

Intentional and Accidental Ingestion of Foreign Body: A Retrospective Single Center Experience

Kasıtlı ve Kaza ile Yabancı Cisim Yutulması: Retrospektif Tek Merkez Deneyim

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ÖZ

Amaç: Yabancı cisim (YC) yutulması ve bunun gastrointestinal sistem üzerindeki etkisi, gastrointestinal pratikte en yaygın sağlık sorunlarından ve acil durumlardan biridir. YC yönetimi endoskopist için büyük bir zorluk olabilir. Bu çalışmada gastrointestinal sistemdeki YC'ler ve onların yönetiminin değerlendirilmesi amaçlanmıştır.

Araçlar ve Yöntem: Bu retrospektif çalışma, üst sindirim sisteminde yabancı cisim yutma şikayetiyle başvuran yetişkin hastaları içermektedir. Hastaların demografik bulgularını, YC'nin özelliklerini; endoskopik tedavi yöntemlerini ve gelişen komplikasyonları tıbbi kayıtlardan incelenmiştir.

Bulgular: YC yutma şikayeti olan toplam 85 hastaya gastroskopi yapıldı. Hastaların ortalama yaşı 46.69 (19-87 yıl) idi. Erkek/kadın oranı %66.7 / %33.3 idi. Hastaların %36'sında YC yutma kasıtlı iken, %64'ünde YC kazara yutmuştu. Kasıtlı YC yutan vakalarda, YC'lerin çoğunluğu çakmak, jilet, pil gibi metalik nesnelerdi. Özofagus perforasyonu(%1.3), mikroperforasyon (%1.3), mukozaya sınırlı kanama (%1.3), ülser ve özofagustaki yüzeysel laserasyonlar (%4), 6 hastada (%8) gözlemlenen en önemli komplikasyonlardı.

Sonuç: Çalışmamız, kasıtlı veya kazara yutulan YC lerde büyük bir değişkenlik olduğunu ortaya koymuştur. Bu nesnelerin çıkarılması için yapılan endoskopik girişimlerin önemli komplikasyonlar olmaksızın hem etkili hem güvenli olduğu görülmüştür.

Anahtar Kelimeler: endoskopi; yabancı cisim; yutma

ABSTRACT

Purpose: Foreign body (FB) ingestion and its impact on gastrointestinal system is one of the most common health problems and emergency situations in gastrointestinal practice. Management of FB may be a great challenge for the endoscopist. We aimed to evaluate the FB in gastrointestinal system and their management.

Materials and Methods: This retrospective study included adult patients with the complaint of FB in upper digestive system. We evaluated the demographic findings of the patients, characteristic of the FB, endoscopic treatment methods and complications from medical records.

Results: Total of 85 patients with the complaint of FB ingestion underwent gastroscopy. The mean age of the patients was 46.69 (19-87 years). The ratio of males/females was 66.7% / 33.3%. In 36% of patients, the ingestion of FB was intentionally, whereas 64 % ingested FB accidentally. In cases who ingested FB intentionally, the majority of FB were metallic objects such as lighter, razor blade, battery. Esophageal perforation (1.3%), micro perforation (1.3%), mucosal self-limited bleeding (1.3%), ulcers and superficial lacerations (4%) in esophagus were most important complications which were observed in 6 patients (8%).

Conclusion: Our study showed a great variability of FB ingested either intentional or accidentally. The endoscopic approach for retrieval of these subjects is both effective and safe, without significant complications.

Keywords: endoscopy; foreign body; ingestion

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INTRODUCTION

Foreign body (FB) ingestion and its impact on gastrointestinal system (GIS) is one of the most common health problems and also emergency situations in gastrointestinal practice. It is mostly accidental in children, but we can also see intentional ingestion of FB in adults, especially in mental retarded people, in those with psychiatric diseases and in prisoners. According to European guideline, 80-90% of FB pass spontaneously through gastrointestinal system, but 10-20% of cases require endoscopic management.¹ Surgery is the only option for removal in 1% of cases. In pediatric age group, coins, batteries and toys are mostly observed subjects that are ingested accidentally.² In adults, ingested FB are mostly food products, such as meat or fish bone but ingestion of pills, batteries, razor blades can also be seen.³ Management of FB changes in consideration with shape, type and size of the subject. Time passed after ingestion of subject is also an important determining factor for symptoms and complications.⁴ Subjects impacted in the esophagus should be removed within 24 hours, because delay can decrease endoscopic success rate meanwhile increase the risk of complications. In cases of complete esophageal obstruction, patients show the symptoms of inability to swallow, even the saliva. In these cases, gastroscopy should be performed within 6 hours. The big and shapeless objects can cause pressure to walls of esophagus and cause perforations due to pressure necrosis.³ Because of these urgent situations, ingestion of foreign bodies should be interpreted as emergency states.

There are some physiological narrowing areas or angulations where FB cannot pass easily. These areas are upper and lower esophageal sphincter, aortic arch, left main stem bronchus, pylorus and duodenal sweep, ileocecal valve and anus. It should be anticipated that objects with a diameter greater than 2-2.5 centimeter (cm) cannot pass from pylorus and ileocecal valve; also, FB longer than 5-6 cm cannot pass through duodenal sweep.^{5,6,7,8,9} These cases have high risk of impaction, perforation and obstruction.

To our knowledge, the studies about FB and their endoscopic treatment are very few in literature; so, we aimed to evaluate the FB in gastrointestinal system and their management.

MATERIALS and METHODS

This study was approved by Izmir Bakırçay University Non-Interventional Clinical Research Ethics Committee (dated 22.03.2023 and numbered 950).

This retrospective study included adult patients who admitted to department of Emergency Medicine and referred to Gastroenterology with the complaint of FB in upper digestive system and underwent gastroscopy between April 2016 and July 2023. We evaluated the demographic findings of the patients, such as age, gender; characteristic of the FB; localization by gastroscopy; endoscopic treatment methods and complications from medical records. We also grouped the patients as intentional or accidental ingestion of FB. Patients under the age 18, patients with no FB found by endoscopic or radiologic methods, and cases whose records are incomplete were not involved.

Endoscopic Procedure

Endoscopy was performed at an appropriate time according to urgency of procedure, ingested material and fasting status of the patient.

Emergency interventions were performed in cases of total obstruction of esophagus and in cases of sharp-edged objects ingested, such as razor blade, in endoscopy unit, under sedo analgesia performed by anesthesia team. Flexible endoscopes (EG-590 WR, EG-530 WR, EG-600 WR, EG-700R; Fujinon, Tokyo, Japan) were used for the endoscopic procedures with a variety of additional instruments such as baskets, forceps, snares or overtubes. After removal of FB, a control gastroscopy was performed to evaluate for the complications such as erosions, bleeding.

Statistical Analysis

Statistical analysis was obtained by using the program Statistical Package for Social Sciences 24.0 (SPSS 24.0, Chicago, IL, USA) statistical package program. Categorical variables were calculated as counts and percentages. For group comparisons, χ^2 test or Fisher's exact test were used. P value less than 0.05 was considered statistically significant.

RESULTS

From April 2016 and July 2023, a total of 85 patients with the complaint of FB ingestion underwent gastroscopy. FB were confirmed in 75 cases, and no FB was found in 10 cases.

The mean age of the patients was 46.69 (19-87 years). The ratio of males/females was 50/25 (66.7% / 33.3%). In 27 patients (36%) the ingestion of FB was intentional, whereas 48 patients (64 %) ingested FB accidentally. In 8 cases, FB were not in upper gastrointestinal system, and we could not see these subjects endoscopically. The foreign bodies found to be ingested were listed in table 1, endoscopic findings of some of them are shown in Figure 1.

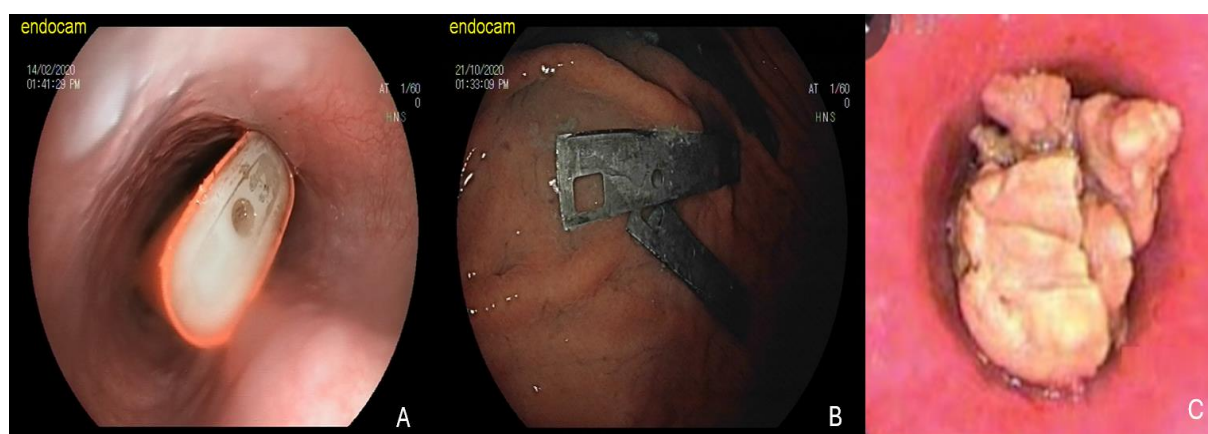


Figure 1. A: Lighter in esophagus, B: Razor blade in stomach, C: Meat impacted in distal esophagus

Table 1. Ingested foreign body.

Variables	Number(n)	Percentage (%)
Meat	23	30.7
Pen battery	9	12
Razor blade	6	8
Meat bone	6	8
Lighter	5	6.7
Pin	4	5.3
Garlic	3	4
Tea spoon	2	2.7
Partial denture	2	2.7
Fishbone	2	2.7
Lighter, razor blade	1	1.3
Razor blade and pen battery	1	1.3
Pen, battery, lighter	1	1.3
Nail clipper	1	1.3
Others*	9	12
Total	75	100

*Drugs, solidified food, unidentified metallic objects

The localization of FB was examined by using endoscopy and radiological method, 42 were in esophagus, and 23 were in stomach (Table 2). In 65 patients (86.7%), endoscopic treatment was effective to take out the foreign body but failed in 2 (2.7 %). In one of these patients, the patients had swallowed many razor blades, and we could not take all of them since some were found to be in distal parts of the gastrointestinal tractus. In second patient, foreign body was a bone, and the diagnosis was cervical esophageal perforation, and the patient was taken in emergency surgery.

For endoscopic removal of FB, forceps (17.3%), retrieval net (14.7%), snare (10.7 %), overtube (6.7%), rat-tooth forceps (8%), basket (6.7%), and some combinations of these devices were used. In 12 patients (16%), push technique was effective (Table 3).

Table 2. Location of foreign body.

Variables	Number(n)	Percentage (%)
Esophagus	42	56
Stomach	23	30.7
Jejunum	5	6.7
Stomach and duodenum	2	2.7
Ileum	1	1.3
Ileum and jejunum	1	1.3
Colon	1	1.3
Total	75	100

Table 3. Retrieval devices used during endoscopic removal of FB.

Variables	Number(n)	Percentage (%)
Not used*	9	12
Basket	5	6.7
Basket, tripod, forceps	2	2.7
Endoscopic pushing	12	16
Rat-tooth forceps	6	8
Retrieval net	11	14.7
Forceps	13	17.3
Retrieval net, forceps	2	2.7
Overtube	5	6.7
Snare	8	10.7
Tripod	2	2.7
Total	75	100

*Includes 8 patient in whom FB was detected radiologically at distal parts of the gastrointestinal system and 1 patient with perforation.

After removal of FB, a control gastroscopy was performed to all patients, and no abnormality was found like esophageal strictures, malignities or endoscopic signs of motility disorders.

When we evaluated the complications, we found that all complications were due to food impaction in esophagus. There were one case of esophageal perforation after ingestion of a meat bone, one case of micro perforation after ingestion of fishbone, and four cases with mucosal self-limited bleeding, ulcers and superficial lacerations in esophagus after ingestion of meat (Table 4). In cases of complication, we saw that all complicated cases were patients who ingested FB accidentally ($p:0.61$) (Table-5).

Table 4. Complications.

Variables	n	%
Microperforation in esophagus (hemoclips)	1	1.3
Self-limited mucosal bleeding in esophagus	1	1.3
Mucosal erosions, ulcers in esophagus	3	4
Esophageal perforation (surgery)	1	1.3

Table 5. Differences between intentional and accidental cases.

Number of cases	Intentional 27(36%)	Accidental 48(64%)	P Value
Sex			<0.01
Male	27	23	
Female	0	25	
Type of foreign body			<0.01
Lighter	5	0	
Lighter and razor blade	1	0	
Teaspoon	1	1	
Others	1	8	
Partial denture	0	2	
Razor blade	6	0	
Razor blade, pen battery	1	0	
Meat bone	0	6	
Meat	0	23	
Fishbone	0	2	
Pen battery	9	0	
Pen battery and lighter	1	0	
Garlic	1	2	
Nail clipper	1	0	
Pin	0	4	
Complication			0.061
With complication	0	6	
Without complication	27	42	

When we divide the patients as those who ingested FB intentionally (36%) or accidentally (64%), we found some differences among the ingested materials. In cases who ingested FB intentionally, the majority of FB were metallic objects such as lighter, razor blade, battery; whereas in patients who ingested the FB accidentally, majority of FB were meat, bones, garlic ($p<0.01$). Four female patients had swallowed pin during making their traditional head scarf. As we evaluate all these patients according to their

gender, we found that all of 25 women ingested FB accidentally ($p<0.01$) (Table-5).

In 8 of the cases (10.7%), FB could not be found in esophagus and stomach by gastroscopy, but they are detected radiologically at distal parts of the GIS. These FB were left for a spontaneous course and hospitalized by general surgery. Among these 8 patients, 5 of them ingested the FB accidentally, 3 of them ingested intentionally. The details of FB in these 8 patients are shown in Table 6.

Table 6. Details of 8 patients in whom FB was detected radiologically at distal parts of the GIS.

Location	FB	Intentionally/ Accidentally
Jejunum	Pin	Accidentally
Jejunum	Pin	Accidentally
Jejunum	Pin	Accidentally
Jejunum	Pin	Accidentally
Jejunum	Razor blade	Intentionally
Ileum	Lighter	Intentionally
Ileum and jejunum	Razor blade	Intentionally
Colon	Partial denture	Accidentally
Total	8	

DISCUSSION

Ingestion of foreign bodies and impaction of food are common emergency situations in daily clinical practice. Most of the cases are in pediatric population, but there are many adult cases as well, like patients with mental disabilities, psychiatric diseases and dental implants. Ingested objects pass gastrointestinal tract spontaneously, but only 10-20% of ingestion cases need medical help, and only 1% need surgery.¹ In adults, food impaction in esophagus is common, with an incidence of 13/100000 people annually.¹⁰ As well as food, some metallic objects, such as razor blade, battery and lighter cause a great challenge for the gastroenterologist.

In our study, we found large spectrum of ingested FB, like meat, bones, pins, razor blades. Ingestion of FB was seen two times more in males, [The ratio of males/females was 50/25 (66.7% / 33.3%)]. The FB ingestion was mostly accidental in females, but all intentional ingestion cases were men, most of who were prisoners. This is compatible with the literature. In most studies among prisoners the patients are male, aged between 15-44 years.¹¹ Ingestion of FB among prisoners are mostly repetitive, and ingestion of multiple subjects is observed.¹² This self-injury attitude may be explained as a planned activity for secondary

gains; which may be an attempt to escape incarceration, or any need to get to hospital.^{13,14} There may be also some fictitious ingestion of FB which have been reported among prisoners.¹⁵

The ages of patients were between 19-87 (mean: 46.69), which was compatible with the literature.^{16,17} The youngest of the patients was admitted to emergency unit after intentional ingestion of razor blade, pen battery and nail clipper; the oldest one after eating meat during meal.

Impact of food in esophagus was seen in 31 patients (41.3%). These cases were mostly accidental, during a meal. Foreign bodies in these patients were meat with or without bone and garlic. In some of these patients, we successfully removed the impacted food from esophagus to stomach by using push technique, which is also recommended by ESGE.¹ In this technique, it's important to make sure that there is passage to the stomach, and there should not be any obstructive esophageal pathology distal to the food impacted. In these cases, air insufflation and gently pushing to food into the stomach will solve the problem. In cases with resistance, pushing should be stopped and the food should be retrieved either totally or in fragmented form, by using some endoscopic devices such as forceps, snare or basket.

Metallic sharp objects should be retrieved with caution not to harm the esophageal and pharyngeal mucosa. To prevent laceration of mucosa, over tubes or latex rubber hood are recommended. Endotracheal intubation may be helpful in some cases with risk of aspiration.¹ In most of our cases with sharp metallic FB ingestion like razor blade, we prefer to use overtubes. Different endoscopic equipments can be used to get out FB, and the choice should be individualized according to the type, size or shape of FB. In most cases, not only one of them is used, but a combination of them can give better results, so it would be important to get different equipments available during endoscopy. In our study, forceps and retrieval nets were mostly used equipments.

In our study, when we analyze complication, we found 6 cases with different degrees of esophageal mucosal injuries, from minor erosions to esophageal perforation. All these complications were seen after impact of food in

esophagus. That kind of esophageal complications can be explained by some reasons: Firstly, these patients do not stop eating in most cases. This may be an attempt of pushing the food with food, which means these patients mostly continue to eat for a possibility of "forceful cleaning" of esophagus. When complete esophageal obstruction occurs, inability to swallow even saliva and hypersalivation are helpful clinical signs and emergent endoscopic treatment should be planned. Secondly, in some of these patients, abnormalities of esophagus such as strictures, malignities, motility disorders such as achalasia, or eosinophilic esophagitis may be the underlying problem. Patients with food impaction should be evaluated for these kinds of pathologies and they should be followed to prevent another-recurrent food impact.

Duration of FB in gastrointestinal tractus is very important, as the time increases, complication rate increases. Also type, size and shape of FB are other important factors for occurrence of complications.

Endoscopic removal of FB is recommended to be completed in 24 hours after ingestion, but sharp objects and batteries need emergent removal.¹ In a study of Loh, it was reported that if the FB impacted for more than 1 day, major complications would increase 14 times, when compared to management within 24 hours.¹⁸ Wu revealed a higher rate of complications like odynophagia and esophageal ulceration, when endoscopic intervention delays.¹⁹ On the contrary, Park reported no correlation between complications and impaction time, whereas sharp pointed objects, long objects and presence of symptoms were risk factors for complications.²⁰ In cases where FB >2-2.5 cm in diameter or >5-6 cm in length should be removed urgently to reduce complication rates.⁵

In a study of Geng, 1294 cases of FB in gastrointestinal tract were evaluated. 50% of FB are retrieved with no complications. Mild complications like mucosal injury or hematomas(29.5%) and significant complication like ulcers, perforation and abscess(20.4%) were analyzed and it was found that independent risk factors for complications were age>60, duration of impaction longer than 24 hours, FB in esophagus and sharp objects.²¹ Li reported complication rate of 2.8%, which included mucosal laceration, bleeding, pyrexia and esophageal perforation.¹⁶ Huang reported a

complication rate of 3.6%, including mucosal trauma and/or bleeding.¹⁴ A complication rate of 26.9%, was reported by Hong, which were minor bleeding in 16%, ulcer in 5.7%, perforation in 1.5%, abscess in 0.5%. They stated that risk factors for complications were sharpness of the object and duration of impaction >12 hours.²²

In 8 of the patients, we could not find the FB endoscopically, but radiological evaluations revealed the presence and localization of FB. Radiology may help to know the presence, size, localization, configuration and number of ingested objects (Figure 2). The initial screening method

is plain radiography, but in cases where plain radiograph is insufficient and complications are suspected, computed tomography (CT) will be the preferred method.¹ It should be noted that barium radiograph is not recommended in FB cases because of aspiration risk. Barium also covers both the mucosa and FB and worsens the endoscopic examination. In our cases, the FB in these 8 patients were found to be in ileum, jejunum and colon after evaluation by CT. CT is more sensitive than plain radiograph to detect FB, but also better in evaluation of regional complications such as perforations.²³

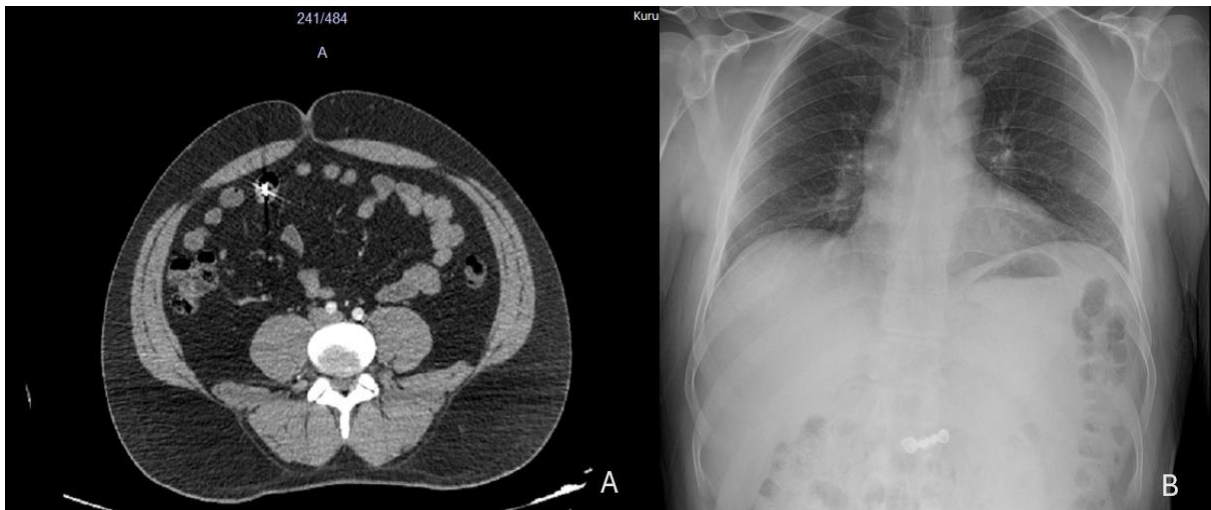


Figure 2. A: Razor blade in jejunum (CT scan), B: Partial denture in colonic segments (abdominal radiograph).

In conclusion, our study showed a great variability of FB ingested either intentional or accidentally. Although we could not analyze the effect of duration of FB in GIS and the size of the FB due to inadequate retrospective data, we can conclude that endoscopic approach for retrieval of subjects is both effective and safe, without significant complications. Every patient must be evaluated individually, and management should be decided accordingly.

Conflict of Interest

The authors declare that there is not any conflict of interest regarding the publication of this manuscript.

Ethics Committee Permission

This study was approved by Izmir Bakırçay University Non-Interventional Clinical Research Ethics Committee (dated 22.03.2023 and numbered 950).

Authors' Contributions

Concept/Design: FUK. Data Collection and/or Processing: FUK. Data analysis and interpretation: FUK. Literature Search: FUK. Drafting manuscript: FUK. Critical revision of manuscript: FUK.

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