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Surgery in foreign body ingestion and aspiration: descriptive study



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I Nyoman Semadi,^{1*} Josua,¹ I Wayan Sucipta²

ABSTRACT

Background: Foreign bodies in upper digestive tract, as well as respiratory tract, are common cases in daily life. This incident can occur in all age groups, ranging from children to elderly. Endoscopy and bronchoscopy are the first treatment option, nevertheless, case with complications which endoscopy or bronchoscopy cannot be done, it requires another extraction procedure specifically surgery.

Method: We conducted a retrospective review of patients who came to consult to Thoracic Cardiovascular Surgery Department by ENT Department. The data obtained are from 2009-2019.

Result: Out of 290 patients recorded, experiencing foreign body impaction in both digestive and respiratory tract for the last 10 years, the highest number was digestive tract with 243 cases (83.8%) and 47 respiratory tract cases (16.2%). From 17 patients who underwent

surgery, 70.6% men and 29.4% women. The age group of children and adults had the same number as seven patients (41.2%) and elderly with three patients (17.6%). The highest number of surgical procedure was thoracotomy with 10 patients (58.8%) while cervical esophagotomy with seven patients (41.2%).

Conclusion: The failure of the extraction procedure using endoscopy or bronchoscopy in the case of a foreign body leads to surgery as a definitive therapy for patients. The age group of children and adults have same number. Cases of impaction in the esophagus are the most common. The most common surgical procedure performed is thoracotomy. In this study the success rate of extraction by surgery reached 100% without additional morbidity and mortality.

Keywords: foreign body, aspiration, ingestion, surgery.

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INTRODUCTION

Foreign bodies in upper digestive tract, as well as respiratory tract, are common cases in daily life. The impaction of foreign bodies is an unavoidable incident. The causes of the impaction of the foreign body itself vary, some literature divides the type of impaction into food impaction, nonedible food, and true foreign bodies.¹

The exact incidence of foreign body impaction in children and adults are not known for certain, but each year there are estimated 1500 deaths due to upper gastrointestinal impaction.² Food impaction is the most common case of foreign bodies in esophagus with incidence rate of 13 out of 100.000 people every year.³ Cases of foreign body aspiration are most often found in children.⁴ It is estimated that there were 111.914 cases of children aged 0-14 years old who were hospitalized in the United States from 2001 to 2009 related to foreign body aspiration.⁵

This incident can occur in all age groups, ranging from children to elderly. There are different causes of impaction in children, adults and elderly. True foreign body impaction is more often found in children. This is because children have habit of putting something that is not food into their mouth. For adults nonedible food is the most common cause of impaction while in elderly is dentures.⁶

Suspicion of foreign body requires X-Ray examination of cervical region with lateral projection and thorax region with postero-anterior projection.¹ Objects that are not visible on X-Ray require additional investigations such as X-Ray with contrast and the use of endoscopy and bronchoscopy. Besides being able to function as a diagnostic tool, it can also be an extraction tool to foreign body. CT-Scan is superior when compared to regular X-Ray because it can provide better information in the management of cases with complications such as sharp or pointed cases.⁷

Nevertheless, in the case of a foreign body with complications of endoscopy or bronchoscopy that cannot be done, it requires another extraction specifically surgery. In 44 studies involving 9.648 patients in the management of esophageal foreign bodies, the use of flexible or rigid endoscopy was 65.1% and 16.8% respectively, and 325 patients (3.4%) who needed surgery due to complications such as perforation, esophageal fistula and failed endoscopic.⁸

METHODS

A total of 17 foreign body impaction patients both in the upper gastrointestinal and respiratory tract that was submitted to the Department of Thoracic Cardiovascular Surgery at Sanglah Hospital,

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all patients failed extraction procedures using endoscopy and bronchoscopy. Endoscopy and bronchoscopy procedures used rigid endoscopy/bronchoscopy with grasping and alligator forceps. Surgery was performed to extract foreign body subsequently. Surgical technique performed were cervical esophagotomy and lateral thoracotomy. After surgery the patient was treated in the intensive care unit and then transferred to the ward. The patient would be discharged if the patient was in good condition later.

We obtained data from the register of patients in the ENT for the last 10 years that included foreign bodies in the digestive and respiratory tract. We conducted a retrospective review of patients who came to consult to the Department of Thoracic Cardiovascular Surgery by the ENT Department. Patient data were obtained based on register records. The data obtained were from 2009-2019.

RESULTS

Data obtained on patient register records in the ENT Department from January 2009 to October 2019. From total 290 patients recorded, experiencing foreign body impaction in both the digestive and respiratory tract, the highest number was

digestive tract with 243 cases (83.8%) and 47 cases for respiratory tract (16.2%). Patients underwent surgery by thoracic, cardiac, vascular, and endovascular surgeons were also included in this table with a total of 17 patients. Gender distribution shows 17 patients there were 12 male patients and 5 female patients with comparison ratio of 70.6% and 29.4%. Male patients are twice as many as female patients. Meanwhile, based on age category, children and adults had the same number of seven patients (41.2%) and the smallest number was the elderly three patients (17.6%). The average age of 17 patients was 32 years old with the oldest age was 92 years old and the youngest was six months (Table 1).

Most diagnoses performed surgically were foreign bodies on the esophagus with 11 patients (64.7%), followed by foreign bodies in the right bronchus with four patients (23.5%) and foreign bodies bronchus sinistra and foreign bodies bronchus superior sinistra respectively with one patient (5.9%). The most cases of surgery performed by thoracic, cardiac, vascular and endovascular surgeons were the upper gastrointestinal tract with 11 patients (64.7%). The highest number of surgical procedures was thoracotomy with 10 patients (58.8%) while for the surgical procedure cervical esophagotomy was with six patients (41.2%). The most foreign bodies that block the upper gastrointestinal and respiratory tract were the group of true foreign bodies with 13 patients (76.5%) and followed by non-edible food with four patients (23.5%). The true foreign body that found in 13 patients consisted of eight dentures, one tooth, one pin, one nail pin, one star-shaped pin and one pen. While, in non-edible food were found two flesh bones, one fishbone, and one seed. No food bolus was found in patients underwent surgery (Table 1 and Figure 1).

In the age group of children there were seven cases of foreign bodies which occur in different location, two cases (28.6%) in esophagus, three cases (42.8%) in right bronchus, one case (14.3%) in left bronchus, and one case (14.3%) in left superior bronchus. In the adult age group there were also seven cases of foreign bodies that occluded in the esophagus with six cases (85.7%) and one case (14.3%) in the right bronchus. In the elderly group there were three cases of foreign bodies, which all in the esophagus (Table 2).

In the age group of children there were five true foreign bodies and two non-edible foods. True foreign bodies that found were in the form of a tooth, a pin, a nail pin, a pen, and a star-shaped pin. While the non-edible foods were fish bones and seed. In the adult age group, there were six true foreign bodies and one non-edible food. The true foreign bodies found were all dentures while non-edible food was bone meat. In the elderly, there

Table 1 Characteristics of foreign body aspiration

Characteristics	Frequency	Percent
Foreign bodies location		
Gastrointestinal Tract	243	83.8
Respiratory Tract	47	16.2
Gender		
Men	12	70.6
Women	5	29.4
Age group (years)		
0-17	7	41.2
18-59	7	41.2
>60	3	17.6
Diagnosis		
Foreign Body Esophagus	11	64.7
Foreign Body Right Bronchus	4	23.5
Foreign Body Left Bronchus	1	5.9
Foreign Body Left Superior Bronchus	1	5.9
Surgical procedure		
Thoracotomy	10	58.8
Cervical Esophagostomy	7	41.2
Foreign bodies		
True Foreign Bodies	13	76.5
Nonedible Food	4	23.5

Table 2 Crosstable age group with diagnosis

Age Group	Diagnosis				Total
	Foreign Body Esophagus	Foreign Body Right Bronchus	Foreign Body Left Bronchus	Foreign Body Left Superior Bronchus	
0-17	2	3	1	1	7
18-59	6	1	0	0	7
>60	3	0	0	0	3
Total	11	4	1	1	17

Table 3 Crosstable age group and foreign bodies

Age Group	Foreign Bodies		Total
	True Foreign Body	Nonedible Food	
0-17	5	2	7
18-59	6	1	7
>60	2	1	3
Total	13	4	17

Table 4 Cross table surgical procedure and diagnosis

Surgical Procedure	Diagnosis				Total
	Foreign Body Esophagus	Foreign Body Right Bronchus	Foreign Body Left Bronchus	Foreign Body Left Superior Bronchus	
Thoracotomy	4	4	1	1	10
Cervical Esophagotomy	7	0	0	0	7
Total	11	4	1	1	17

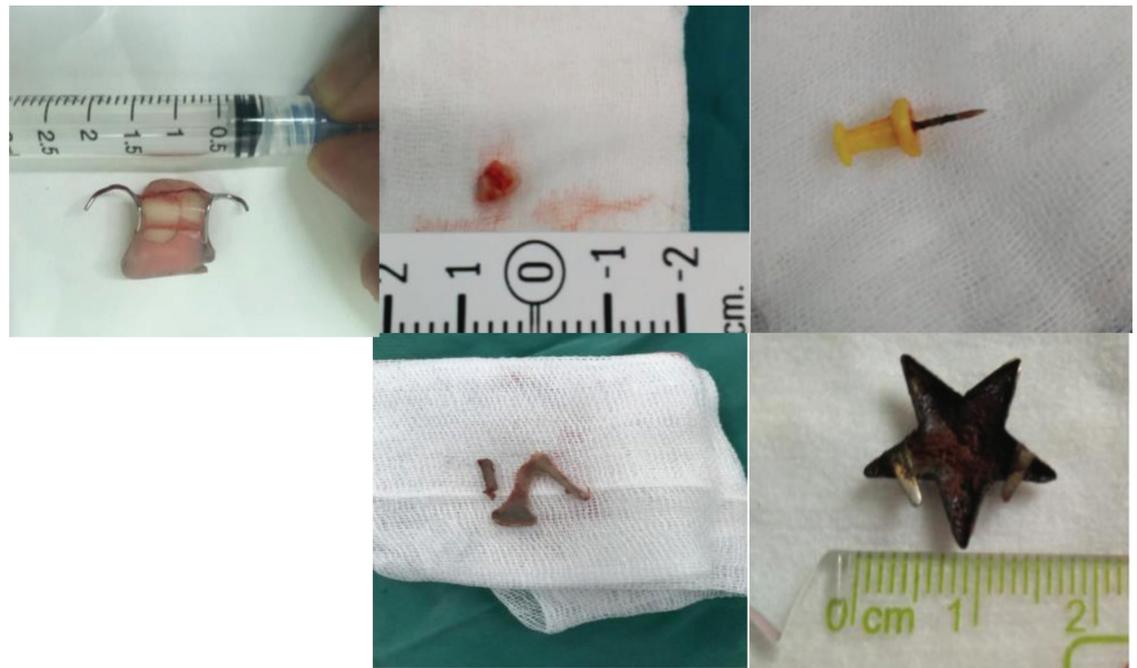


Figure 1 Foreign body was found after surgery

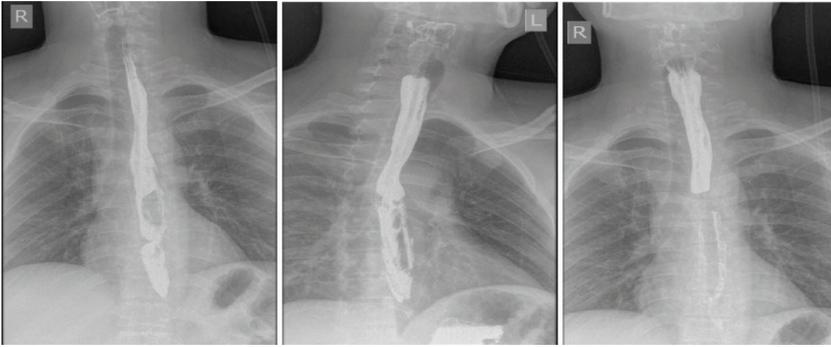


Figure 2 Result of esophagography in last patient

were two true foreign bodies and one undigested food. The blockages of the true foreign bodies found were all in the form of dentures while the undigested food was meat bones (Table 3).

The thoracotomy surgery procedure was the most commonly used procedure, out of 10 patients who performed a thoracotomy surgery procedure consist of all foreign body diagnoses, four patients (40%) with foreign bodies on the esophagus, four patients (40%) with foreign body in the right bronchus, one patient (10%) with a foreign body in the bronchi and one patient (10%) in the left superior bronchus. The cervical esophagotomy surgical procedure was performed in all cases of foreign bodies in the esophagus (Table 4 and Figure 2).

A total of 17 patients recorded, there were 12 patients known to have length of stays in hospital, while the rest of the data were not found. The five patients underwent surgery before 2015. The total of 12 patients had an average of 10.3 days with the longest of stay was 21 days and the shortest was four days.

DISCUSSION

Cases of foreign bodies in the upper gastrointestinal and respiratory tract were recorded in Sanglah Hospital for 10 years as many as 290 cases and among them were surgically removed, 17 cases (6%). Surgeries were done in the upper gastrointestinal tract as many as 11 cases (4.5%) of 243 cases, while on the respiratory were six cases (12%) of 47 cases.

In 44 studies involving 9,648 patients in the management of esophageal foreign bodies, the use of flexible or rigid endoscopy, 65.1% and 16.8% respectively, only 325 patients (3.4%) required surgery due to complications such as perforation, esophageal fistulas and failed endoscopy.⁸ Research in Nigeria collected data from 1996 to 2019, 131 patients with cases of esophageal impaction were obtained and 13 patients (10%) had surgery.⁹ This number is higher than 44 previous studies, this means developing countries have higher rates of extraction failure using

endoscopy therefore surgical procedures are inevitable. In this study the rate of surgery on the esophagus is lower when compared to research in Nigeria.

Cases of esophageal foreign body can affect men and women, nothing specific.¹ In this study, men are twice as many as women. In a study in the ENT Department at the University of Lausanne from 1 January 1963 to 31 December 1998, there were 949 cases reported with a men: women ratio of 52% : 48%. In a study conducted in the United States showed that cases of esophageal impaction in men were also higher than women, from 548 patients, 324 male patients (59%) and 224 female patients (41%).¹⁰

In a meta-analysis study conducted on the case of foreign bodies of respiratory tract in children found the proportion of men who reached 60%, namely from 58 articles with a total of 6,757 cases with 4,008 men who experienced this case.¹¹ In Systematic Review with 16 studies also found a slight difference where sum of men was more than women which were 536 compared to 443.¹² Similarity of the results of this study indicate that men have more risk of experiencing a foreign body ingestion or aspiration, but further research is needed whether the cause of the impaction is due to behaviour or differences anatomy.

The most group age that experience foreign body impaction in the upper gastrointestinal and respiratory tract is in the group of children. Nearly 80% of cases of foreign body obstruction in the gastrointestinal tract occur in children. This is related to the habits of children who often put objects into oral cavity. Coins are foreign bodies that are most often swallowed by children.¹³ The causes of impaction in this study do not find any coins, this is because coin is foreign body that is relatively easy to extract using endoscopy or bronchoscopy.

About 84% of foreign body impaction in the esophagus occurs in children under five years old, and 73% occur in children under three years old. There are factors that increase the risk of foreign body obstruction in children such as cerebral palsy, achalasia from cardia and neuromuscular disorders. In adult oesophageal foreign body impaction occurs distally which is often associated with anatomic or motor abnormalities, such as diverticula, webs, rings, strictures, tumors, eosinophilic esophagitis, achalasia, scleroderma or esophageal spasm.¹

There were more children than adults in foreign body aspiration cases.¹² In this study, the sum of cases in children was twice as many as adult group, and the fewest cases were in the elderly group. Children tend to have habit to put foreign bodies into their mouths as a form of psychological development of children. This habit results impaction of foreign objects often occurs in children. Meanwhile, if it occurs in adults,

it is usually caused by coughing or choking while eating or patients with psychiatric disorders.

In a study at Sanglah Hospital conducted in 2010-2012 there were 56 cases of foreign bodies in the esophagus and bronchus, where there were more obstructions in the esophagus, 46 cases (82.1%) and in the bronchus 10 cases (17.1%).¹⁴ From the data, we found similarity in patients who underwent surgery, where foreign bodies in the esophagus were more than foreign bodies in the bronchus.

Esophagus has three anatomical narrowings, namely in the upper sphincter (cricopharyngeal muscle), the height of the aortic arch, and the lower sphincter.¹ In this study, it was found that the obstruction in the cervical region of the esophagus was six patients (55%), while the obstruction in the thoracic region three cases (27%) and distally, two cases (18%) of a total of 11 patients. Overall from 40 studies (7541 patients), were reported the location of foreign body obstruction, there were 5.044 patients (66.9%) who experienced foreign body obstruction in the cervical esophagus, 1.862 patients (24.7%) in the thoracic esophagus and 635 patients (8.4%) in the lower esophagus.⁸ The suitability of these results showed that blockage in the cervical esophagus is more common.

Besides caused by narrow of the esophagus there was a concomitant disease that causes foreign bodies to become blocked in the esophagus, as reported in a study of 7.280 patients from 26 studies found 1.872 patients with comorbidities. It was esophageal strictures (33.9%), hiatal hernias (20.2%), web esophagus or schatzki ring (17.1%) and only a few eosinophilic esophagitis (9.5%).⁸ But in this study no comorbidities were found in patients underwent surgery.

If foreign body aspiration happens, the right bronchial branch is the most common place for a foreign object impacted. This is because the diameter of the right bronchial branch is greater when compared to the left bronchial branch. In addition, right main bronchus has more direct extensions of the trachea than the left main bronchus. This is more common in adults, although some studies in children also show the same thing, but in children proximal obstruction occurs more often because the diameter of the lower respiratory tract is still small.¹⁵ This is similar with the results of this study, which impaction foreign body in right bronchus were more often than the left bronchus.

The most frequently surgical procedure for the extraction of foreign bodies that performed in this study was thoracotomy. Surgical procedures were performed based on consideration of the location of foreign bodies. Foreign body that occurs in the upper esophagus will generally be done by

cervical esophagotomy. While in the lower esophageal and bronchial impaction, thoracotomy was performed.¹⁶ In this study both surgical procedures gave perfect success results and the absence of post-surgical complications.

From 17 patients underwent surgery, there were 13 patients with true foreign body obstruction and four patients with nonedible food impaction. The impaction of true foreign bodies was three times more than nonedible food, it was because the endoscopy and bronchoscopy could be easily used to retrieval nonedible food. In the experience gained by ENT specialists who performed endoscopy and bronchoscopy, it was difficult to extract dentures, because dentures had wires that often penetrated the esophageal lumen and the difficulty in visual field, manipulation could cause worse damage in the esophageal lumen.

In foreign body aspiration cases who underwent surgery, there was only one case in the adult age group while there were five cases in the age group of children that occur in the right bronchus, left bronchus and left superior bronchus. For adults they are more able to control food to enter the digestive tract, but not for children. Children still have the habit of inserting objects into the mouth so that foreign objects can enter the respiratory tract. Whereas, the elderly group who performed surgery, all of the cases were esophageal foreign bodies.

Surgical procedures performed in this study consisted into two, namely lateral thoracotomy and cervical esophagotomy. If a foreign body was found in the cervical esophagus, the surgical procedure performed was cervical esophagotomy. In the case of thoracic or lower esophageal foreign body, we performed thoracotomy. If the foreign body was located on the thoracic esophagus, then a lateral thoracotomy incision was made at intercostal five, while if it was located on the distal esophagus, the incision was made at intercostal seven. All actions for the extraction of foreign bodies in the bronchus and superior bronchus were lateral thoracotomy with incisions in intercostal five.

In the results we found that the average length of stay patient underwent surgery was 10,3 days. This is longer than two case reports performed surgery on esophageal foreign body where the patient was discharged on the seventh and eighth day.¹⁷ In patients with esophageal surgery, we placed nasogastric tube for three into seven days. Nutrition in patients is given in full parenterally. After the esophageal lumen considered patent enough to pass food, the nasogastric tube would be removed and the patient would be discharged. Also we did esophagography to make sure the esophagus mucosa was regular, no filling defect, additional shadow and leakage contrast.

CONCLUSION AND SUGGESTION

The failure of the extraction procedure using endoscopy or bronchoscopy in the case of a foreign body leads to surgery as a definitive therapy for patients. Surgical procedures that performed by thoracic, cardiac, and vascular and endovascular surgeons were cervical esophagotomy and thoracotomy.

In this study, it was found that more patients were surgically treated were men. The children group and adults had the same number. Cases of impaction in the esophagus were the most common cases. The foreign bodies that found the most were true foreign bodies. The most commonly surgical procedure performed was thoracotomy. In this study the success of extraction by surgery performed by thoracic, cardiac, vascular and endovascular surgeons reached 100% without additional morbidity and mortality.

From the results of this study, it was found that there is a need to improve services for patients with foreign body obstruction. The faster extraction action is carried out after the diagnosis is established will increase the extraction success rate and the final result of the action. In addition, there is also a need for cooperation with other unit units such as the pulmonology and digestive units. Improving skills in using tools and the availability of better tools also needs to be done.

ETHICAL CLEARANCE

All of data were taken from registry records in ENT Department without utilize medical records. Current study has been approved by Thoracic Cardiovascular Surgery Department and Ear, Nose, Throat and Head Neck Surgery Department.

CONFLICT OF INTEREST

The author declares there is no conflict of interest regarding the publication of this article.

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AUTHOR CONTRIBUTIONS

INS was responsible for study design, conceptualization, and data analysis. IWS was responsible for data acquisition. Josua was responsible for literature search, manuscript preparation and review. All the author had review final manuscript version.

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