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The analysis of 232 patients with esophageal foreign bodies

Özofagusta yabancı cisim bulunan 232 hastanın analizi

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ABSTRACT

Background: Esophageal foreign bodies (EFB), which can be seen in adults as well as being more common in the pediatric population, are important because of their serious and life-threatening complications when diagnosed late. For this reason, we aimed to review EFBs.

Materials and Methods: Hospital records of 232 patients who underwent emergency rigid esophagoscopy with the prediagnosis of EFB in our clinic between January 2007 and April 2023 were reviewed retrospectively. Esophagoscopy was performed with rigid esophagoscopy under general anesthesia.

Results: Of these patients, 134 (57.8%) were male. The median age was 5.50 years \pm 2.12 years in the pediatric population and 50.26 years \pm 16.33 years in the adult population. The mean time from insertion of the foreign body into the esophagus to removal with a rigid esophagoscope was 13.1 hours. The foreign body was localized in the cervical esophagus at a rate of 67.5%. In the pediatric group, the most encountered foreign body was a metal coin, while in the adult group, it was a bone fragment. Rigid esophagoscopy (n = 160) or direct laryngoscopy (n = 72) was used for the removal of the EFB. Esophageal perforation was seen in a total of 7 (3.0%) patients. Mortality was observed in 3 (1.3%) of our patients. Mortality was observed in 3 (1.3%) of our patients. Two of these were due to mediastinitis, and one was due to additional diseases.

Conclusions: Early diagnosis and treatment of EFBs is important because of the seriousness of their complications. Foreign body removal by rigid esophagoscopy is a reliable treatment method that should be performed as soon as possible. If the foreign body is sharp-edged and has penetrated the esophageal wall, it cannot be removed without complication; it should be removed by surgical operation.

Keywords: Esophagus, Foreign body, Rigid esophagoscopy

ÖZET

Amaç: Pediatrik popülasyonda daha sık görülmesinin yanı sıra erişkinlerde de görülebilen özofagus yabancı cisimleri (ÖYC), geç tanı konduğunda komplikasyonlarının ciddi ve hayatı tehdit edebilecek özellikte olması nedeniyle önemlidir. Bu nedenle ÖYC'lerini gözden geçirmeyi amaçladık.

Materyal ve Metot: Ocak 2007- Nisan 2023 yılları arasında kliniğimizde ÖYC ön tanısıyla acil rijit özofagoskopi yaptığımız 232 olgunun hastane kayıtları retrospektif olarak incelendi. Özofagoskopi genel anestezi altında rijit özofagoskopi ile yapıldı.

Bulgular: Bu hastaların 134'i (%57,8) erkek idi. Medyan yaş pediatrik ve yetişkin popülasyonda sırasıyla 5,50 \pm 2,12 ve 50,26 \pm 16,33 idi. Yabancı cisimin özofagusa takılmasından rijit özofagoskopi ile çıkarılmasına kadar geçen süre ortalama 13,1 saat idi. Yabancı cisim %67,5 oranında servikal özofagusta lokalize idi. Pediatrik grupta en sık rastlanan yabancı cisim madeni para iken erişkin grupta kemik parçası idi. ÖYC'nin çıkarılması için rijit özofagoskopi (n = 160) veya direkt laringoskopi (n = 72) kullanıldı. Toplam 7 (%3,0) hastada özofagus perforasyonu görüldü. Hastalarımızdan 3 (%1,3)'ünde mortalite görüldü. Bunlardan ikisi mediastinite bağlı, biri ise ek hastalıklar nedeniyle idi.

Sonuç: ÖYC'lerinin erken tanı ve tedavisi, komplikasyonlarının ciddi olması nedeniyle önemlidir. Rijit özofagoskopi ile yabancı cisim çıkarılması, en kısa zamanda yapılması gereken güvenilir bir tedavi yöntemidir. Yabancı cisim keskin uçlu, özofagus duvarına penetre olduysa ve komplikasyonsuz çıkarılamayacağı düşünülüyorsa cerrahi operasyon ile çıkarılmalıdır.

Anahtar Kelimeler: Özofagus, Yabancı cisim, Rijit özofagoskopi.

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INTRODUCTION

Esophageal foreign bodies (EFBs) are mostly seen in the pediatric population. In adults, accidental ingestion is a common problem, and this is seen in the elderly edentulous, those with psychiatric disorders, the mentally handicapped, and alcohol intoxication (Aiolfi et al., 2018). In childhood, most EFBs are coins and toys, while in adults, they are usually pieces of meat and bone. Thin objects such as sharp-tipped fishbones, metal objects, dental prostheses, bones, pins, and wooden toothpicks are especially dangerous due to their high complication rates, such as occlusion, esophageal perforation, fistulization, and mediastinitis. In conclusion, EFBs are an emergency and require immediate treatment to avoid complications (Akkuzu et al., 2020; Nadir et al., 2011). We wanted to share our experience and results in this research by retrospectively evaluating patients who underwent emergency rigid esophagoscopy at our hospital due to EFB.

MATERIALS AND METHODS

After obtaining approval from the Ethics Committee of the University (Letter no. 2023-06/27), the medical files of 232 patients who underwent emergency rigid esophagoscopy with a preliminary diagnosis of EFB in our clinic between January 2007 and April 2023 were reviewed retrospectively. The majority of patients had a history and symptoms consistent with EFB. The initial diagnostic approach was a physical examination, which included a detailed history and examination of the oropharynx, hypopharynx, neck, and abdomen. In all patients, a radiological examination was done. To demonstrate the FB, soft-tissue roentgenograms of the oropharynx, neck, chest, and, when appropriate, abdomen were taken. Foreign bodies were classified according to the regions detected in esophagoscopy, and the most frequent insertion sites of foreign bodies were determined. In patients who swallowed sharp FBs or when the extraction operation appeared problematic, esophagography with barium or water-soluble radiopaque substances was performed. The chosen treatment option for all patients was the removal of the FB in the operating theatre under general anesthesia utilizing rigid esophagoscopy. To prevent FB migration into the distal esophagus or stomach, patients receiving round FBs were maintained in the Trendelenburg position during premedication and intubation. Prior to endotracheal intubation, a direct laryngoscopy was performed. The FB was removed with McGill forceps in 72 individuals without the use of any other instrumentation. Only one patient used a Fogarty catheter. All patients were monitored for perforation symptoms such as fever, tachycardia, chest pain, abdominal pain, and neck crepitation. If necessary, the patients were operated on.

Statistical analysis

In the statistical evaluation of the data to be obtained from our study, the distribution was defined by using the arithmetic mean, standard deviation, frequency, and percentages as descriptive measures of the frequency distribution. The normality test was checked with the Kolmogorov-Smirnov test. The SPSS 25.0 program was used to calculate the values.

RESULTS

Of the 232 patients whose medical records were analyzed, 134 (57.8%) were male and 98 (42.2%) were female. The youngest patient was 6 months old, and the oldest patient was 83 years old. The median age was $5.50 \text{ years} \pm 2.12 \text{ years}$ in the pediatric population and $50.26 \text{ years} \pm 16.33 \text{ years}$ in the adult population.

There were symptoms varying according to the shape, structure, location of the swallowed object, age of the patient, and the complication it caused. The most common symptoms were dysphagia ($n = 98, 42.2\%$), feeling stuck ($n = 92, 39.6\%$), abdominal pain, and nausea ($n = 78, 33.6\%$). The average time from FB ingestion to removal was 13.1 hours (range: 1 to 120 hours), which was similar for children and adult patients.

Rigid esophagoscopy (69.0%) or direct laryngoscopy (31.0%) was used to remove EFB, which was successful in 206 (88.8%) cases. FB was removed with McGill forceps during direct laryngoscopy. FB was pushed into the stomach in 12 cases (5.2%). Although the anamnesis was positive in 26 (11.2%) of the 232 cases, no foreign body was found in esophagoscopy. Fifteen of these cases were adults, and 11 of them were pediatrics. Stenosis was found in 1 (0.4%) and esophageal cancer in 1 (0.4%) of adult patients without foreign bodies. When all cases were evaluated ($n = 232$), only 4 (1.7%) patients had a specific underlying condition: stenosis (0.9%), diverticulum (0.4%), and esophageal cancer (0.4%). When we look at the regions where foreign bodies were seen in our patients, 139 (67.5%) EFBs were in the cervical esophagus, 53 (25.7%) were in the middle esophagus, and 14 (6.8%) were in the distal esophagus in the vast majority of cases.

Foreign bodies that can be detected and cause symptoms; While meaty morsels and bones were encountered most frequently in organic ones, coins and needles were the most common among inorganic ones. The most common foreign bodies found were fishbone, chicken bone, and dental prostheses, particularly in elderly patients. Foreign body types are detailed in Table 1.

Table 1 Types of swallowed foreign bodies (FB) among adults and pediatric.

Type of foreign body	Pediatric (%)	Adult (%)	Total (%)
Inorganic	n=81 (39.3)	n=16 (7.8)	n=97 (47.1)
Coin	57 (27.7)	2 (1)	59 (28.7)
Needle	8 (3.9)	6 (2.9)	14 (6.8)
Plastic	6 (2.9)	1 (0.5)	7 (3.4)
Token	3 (1.5)	0 (0)	3 (1.5)
Dental prosthesis	0 (0)	2 (0.9)	2 (0.9)
Other (Thinner, wire, piece of glass, etc.)	7 (3.4)	5 (2.4)	12 (5.8)
Organic	n=11 (5.4)	n=98 (47.5)	n=109 (52.9)
Piece of meat with bones	1 (0.6)	58 (28.1)	59 (28.7)
Piece of meat	4 (1.9)	27 (13.1)	31 (15.0)
Fruit seed	6 (2.9)	9 (4.4)	15 (7.3)
Other (Scone, garlic, etc.)	0 (0)	4 (1.9)	4 (1.9)
Total	92 (44.7)	114 (55.3)	206 (100)

The morbidity rate was 3.4% (n = 8). Atrial fibrillation developed in one patient, which improved with medical treatment. Esophageal perforation was seen in a total of 7 (3.0%) patients, with 3 (1.3%) of the patients in the cervical and 4 (1.7%) in the thoracic esophagus. One of these patients was a 10-year-old boy who had swallowed a marble and was at the level of the first stenosis. During removal, it passed to the second stenosis. When attempting to press into the stomach, a perforation developed. The defect was repaired by thoracotomy. Meanwhile, on the sixth day, the foreign body went through the intestinal tract and exited the body. A 1-year-old male was another patient who experienced iatrogenic perforation. He had swallowed the jewel ring (Figure 1). This child also underwent a surgical repair.

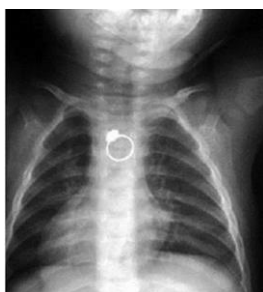


Figure 1: Metallic object (the jewel ring) is seen chest X-ray.

The other 5 patients with perforation were in the adult group and admitted to the hospital late (days 3–4). In one of our cases, the swallowed large bone fragment (Figure 2) was removed by open surgery, considering that it could not be removed endoscopically without complications.



Figure 2: Image of removed large bone fragment.

Mortality was observed in 3 (1.3%) of our patients. Two of them died due to mediastinitis, and one of them died due to additional diseases.

DISCUSSION

While EFBs are frequently seen in the pediatric group, they can also be seen in adults who wear dentures (due to loss of sensation in the soft palate), edentulous individuals, psychiatric patients, and people with heavy alcohol use. In addition, deliberate and repeated foreign body ingestion is more common among prisoners (Hunter et al., 2003; Aiolfi et al., 2018). Accidental ingestion of FBs is a common problem in the pediatric population.

Children are more prone to FB intake due to their propensity to explore the environment through the mouth, a lack of molars that reduces their chewing ability, and their inability to distinguish edible from inedible foods (Klein et al., 2019). In the literature, the highest prevalence was reported in the pediatric age group (1–11 years, most patients 2–4 years old) (Klein et al., 2019; Kim et al., 2016). In our study, in accordance with the literature, the majority of pediatric patients (n = 48, 52.2%) were in the age range with a high prevalence.

It is more common in men in the adult group, and some studies have reported that the male/female ratio is 1.5 (Tumay et al., 2015; Yao et al., 2015). In our study, 51.8% of our cases in the adult group were male (M/F = 59/55).

While some patients will have no symptoms, in symptomatic patients, the sensation of FB may vary greatly, ranging from a sore throat to dysphagia, odynophagia, retrosternal pain, and vomiting (Klein et al., 2019). Initial symptoms may be a feeling of FB and localized pain. Over time, localized inflammatory symptoms develop, followed by systemic symptoms such as hematemesis, fever, chest and back pain, swelling in the neck, erythema, or tenderness. It may show signs of pharyngeal or esophageal perforation (fever, tachycardia, subcutaneous emphysema, septic picture) due to EFB (Kim et al., 2016). The most common symptoms in our patients were dysphagia, feeling stuck, abdominal pain, and nausea. Perforated patients also had fever, tachycardia, and septic findings.

In many studies, the most commonly removed esophageal foreign body was reported as coin in the pediatric group and chicken bone and fish bone in the adult group (Boo et al., 2018; Aiolfi et al., 2018). The most common foreign bodies in our series are as follows: Among adults, bones and boneless meat morsels were the most frequently encountered food items due to dietary habits, while among children, coins were the most ingested foreign bodies. However, we did not encounter batteries, which are reported to be common in the pediatric age group in the literature, or fish bones, which are common in the adult age group, in our patient group.

EFBs are usually inserted in the areas of physiological anatomical narrowing of the esophagus (1st narrowing is the pharyngoesophageal junction, 2nd narrowing is the region where the esophagus passes between the left main bronchus and aorta, and 3rd narrowing is where it crosses the diaphragm), and they are most seen in the first narrowing at a rate of approximately 70% (Macpherson et al., 1996; Yavuzer et al., 1977; Binicier et al., 2022). On the other hand, some studies indicate that there is a correlation between

the site of foreign body impaction and age. While EFBs are seen more frequently in patients under 40 years of age in 1st narrowing, their incidence increases in patients over 40 years of age in 2nd and 3rd narrowing (Klein et al., 2019; Kim et al., 2016). In our study, the foreign body was most frequently identified in the first narrowing ((n = 139, 67.5%), consistent with the existing literature. Considering the age of the patients with foreign bodies in the first narrowing, the majority ((n = 107, 77.0%) consisted of patients under the age of 40. It makes us think that dysmotility of the pharyngeal muscles in elderly patients may cause this.

Individuals with a history of upper GIS surgery, congenital esophageal malformation, esophageal motility disorder, Schatzki ring, peptic stricture, radiation-related stricture, esophageal carcinoma, Zenker or non-Zenker esophageal diverticulum, or eosinophilic esophagitis are also risk factors for EFB (Binicier et al., 2022). When examining patients who had foreign bodies removed from the esophagus, we determined that four (1.7%) of them had underlying conditions, namely stricture (n = 2), diverticulum (n = 1), and esophageal cancer (n = 1). For this reason, the esophagus should be evaluated in detail with the endoscope after the removal of the foreign body.

Removal of foreign bodies is also controversial as the best treatment method. Most ingested foreign bodies, 80–90%, pass spontaneously through the GI tract; 10%–20% require endoscopic intervention; and only 1% or less may require surgery (Lin et al., 2007). While gastroenterologists advocate flexible instruments, surgeons prefer rigid esophagoscopy. The main aim is to promptly remove the foreign body, preferably within the first 24 hours, in order to prevent serious complications. As the foreign body stays in the esophagus, the inflammation and fragility of the esophageal wall increase, thus increasing the possibility of perforation. Moreover, organic foreign bodies that swell and expand when water is absorbed can exert pressure on the trachea through the anterior membranous trachea, leading to respiratory distress. In addition, as long as the foreign body remains in the esophagus, it can lead to complications such as fistula, mediastinitis, and abscess (Ma et al., 2013; Pinto et al., 2012). Our complication rates are low because the majority of our patients underwent an early esophagoscopy procedure (2–6 hours). If the foreign body is pointed and has penetrated the esophageal wall and its removal is risky for perforation, open surgery should not be hesitated. In one of our patients, a large piece of bone that she swallowed was removed by open surgery, considering that it could not be removed endoscopically without complications. Of the 7 patients with perforation, 5 were late admissions, and perforation was detected at the time of admission. In two patients, open surgery was

performed because iatrogenic perforation developed during the esophagoscopy procedure.

Although there are various different methods for removing EFBs, including the use of a Foley catheter, bougie advancement, papain or carbonated fluid therapy, and intravenous glucagon (Nadir et al., 2011), and the endoscopic clip method in cases of perforation (Yozgat et al., 2016), in our series, rigid esophagoscopy was performed in 69.0% (n = 160) of patients, while direct laryngoscopy was employed in 31.0% (n = 72) for foreign body extraction. In our study, no alternative treatment method was used, except for the use of a Fogarty catheter in one patient.

This study has some limitations as it is a retrospective and single-center study. Our data is based on retrospective medical records and endoscopy reports. Also, the data collectors were not blind to the purpose of the study.

CONCLUSION

Consequently, awareness of the dangers of EFBs should be raised to prevent accidental ingestion of foreign objects. We especially recommend rigid esophagoscopy for pediatric patients. Because it allows both the use of optical forceps with a strong gripping ability for foreign objects and the insertion of sharp objects into a rigid endoscope. Early management of EFBs is beneficial in reducing the risk of diagnostic delay and complications.

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Ethics Committee Approval: Ethical approval was obtained from the local Clinical Research Ethics Committee (Cumhuriyet University 2023-06/27).

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Author Contributions:

Idea/Concept: Özgür KATRANCIOĞLU; **Design:** ŞK; **Supervision/Consulting:** Şule KARADAYI; **Data Collection and/or Processing:** Eftal SERT; **Analysis and/or Interpretation:** Özgür KATRANCIOĞLU; **Literature Review:** Şule KARADAYI; **Writing of the Article:** Özgür KATRANCIOĞLU; **Critical Review:** Şule KARADAYI.

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