

Extraction of Round Plastic Toys on Children Using Rigid Esophagoscopy

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Keyword:

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Abstract

Background: Diagnosis of foreign body in children requires a good history, physical examinations, and appropriate investigations. Negative result of *cervico-thoraco-abdominal* radiography (non radioopaque foreign body), not necessarily to eliminate the suspicion of esophageal foreign body impaction. Objective: To identify *radioopaque* and *non-radioopaque* foreign body in children. Case: An 8-year-old male diagnosed with esophageal foreign body impaction as high as VC VI by rigid esophagoscopy as the definitive diagnostic and was extracted (urgency setting) based on history, typical signs and symptoms in patient.

Conclusion: detection of signs and symptoms as well as the selection of appropriate investigations is highlighted in diagnosis.

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INTRODUCTION

Esophageal foreign body impaction is a sharp or blunt object or food bolus that lodged in the esophagus when swallowed intentionally or unintentionally. Most cases are found in children (peak at 6 months and 6 years) on the digestive tract, at the sites of both physiological and pathological narrowings, and might lead to fatal complications due to perforation.^{1,2} Younger children are tend to explore with their mouth

spontaneously, and have incomplete molars to chew food, lack of cognitive ability to distinguish edible objects and easily distracted during meals.³⁻⁷

The diagnosis and treatment of aero-digestive tract foreign body in children remains challenging for otolaryngologist, since the case is often unwitnessed directly by family members or relatives, therefore high suspicion is needed to provide appropriate management and to prevent further complications.^{4,5,8,9}

Management of esophageal foreign bodies should consider the important factors including the condition of the patient, time of ingestion, types of foreign bodies, location, accompanied esophageal diseases and history of previous surgery.¹⁰

CASE

A case of 8 years old male from Banda Aceh, was examined (9/9/2018) with complaints of vomiting in every meals and drinks after ingestion of toy's piece 32 hours before he was brought to the hospital (SMRS). The toy is swallowed accidentally when he tried to tear the plastic wrap with his teeth. He then suffered from drooling, pain swallowing, stuck sensation in the throat. History of fever, persistent cough, shortness of breath, vomiting of blood are denied. The patient unable to swallow food and drink and has not been defecating ever since. Past similar medical history is denied. The general condition is good, with hyperemic pharyngeal wall, no sign of laceration, no bleeding spot, pain in anterior neck, no lung abnormalities, and leukocyte counts of 18,400 / mm³. These typical signs and symptoms indicate the presence of an esophageal foreign body. Leukocytosis is found with a leukocyte count of 18,400 / mm³ which indicates a body immunity reaction due to the impaction of 32 hours foreign bodies. Cervico-thoraco-abdominal soft tissue radiography (antero-posterior and lateral cervical and thorax) was performed, but none of the radioopaque feature were visible hence the impaction of plastic foreign body was suspected.

DISCUSSION

The diagnosis and treatment of aero-digestive tract foreign body in children remains challenging for otolaryngologist, since the case is often unwitnessed directly by family members or relatives, therefore high suspicion is needed to provide appropriate management and to prevent further complications.^{4,5,8,9} Management of esophageal foreign bodies should consider the important factors including the condition of the patient, time of ingestion, types of foreign

bodies, location, accompanied esophageal diseases and history of previous surgery.¹⁰

The event of foreign body aspiration have often been found at Zainoel Abidin Hospital, Banda Aceh. In 2017, at least there were at least 25 foreign body cases found in the emergency room, that consisted of coins (36%), bones (36%) and dentures (12%) ingestions, 19 cases were in the esophagus. Whereas in 2018, there were 13 cases of esophageal foreign bodies of coins (69%), dentures (15%), bones (8%), and meat (8%).

Chevalier Jackson had classified some contributing factors of foreign body impaction: personal factors including age, sex, activity, home condition, failure protection mechanisms, influence of alcohol, epileptic seizures, unconsciousness, physical, emotional, activity, posture, dental, medical and surgical factors; psychotic factors, the nature of foreign objects and carelessness. Predisposing factors include the failure of molar in mastication, incoordination of the swallowing process and imperfect laryngeal sphincter in the age group of 6 months to 1 year, mental retardation, growth disorders and other neurological diseases. Esophageal foreign bodies often found in younger children due to their tendency to play inedible objects in their mouth. Coins, buttons, bones, pins, children's toys, plastic materials and meat bolus are the common objects.^{1,2,12} The obstruction depends on the size, length, shape, type of objects, the site of impaction, and complications.^{1,2,10}

Foreign objects that remain lodged in the esophagus for days might lead to various complications, including granulation tissue that covers foreign objects, periesophageal inflammation. Foreign ingestants might get stuck anywhere along the esophageal level, but the physiological or pathological narrowing are the prevalent sites. The most common place is at the cervical-esophageal just below cricopharyngeal junction. Jackson in 1950 suspected that the weakness of the upper cervical peristaltic muscle structure is the main cause of the foreign objects impaction.^{2,11,12-14}

The esophagus is a vertical muscle tunnel that expands from hypopharynx to the stomach. It is divided into cervical, thoracic, and abdominal parts.

The relationships of structures around esophagus had formed some narrowing parts of the lumen at cricopharyngeal junction, aortic crossing, left bronchus crossing, and diaphragm.^{2,10,11,15}

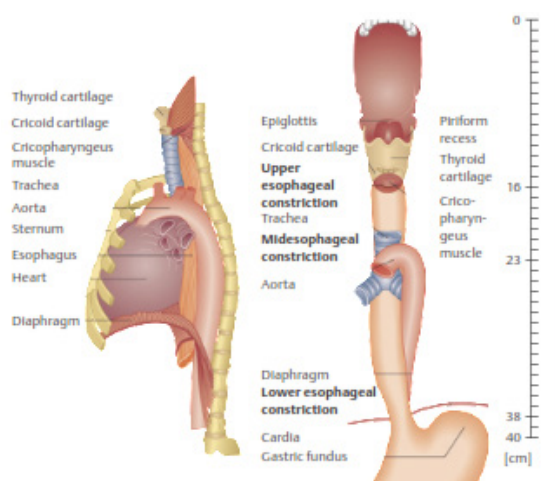


Figure 1 Anatomy of the esophagus^{12,13}

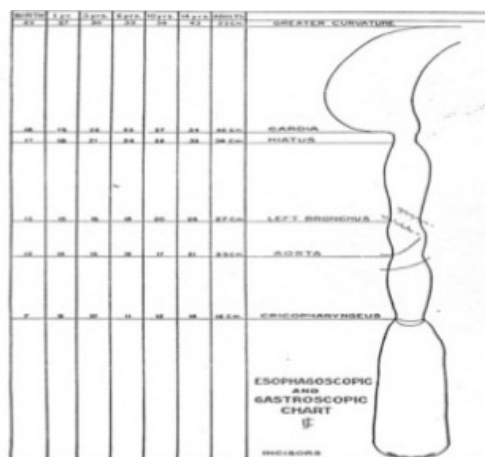


Figure .2 Esophageal Narrowing and Age-Based Incisor Distance¹⁵

Diagnosis of foreign body in esophagus is based on history, clinical presentations by signs and symptoms, radiographic and endoscopic examinations. Endoscopic approach carried out for both diagnostic and therapeutic purposes.^{1,2,10} History of foreign body swallowing or aspiration including the estimated time of ingestion is crucial. Typical signs and symptoms of esophageal foreign bodies include hypersalivation, dysphagia, vomiting, reflux, and chest pain. The availability of samples of duplicate is supportively

helpful for further management.¹²⁻¹⁴

The radiographic examination is cervico-thoraco-abdominal view with soft tissue density.^{3,4,18} Anteroposterior (AP) and lateral cervical x-ray should be performed to all suspected patients with foreign bodies. Radiolucent foreign bodies e.g. plastic and aluminum, can be identified by signs of periesophageal inflammation or proximal parts of the hypopharynx and esophagus.^{1,2}

Non-opaque esophageal foreign body is identified by additional gap between the cervical vertebrae, larynx and trachea or the presence of air at the cervical level of esophagus. When a lateral cervical view was not providing an adequate identification, postero-anterior and lateral x-ray might help to show radio-opaque foreign bodies. Esophageal contrast examination with a water-soluble barium sulfate / radio-opaque solution can be planned if the previous method failed.¹² Radiographic of barium-swallow with cottons remain a controversy due to risk of aspiration or obscuring the esophagoscopy procedure due to its overlaying material along esophageal mucosa, however it is proven beneficial to view small foreign objects such as the staples. Esophagogram in radiolucent foreign bodies will show a “persistent filling defect”.^{3,4,14}

Fluoroscopy by using a barium contrast, or a capsule filled with barium, will identify the site of non-opaque objects (such as bones, meat, etc.) in the esophagus. Computed tomography (CT) scan of esophagus will show a description of soft tissue inflammation and abscesses, while magnetic resonance imaging (MRI) shows all the pathological signs in esophagus, however may need general anesthesia in children.^{1,14}

The proper yet efficient way to rule out the possibility of foreign bodies is by rigid esophagoscopy. Foreign body impaction are best managed with rigid endoscopy under general anesthesia. Rigid endoscopy has the advantage to protect the respiratory tract and limit the risk of moving the esophageal object into laryngotracheal during extraction.^{1,16}

Indications include complaints of dysphagia, odinophagia, regurgitation, pyrosis, hematemesis,

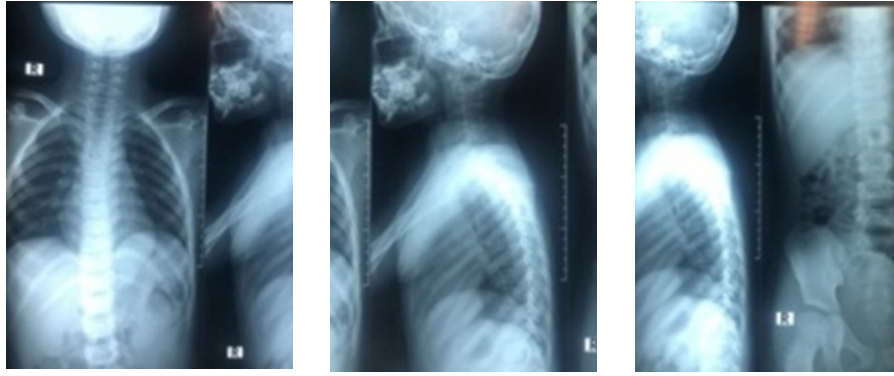


Figure 3. Non radio-opaque esophageal foreign body on x-ray

blunt cervical trauma with subcutaneous emphysema, cervical penetrating trauma, evidence of esophageal mass or stricture in radiography, gastroesophageal reflux, corrosive substances, congenital anomalies, vocal cord anomalies, suspicion of aerodigestive malignancy, esophageal involvement with autoimmune and idiopathic disease and mechanical obstruction or neuromuscular disorders.^{13,14}

Esophagoscopy can be done with a rigid esophagoscope or fiberoptic (flexible) or a panendoscope. Procedure should be carried out in the operating room and with premedication. General anesthesia with endotracheal tube is better for most patients who undergo rigid esophagoscopy.¹⁴ Administration of broad-spectrum intravenous antibiotics for bacterias should be started as soon as possible.¹⁷

Rigid esophagoscopy equipment may include various sizes of esophagoscopes, telescope 00, extraction forceps according to the type of foreign body, suction cannula, light source, light source cable, and monitor.^{16,17}

Preparation of rigid esophagoscopy procedure in management of this case:

1. Patient consent, fasting at least 6 hours before procedure,
2. Patient in supine position with the elevated head 15 cm from the operating bed under general anesthesia. Assistant hold the patient's head (in lap) in left side while sitting (assistant hold this position until procedure finished) and the surgeon hold the esophagoscope with the right hand at

proximal part and left hand at the distal part like holding a pencil.

3. The left middle finger and ring finger open the upper lip and hook the incisor; the index finger and thumb of the left hand hold the distal part of the esophagoscope and pull the lips. The right hand holds the proximal part of the esophagoscope by clamping index finger and middle finger, esophagoscope then pushed slowly by moving the left thumb along the underside of the esophagoscope and the right hand serve to direct the esophagoscope like holding a pencil.
4. The esophagoscope is inserted vertically via mouth at midline of tongue and sub sequentially posterior uvula and pharyngeal wall are identified, then the esophagoscope is pushed gently along the posterior wall of the pharynx until the right and left arytenoids are seen.
5. The esophagoscope is inserted below the arytenoid. A slight movement of left thumb at the end of the esophagoscope will show the esophageal inlet. Then it is carefully pushed into the esophageal lumen by slowly moving the left thumb. Evaluations of inlet include the orientation upward, downward, left and right sides. The esophagoscope then pushed along the esophageal lumen with the movement of the left hand thumb.
6. As high as thoracic segment of esophagus, patient's head must be lowered flat to adjust the axis of the esophagus so that the lumen remain visible. When the esophagoscope reaches the narrowing

at aorta and left bronchus level, the lumen will narrow anteriorly.

7. At the level of diaphragm hiatus, patient's head is lowered again, then the neck and head are moved slightly to the right to keep the scope axis in line with the lower third of the esophagus. The operator directs the esophagoscope to the left antero-superior of iliac spine. The esophageal hiatus can be seen as a sloping gap between direction of 10 and 4 clockwork.
8. After passing through the diaphragm, the patient's head is lowered preferably to maintain visualization of the esophageal lumen and during these steps, identification of foreign objects position is carried out, then evacuation with appropriate forceps is performed.
9. Further evaluation then performed (to explore the possible remaining foreign bodies, mucosal lacerations, bleeding, perforation and the possibility of other esophageal abnormalities) by repeated esophagoscopy until the lower esophageal sphincter point.

Post extraction observation include signs of bleeding from laceration or perforation. Once deep laceration of muscular or perforation layer occurs, nasogastric tube is inserted as conservative treatment, within the first 3 hours and maintained for 10 days with close monitoring, CT scan and or flexible esophagoscopy if needed.

Removing foreign body along with pulling out the esophagoscope simultaneously is done by gently grasping a foreign object at the end of the esophagoscope, then maintain the forceps position and esophagoscope with the thumb and forefinger of the left hand, which also holds the esophagoscope, when pulling out forceps, esophagoscopes and objects as one unit.¹⁶

Pushing the foreign objects into the stomach by consuming amount of breads or removing the esophageal foreign body at cervical level blindly with a Foley catheter and other methods is highly not recommended.¹⁶

If a blunt or non corrosive foreign body impaction just happened and there are no respiratory distress signs, observation within 24 hours is suggested and it is expected to exit spontaneously. The radiograph is then repeated and once it in the stomach, the risk of impaction is low. When foreign body has been successfully removed, repeated esophagoscopy must be performed to assess the presence of pre-existing esophageal abnormalities. In condition where small perforation is suspected, an immediate NGT insertion is advisable before patient start to swallow food and saliva, and broad-spectrum antibiotics need to administer for 7-10 days to prevent the onset of sepsis.^{3,14}

The main complications of esophagoscopy are bleeding and perforation.¹⁶ Foreign objects can cause mucosal laceration, bleeding, local perforation with neck abscess or mediastinitis. Esophageal perforation

Table 1. Endoscopic Time Priority Setting of Foreign Body ¹²

Emergency	• Severe grades of esophageal obstruction (unable to regulate secretion) • Button battery in esophagus • Sharp objects in esophagus
Urgency	• Blunt foreign body in esophagus • Partial obstruction of semi solid food in esophagus • Sharp object in stomach or duodenal • Objects > 6 cm along or above the proximal duodenum • Magnet within endoscopic range
Non Urgency	• Coin that remain in the esophagus within 12-24 hours • The object in the stomach with diameter > 2.5 cm • Battery in stomach without gastrointestinal symptoms. Injury can be observed within 48 hours. Batteries that remain in the stomach after 48 hours must be removed

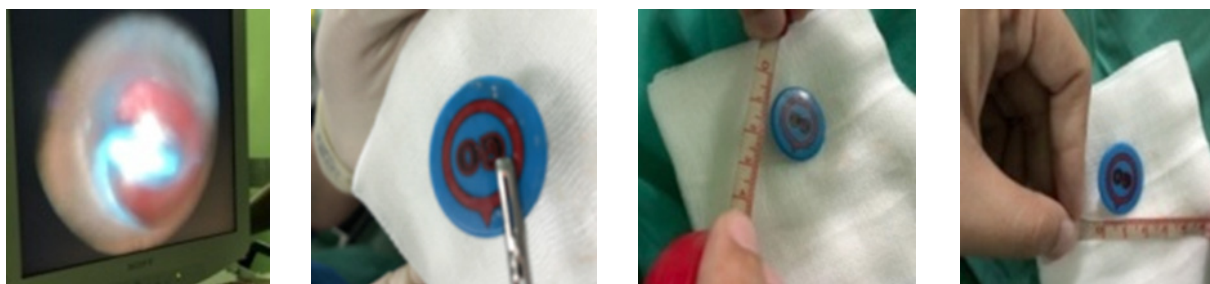


Figure 4. The foreign body

may lead to local cellulitis and tracheoesophageal fistula. Round or blunt foreign bodies can also cause perforation, as a result of secondary chronic inflammation and erosion. Granulation tissue around a foreign object is formed when a foreign object is in the esophagus and has been impacted for longer time.^{13,16}

Areas that are easily perforated during esophagoscopy are the hypopharynx just above the cricopharyngeal muscle, cervical part of esophagus, and proximal of esophago-gastric junction.¹⁶ Perforations of cervical part of esophagus and hypopharyngeal are characterized by severe pain in the neck. Subcutaneous swelling and crepitus could be palpable. Subcutaneous emphysema might shown on radiological examination. Furthermore, the infection will spread to the mediastinum.¹⁶

Thoracic part of esophageal perforation is more severe and is characterized by high fever, tachycardia, hypotension, chest pain that radiates to the back, sternum tenderness, and subcutaneous emphysema in the neck. Chest radiograph examination shows widening of the mediastinum and emphysema and unilateral or bilateral pleural effusion. Water-soluble contrasts will show the perforation site precisely. It is necessary to do thoracotomy and mediastinal drainage.¹⁶

The Consumer Product Safety Guidelines that authorized in 1979 had included the criteria for a minimum object with diameter > 3.17 cm and length > 5.71 cm) that is safe for children's toys, but the regulation was not enforced adequately. Children should remain under adults supervision and play with toys that are suitable for their age. Small and

dangerous objects must be stored safely from babies who are just learning to walk with their high curiosity.¹³

Most children had full recovery without a permanent sequel from foreign body impaction. Diagnosis delay might lead to severe morbidity. Children who suffered from delay or difficult extraction must be observed postoperatively in the intensive care until the airway assistance is no longer needed.¹³

CONCLUSION

CT scan and MRI were not performed on these case because it is less effective and inefficient in terms of time, cost, and the results obtained for early diagnosis. The use of barium contrast agent and esofagogram with contrast agent were also not carried out because of the reflux symptoms, where the risk of aspiration in such patient was high. Fluoroscopy was not performed due to the duration of ingestion of foreign object, the patient was planned for urgency extraction. Negative radiographic result do not definitively exclude foreign body impaction and once symptom persists, endoscopic approach is an obligatory. Esophagoscopy exploration and foreign body extraction were performed in urgent setting with a rigid esophagoscope, and intravenous 250 mg ceftriaxone was given twice daily. During exploration, a blue round flat plastic foreign body was found as high as VC VI (12 cm from the incisor) $\square = 2.5 \times 2.5 \times 0.4$ cm and extracted with 2-tooth forceps without any bleeding, laceration, and perforation. Patients discharge on the next day.

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