

Foreign bodies in the esophagus in children and adults – a five-year experience

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Abstract

Introduction: Incidents of foreign body ingestion and entrapment in the esophagus are a common pathology that brings patients to emergency departments. The main affected groups are children, adults over 80 years old and people with mental problems as well as patients with an anatomical predisposition to retain larger bites of food in the esophagus – conditions after surgical interventions on the esophagus, after either unintentional swallowing acids and bases or suicide attempt, growing mass causing narrowing of the esophagus in a sudden area and others.

The diagnosis of this condition is made based on anamnestic and clinical data (dysphagia, hypersalivation, retching), supported by imaging studies (chest X-ray, esophagography with water-soluble contrast, CT-scan). The main method of treatment is endoscopic extraction, and if it fails, surgery is performed.

Aim: The aim of this study was to analyze the incidence, diagnosis, and management of esophageal foreign bodies, emphasizing the role of endoscopic intervention as the primary treatment approach.

Patients and methods: During a five-year period, 419 patients with suspected foreign bodies in the esophagus were treated at our clinic. Of these patients, 138 were under the age of 18, and 281 were adults.

Results: A total of 177 cases were found to contain foreign bodies after esophagoscopies were performed, while 242 patients exhibited no such foreign bodies.

Conclusions: Esophageal foreign bodies represent a preventable incident that poses a global health concern. They might spontaneously pass into the stomach, but such occurrence is not to be relied upon. Esophagoscopy is regarded as the primary treatment modality for such conditions.

Keywords

foreign body in esophagus, foreign body extraction, rigid esophagoscopy

Introduction

Esophageal foreign bodies are a common pathology in pediatric emergency surgical departments, largely due to

the tendency of children to put various objects in their mouths to explore their surroundings.^[1] According to statistical data, 80% of such cases in the United States involve children between the ages of 2 and 6.^[2,3] According to the

findings of some researchers in the field, the highest incidence of these incidents has been documented in patients between the ages of 0 and 3, with a notable peak observed around the first year of life.^[4,5] While it is true that over 80% of foreign bodies that enter the esophagus pass spontaneously into the stomach^[6,7], the number of patients with that pathology requiring hospitalization and treatment remains significant and shows no signs of decreasing. Aside from young age, other risk factors for foreign bodies entering the esophagus and not passing to the stomach include the presence of esophageal strictures (either congenital or acquired), Schatzky's ring, esophageal diverticula, esophageal compression by tumor processes in the mediastinum, eosinophilic esophagitis, motility disorders, swallowing a bite that is too large for the respective esophagus, advanced (senile) age, dementia, and other mental disorders.

Foreign bodies in the esophagus can be divided by type into two main groups – esophageal food impaction (EFI) and true foreign object ingestion (FOI).^[5] The esophageal food impaction is usually observed in adult patients with underlying esophageal diseases causing motility disorders or narrowing of the esophageal lumen. True foreign bodies are characteristic of children and people with poorly secured prostheses, mental disorders, prisoners, and drug dealers.^[5,8,9]

Other studies divide foreign bodies into two large groups according to their shape – sharp or blunt – but this division is usually considered too general and, in many cases, inaccurate.^[10] Another common classification of foreign bodies is according to the likelihood of causing complications. In

this classification, foreign bodies are divided into two categories: high-risk and low-risk. Low-risk foreign bodies are large pieces of boneless food, plastic toys, coins, marbles, pebbles, etc. High-risk foreign bodies include sharp-edged objects, long foreign bodies, pointed objects, small magnets, and batteries.^[11]

In the absence of additional occlusion or functional impairment, the most common locations of foreign body entrapment are the anatomical narrowings of the esophagus (the level of the cricopharyngeus muscle, the level of the aortic arch, and the lower esophageal sphincter).^[12] According to statistical data, the majority of foreign bodies are located in the upper portion of the esophagus.^[6]

The diagnosis is mostly based on anamnestic evidence, which includes an episode of ingesting a foreign body followed by dysphagic symptoms.

Clinical findings usually consist of inability to take food and liquids, inability to swallow saliva, attempted vomiting, hematemesis, dry cough, a sense of heaviness and tension in the chest, and even respiratory symptoms as a result of the compression caused by the foreign body.^[4,7] The absence of complaints is also not an infrequent occurrence. In children, if the incident of swallowing a foreign body goes unnoticed by adults, it can result in a delay in the removal of the foreign body and the occurrence of complications, such as perforation of the esophagus, periesophagitis, and mediastinitis.^[11] For further diagnostic clarification of the condition, imaging studies are used, usually starting with a standard chest X-ray, especially if the foreign bodies are radiopaque^[9,13] (Figs 1, 2).

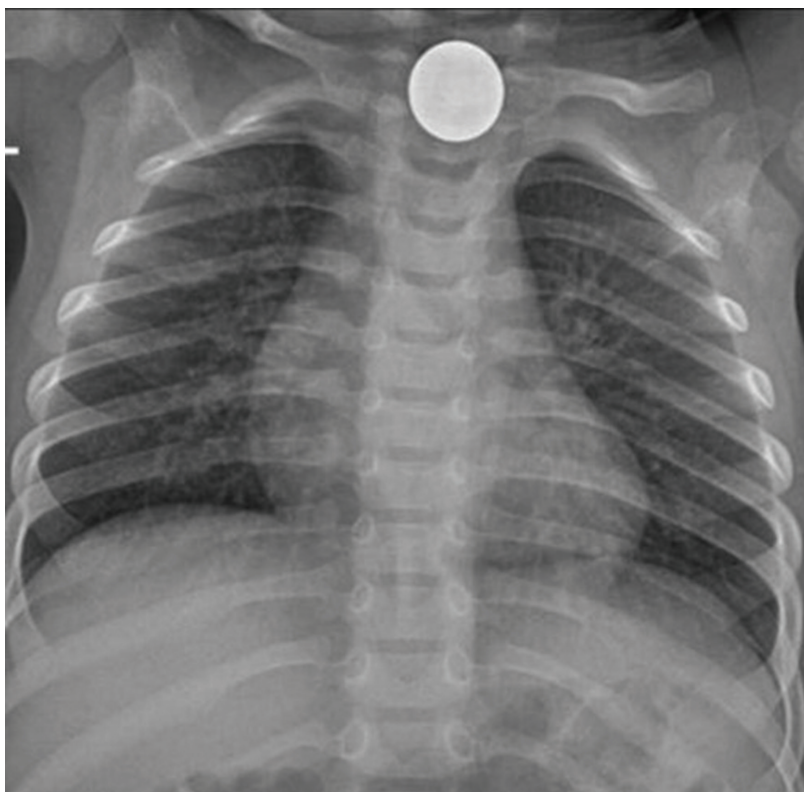


Figure 1. Radiopaque foreign body in esophagus (a coin).

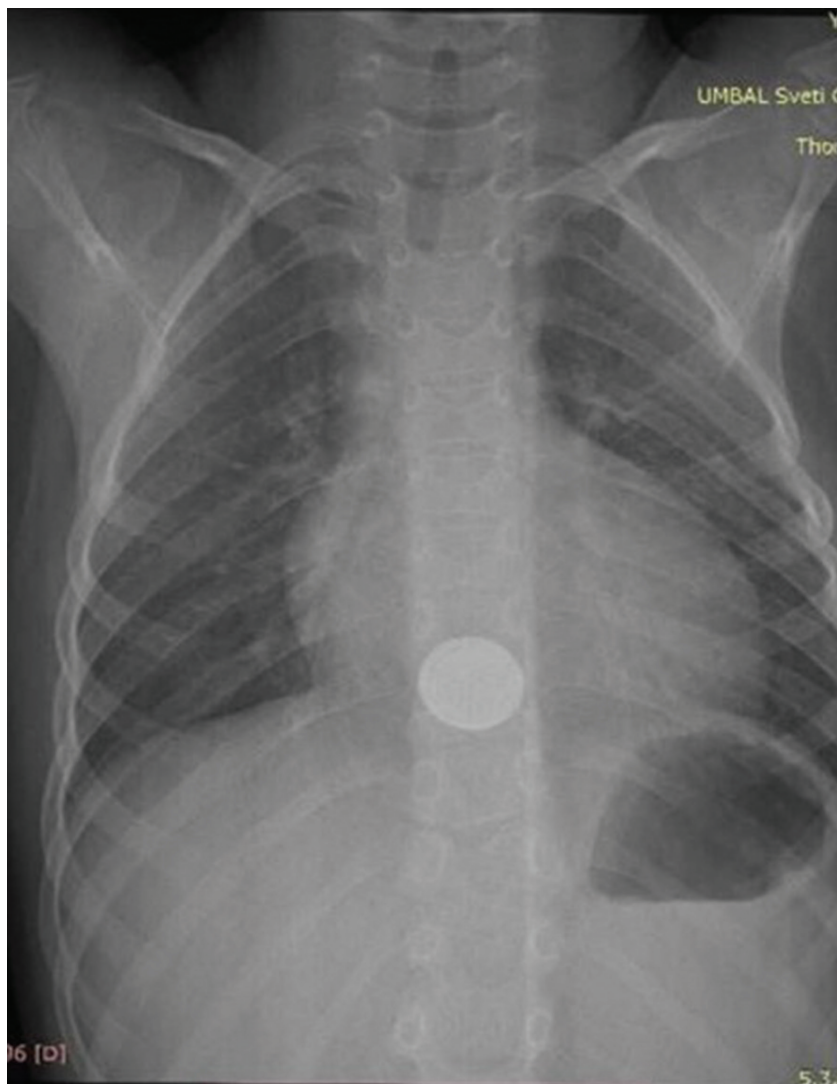


Figure 2. Radiopaque foreign body in the esophagus (a battery).

A high-value diagnostic method is the esophageal passage with water-soluble contrast. In cases of esophageal foreign bodies presence when the method is used, complete stop of the contrast material is clearly visible (**Fig. 3**), or the typical image of the “champagne glass” is seen (**Fig. 4**). Notwithstanding its precision, this method is increasingly being replaced as the preferred approach by computed tomography or diagnostic endoscopy. This shift is primarily attributable to the potential for aspiration of the contrast material, a concern that is especially salient in young children and patients with mental disorders. Performing MRI in patients with suspected esophageal foreign bodies is ineffective.^[7]

For foreign bodies lodged in the esophagus that do not have a natural tendency to pass into the stomach, muscle relaxants are used as a conservative treatment because these medications relax the smooth muscles of the esophagus. Glucagon is the medication of choice in such cases. It is administered in doses ranging from 0.25 milligrams to 2 milligrams via intravenous injection over a period of 1 to 2

minutes, with the patient in a seated position. After taking the medication, the patient drinks water (plain or carbonated) to stimulate the dilation of the esophagus. However, a number of modern studies do not report any advantages in its use.^[14-16] The primary treatment for lodged foreign bodies in the esophagus in children and adults is endoscopic removal under general anesthesia with a rigid or flexible esophagoscope and removal techniques that include extracting the foreign body (pull technique) or gently pushing it into the stomach (push technique).^[14] In the few cases where endoscopic treatment is unsuccessful, surgical removal of the foreign body is performed using an open technique.^[9]

Extraction is usually performed within 24 hours after admission of the patient, and in cases of complete obstruction, sharp-edged foreign bodies, or batteries, it is performed as soon as possible.^[10,17] Both delayed and improper treatment of this condition can lead to complications^[17] such as esophageal perforation, bleeding, and mediastinitis.

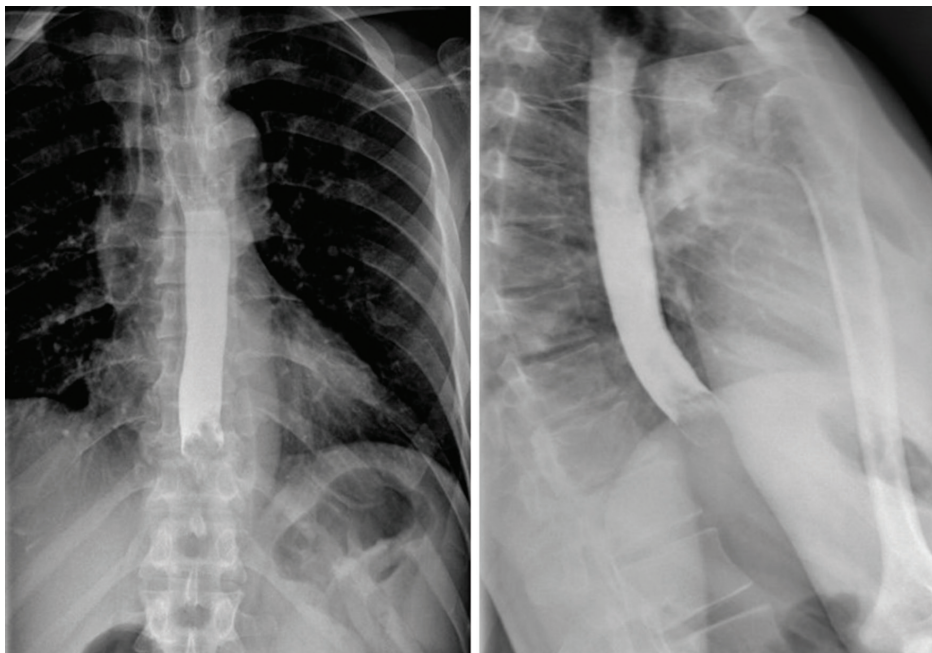


Figure 3. Complete stop of the contrast material during esophageal passage with water-soluble contrast.

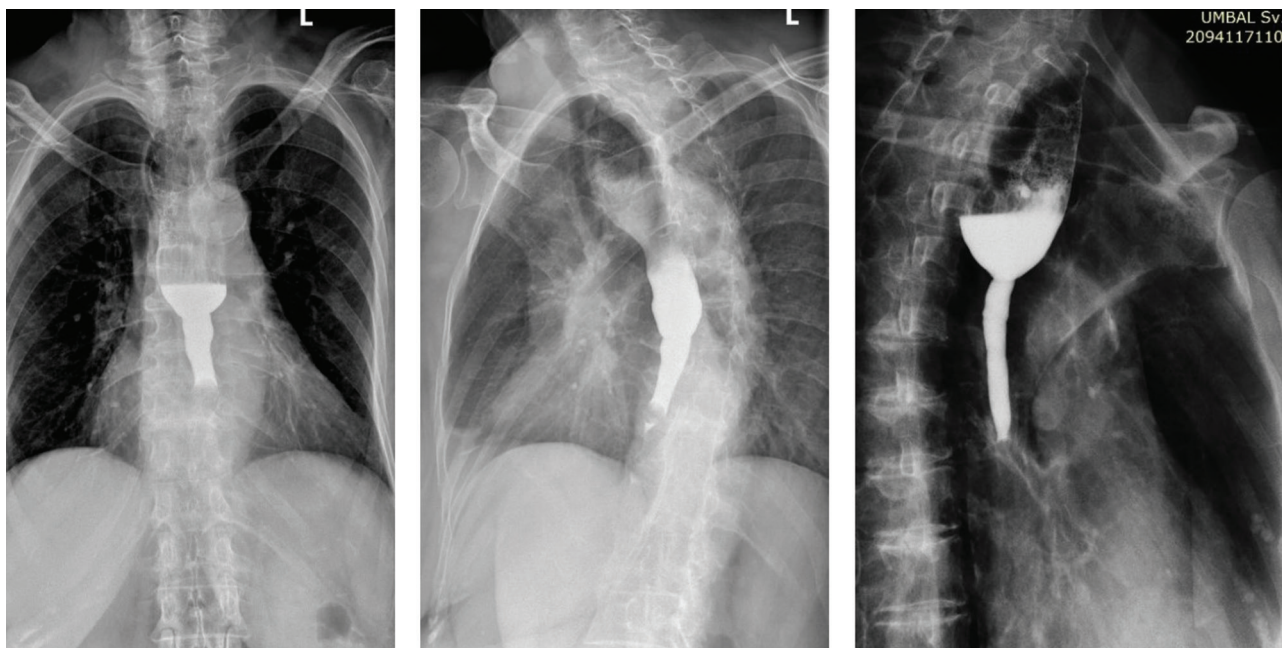


Figure 4. “Champagne glass” image during esophageal passage with water-soluble contrast.

The main complication associated with esophageal foreign bodies is perforation of the esophageal wall (1%–4% of cases^[10,18]), leading in turn to the occurrence of additional complications (mediastinitis), which can be fatal. If the foreign body is sharp-edged, perforation may occur before the extraction attempt.^[12] Batteries stuck in the esophagus cause a chemical burn at the site of their insertion, followed by perforation of the esophagus or scarring with subsequent stenosis of this area.

Patients and methods

For a period of five years, 419 patients – 138 of whom were children and 281 adults (182 men and 99 women) – were admitted to the ENT Clinic of St George University Hospital in Plovdiv with a working diagnosis of a suspected foreign body in the esophagus. They all underwent esophagoscopy (Fig. 5). The distribution of patients by year is shown in Fig. 6.

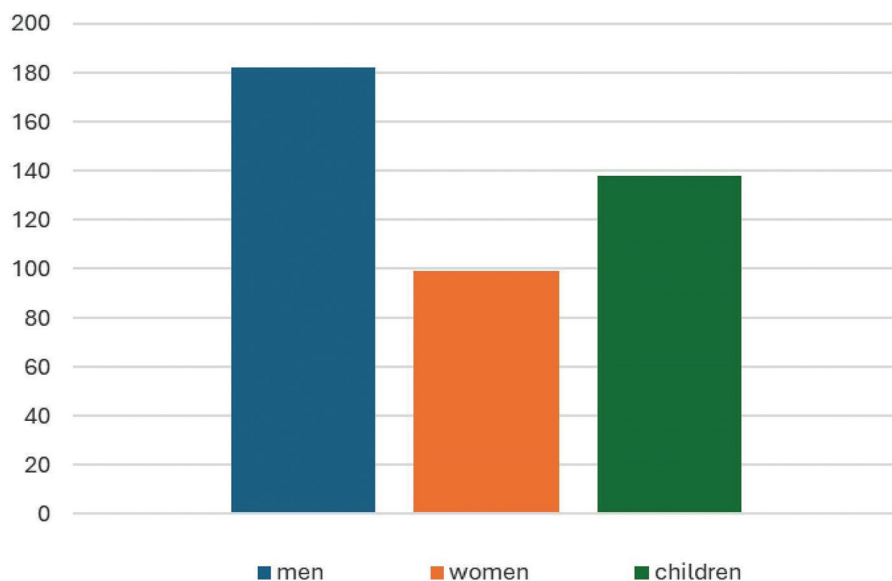


Figure 5. Distribution of patients with suspected foreign body in the esophagus.

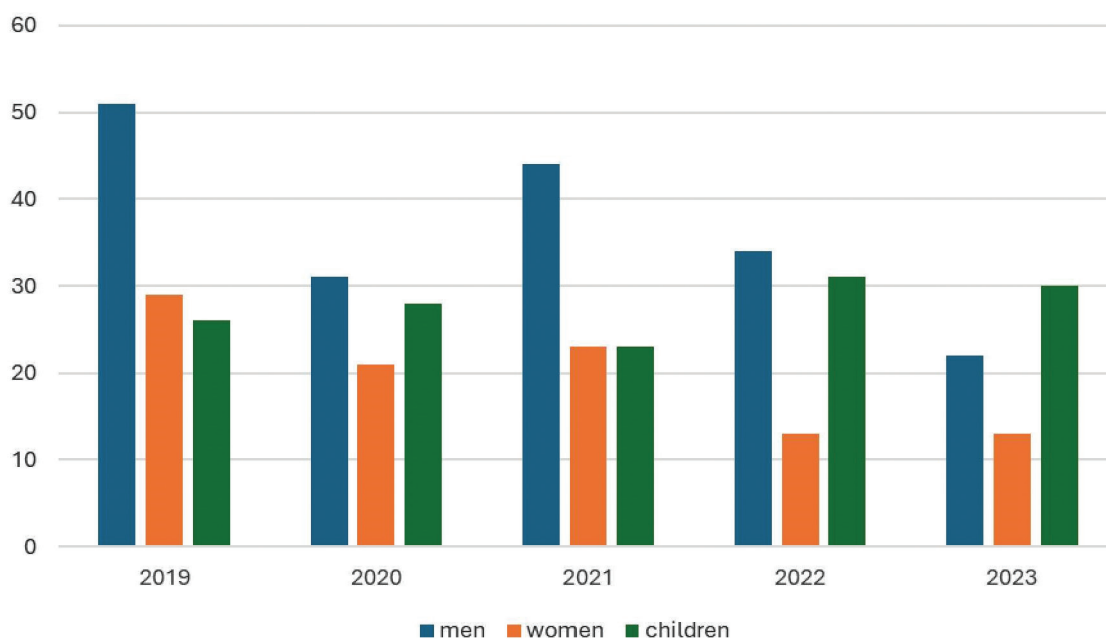


Figure 6. A 5-year distribution of patients with suspected foreign body in the esophagus.

Esophagoscopy examination and extraction of the foreign bodies lodged in the esophagus was performed using a rigid esophagoscope (KARL STORZ, Germany) (Fig. 7) and a set of extraction forceps (Fig. 8).

Results

The analysis of the anamnestic data revealed that all patients had experienced a foreign body ingestion episode. The following algorithm was applied to all patients:

1. Taking a careful history of the patient and/or his companions and of the medical team if the patients was brought by ambulance or referred to by another medical facility.
2. Obtaining permission from the patient or his/her companions (parents, caregivers, relatives) for admission to the hospital and performing emergency esophagoscopy under general anesthesia.
3. Expedited admission to the clinic and conducting basic tests – blood count, radiograph, and esophageal passage with water-soluble contrast.
4. Urgent consultation with an internist, or pediatrician,



Figure 7. Rigid esophagoscope.



Figure 8. Extraction forceps.

and an anesthesiologist.

5. Assembling a team and performing esophagoscopy.

Deviations from this algorithm occurred in isolated cases. The main differences were in the choice of imaging study – in patients with a history of ingested radiopaque objects, a chest X-ray was performed, and in those with radiolucent foreign bodies, a contrast (water soluble) esophagography was performed. Imaging was not performed due to parental disagreement in 14 pediatric cases; attempts to perform esophagography with water soluble contrast were unsuccessful in 16 cases due to the patient choking on the contrast material (foreign body located in the entrance to the esophagus), and in three cases, it was impossible to conduct an imaging study due to the patient’s lack of cooperation (a patient with cerebral palsy).

During the 5-year period under review, a number of patients with a history of a foreign body lodged in the esophagus and/or a choking episode who refused hospitalization also attended the emergency ENT office. They were excluded from the statistics.

A foreign body was found in 177 of the patients, no foreign body was found in 242 of the cases (**Fig. 9**). The distribution by age and, in adults, by sex is shown in **Table 1**.

The extracted foreign bodies were of all material types and shapes as shown in **Fig. 10**.

No fatality due to esophageal foreign body was recorded in the study period (2019–2023). The foreign body was successfully extracted in all 177 cases. In five patients, the esophagoscopy was repeated – in three due to initial failure in extraction, and in two due to suspicion of a remaining foreign body. These two patients had dysphagic complaints after extraction of meat and poor esophageal patency data from control imaging studies. However, no residual foreign body was found in both cases. Complications from

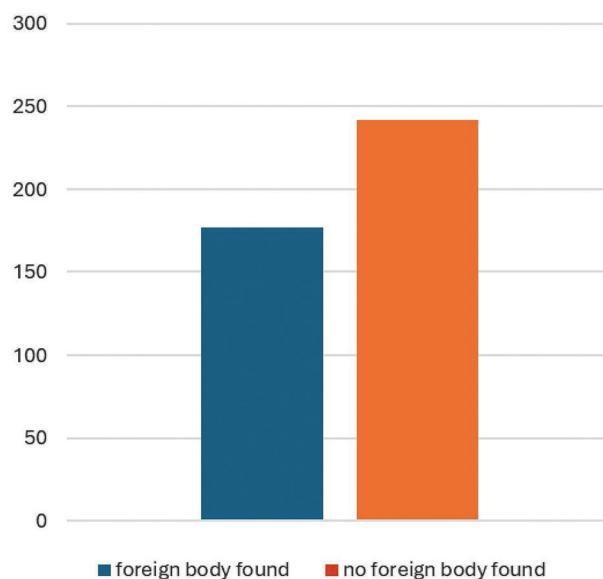


Figure 9. Distribution of patients according to presence/absence of a foreign body upon esophagoscopy.

Table 1. Distribution of patients by age and, in adults, by sex over time

	Foreign body found			No foreign body found		
	Men	Women	Children	Men	Women	Children
2019	20	9	7	31	20	19
2020	11	13	9	20	8	19
2021	18	5	9	26	18	14
2022	22	4	16	12	9	15
2023	13	6	15	9	7	15
Total	84	37	56	98	62	82



Figure 10. Extracted foreign bodies.

esophagoscopy were extremely rare – 11 patients experienced minor bleeding from the esophageal mucosa during foreign body extraction, which stopped spontaneously. The patients were mostly discharged within 48 hours of the esophagoscopy – only five patients who underwent repeated esophagoscopy required extended hospital stay. For the period under review, no esophageal perforation caused by a foreign body or its extraction attempts were recorded.

Discussion

The aim of this study was to analyze the incidence, diagnosis, and management of esophageal foreign bodies, emphasizing the role of endoscopic intervention as the primary treatment approach. By reviewing our five-year clinical experience, we aimed to highlight the effectiveness of esophagoscopy in foreign body extraction and the need for timely intervention to prevent complications.

Foreign bodies of biological and non-biological origin that became lodged in the esophagus have been a persistent

problem in the field of medicine since ancient times, with no indication of a decrease in its prevalence.

A patient with a foreign body in the esophagus may be treated by an otolaryngologist, gastroenterologist, or surgeon (a pediatric surgeon in children), depending on the individual characteristics of the healthcare system in the country, the hospital policy of the medical facility where the patient is admitted, and the available specialists with the necessary qualifications.^[3]

The presence of foreign bodies in the esophagus can vary significantly in terms of appearance, influenced by factors such as an individual’s habits, social characteristics, mental status, and dietary preferences.^[10]

The diagnosis of a foreign body lodged in the esophagus is made based on a carefully taken medical history (presence of an incident of a foreign body swallowing with subsequent complaints characteristic of its failure to pass into the stomach) and the clinical findings.

Symptoms usually include dysphagia with vomiting attempts, abdominal or chest pain, inability to swallow saliva, hiccups, hematemesis, and respiratory symptoms caused

by tracheal compression (wheezing, coughing, dyspnea and stridor). The presence, type, and severity of symptoms depend on the exact location of the foreign body, and its size and shape (foreign bodies with sharp edges cause the most severe symptoms).

The utilization of imaging studies is mandatory to facilitate diagnosis and determine the precise location of the foreign body within the esophagus, as stipulated by global guidelines.^[4] Classical chest X-ray is the method of first choice in most cases, although it has high diagnostic value only for X-ray positive (radiopaque) foreign bodies and is not a good choice for X-ray negative (radiolucent) foreign bodies such as food, plastic, wooden or aluminum foreign bodies. In case of an X-ray negative foreign body suspicion, a CT scan or diagnostic esophagoscopy is indicated^[9], and in many cases esophagoscopy is both a diagnostic and therapeutic procedure. A method with extremely high diagnostic value for both X-ray positive and X-ray negative foreign bodies in the esophagus is the passage of the esophagus with contrast agent (water-soluble). With its help, in the presence of a foreign body, a defect in the esophageal filling is confirmed – complete stop of the contrast material is clearly visible or the typical image of the “champagne glass” is clearly seen. However, this method has not been recommended in recent years due to the possibility of choking – the contrast material getting into the trachea and bronchi.

An extremely important question is how urgent the situation with presence of a foreign body in the esophagus is, and whether it is indicated to wait a certain amount of time due to the fact that 80%–90% of swallowed foreign bodies spontaneously pass into the stomach.^[7]

If there is total esophageal obstruction or the lodged foreign body is at high risk for complications – it has sharp edges, is elongated with a sharp tip^[11] or is a battery (hydrochloric acid can cause chemical burns of the esophagus), most authors recommend performing emergency endoscopy and extraction within the first six hours of the patient's admission^[13], in children if possible within two hours, in case of battery ingestion as soon as possible^[6,11]. In the remaining cases (foreign bodies with a low risk of complications), the endoscopic extraction attempt can be performed within the first 24 hours after admission if the foreign body does not pass into the stomach during this time.^[4,7]

Despite the existence of indirect techniques for esophageal foreign body removal, such as bouging, the use of a Foley catheter, and magnetic nasogastric tubes, the primary method for their removal in children and adults is esophagoscopy under general anesthesia using a rigid or flexible esophagoscope.^[3] The success rate of this method is over 90%^[8], with an extremely low complication rate of less than 5%. The preferred technique for removing a foreign body is the extraction (pull) technique, which carries a lower risk of perforation of the esophagus compared to the pushing (push) technique.

The most common complications of the endoscopic esophageal foreign body removal are superficial tear of the

esophageal mucosa (most common), esophageal perforation, cardiovascular and pulmonary complications.^[14] The incidence of complications when using a rigid or flexible esophagoscope to remove foreign bodies in the esophagus is comparable.^[3,13] When a rigid esophagoscope is used, complications usually occur due to inexperience of the endoscopist or use of inappropriate instrumentation.^[12] Surgical removal of foreign bodies lodged in the esophagus using an open approach is the last choice of treatment.^[5,9]

Conclusion

Of all the parts of the digestive system, the esophagus is the main site for foreign body entrapment. The most common items that get stuck are food boluses (mainly meat), coins, fish and chicken bones, dentures, small toys or parts of them, and batteries.

Although esophageal foreign bodies are usually associated with early childhood, according to literature data supported by our clinical experience, there are a significant number of adult patients admitted to emergency surgical departments with this pathology, and they usually have a predisposing factor – advanced age, poor dental status, and swallowing large bites of food, mental disorders, previous burns of the esophagus with acids or bases with formed stenotic areas etc.

Delaying the extraction of a foreign body lodged in the esophagus increases the risk of complications^[13] – perforation of the esophagus, chemical burns of the esophageal wall with subsequent stricture formation, tracheoesophageal fistula, mediastinitis, and death. Therefore, the time for performing an attempt to remove it should be specified individually for each patient, but no later than 24 hours after the incident.

The method of choice for treating this pathology, showing excellent results (95.6% success rate^[5,13]), is esophagoscopy with a rigid or flexible esophagoscope. Presently, open surgical techniques are employed exclusively in cases where endoscopic extraction has proven unsuccessful. According to extant literature, only 1%–1.6% of patients diagnosed with a “foreign body in the esophagus” require surgical intervention due to failure of endoscopic removal or the presence of esophageal perforation caused by the foreign body or endoscopic attempts to remove it.^[5,19,20]

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Author contributions

Conceptualization: Stoyan Markov and Petya Markova; methodology: Stoyan Markov; software: Aleksandrina Topalova; validation: Stoyan Markov and Karen Dzhambazov; formal analysis: Stoyan Markov; investigation: Stoyan Markov; resources: Petya Markova; data curation: Aleksandrina Topalova and Karen Dzhambazov; writing – original draft preparation: Stoyan Markov; writing – review and editing: Stoyan Markov and Petya Markova; visualization: Stoyan Markov; supervision: Aleksandrina Topalova; project administration: Petya Markova; funding acquisition: no funding.

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