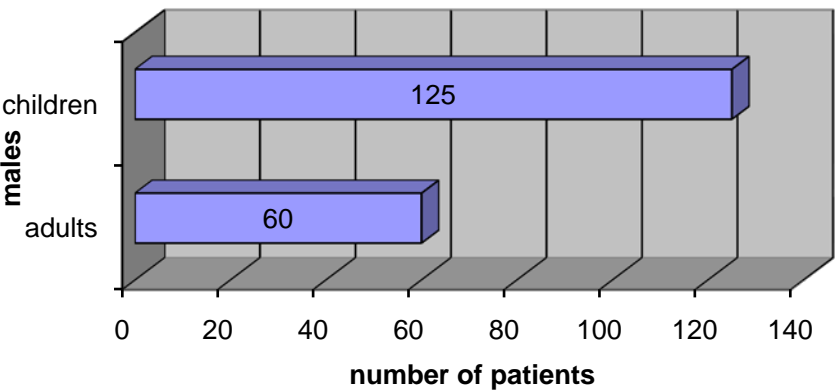
**GRAPH 2 : Sex distribution in various foreign bodies :**



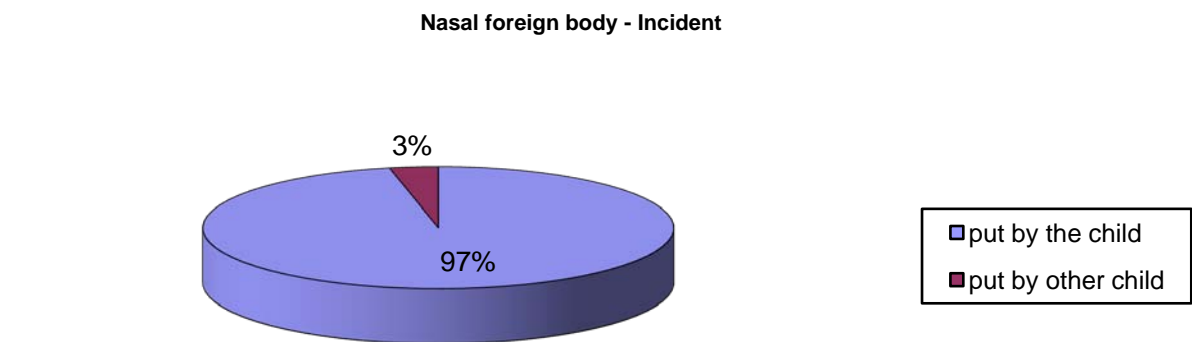
**CHART 3: Over all sex distribution:**



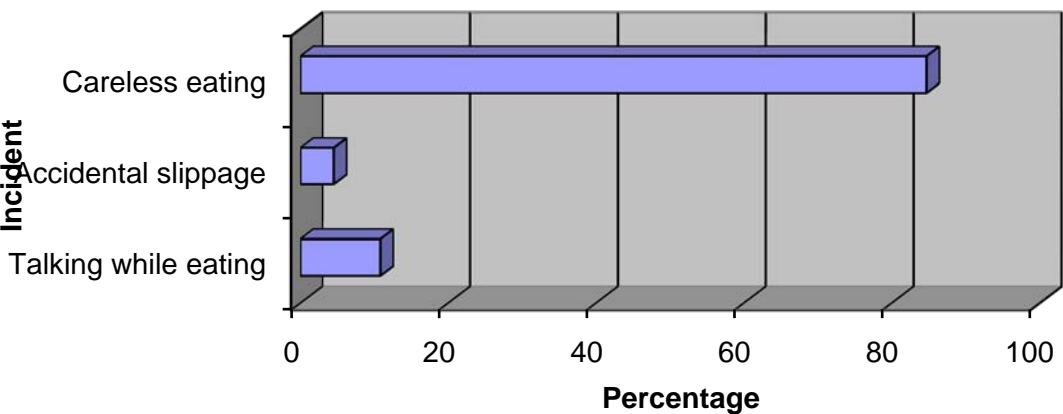
**GRAPH 3 : Sex distribution in adults and children :**



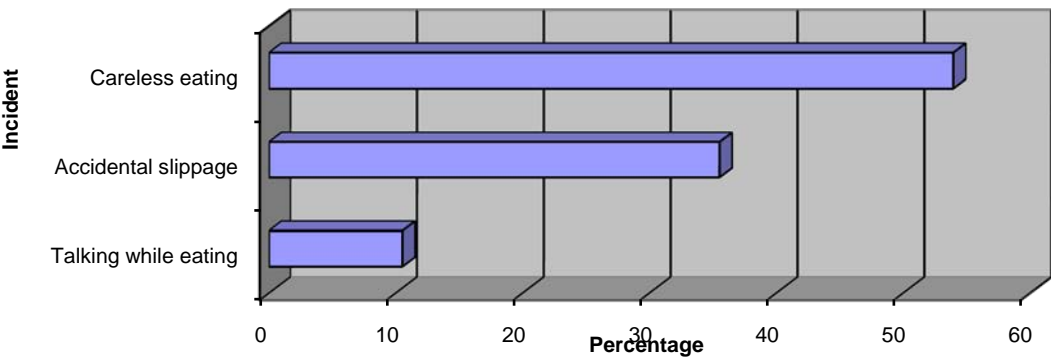
**CHART 4: Incident causing nasal foreign bodies:**



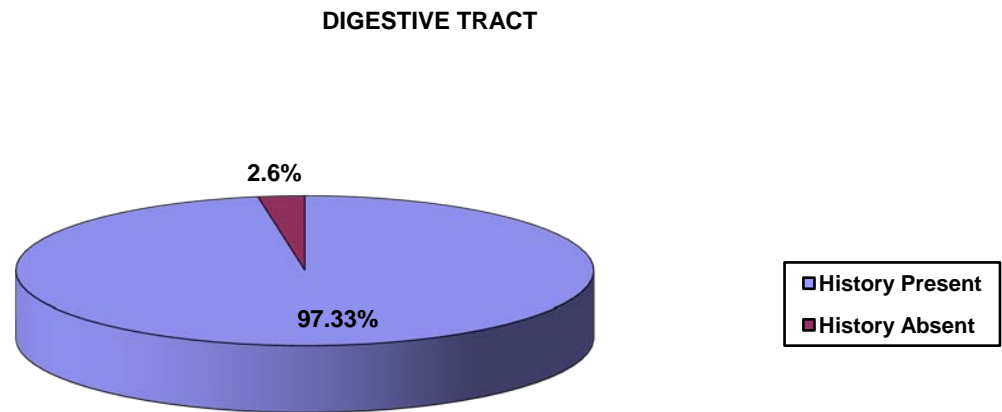
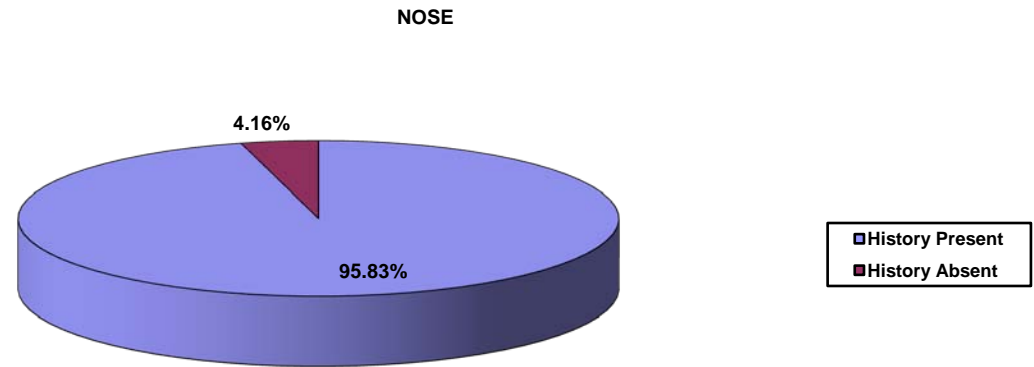
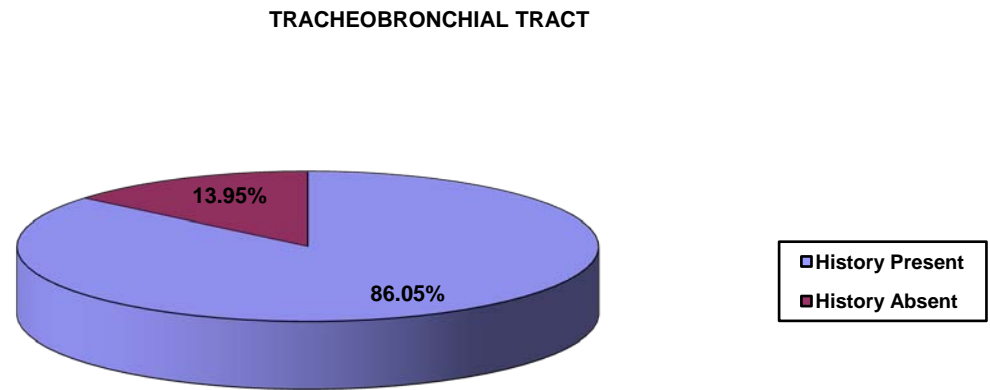
**GRAPH 4: Incident causing digestive tract foreign bodies – adults:**



**GRAPH 5: Incident causing digestive tract foreign bodies in children:**



**CHART 5 : History of ingestion/aspiration of foreign body :**



### **Types of foreign bodies:**

The most common foreign body in the digestive tract in adults was fish bone followed by chicken bone. In children it was coins(58 out of 68 coins in total). In the nasal cavity 27% was food articles followed by plastics (21%).In the tracheobronchial tree it was groundnuts.{TABLE 6}

**TABLE 4: Types of nasal foreign bodies :**

Objects	Number	%
Food articles	33	27.5
Plastics/beads	26	21.6
Chalk	20	16.66
Stones	16	13.33
Button battery	15	12.5
Rubber	5	4.16
others	5	4.16

**TABLE 5 : Types of digestive tract foreign bodies :**

Objects	Number	%
Coin	68	38.9
Fish bone	38	21.71
Chicken bone	24	13.71
Mutton piece	15	8.57
Metals/sharps	9	5.14
Seeds/nuts	5	2.8
Dentures	15	8.57
Button battery	1	0.5



**TABLE 6 : Types of tracheobronchial foreign body:**

Object	Number	%
Ground nut	20	46.51
Other seeds	9	20.93
Sharps	8	18.60
Whistle/plastics	6	13.9

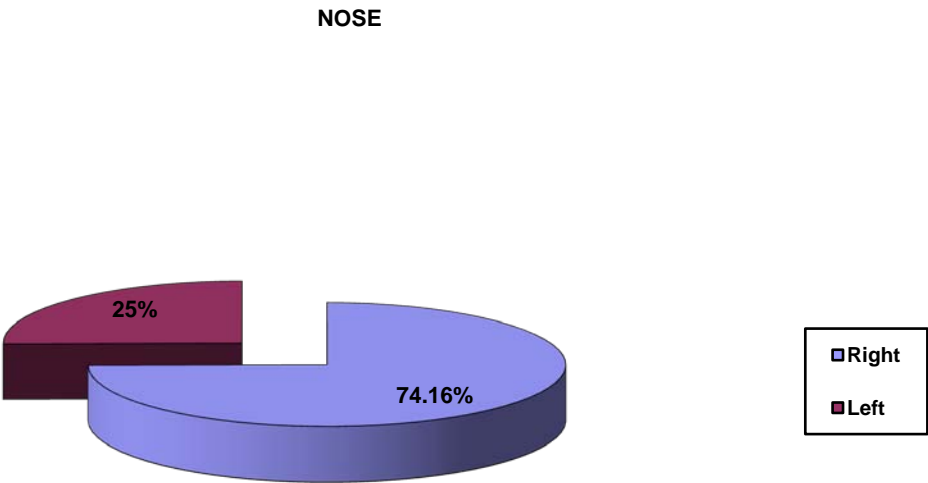
**SITES OF FOREIGN BODY :**

In the nose (74%)and bronchus (68%), right sided foreign bodies were more common than left.{CHART 6 and 7}

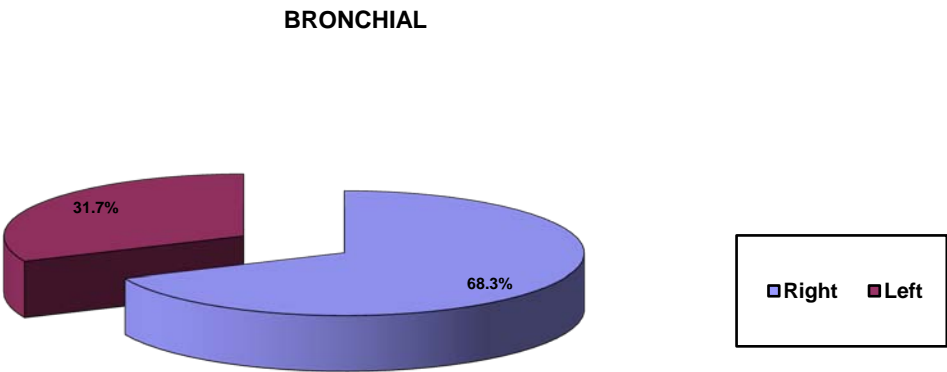
The most common site of digestive tract foreign body was cricopharynx (75%). Next was the oropharynx where fish bones commonly lodged (18%),of which tonsils were the most common site.{TABLE 7 and 10}

In the airway, majority of the foreign bodies were in the nasal cavity(74%) and the rest were in the tracheobronchial tree (26%).

**CHART 6 : Most common Site of Nasal foreign body :**



**CHART 7: Most common site of Bronchial foreign body :**



**TABLE 7 : Site of Digestive tract foreign body:**

Site	Number	Percentage
Oral cavity	1	0.5
Oropharynx	32	18.29
Posterior pharyngeal wall	3	1.71
Pyriform fossa	2	1.41
Cricopharynx	130	74.29
Mid and Lower oesophagus	7	4

**Presentations of the various foreign bodies:**

The commonest presentation in tracheobronchial tract foreign bodies was cough (69%) and difficulty in breathing(18%),and 25% had fever, which were all in delayed presentations{TABLE 8}. In the digestive tract, difficulty in swallowing (77%) and throat pain (72%)were the most common symptoms. Induced vomiting was seen in almost 80% of the individuals.{TABLE 9}

**TABLE 8:Symptoms of Tracheobronchial foreign body :**

Symptoms	Number	Percentage
Cough	32	69.78
Respiratory distress	8	18.60
Cough+distress	5	11.62
Chest pain	5	11.62
Fever	11	25.59

**TABLE 9: Symptoms of Digestive tract foreign bodies:**

Symptoms	Number	Percentage
Difficulty in swallowing	144	77
Excessive salivation	110	58.82
Throat pain	136	72.72
Vomiting	126	67.38
Respiratory distress	2	1.06
Induced vomiting	150	80.21

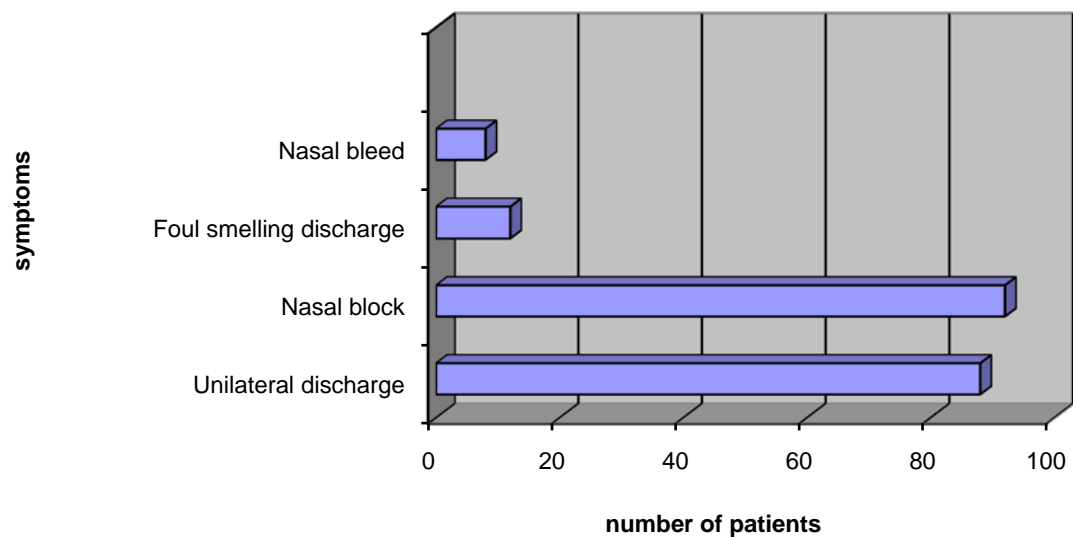
In the nasal cavity, nasal block (92%) and unilateral nasal discharge (88%) were the commonest. Foul smelling nasal discharge was seen in delayed presentations. {GRAPH 6}

The clinical findings in tracheobronchial foreign bodies were diminished air entry on auscultation (93%) and respiratory distress (67.44%) {GRAPH 7}

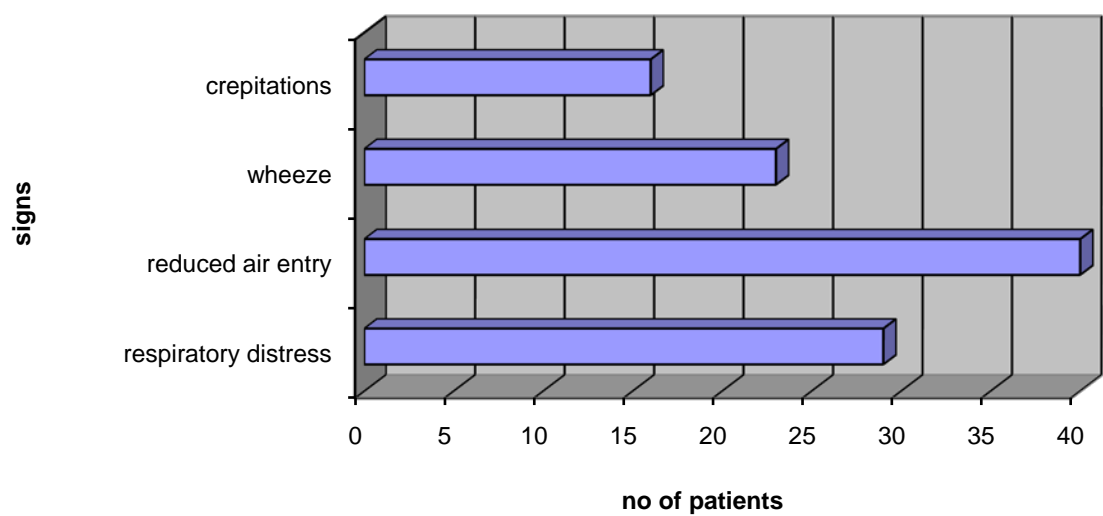
**TABLE 10:Site of Fish Bone :**

Site	Number	%
R – tonsil	10	26.3
L- tonsil	9	23.6
Posterior 1/3 <sup>rd</sup> tongue	7	18.4
Vallecula	6	15.8
Posterior pharyngeal wall	3	7.8
Pyriform fossa	1	2.6
Right side gums	1	2.6
Cricopharynx	1	2.6

**GRAPH 6: Symptoms of Nasal foreign body:**



**GRAPH 7: Clinical findings in Tracheobronchial foreign bodies :**



### **Radiology in Aerodigestive tract foreign bodies :**

In the tracheobronchial foreign bodies, radiology revealed a definite foreign body only in 79%. In the rest, features of doubtful foreign body were present. But in the oesophageal foreign bodies, 89% showed definite presence. In the remaining, features of air column in the region of cricopharynx and other features suggesting the presence of foreign body were only seen, including the negative scopies.{CHART 8 and 9}

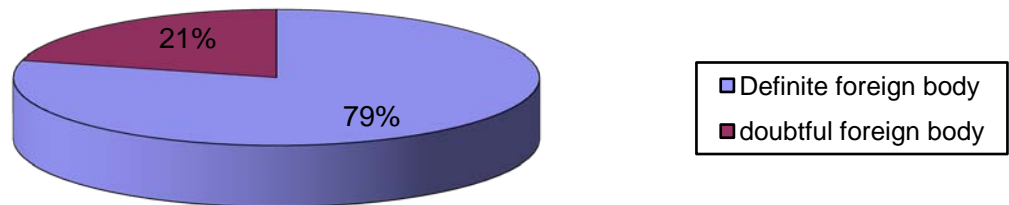
### **Dentures :**

Regarding dentures, most of the patients gave history of ill-fitting dentures (80%), that did not have hooks of wires, and were most common in the 6<sup>th</sup> decade of life. In the rest of 20%, carelessness was the cause. Only one out of 15 cases was an impacted denture, which presented difficulty in removal and needed fragmentation and removal and good antibiotic cover.{CHART 10}

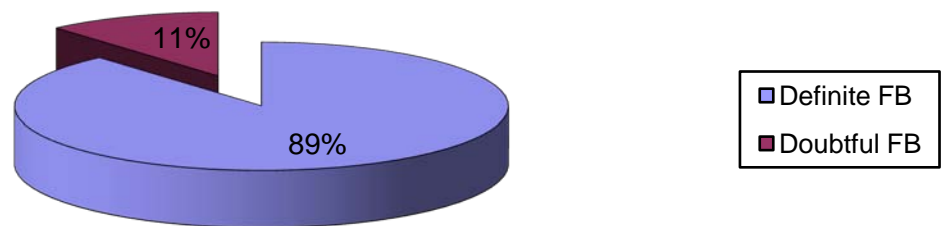
### **Management :**

Regarding the management of the various foreign bodies, majority of the nasal objects (88/120) and fish bones(29/38) were removed as an office procedure. Among the rest, rigid endoscopic (66%) removal was the mode of management employed of which 42% and 22% were oesophagosopic and direct laryngoscopic removal, respectively. Hopkins rod lens endoscope was employed in 17%.{CHART 11 and 12}

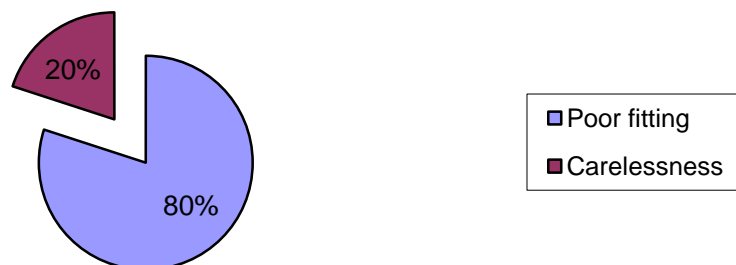
**CHART 8: Radiology in Tracheobronchial Foreign bodies:**



**CHART 9: Radiology in Oesophageal foreign bodies :**



**CHART 10: Etiology for Dentures as foreign bodies :**



**TABLE 11 : Procedures done:**

Procedure	Number	Percentage
Direct removal	117	33.43
Endoscopic removal	232	66.28
Tracheotomy	1	2.3
Thoracotomy	1	2.3
Incision and drainage	6	32.08

**TABLE 12 : Endoscopic procedures done :**

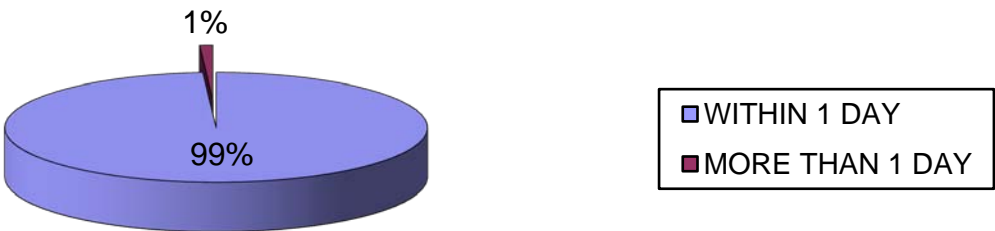
Procedure	Number	Percentage
Oesophagoscopy	98	42.06
Bronchoscopy	42	18.02
Direct laryngoscopy	53	22.74
Hopkins rod lens endoscopy	40	17.16

**Time of presentation:**

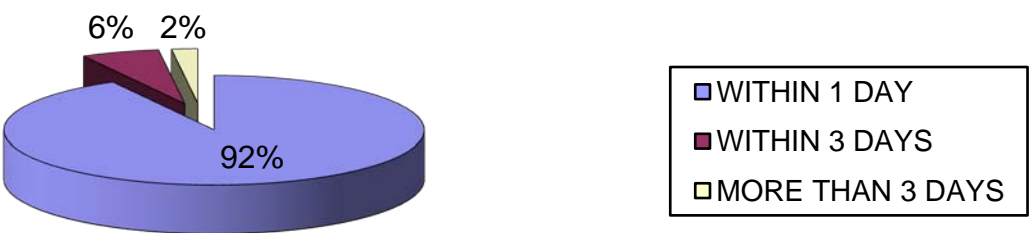
Most of the patients presented within 1 day of the incident.99% of foreign body ingestion presented within 24 hrs. But delay was more common in nasal and tracheobronchial foreign bodies. 92% came within a day of the incident, but 6% and 2% presented within 1-3 days and more than 3 days respectively. In delayed presentation, fever, lung crepitations and oedema around the foreign body were found.{CHART 10}



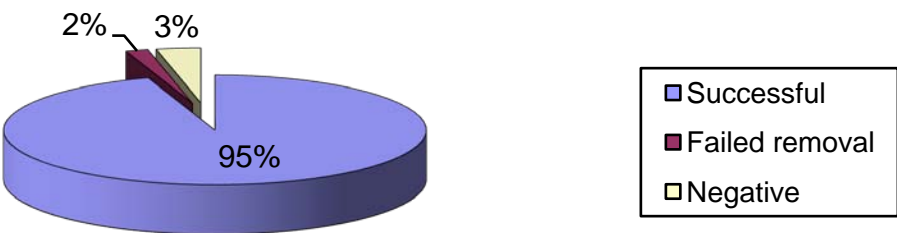
**CHART 11: Time of presentation:**  
**Digestive tract**



**AIRWAY**



**CHART 12: Outcome :**



## **OUTCOME :**

Successful removal of foreign bodies was done in 95%. All the cases, {in 3.4%(12 out of 350)}with history of foreign body ingestion and with negative endoscopy, were adults. Of these 5 patients had strictures, one had cricopharyngeal web and in 6 patients no foreign body was found.{CHART 12}

In a total of 6 foreign bodies,5 digestive tract foreign bodies, and 1 bronchial foreign body could not be retrieved, as they passed distally. Post-operative radiological evaluation was done in the 5 digestive tract foreign bodies, to locate the site, and were referred to surgical gastroenterology department. The bronchial foreign body required thoracotomy.

**TABLE 13 : Outcome :**

Outcome	Number	Percentage
Successful removal	332	94.86
Failed/slipped	6	1.71
Negative	12	3.4

## **COMPLICATIONS :**

Overall complication rate was 4.2%. The only complication encountered in ingested foreign body was retropharyngeal abscess (3.2%). Injury to the teeth as a complication of oesophagocopy was encountered in 11 cases (11.2%), which were in elderly patients who had a loose tooth. This complication was explained to these patients prior to the procedure.

**Retropharyngeal abscess** as a complication of chicken bone in the digestive tract was managed by endoscopic foreign body removal and incision and drainage (6 cases). Thoracotomy and tracheotomy for airway foreign body complication was required in (2.3%) each.

Thoracotomy was done for a patient with airway foreign body, and no cases of tracheoarterial fistula, lung abscess or mediastinitis were seen. Out of 43 tracheobronchial foreign bodies, 5 presented with **recurrent bronchopneumonia** and 3 cases with **collapse of lung**, though complete recovery was seen in the post op. Granulation tissue was encountered in about 16 cases, most of which were seen in delayed presentations.

**TABLE 14: Complications:**

Site	Overall percentage	Number
Airway	20.9%	9
Digestive tract	3.2%	6

## **DISCUSSION**

A total of 350 patients were included in the study. Of these 185 were males and 165 were females. 163 were airway foreign bodies and 187 were digestive tract foreign bodies. Of these, 43 were in the **tracheobronchial passage**, 120 were in the **nasal cavity** and 175 in the **digestive tract**. 12 were **negative** for foreign body.

**Among 350 cases**, 235 foreign bodies were in children (67 %) and 115 were in adults (33%). In children majority of the foreign bodies were in the age group less than 4 yrs

The **sex distribution** in digestive tract foreign bodies was in favour of males (58%), compared to females (47.8%) and in the airway, was slightly more in females (52%), compared to males (41%). In studies by Brooks et al, Jackson et al, Kim et al and Hung W and Lim there was no significant difference in sex distribution<sup>1,52</sup>.

**History of foreign body** was present in 97 % in throat and slightly less in the tracheobronchial tract (86%). In the nose, 95% had a definite history.

### **AIRWAY FOREIGN BODIES:**

In the nose, **the peak age** was around 3 years, which correlates well with Francois M et al and Balbani APS et al<sup>55</sup>. In the tracheobronchial tract, the majority of foreign bodies were in the age between 1 and 2. The types of foreign bodies were a variety. In the

airway, nuts and seeds were the commonest in children. (nose – 27% and tracheobronchial tract 46%). This observation is also seen in the study by Chee LW and Sethi DS and Baharloo F et al<sup>58</sup>.

**Foreign body aspiration is very rare in adults** (6%), of which sharp objects were more common. In a study by Sharma et al it was found that adults are more likely to have non-food items aspirated. **Regarding symptoms** in the tracheobronchial tract, choking associated with cough was seen in 70% of children. 18% had difficulty in breathing and 25% had fever due to delayed presentation. This well correlates with Baharloo F et al<sup>58</sup>. In 96%, choking episode was found in the study of Methanol S et al. In the nose, the mother noticed a blocked nose in the majority of patients (76%), followed by unilateral nasal discharge (73%). **Complications** such as nasal bleeding, were present in less than 6%.

Nearly 92% of patients (149 patients) with foreign body, presented within 1 day of the incident, 6% within 3 days (9 patients) and 2% beyond 3 days (5 patients). But children with foreign body in the nose and bronchus have **delayed presentation** even up to one month. In this study the most delayed was a bronchial foreign body - after five days. Complications such as lung collapse and recurrent bronchopneumonia were seen in 18% and more so in late presentations. Similar findings were earlier published in the studies of Campbell et al, Black et al and McGahren et al. In the study of Bodart E et al only half of patients with

foreign body bronchus presented within 1 day, 20% within 1 week and 20% more than 1 week<sup>59</sup>. **In the nose**, the child putting the foreign body into its nasal cavity was more common (96%), than by another child.

In the airway, **diminished breath sounds** were present in 93% in this study. Ronchi and crepitations in 53% as compared to 37% by Baharloo et al and 50% by Bodart et al<sup>59</sup>. **Radiological examination** revealed evidence of definite foreign body in 79% and doubtful in 20%. **Complications** in airway foreign bodies was very rare, which were mainly unresolving bronchopneumonia (11.6%) and lung collapse (6.9%). Granulation tissue was present in 16 cases (37%)

In the **nasal foreign bodies** 73.33% (88 patients) was direct removal and 26.66%(32 patients) required endoscopic removal. Tracheobronchial objects were all removed by rigid endoscopes except one patient which required a thoracotomy.

### **DIGESTIVE TRACT :**

In the digestive tract , 40 % were under 12 yrs of age and of them more than 50% were between 5 and 10 years. Lowest incidence was in the 2<sup>nd</sup> decade, and 3<sup>rd</sup> decade. A rise was seen the 4<sup>th</sup> and 5<sup>th</sup> decade. But it was found the no age group was spared. Studies by Jackson et al<sup>1</sup>, Hung and Lin, Massachusetts hospital and Black RE et al have shown that children younger than 10 years are most vulnerable, as in this study. Baharloo F et al has found peak incidence at 2 years in children<sup>58</sup>.

During swallowing, the **most common incident leading to accidental ingestion** was careless eating, (85%) in adults. Accidental slippage while placing the objects in mouth was the second commonest cause, more so in children (35%), compared to adults (4%).

In the digestive tract, **coins were the most common** (85%) **in children** (58 patients), compared to 14% (10 patients) in adults. **In adults, fish bone was the most common** foreign body(86%)followed by chicken bone. Similar observation was also seen in the study of Kamat et al, in the costal belts of South India (39%) and by Ravi Seshadri<sup>60</sup>.

**The most common symptom** was difficulty in swallowing (77%), followed by throat pain (72%). This observation correlates well with the study of Murty PSN et al and Abdul Aziz A et al. Pain localization is better in pharyngeal foreign bodies than in the oesophagus, as observed by Cannoly et al. Side of throat pain or foreign body sensation correlated well with the side impaction. Pooling of saliva was seen in 58%, but not as found in the study of Jones NS et al(85%)<sup>61</sup>.

In adults, 80% of patients with foreign body throat were partially edentulous, which correlates with previous studies by Bloom DC et al and Brown L et al. In 90% of patients with **dentures** in the oesophagus, the most common cause was ill fitting dentures, without a proper hold on the teeth by hooks or wires, and most commonly seen in the 6<sup>th</sup> decade of life.

In oesophageal foreign bodies, definite **radiological findings** were seen in 89% and in 11% it was doubtful. Lowinger DSG et al recommended looking for secondary changes providing clue to the foreign body when it is not seen radiologically. 99% patients presented within 1 day of the incident and only 1% presented after a day.

**The most common site of foreign body impaction** in throat was cricopharynx 74%. This also correlates well with the study of Murty PSN et al, Abdul Azeez A et al and several others. Regarding the procedures used, oesophagoscopy (42%) was the commonest and the other modality was direct laryngoscopy (22%). **Endoscopic retrieval** of foreign bodies was done in 66% and direct removal in 33%. In fish bones, in 29 out of 38 patients, direct removal was done.

In this study, complication such as oesophageal perforation was nil. In a study by Binder L et al, Chaikhonni A et al and Garcia C et al such cases occurred<sup>21</sup>. This was seen in sharp foreign bodies. Most common complication due to foreign body was retropharyngeal abscess, which is also observed by Hung W et al and Singh et al.

**Successful removal** as outcome was seen in 94%.



## **SUMMARY:**

In a total of 350 patients included in the study, 185 were males and 165 were females. Airway foreign bodies were 163 and 187 were in the digestive tract. Out of 163 objects, 43 were in the tracheobronchial passage, 120 were in the nasal cavity, which showed a higher incidence in children below 4 years. In general, aerodigestive foreign bodies were more common in children – 67% and in adults it was 33% only.

**A history of foreign body** was more accurate in digestive tract and nasal foreign bodies (>95%), whereas in the tracheobronchial tree, 85% accuracy only was seen.

In the **nasal foreign bodies**, food related objects were the commonest – 27%, followed by plastics (21%). Right sided nasal foreign body (75%) exceeded the left side (25%). Nose block was the commonest symptom (92%), following insertion of foreign body, which was in >95% by the child itself. Direct removal of nasal objects was done in 74%.

In the **tracheobronchial foreign bodies**, bronchial were 96% and the right main bronchus lodged around 70% of them. Cough and respiratory distress were the commonest symptoms (70%). Reduced air entry as a clinical finding was present in 93%.

Among 350, 175 foreign bodies were **in the digestive tract**. 38 were fish bones and 137 were in the oesophagus. 12 were negative for foreign body. The most common in adults was **fish bone** and chicken

bone (21%) and 13%). In children the commonest was **coin impaction** - >80%. The commonest site in both adults and children was cricopharynx – around 75%. Difficulty in swallowing was the **commonest complaint** (77%) followed by throat pain (72%). Accidental denture ingestion occurred most commonly in the sixth decade of life. Among the **12 negative** endoscopies, all were adults and 5 patients had stricture oesophagus and 1 cricopharyngeal web was identified.

In **airway foreign bodies**, 92% presented within one day, but 99% of digestive tract foreign bodies presented within a day. **Radiological assessment** revealed definite foreign body in 89% of digestive tract and 79% of airway foreign bodies.

**Endoscopic removal** played the major role in management of foreign bodies (67%) and 33 % was by direct removal. The percentage of oesophagoscopies done was 42% and bronchoscopies was 24% overall. In children, direct laryngoscopy was resorted to in 22%. Other open procedures were less than 0.5%.

**Incision and drainage** for retropharyngeal abscess was done in 6 patients. In 11 patients injury to teeth occurred.

The **overall outcome** showed a successful removal in 95%, and a negative foreign body in 3.4%. Failure to remove/slippage of the object was seen in only 1.7 %.

## **CONCLUSIONS:**

- In this study, foreign bodies were more common in children than in adults, and in males than in females.

- **Airway foreign bodies** were more common in children and digestive tract foreign bodies were more common in adults.

- **The most common age** for throat and airway foreign bodies was in the 1<sup>st</sup> decade.

- **Foreign bodies in the throat** were more commonly found in males and airway foreign bodies, in females.

- Rapid or careless eating was the **most common causative factor** for foreign body in the digestive tract, and carelessness on the part of caretaker was the cause in airway foreign bodies.

- In the digestive tract, **Fish bone** was the most common foreign body in adults and **Coins** in children. **Groundnut** was the most common foreign body in the airway.

- Majority of patients with foreign body, present within 1 day, but children with objects in the nose and bronchus have shown delayed presentation.

- Difficulty in swallowing and throat pain were the most common symptoms in digestive tract foreign bodies. Cough and breathlessness were the **most common presenting symptoms** in airway foreign bodies.

- Food articles were the **commonest nasal foreign bodies**. Nasal block and unilateral nasal discharge were the commonest complaints.

- Rhonchi, crepitations and decreased air entry were present in more than half of the airway foreign bodies. Hyperinflation was seen in 2/3<sup>rd</sup> of patients on chest x-ray. Radiological evidence of definite foreign body is present in 2/3<sup>rd</sup> of the cases, more in oesophageal than in the tracheobronchial tract.

- Most common site of foreign body impaction** is cricopharynx in the digestive tract, right bronchus in airway and right nasal cavity in the nose.

- Rigid endoscopic removal** remains the procedure of choice in removal of foreign body in the trachea, bronchus and oesophagus. In oesophageal foreign bodies, a few negative procedures were encountered, in whom strictures and cricopharyngeal webs were present.

- Injury to the teeth was the most common iatrogenic **complication**. Retropharyngeal abscess was the only complication in digestive tract foreign bodies and persisting bronchopneumonia and lung collapse were seen due to tracheobronchial foreign bodies.

Upper aerodigestive tract foreign bodies still remain a diagnostic challenge to health care professionals, despite technological advances. A high index of suspicion and early diagnosis are the key to successful and uncomplicated management of these accidents.

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## **PROFORMA**

Name :

Ip / op no:

Age :

Sex:

Occupation :

Address :

Presenting complaints :

History of presenting complaints:

S.no	Complaints	yes	no	Duration
1.	History of foreign body insertion into nose			
2.	History of foreign body aspiration			
3.	History of accidental foreign body ingestion			
4.	Nasal obstruction			
5.	Unilateral/foul smelling nasal discharge			
6.	Difficulty in swallowing			
7.	Excessive salivation/drooling of saliva			
8.	Vomiting			
9.	Throat pain			
10.	Cough			
11.	Choking			
12.	Difficulty in breathing			

13.	Noisy breathing			
14.	Fever			
15.	Nasal bleed/hemoptysis			

Past history : Diabetes mellitus / tuberculosis / hypertension / epilepsy /  
jaundice / asthma / previous history of foreign body removal

Personal history : Diet ,appetite, smoking , alcohol, tobacco chewer,  
Bowel and bladder habits

Family history : Married / Unmarried:

Number of children :

Socioeconomic status : low ☐ middle ☐ high ☐

**General examination :**

Respiratory distress:

Appearance :

Temperature :

Pallor :

Cyanosis :

Jaundice :

Pedal edema :

Lymphadenopathy :

VITAL SIGNS:

**Pulse :**

**Blood pressure :**

**Respiratory rate :**

**Systemic examination :**

Cardiovascular system :

Respiratory system :

Inspection :

Palpation :

Percussion :

Auscultation :

Examination of abdomen :

Central nervous system :

**EAR, NOSE, THROAT EXAMINATION:**

NOSE :

External contour :

Anterior rhinoscopy :

Posterior rhinoscopy :

**THROAT :**

**Oral cavity:**

Lips

Gums :

Teeth :

Oral mucosa :

Floor of mouth :

Anterior 2/3<sup>rd</sup> Tongue :

Hard and Soft Palate :

Retromolar trigone :

**Oropharynx :**

Anterior pillar

Posterior pillar :

Tonsil :

Posterior pharyngeal wall :

**Indirect laryngoscopy :**

Posterior 1/3<sup>rd</sup> of tongue

Vallecula :

Epiglottis :

Aryepiglottic fold:

Arytenoids :

Ventricular band :

Vocal cords and mobility :

Subglottis :

Pyriform fossa

Post cricoid region :

Posterior pharyngeal wall :

**Neck :**

Tracheal position

Laryngeal contour/neck swelling

Accessory muscles of respiration

Abnormal veins, sinus, scar

Laryngeal crepitus

Lymphadenopathy

EAR :

Right ☐

left ☐

Pinna

External auditory canal

Tympanic membrane

**Investigations :**

Blood investigations :



X ray chest - Anteroposterior view

X ray chest – Lateral oblique view

X ray soft tissue neck – Anteroposterior

Lateral

X ray skull – Anteroposterior

Lateral

Xray abdomen :

Endoscopy :

**Patient name:**

**Diagnosis:**

**Procedure :**

**Anaesthesia**

**Position :**

**Final diagnosis :**

## MASTER CHART

S.no	Name	Age/sex	IP.No	Site	Type	H	CLINICAL FEATURES								Rad	Compl	Proc
							RD	CU	F	DY	POS	PS	VO	NB			
1.	Dinesh	14/M	34521	CP	CB					+			+		+		RO
2.	Shanmugam	60/M	22215	CP	CB					+	+		+		+		RO
3.	Venkatesan	45/M	22581	CP	CB					+	+		+		+		RO
4.	Egambaram	80/M	24099	CP	MP					+	+		+		+		RO
5.	Mani	55/M	20881	CP	CB					+	+		+		+		RO
6.	Papathy	65/F	20334	CP	C					+			+		+		RO
7.	Kala	60/F	20567	CP	D					+	+		+		+		RO
8.	Raji	55/F	24877	CP	CB					+	+		+		+	RPA	O/I&D
9.	Logeshvari	13/F	26943	L-N	S									+			E
10.	Abilasha	14/F	24451	MO	C					+	+				+		RO
11.	Annamaal	60/F	26654	CP	MP					+	+		+		+		RO
12.	Annalakshmi	60/F	27311	MO	D					+	+		+		+		RO
13.	Subramani	61/M	25091	CP	CB					+	+		+		+		RO
14.	Prabhakaran	16/M	26112	R-B	Pin			+							+		RB
15.	Janakiraman	60/M	27451	CP	MP					+	+		+		+		RO
16.	Harikrishnan	52/M	28871	CP	D					+	+		+		+		RO
17.	Babu	30/M	26190	CP	CB					+	+		+		+		RO
18.	Amsa	30/F	29635	-	CB?					+			+		DB		RO neg
19.	Poonga	55/F	27044	CP	MB					+	+		+		+		RO
20.	Kala	36/F	25587	CP	CB					+	+		+		+		RO
21.	Jaya	34/F	27111	CP	CB					+	+		+		+		RO
22.	Lalitha	55/F	29488	-	CB?					+	+		+		DB		RO neg
23.	Raghu	46/M	27601	CP	CB					+	+		+		+	RPA	O/I&D

24.	Jabaseelan	48/M	28943	CP	MP					+	+		+		+		RO
25.	Maharajan	55/M	29112	CP	D					+	+		+		+		RO
26.	Parthiban	67/M	29356	CP	MP					+	+		+		+		RO
27.	Dhinakaran	38/M	29270	CP	CB					+	+		+		+		RO
28.	Akash	16/M	29004	CP	C					+	+		+		+		RO
29.	Ramesh	22/M	30002	CP	CB					+	+		+		+		RO
30.	Loganathan	60/M	30045	CP	D					+	+		+		+		RO
31.	Lakshmi	48/F	30127	-	CB?					+	+		+		DB		RO str
32.	Vimala	52/F	30222	-	TS					+			+		DB		RO neg
33.	Gowri	40/F	30167	L-T	Fb							+					DR
34.	Shakunthala	47/F	31128	L-T	Fb							+					DR
35.	Ranjana	40/F	31267	R-T	Fb							+					DR
36.	Latha	30/F	30276	CP	MP					+	+		+		+		RO
37.	Dharani	23/F	29433	L-T	Fb							+					DR
38.	Lalitha	40/F	30117	PT	Fb					+		+					DR
39.	Amar	13/M	30665	CP	C					+			+		+		RO
40.	Balaji	13/M	31675	R-B	Pin			+							+		RB
41.	Sukumar	33/M	31179	CP	CB?	-				+	+		+		+		RO
42.	Saleem	52/M	32000	-	CB?					+	+		+		DB		RO str
43.	Kumarasen	60/M	32765	-	MP?	-				+	+		+		DB		RO str
44.	Govindan	55/M	32871	CP	CB					+			+		+		RO
45.	Senthil	24/M	32884	R-PF	Fb					+		+					E
46.	Murugan	48/M	32300	CP	CB					+	+		+		+	RPA	O/I&D
47.	Latha	30/F	27441	PT	Fb					+		+					E
48.	Sumathi	22/F	27856	PPW	Fb							+					E
49.	Lakshmi	55/F	32155	CP	D					+	+		+		+		RO
50.	Lakshmi	48/F	34660	-	CB?					+			+		DB		RO str
51.	Thara	63/F	32441	CP	D					+	+		+		+		RO
52.	Grace	32/F	31521	-	CB?					+	+		+		DB		RO neg

53.	Ellamal	65/F	28005	-	CB?					+	+		+		DB		RO neg
54.	khadambari	50/F	27439	CP	CB					+	+		+		+	RPA	O/I&D
55.	Devi	60/F	26552	CP	MP					+	+		+		+		RO
56.	Kannan	60/M	34528	CP	Seed					+			+		+		RO
57.	Ram	54/M	32516	CP	D					+	+		+		+		RO
58.	Kumar	21/M	34228	CP	Fb							+			+		RO
59.	Raja	58/M	33214	CP	CB					+	+		+		+	RPA	O/I&D
60.	Guru	50/M	33576	-	CB?					+	+		+		DB		RO neg
61.	Akbar	31/M	34217	CP	C					+	+		+		+		RO
62.	Babu	45/M	32190	-	CB?					+	+		+		DB		RO neg
63.	Velu	30/M	33194	CP	CB					+	+		+		+		RO
64.	Chandran	50/M	33131	V	Fb							+					E
65.	Ravi	42/M	31164	L-T	Fb							+					DR
66.	Raju	32/M	32164	L-T	Fb							+					DR
67.	Lakshman	36/M	29032	RG	Fb												DR
68.	Gopal	38/M	28731	V	Fb					+		+					E
69.	Govind	40/M	29011	PT	Fb							+			+		DR
70.	Soundari	34/F	29834	CP	CB					+	+		+		+	RPA	O/I&D
71.	Vasantha	36/F	28145	CP	MP					+	+		+		DB		RO
72.	Rose	45/F	20312	CP	MP					+	+		+		+		RO
73.	Ellamaal	45/F	25437	T	M										+		E
74.	Alli	45/F	34210	CP	MP					+	+		+		DB		RO
75.	Nagama	65/F	35226	-	CB					+	+		+		+		RO
76.	Kuppammal	61/F	34287	-	CB?					+	+		+		DB		RO str
77.	Madhu	32/F	35561	CP	CB					+	+		+		+		RO
78.	Gomathi	40/F	32248	L-T	Fb							+					DR
79.	Revathi	38/F	34234	V	Fb							+					E
80.	Rama	38/F	31121	PT	Fb					+		+					DR
81.	Banu	40/F	32776	PPW	Fb							+					DR

82.	Sumathi	36/F	31552	R-T	Fb							+					DR
83.	Roopa	56/F	34521	CP	D					+	+		+		+		RO
84.	Lakshmi	36/F	33276	V	Fb	-						+					E
85.	Amudha	35/F	30025	PT	Fb							+					DR
86.	Anitha	23/F	39255	R-T	Fb							+					DR
87.	Gomathi	35/F	30987	R-T	Fb							+					DR
88.	Durai	39/M	30674	MO	D					+			+		+		RO
89.	Suresh	25/M	30001	R-T	Fb							+					DR
90.	Raja	22/M	34451	V	Fb							+					E
91.	Joseph	30/M	32418	PT	Fb							+					DR
92.	Maran	35/M	32110	R-T	Fb	-						+					DR
93.	Abinesh	22/M	32244	V	Fb							+					E
94.	Bala	55/M	30014	PT	Fb							+					DR
95.	Gopal	62/M	33416	CP	D					+	+		+		+		RO
96.	Dinakar	57/M	32650	CP	MP					+	+		+		DB		RO
97.	Divakar	15/M	33488	CP	C					+					+		RO
98.	Subaiya	45/M	33761	CP	CB					+	+		+		+		RO
99.	Anandan	56/M	33881	CP	CB					+	+		+		+		RO
100.	Hari	13/M	35546	CP	C					+			+		+		RO
101.	Ismail	23/M	29033	L-T	Fb							+					DR
102.	Sumathi	43/F	30017	CP	CB					+	+		+		+		RO
103.	Annamaal	64/F	31947	CP	MP					+	+		+		DB		RO
104.	Latha	39/F	33001	L-PF	M										+		E
105.	Ponnuamma	60/F	33244	CP	D					+	+		+		+		RO
106.	Sujatha	43/F	33611	R-T	Fb							+					DR
107.	Komala	19/F	31129	R-T	Fb							+					DR
108.	Kasthuri	15/F	35466	CP	C					+			+		+		RO
109.	kuppammal	63/F	32270	CP	D					+	+		+		+		RO
110.	mani	14/M	30711	CP	C					+	+		+		+		RO

111.	Badri	57/M	33021	CP	CB					+	+		+		+		RO
112.	Chellappan	59/M	35541	CP	D					+	+		+		+		RO
113.	Guru	38/M	32227	CP	CB					+	+		+		+		RO
114.	Sathappan	60/M	31874	CP	D					+	+		+		+		RO
115.	Raghu	63/M	33982	CP	MP					+	+		+		DB		RO
116.	Amar	4/M	19661	L-N	P												DR
117.	James	1/M	13697	CP	M					+			+		+		DLS
118.	Naren	3/M	13811	R-N	G												DR
119.	Jagan	1 ½/M	62642	L-B	G			+							+		RB
120.	Lokesh	4/M	14005	CP	P					+			+		+		RB
121.	Santhosh	4/M	62715	R-B	PIN			+							+	+	TRT
122.	Santhakumar	1 ½/M	62458	R B	G		+	+							+		RB
123.	Jahir	1/M	14162	R-N	CK												E
124.	Shanmugam	6/M	62667	CP	M					+			+		+		RO
125.	Raja	3 1/2/M	14329	L-N	CK	-											DR
126.	Raghu	2 1/2/M	13563	R-N	R									+			E
127.	Parthiban	2 1/2/M	12557	L- N	BB									+			E
128.	Lokesh	9/M	63421	CP	C					+	+		+		+		DLS
129.	Chinna	10/M	62332	R-B	PIN			+							+		RB
130.	Dinesh	3/M	14356	L-N	G												DR
131.	Subash	8/M	61879	CP	MP					+			+		+		RO
132.	Santhosh	3/M	14458	R-N	B												DR
133.	Karthi	2 1/2/M	14339	R-N	B												E
134.	Diwakar	3 1/2/M	14009	R-N	P												DR
135.	Magesh	4/M	14330	R-N	GP					+				+			DR
136.	Vinod	5/M	14351	R-N	BB					+				+			DR
137.	Madhu	5/F	14356	L-N	TS					+				+			DR
138.	Kavya	2/F	14551	CP	C	-							+		+		DLS
139.	Nithya	3/F	14778	R-T	Fb							+					DR

140.	Jaya	1 ½F	62234	L-B	G			+	+						DB		RB
141.	Nandita	2/F	14335	R-N	TS					+				+			DR
142.	Indhu	4/F	14678	R-N	TS					+				+			DR
143.	Deepa	4/F	12375	L-N	BB					+				+			DR
144.	Mageshwari	4/F	12889	R-N	G												DR
145.	Abishek	4/M	86054	R-N	S												DR
146.	Sathish	3/M	86755	R-N	P												DR
147.	Lakshman	2/M	86072	R-N	TS					+				+			E
148.	Shakthi	5/M	87370	R-N	CK												DR
149.	Stephen	11/M	87621	R-N	BB					+				+			DR
150.	Babu	2/M	61324	CP	C								+		+		DLS
151.	Rajadurai	3/M	61998	CP	C								+		+		DLS
152.	Venkat	4/M	63286	R-B	G		+	+							+		RB
153.	Guna	2/M	63455	CP	C						+		+		+		DLS
154.	Anbarasan	1 ½ /M	63551	T	CRT										+		RB
155.	Jacob	8/M	87409	R-N	R					+				+			DR
156.	Roshan	3 ½ /M	87611	R-N	BB					+				+			DR
157.	Ragul	8/M	63909	CP	C								+		+		DLS
158.	Ranjith	2 ½ /M	62005	L-B	P										+		RB
159.	Logith	5/M	86112	R-N	R												DR
160.	Gowtham	2/M	64332	L-B	TS				+						+		RB
161.	Abdul	6/M	89326	L-N	GP					+				+			DR
162.	Arjun	8/M	61222	CP	C						+		+		+		RO
163.	Sangeetha	2/F	62998	R-B	G	-	+	+	+						+	LC	RB
164.	Lalitha	3/F	87632	L-N	P												DR
165.	Nithya	9/F	58871	CP	C								+		+		DLS
166.	Thilothama	3/F	90158	R-N	P					+				+			DR
167.	Abi	5/F	58854	CP	C						+		+		+		DLS
168.	Lavanya	3/F	90896	L-N	CK					+				+			DR

169.	Keethana	2/F	91371	R-N	B									+			DR
170.	Yamini	3/F	91851	R-N	CK									+			DR
171.	Sneha	2/F	91776	R-N	TS									+			E
172.	Subha	4/F	58976	CP	C					+	+		+		+		DLS
173.	Preethi	2/F	91223	R-N	B									+			E
174.	Thalarmathi	2/F	91778	R-N	S									+			E
175.	Swathi	1/F	58864	CP	M					+			+		+		DLS
176.	Subeda	6/F	93675	L-N	M									+			DR
177.	Abi	7/F	58900	R-B	P			+							+	LC	RB
178.	Sandhya	3/F	92009	R-N	BG									+			DR
179.	Devi	2/F	12414	L-B	BG	-		+	+						DB	RBP	RB
180.	Nagma	8/F	92311	R-N	CK												DR
181.	Thenmozhi	3/F	92440	R-N	G									+			DR
182.	Nisha	5/F	93765	R-N	CK												DR
183.	Janani	2/F	93654	R-N	P									+			DR
184.	Suhasini	3/F	12499	L-N	G									+			DR
185.	monisha	2/F	12354	R-N	R	-								+			DR
186.	Abirami	4/F	17654	R-N	TS									+			DR
187.	Janet	2/F	13328	R-N	S									+			E
188.	Yamuna	4/F	13856	R-N	P									+			E
189.	Prema	3/F	13009	R-N	G									+			DR
190.	Keerthana	6/F	59009	CP	C					+			+		+		DLS
191.	Trisha	4/F	13423	L-N	CK												DR
192.	Deepa	3/F	11543	R-N	AL									+			DR
193.	Pushpa	7/F	12904	R-N	CK									+			DR
194.	Akash	3/M	59554	CP	C					+	+		+		+		DLS
195.	Mukesh	5/M	13914	R-N	CK									+			DR
196.	Babu	2/M	57792	CP	C					+			+		+		DLS
197.	Sanjay	3/M	13241	R-N	P									+			DR



198.	Jayaprakash	1/M	57818	CP	C					+	+		+		+		DLS
199.	Madhan	3/M	57823	CP	C					+	+		+		+		DLS
200.	Rahul	3/M	93404	L-N	G									+			DR
201.	Sathish	2/M	93221	R-N	G									+			E
202.	Yuvraj	3/M	93450	R-N	P	-								+			DR
203.	Krishna	4/M	58000	R-B	G		+	+							+		RB
204.	Vimal	2/M	94111	R-N	CK									+			E
205.	Sridhar	4/M	93992	R-N	G									+			DR
206.	Sanjay	4/M	92221	R-N	CK									+			DR
207.	Stephen	4/M	58052	CP	C					+	+		+		+		DLS
208.	Siva	3/M	94001	R-N	G									+			DR
209.	Lokesh	2/M	95105	R-N	CK									+			E
210.	Nithin	1/M	57867	R-B	M			+							+		RB
211.	Akash	9/M	57419	CP	C					+	+		+		+		DLS
212.	Inba	2/M	57335	L-B	G			+							+		RB
213.	Thomas	9/M	57999	CP	C					+			+		+		DLS
214.	Saravanan	2/M	57957	R-B	G			+							+		RB
215.	Sarathy	3/M	58000	L-B	G				+						+	LC	RB
216.	Rahul	1/M	58122	L-B	M			+							+		RB
217.	Ajith	4/M	58145	CP	C					+	+		+		+		DLS
218.	Babu	1/M	58100	L-B	G			+							+		RB
219.	Harini	4/F	95918	L-N	BB									+			DR
220.	Kavya	3/F	10041	R-N	R									+			E
221.	Meena	4/F	97664	R-N	R									+			DR
222.	Yoga	4/F	98220	R-N	S									+			DR
223.	Divya	3/F	58051	R-B	G	-	+		+						DB	RBP	RB
224.	Priya	2/F	95221	R-N	S									+			E
225.	Jessy	3/F	10167	R-N	CK									+			E
226.	Priya	2/F	11113	L-N	P									+			E

227.	Devi	2 ½ /F	10020	CP	C					+	+		+		+		DLS
228.	Malathy	9/12 /F	10056	CP	SP										+		RO
229.	Nandhini	9/F	11287	CP	C					+			+		+		DLS
230.	Seema	8/F	11223	R-N	P	-								+			DR
231.	Keerthana	2/F	11876	R-N	G									+			DR
232.	Pricy	1/F	12390	L-N	CRT									+			E
233.	Sowmya	2/F	10272	CP	C					+	+		+		+		DLS
234.	Meena	5/F	10288	CP	C					+			+		+		DLS
235.	Santhoshi	8/F	11432	R-B	CK				+						+		RB
236.	Divya	1/F	10145	MO	C					+	+		+		+		DLS
237.	Monisha	5/F	10894	R-N	BG									+			DR
238.	Valar	4/F	10332	CP	C					+	+		+		+		DLS
239.	Maheshwari	9/F	10265	CP	C					+			+		+		DLS
240.	Saritha	4/F	10287	CP	GP					+					+		RO
241.	Sowmya	10/F	11220	CP	C					+			+		+		DLS
242.	Samina	2/12 F	11239	R-B	SP			+							+		RB
243.	Siva	3/M	11279	R-B	N			+							+		RB
244.	Jaswant	11/12	11239	R-B	BG			+							+		RB
245.	Kathir	1 ½ /M	58652	CP	C					+	+		+		+		DLS
246.	Balaji	12/M	58312	CP	C					+			+		+		RO
247.	Murugan	5/M	58776	CP	C					+			+		+		DLS
248.	Deepak	2/M	12309	L-N	R									+			E
249.	Shakthivel	6/12 /M	56432	L-B	G			+								DB	RB
250.	Murugan	4/M	56712	T	AN		+								+	+	TRA
251.	Vignesh	3/M	57454	CP	C					+	+		+		+		DLS
252.	Mukesh	5/M	12090	R-T	Fb												DR
253.	Ahmed	4/M	58680	CP	C					+			+		+		DLS
254.	Tamil	1 ½ /M	12253	L-N	B									+			E
255.	Kumar	3 ½ /M	11517	R-N	G									+			E

256.	Siva	3/M	61540	CP	M					+			+		+		RO
257.	Naveen	10/M	61576	CP	C					+			+		+		RO
258.	Rajesh	5/M	51243	CP	C					+	+		+		+		DLS
259.	Abishek	8/M	52114	CP	C										+		RO
260.	Rupan	1 ½ /M	56564	R-B	P			+							+		RB
261.	Imran	5/M	58889	PPW	Fb												DR
262.	Rahmathulla	7/M	58879	CP	C					+			+		+		RO
263.	Sanjay	4/M	58834	CP	C					+			+		+		DLS
264.	Mathew	2/M	10009	R-N	CK									+			E
265.	Ahmed	4/M	12296	CP	C					+			+		+		DLS
266.	Guru	3/M	12265	R-B	G										+		RB
267.	Afrin	4/M	76590	R-N	P									+			DR
268.	Vignesh	4/M	78651	R-N	M									+			E
269.	Lokesh	8/M	65801	R-B	P			+							+		RB
270.	Raja	1 ½ /M	65122	R-B	G	-	+		+						DB	RBP	RB
271.	Prakash	6/M	82176	R-N	CK									+			DR
272.	Yuvraj	1/M	84462	CP	C					+	+		+		+		DLS
273.	Hari	10/12	69887	R-B	AL			+							+		RB
274.	Ahmed	3/M	86312	L-N	G									+			DR
275.	Yuvraj	4/M	64099	CP	C					+			+		+		DLS
276.	Daniel	3/M	64534	CP	C					+			+		+		DLS
277.	Raju	10/M	86322	R-N	TS									+			DR
278.	Harini	1 ½ /F	86754	R-N	BB									+			E
279.	Suganthi	2/F	86775	L-N	BB									+			E
280.	Kala	3/ F	65108	CP	C					+			+		+		DLS
281.	Swetha	3/ F	86611	R-N	BB									+			DR
282.	Monica	4/F	65099	L-B	G			+							DB		RB
283.	Harini	3/F	86645	R-N	CK												DR
284.	Geetha	2 ½ /F	86971	R-N	BB									+			DR

285.	Nahila	3/F	87025	R-N	S	-										E
286.	Sahaya	4/F	87112	R-N	B									+		DR
287.	Roopa	3/F	87092	L-N	BB									+		DR
288.	Lavanya	2/F	65118	R-B	G			+							DB	RB
289.	Ariha	1/F	62755	R-B	AN	-		+	+							RBP RB
290.	Keerthana	2/F	62133	CP	C					+	+		+		+	DLS
291.	Gomathi	2//F	10065	R-N	BB									+		DR
292.	Divya	2/F	87092	R-N	P									+		E
293.	Porkodi	6/F	65473	CP	C					+	+				+	DLS
294.	Megala	8/F	65543	CP	C					+					+	RO
295.	Manisha	4/F	87033	R-N	TS									+		DR
296.	Bhavani	4/F	86854	L-N	G									+		DR
297.	Sharmi	1 ½ F	66754	L-B	G			+							DB	RB
298.	Priya	2 ½ F	84551	R-B	B			+							+	RB
299.	Pavithra	4/F	87009	R-N	B											DR
300.	Sathya	4/F	65321	CP	C					+					+	DLS
301.	Thangam	2/F	88063	R-N	G									+		DR
302.	Diana	2/F	88631	L-N	B									+		E
303.	Geetha	5/F	65421	CP	C					+			+		+	DLS
304.	Saranya	4/F	88094	L-N	CK											DR
305.	Thangam	4/F	96954	R-N	B									+		DR
306.	Pramila	3/F	96972	R-B	TS	-		+	+						+	RBP RB
307.	Harini	7/F	63345	CP	C					+	+				+	DLS
308.	Suganthi	3/F	97900	R-N	CK											DR
309.	Pooja	3/F	96681	R-N	P									+		DR
310.	Mohana	9/F	65741	CP	C					+					+	RO
311.	Thangam	4/F	10709	R-N	B									+		DR
312.	Sandhya	3/F	93308	L-N	TS									+		DR
313.	Mohana	1/F	61520	R-B	G		+	+							DB	RB

314.	Mubena	1/F	62213	R-B	G			+	+						+		RB
315.	Radhika	12/F	10531	R-T	Fb							+					DR
316.	Harini	4/F	10910	R-N	CK												DR
317.	Maha	3/F	61008	CP	C					+			+		+		DLS
318.	Shahul	3/M	62660	CP	C											+	DLS
319.	Sham	2/M	10221	R-N	AP									+			DR
320.	Manoj	2/M	10526	R-N	S									+			DR
321.	Arul	5/M	61332	CP	C											+	DLS
322.	Venkatesh	7/M	61694	CP	C					+	+		+		+		DLS
323.	Sathish	4/M	61387	CP	C					+						+	DLS
324.	Subash	1 ½ /M	61694	CP	C											+	DLS
325.	Riaz	4/M	66771	CP	C					+			+		+		DLS
326.	Govardhan	8/M	66894	CP	C					+						+	RO
327.	Muthu	4/M	65409	LO	OSP											+	RO
328.	Lokesh	2/M	11598	L-T	Fb												DR
329.	Rajesh	6/M	11865	L-T	Fb							+					DR
330.	Vignesh	2/M	66540	Ch	S									+	+		E
331.	Vineeth	1 ½ /M	11675	L-N	S									+			DR
332.	Arvind	3/M	11034	R-N	M												DR
333.	Ashok	3/M	11885	R-N	P												DR
334.	Samuel	4/M	65933	CP	OSP											+	RO
335.	Govindhan	4/M	65100	MO	P											+	RO
336.	Harish	1 ½ /M	10713	L-N	Co									+			E
337.	Balu	3/M	10126	R-N	Co									+			DR
338.	Guru	2 ½ /M	11245	L-N	BB									+			E
339.	Lokesh	3/M	11221	R-N	BB									+			DR
340.	Santhanam	3/ M	11434	R-N	B									+			DR
341.	Mani	3/M	87112	R-N	TS									+			DR
342.	Dhanush	5/M	10771	CP	C					+	+				+		DLS

343.	Grisha	3/F	86654	R-N	BB									+			DR
344.	Sandhya	3/F	85609	R-N	R												DR
345.	Abi	5/F	87023	R-N	S									+			DR
346.	Bhooma	3/F	22654	R-N	B												DR
347.	Maha	3/F	23143	R-N	R												DR
348.	Priya	2/F	10096	R-N	S												DR
349.	Dharshini	6/F	14199	R-N	S									+			DR
350.	Ranjith	7/M	11593	CP	C					+					+		DLS

## **ABBREVIATIONS :**

FB	: Foreign body	D	:Dentures
H	: History	S	:Stone
RAD	: Radiography	T	:Tamarind seed
COMPL	:Complication	Fb	: Fish bone
PROC	: Procedure	CK	:Chalk piece
CP	: Cricopharynx	BB	:Button Battery
MO	: Mid oesophagus	R	:Rubber
L-N/R-N	: Left / Right nasal Cavity	G	:Groundnut
L-B/R-B	:Left/Right bronchus	P	:Plastic
L-T/R-T	: Left / Right Tonsil	CRT	:Carrot piece
LO	: Lower oesophagus	B	:Bead
PT	:Posterior1/3 <sup>rd</sup> tongue	BG	:Bengal gram
R-PF/L-PF	:Right /Left Pyriform fossa	AN	:Arecanut
PPW	:Posterior pharyngeal Wall	M	:Metal object
T	:Trachea	AL	:Almond
V	:Vallecula	AP	:Apple piece
CB	:Chicken bone	CO	:Corn
MP/MB	:Mutton piece/mutton Bone	OSP/SP	:Open safety pin/safety Pin
C	:Coin	Ch	:Choana
		GP	:Green peas

RD	:Respiratory distress	TRT	:Thoracotomy
CU	:Cough	TRA	:Tracheotomy
F	:Fever	CT	:Computerised Tomography
DY	:Dysphagia	GA	:General anaesthesia
POS	:Pooling of saliva	LA	:Local anaesthesia
PS	:Pricking sensation of Throat		
VO	:Vomiting		
NB	:Nasal block		
DB	:Doubtful foreign body		
RPA	:Retropharyngeal Abscess		
LC	:Lung collapse		
RO	:Rigid oesophagoscopy		
RB	:Rigid bronchoscopy		
DLS	:Direct laryngoscopy		
DR	:Direct removal		
Neg	:Negative		
Str	:Stricture		
O/I&D	:Oesophagoscopy/ Incision and drainage		
E	:Endoscopic removal (Hopkins rod lens)		



**INSTITUTIONAL ETHICAL COMMITTEE**  
**MADRAS MEDICAL COLLEGE, CHENNAI-600 003.**

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L.Dis.No. 14597 /ME5 /EthicsDean/MMC/2009

Dated .09.2009

Title of the work : "Study on upper Aerodigestive tract Foreign bodies"  
Principal Investigator : Dr. Archana Balagubmanian PG in MS ENT  
Department : ENT. Madras Medical College Ch-3.

The request for an approval from the Institutional Ethical Committee(IEC) was considered on the IEC meeting held on 23<sup>rd</sup> September 2009 at 2.00P.M. in Madras Medical College, Deans, Chamber, Chennai-3. / Pharmacology Seminar Hall, Madras Medical College Ch-3

The members of the Committee, the Secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The principal investigator and their term are directed to adhere the guidelines given below:

1. You should get detailed informed consent from the patients/participants and maintain confidentiality.
2. You should carry out the work without detrimental to regular activities as well as without extra expenditure to the Institution or Government.
3. You should inform the IEC in case of any change of study procedure, site and investigation or guide.
4. You should not deviate from the area of the work for which I applied for ethical clearance.
5. You should inform the IEC immediately, in case of any adverse events or serious adverse reactions.
6. You should abide to the rules and regulations of the institution(s).
7. You should complete the work within the specific period and if any extension of time is required, you should apply for permission again and do the work.
8. You should submit the summary of the work to the ethical committee on completion of the work.
9. You should not claim funds from the Institution while doing the work or on completion.
10. You should understand that the members of IEC have the right to monitor the work with prior intimation.

  
SECRETARY  
IEC, MMC, CHENNAI

  
CHAIRMAN  
IEC MMC CHENNAI

  
DEAN  
MADRAS MEDICAL COLLEGE  
CHENNAI