

What is the role of an endoscopist in foreign body management in the upper gastrointestinal tract in adults?

YETİŞKİNLERDE ÜST GASTROİNTESTİNAL SİSTEMDEKİ YABANCI CİSİMLERİN YÖNETİMİNDE ENDOSKOPİSTİN ROLÜ NEDİR?

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ABSTRACT

Background: Foreign body ingestion in the upper gastrointestinal tract is considered an emergency worldwide. The aim of this paper is to report our experience and outcomes of upper gastrointestinal tract foreign body management.

Methods: This retrospective study was conducted on adult patients who received endoscopic management of foreign bodies at Ağrı Training and Research Hospital between December 2022 and December 2023.

Results: A total of 56 patients (male/female: 27/29; median age: 56 years) were included. Chicken bones were the most common ingested foreign bodies (n = 32; 57.1%), and the upper esophagus was the most common lodgment site (n = 28; 50%). The detection rate of ingested foreign bodies in the upper gastrointestinal tract through plain radiography was 66% (2/3) and computed tomography was 82% (38/46). The average "door-to-scope" time was 2.4±1.2 hours. The complication rate was low. Endoscopic treatment was successful in 50 patients (89.3%), and surgical treatment was required in 5 patients (8.9%). In our study, no mortality was reported after endoscopic treatment.

Conclusion: Endoscopic management is a safe and effective procedure for ingested foreign bodies when performed by experienced hands. The endoscopic technique has the advantages of high success rates, a lower incidence of minor complications, and a decreased need for surgery.

Keywords: Endoscopic management, Foreign bodies, Gastrointestinal tract

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ÖZ

Üst gastrointestinal sistemdeki yabancı cisimler, dünya genelinde acil bir durum olarak kabul edilmektedir. Bu çalışmanın amacı, üst gastrointestinal sistemde yabancı cisim yönetimi konusundaki deneyimlerimizi ve sonuçlarımızı rapor etmektir.

Gereç ve Yöntemler: Bu retrospektif çalışma, Aralık 2022 ile Aralık 2023 arasında Ağrı Uygulama Araştırma Hastanesi'nde yabancı cisimlere endoskopik tedavi uygulanan yetişkin hastalar üzerinde yürütülmüştür.

Bulgular: Çalışmaya toplamda 56 hasta (erkek/kadın: 27/29; medyan yaş: 56 yıl) dahil edildi. Tavuk kemiği, en sık yutulan yabancı cisimdi (n = 32; %57,1) ve üst özofagus, en sık yabancı cisimlerin takıldığı lokalizasyondur (n = 28; %50). Düz radyografi ile üst gastrointestinal sistemdeki yabancı cisimlerin tespit oranı %66 (2/3), bilgisayarlı tomografi ile %82 (38/46) olarak belirlendi. Ortalama hastaneye giriş ile endoskopi yapılma zamanı arasındaki süre farkı 2,4±1,2 saat idi. Komplikasyon oranı düşük olarak tespit edildi. Endoskopik tedavi 50 hastada (%89,3) başarılı oldu, cerrahi tedavi ise 5 hastada (%8,9) gerekliydi. Çalışmamızda, endoskopik tedavi sonrası mortalite bildirilmedi.

Sonuç: Deneyimli ellerde uygulandığında endoskopik yönetim, yutulan yabancı cisimler için güvenli ve etkili bir prosedürdür. Endoskopik teknik, yüksek başarı oranları, daha düşük minör komplikasyon insidansı ve cerrahiye daha az ihtiyaç duyulması gibi avantajlara sahiptir.

Anahtar Kelimeler: Endoskopik yönetim, Yabancı cisimler, Gastrointestinal sistem

Foreign body (FB) ingestion is a quite prevalent clinical issue that arises in emergency rooms all around the world (1). The majority of FB ingestion in adults happens by accident, although there may be other contributing factors as well, such as mental retardation, alcoholism, psychiatric problems, and edentulous states (2). Plain radiography images or computed tomography (CT) scans of the abdomen, chest, or neck can be utilized to detect free peritoneal or mediastinal air as well as true FBs (1-3). Ingested FBs pass on their own in 80–90% of cases. On the other hand, less than 1% require surgery, and 10% to 20% require an endoscopic operation for removal (4). Several factors, including the FB's size and shape, anatomical position, and the length of impaction affect how they are managed (5). Endoscopic removal of FBs generally has a low probability of complications, including impaction, perforation, bleeding, and obstruction (1-6). It can also sometimes be associated with severe or even life-threatening complications (7).

The aim of this paper is to report our experience and outcomes of upper gastrointestinal tract foreign body management.

MATERIALS AND METHODS

The clinical documentation of patients with a diagnosis of FB in the upper gastrointestinal tract confirmed by endoscopy was screened retrospectively. After excluding pediatric patients, 56 cases who referred endoscopic management of FBs in the upper gastrointestinal tract at the Hospital at Ağrı Training and Research Hospital between December 2022 and December 2023 were included in the study. The study confirmed the tenets of the Declaration of Helsinki and was approved by the ethics committee of the Ağrı Training and Research Hospital (Date: 30/11/2023 and number: 264).

With or without radiological imaging (plain radiography and CT), esophagogastroduodenoscopy (EGD) was performed on all patients. An emergency non-

contrast CT examination (Siemens, Forchheim, Germany) was performed using a 128-detector spiral CT scanner from the neck to the abdominal basement. Since CT is a superior method for detecting foreign body perforation or localization of foreign bodies, it was used more extensively in our study so that patients could be diagnosed more safely and quickly. Excluded from the study were patients with incomplete data and those who had a history of FB ingestion but none were found after endoscopic examination. All EGD procedures were performed using the Fujinon EG-600 WR (Fujinon Corp., Saitama, Japan). Depending on the type and location of the swallowed FBs, different endoscopic tools such as biopsy forceps, dormia baskets, polypectomy snares, and overtubes were employed to remove them. Patients were referred to the surgical section when endoscopy failed to remove FBs. All the patients received endoscopic management of FBs under deep or conscious sedation. All EGD procedures were performed by the same gastroenterologist with experience performing more than 10,000 EGD procedures. As there was only one gastroenterologist working at our center, all patients were referred to the same gastroenterologist.

Age, sex, the type and location of FBs, radiological examinations, endoscopic techniques and tools employed, duration of FB impaction, duration of endoscopic performance and complications were all examined in this investigation. A complication was defined as any unfavorable event connected to an endoscopic procedure or FB manipulation, such as bleeding, perforation, or laceration.

Statistical analysis

SPSS software, version 25 (SPSS Inc., Chicago, IL, USA), was used to analyze the collected data. The results were expressed as numbers and percentages for the qualitative variables and as the median \pm standard deviation for the quantitative variables.

RESULTS

Characteristics of patients

A total of 56 patients were diagnosed with FBs ingestion after endoscopic examination. The median (\pm SD) age of the patients was 46 (\pm 16) years. Our study included more female patients (n = 29; 51.8%).

Types and locations of foreign bodies

The most common locations of FB lodgment were the upper esophagus (n = 28; 50%), mid-esophagus, and stomach (n = 11, 19.6%). Chicken bones (n = 32, 57.1%) and food boluses (n = 10, 17.9%) were the two most common forms of FBs. Additional FBs found in the upper gastrointestinal system included pins, dental prosthetics, dental milling cutters, foil used for medication, fish bones, nails, razor blades, batteries, and glass fragments. Of the four patients with six bolus impactions in the esophagus, two had a new diagnosis of esophageal carcinoma, and the other two had problems with prior esophageal carcinoma following surgery or stenting. Types and locations of FBs and characteristics of patients are summarized in Table-1.

Table-1: Characteristics of patients and foreign bodies

	N:56	%
Characteristics of patients		
sex		
Male	27	48.2
Female	29	51.8
Location of foreign bodies		
Esophagus		
Upper	28	50
Mid	11	19.6
Lower	1	1.8
Stomach	11	19.6
Duodenum	1	1.8
Anastomotic or stent	4	7.1
Type of foreign body		
Chicken bones	32	57.1
Dental prosthesis	2	3.6
Dental milling cutter	1	1.8
Medication foil	1	1.8
Fish bones	1	1.8
Food bolus	10	17.9
Nail	1	1.8
Pin	3	5.4
Razor blade	1	1.8
Battery	2	3.6
Glass fragments	2	3.6

Detection rates of plain radiography and CT

Plain radiography was performed in 3 (0.5%) patients, and a CT scan was performed in 46 (82.1%) patients prior to EGD. On plain radiography, 66% (2/3) of FBs were seen in the upper gastrointestinal tract. Using a CT scan, 82% (38/46) of the FBs in the upper gastrointestinal tract were found.

Endoscopic management

The type and location of the ingested FB, as well as the endoscopist’s experience, affected the methods for endoscopic management. Although the time at which patients visited the emergency department varied (17±23 hours), all patients who visited the emergency department with a FB complaint underwent EGD within the first 6

hours (2.4±1.2 hours). Endoscopic treatment was successful in 50 patients (89.3%), and surgical treatment was required in 5 patients (8.9%). In 1 patient (1.8%), although endoscopic treatment was unsuccessful, a FB was observed to pass through the stool. In this study, biopsy forceps were the most commonly used forceps for endoscopic treatment (n = 32; 64%). Polypectomy snares, dormia baskets, and an overtube were used. The food bolus fragments in the esophagus was pushed into the stomach after retrieval by using Dormia baskets most of them. Overtube was used in only 1 patient (5x2.5 cm diameter glass fragment in the stomach).

Complications

Among the patients with complications, 10 (17.8%) had minor lacerations and 9 (16.1%) had minor bleeding. These patients were treated with oral antibiotics and sucralfate, without hospitalization. Five hemoclips were applied to two patients with lacerations. These patients were discharged without complications after one day of hospitalization. In one patient, after the bone fragment in the esophagus was removed, the perforation area was closed with two hemoclips, and the patient was hospitalized for 5 days and then discharged. Mediastinitis

and abscess diagnosed in one patient after EGD, and referred for surgery. Four patients with failure of endoscopic removal underwent surgical intervention. In total, 5 patients with ingested FBs underwent surgery. In a patient who swallowed multiple nails, after some of the nails were removed endoscopically, the patient developed sepsis and was found to have small bowel perforation but the patient died before surgery. The death of this patient was due to nails that could not be removed endoscopically. No mortality was associated with endoscopic procedures for removing FBs in our center. Treatment and complications are summarized in Table-2 and Table-3.

Table-2: Treatment and complications

Treatment	N:56	%
Endoscopic	50	89.3
Surgery	5	8.9
Spontaneous passage	1	1.8
Endoscopic Instruments	N:50	
Dormia basket	13	26
Forceps	32	64
Snare	4	8
Overtube	1	2
Complications	N:56	
Esophageal tears	10	17.8
Bleeding	9	16.1
Perforation	4	7.1

Table-3: Cases of surgical management

No	Reason for surgery	Foreign body type	Foreign body location
Case1	Failure of endoscopic removal	Chicken bone	Upper esophagus
Case2	Failure of endoscopic removal	Glass fragment	Stomach
Case3	Failure of endoscopic removal	Chicken bone	Upper esophagus
Case4	Mediastinitis + abscess	Chicken bone	Upper esophagus
Case5	Failure of endoscopic removal	Chicken bone	Upper esophagus

DISCUSSION

Endoscopic removal of FBs is a frequent indication of upper gastrointestinal endoscopy. It is important for endoscopists to be experienced in FB management. There has been an increase in the demand for endoscopic procedures since the first report on endoscopic removal of a FB in 1972 (8). This is partly due to the fact that most patients are spared the expense of surgery, and partly because endoscopic removal is technically more advanced, has excellent visualization, can diagnose other conditions simultaneously, and has a low morbidity rate (4). In our study, we concluded that intervention with endoscopy is beneficial without the need for surgery in the majority of patients, and that the intervention performed by experienced endoscopists does not have any life-threatening complications.

The median (\pm SD) age of the patients was 46 (\pm 16) years, and most were female ($n = 29$; 51.8%). In a recent study examining the endoscopic management of FBs in the upper gastrointestinal tract, 280 patients were analyzed. The findings revealed that the mean age of the patients was 56 years old, with a larger proportion of female patients (62.5%) compared to male patients (1). This disparity in gender and age distribution may warrant further investigation to better understand potential contributing factors.

In the current study, chicken bones ($n = 32$, 57.1%) were the most commonly ingested FBs. This observation is not the same as that reported in studies(1,6,9). Ingestion of fish bones may be more common in societies where seafood is extensively consumed (1,10,11). The reason why chicken bones were seen more frequently than fish bones in our study can be explained by differences in sociocultural habits. As chicken consumption is more common regionally, it is expected that such foreign bodies will be seen more frequently. The majority of FBs were in the esophagus, and the proportion of FBs in the upper esophagus was greater than that in the middle and lower esophagus in studies (1,12,13). Similarly, our findings showed that the majority of FBs were stuck in the esophagus, mostly in the upper third. The upper esophagus sphincter is a narrow lumen anatomically and

physiologically, making its mucosa prone to sharp FB penetration. This situation may explain why there was more chicken bone ingestion in the upper esophageal sphincter in our study. It is possible that the size and shape of chicken bones make them more likely to become lodged in the upper esophageal sphincter. Additionally, the way in which people eat chicken, such as quickly or without chewing thoroughly, could contribute to more frequent instances of bone ingestion in this area.

Witnesses of FB intake and the medical history of the patient are important in the diagnosis of FB trapping. To pinpoint the precise position of the FB, additional imaging tests like CT or plain radiography could be required in certain circumstances. Most radiopaque FBs can be detected by direct radiography, whereas food bolus impaction cannot (4). In our study, most of the patients were examined by plain radiography or CT examination before undergoing EGD. Since CT is a much more sensitive method for detecting FBs and perforations than plain radiography, CT was used more frequently in our study. The detection rate of FBs in this study was similar to that reported in previous studies(1,14). Radiological techniques are essential in the diagnosis and management of cases involving FB trapping. In patients presenting with typical symptoms or having a high suspicion of FB ingestion, it is crucial to perform an endoscopic evaluation, even if the radiography results appear normal.

FBs affecting the esophagus should be removed within 24 hours to minimize the risk of serious problems, according to the clinical guidelines of the European Society of Gastrointestinal Endoscopy (ESGE) (15). Various studies have presented differing perspectives on this matter. Loh et al suggested a significantly higher risk of major complications when the FB remained impacted for more than 24 hours compared to less than a day (16). Wu et al highlighted that delayed endoscopic intervention, specifically beyond 24 hours, could lead to additional symptoms like odynophagia and esophageal ulceration (17). Hong et al observed that the duration of impaction emerged as crucial risk factors for the development of major complications (18). In contrast, Park et al found no significant association between impaction time exceeding 24 hours and the risk of complications (19).

There has been debate over the relationship between impaction time and the likelihood of problems. The timing of endoscopic treatment following ingestion of FBs significantly affects the results. In our study, although patients' admission to the emergency department was delayed, the mean door-to-scope examination time was 2.4 (± 1.2) hours. In a study from Italy, the mean "door-to-scope" was 5.9 (± 5.2) hours (2). Most patients had a history of sharp FB, and FBs were observed in the esophagus on CT or plain radiographs. We thought that the FBs would not spontaneously pass through the upper gastrointestinal tract. For this reason, the endoscopic procedure was performed in most patients within 6 hours in our study. Timely intervention can prevent serious complications and ensure the well-being of the patient.

Depending on the shape and location of the swallowed FBs and endoscopist experience, different endoscopic techniques and tools are used (1,6,12). Polypectomy snares, dormia baskets, and biopsy forceps with linear sharp points were used for FBs. We used an overtube to protect the esophageal mucosa from lacerations during retrieval of big sharp objects. In this study, biopsy forceps were the most commonly used for endoscopic treatment ($n = 32$; 64%). According to the guidelines, only 10%–20% of instances involving FB ingestion necessitate endoscopic removal (4,15). According to our study, we believe that this percentage might be higher because of sharp-pointed objects that have a higher risk of complications. Our success rate was 89.3% for endoscopic removal. As in our study, the success rates of endoscopic removal in studies have been found to be high. Webb et al. reported a success rate of 98.8%, Li et al. reported 94.1% success rate in China, Zhang et al. reported 96.1% success rate in South China, and Kamiya et al. reported a 100% success rate (9,20-22). The results of these studies suggest that EGD can be a reliable and successful method for treatment FB ingestion.

Although the exact mortality rate is unknown, the high incidence of timely and successful endoscopic removal contributes to its extremely low rate (4). Spontaneous passage without intervention or damage to the gastrointestinal tract is also important (4,21). Important variables may put patients at risk for problems, such as the

duration of impaction and the presence of a sharp FB (18). Serious consequences include esophagitis, mucosal ulceration, bleeding, obstruction, perforation, and in rare cases, death could result from the FB becoming lodged in the esophagus. Good results are linked to early endoscopic procedures performed within 24 h of consumption (23). According to Lee et al., the mean "door-to-scope" time of patients who had complications was longer than that of patients who had no complications (1). In our study, minor complications such as minor bleeding and laceration were low, the rate of perforation due to FB ingestion was low and no mortality was associated with endoscopic procedures for removing FBs in our study. Similarly, the complication rate was notably low in studies (1,2,6,20). Hemoclips were suggested in three patients with one perforation and 2 lacerations. Endoscopic wound closure was successful in these patients. Similarly, in a study involving 67 patients, mucosal lacerations were immediately treated by endoscopic clipping without further morbidity (6). Surgical intervention was reserved for four patients who failed endoscopic therapy, and for one patient, mediastinitis and abscess. It is best to recommend surgery to patients rather than endoscopic therapy if there is a high risk of esophageal perforation and abscess, such as in situations with sharp or pointed FBs deeply embedded in the wall.

Our study has some limitations. The study utilized a retrospective analysis method with a limited sample size. The small sample size of the study could limit the broad application of the results. Owing to the small number of cases, additional prospective studies including a larger patient population are necessary to confirm the risk factors for complications associated with FB removal from the upper gastrointestinal tract. The fact that CT is more expensive and has more radiation than plain radiography is a limitation. However, in cases where a foreign body cannot be detected with plain radiography, CT is more reliable in determining the location of the foreign body and complications. Although we advocate the emergency endoscopic removal for FBs, we do not know spontaneously pass through the upper gastrointestinal tract possibility. The degree of complications, such as lacerations, was not defined objectively, and some potential bias might have been added.

In conclusion, ingestion of FBs is a worldwide common clinical problem.

The swallowed FBs can be extracted with a variety of tools.

With comparatively low rates of complications and death, endoscopic treatment is a very successful technique for removing swallowed FBs. In our experience, surgery is required five selected patients with high risk of esophageal perforation. Patients who were anticipated to present with challenges during endoscopic removal may have had surgery right away. We found that most of our patients ingested FB in the upper esophagus; therefore, physicians should examine the upper esophagus more carefully. Understanding the anatomical distribution of FBs can aid in targeted interventions and prompt medical management.

REFERENCES

1. Lee CY, Kao BZ, Wu CS, Chen MY, Chien HY, Wu LW, et al. Retrospective analysis of endoscopic management of foreign bodies in the upper gastrointestinal tract of adults. *J Chin Med Assoc.* 2019 Feb;82(2):105-109. doi: 10.1097/JCMA.000000000000010. PMID: 30839499.
2. Nassar E, Yacoub R, Raad D, Hallman J, Novak J. Foreign Body Endoscopy Experience of a University Based Hospital. *Gastroenterology Res.* 2013 Feb;6(1):4-9. doi: 10.4021/gr517w. Epub 2013 Mar 9. PMID: 27785219; PMCID: PMC5051113.
3. Wu WT, Chiu CT, Kuo CJ, Lin CJ, Chu YY, Tsou YK, et al. Endoscopic management of suspected esophageal foreign body in adults. *Dis Esophagus.* 2011 Apr;24(3):131-7. doi: 10.1111/j.1442-2050.2010.01116.x. Epub 2010 Oct 13. PMID: 20946132.
4. ASGE Standards of Practice Committee; Ikenberry SO, Jue TL, Anderson MA, Appalaneni V, Banerjee S, Ben-Menachem T, et al. Management of ingested foreign bodies and food impactions. *Gastrointest Endosc.* 2011 Jun;73(6):1085-91. doi: 10.1016/j.gie.2010.11.010. PMID: 21628009.
5. Palta R, Sahota A, Bemarki A, Salama P, Simpson N, Laine L. Foreign-body ingestion: characteristics and outcomes in a lower socioeconomic population with predominantly intentional ingestion. *Gastrointest Endosc.* 2009 Mar;69(3 Pt 1):426-33. doi: 10.1016/j.gie.2008.05.072. Epub 2008 Nov 18. PMID: 19019363.
6. Geraci G, Sciume' C, Di Carlo G, Picciurro A, Modica G. Retrospective analysis of management of ingested foreign bodies and food impactions in emergency endoscopic setting in adults. *BMC Emerg Med.* 2016 Nov 4;16(1):42. doi: 10.1186/s12873-016-0104-3. PMID: 27809769; PMCID: PMC5095952.
7. Simic MA, Budakov BM. Fatal upper esophageal hemorrhage caused by a previously ingested chicken bone: case report. *Am J Forensic Med Pathol.* 1998 Jun;19(2):166-8. doi: 10.1097/00000433-199806000-00013. PMID: 9662114.
8. McKechnie JC. Gastroscopic removal of a phytobezoar. *Gastroenterology.* 1972 May;62(5):1047-51. PMID: 5029071.
9. Limpas Kamiya KJ, Hosoe N, Takabayashi K, Hayashi Y, Sun X, Miyanaga R, et al. Endoscopic removal of foreign bodies: A retrospective study in Japan. *World J Gastrointest Endosc.* 2020 Jan 16;12(1):33-41. doi: 10.4253/wjge.v12.i1.33. PMID: 31942232; PMCID: PMC6939123.
10. Yao CC, Wu IT, Lu LS, Lin SC, Liang CM, Kuo YH, et al. Endoscopic Management of Foreign Bodies in the Upper Gastrointestinal Tract of Adults. *Biomed Res Int.* 2015;2015:658602. doi: 10.1155/2015/658602. Epub 2015 Jul 15. PMID: 26258140; PMCID: PMC4518178.
11. Chiu YH, Hou SK, Chen SC, How CK, Lam C, Kao WF, et al. Diagnosis and endoscopic management of upper gastrointestinal foreign bodies. *Am J Med Sci.* 2012 Mar;343(3):192-5. doi: 10.1097/MAJ.0b013e3182263035. PMID: 21804366.
12. Wang X, Zhao J, Jiao Y, Wang X, Jiang D. Upper gastrointestinal foreign bodies in adults: A systematic review. *Am J Emerg Med.* 2021

- Dec;50:136-141. doi: 10.1016/j.ajem.2021.07.048. Epub 2021 Jul 29. PMID: 34365062.
13. Saltiel J, Molinsky R, Lebowitz B. Predictors of Outcomes in Endoscopies for Foreign Body Ingestion: A Cross-Sectional Study. *Dig Dis Sci*. 2020 Sep;65(9):2637-2643. doi: 10.1007/s10620-019-06033-3. Epub 2020 Jan 6. PMID: 31907772.
 14. Pfau, Patrick R. "Removal and management of esophageal foreign bodies." *Techniques in Gastrointestinal Endoscopy* 16.1 (2014): 32-39.
 15. Birk M, Bauerfeind P, Deprez PH, Häfner M, Hartmann D, Hassan C, et al. Removal of foreign bodies in the upper gastrointestinal tract in adults: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline. *Endoscopy*. 2016 May;48(5):489-96. doi: 10.1055/s-0042-100456. Epub 2016 Feb 10. PMID: 26862844.
 16. Loh KS, Tan LK, Smith JD, Yeoh KH, Dong F. Complications of foreign bodies in the esophagus. *Otolaryngol Head Neck Surg*. 2000 Nov;123(5):613-6. doi: 10.1067/mhn.2000.110616. PMID: 11077351.
 17. Wu WT, Chiu CT, Kuo CJ, Lin CJ, Chu YY, Tsou YK, et al. Endoscopic management of suspected esophageal foreign body in adults. *Dis Esophagus*. 2011 Apr;24(3):131-7. doi: 10.1111/j.1442-2050.2010.01116.x. Epub 2010 Oct 13. PMID: 20946132.
 18. Hong KH, Kim YJ, Kim JH, Chun SW, Kim HM, Cho JH. Risk factors for complications associated with upper gastrointestinal foreign bodies. *World J Gastroenterol*. 2015 Jul 14;21(26):8125-31. doi: 10.3748/wjg.v21.i26.8125. PMID: 26185385; PMCID: PMC4499356.
 19. Park JH, Park CH, Park JH, Lee SJ, Lee WS, Joo YE, et al. [Review of 209 cases of foreign bodies in the upper gastrointestinal tract and clinical factors for successful endoscopic removal]. *Korean J Gastroenterol*. 2004 Apr;43(4):226-33. Korean. PMID: 15100486.
 20. Webb WA. Management of foreign bodies of the upper gastrointestinal tract: update. *Gastrointest Endosc*. 1995 Jan;41(1):39-51. doi: 10.1016/s0016-5107(95)70274-1. PMID: 7698623.
 21. Li ZS, Sun ZX, Zou DW, Xu GM, Wu RP, Liao Z. Endoscopic management of foreign bodies in the upper-GI tract: experience with 1088 cases in China. *Gastrointest Endosc*. 2006 Oct;64(4):485-92. doi: 10.1016/j.gie.2006.01.059. Epub 2006 Aug 22. PMID: 16996336.
 22. Zhang, S., Cui, Y., Gong, X., Gu, F., Chen, M., & Zhong, B. (2010). Endoscopic management of foreign bodies in the upper gastrointestinal tract in South China: a retrospective study of 561 cases. *Digestive diseases and sciences*, 55, 1305-1312.
 23. Lin HH, Lee SC, Chu HC, Chang WK, Chao YC, Hsieh TY. Emergency endoscopic management of dietary foreign bodies in the esophagus. *Am J Emerg Med*. 2007 Jul;25(6):662-5. doi: 10.1016/j.ajem.2006.12.012. PMID: 17606092.