# ADULT FOREIGN BODY IMPACTION: 11 YEARS OF EXPERIENCE IN A TERTIARY CENTER

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## ABSTRACT

**Background/aims:** Impaction of an esophageal foreign body is a medical emergency. Its incidence in recent years has increased. Symptoms include dysphagia, aphagia, chest pain, among others. The treatment of choice is endoscopic extraction. Complications such as perforations, erosions or fistulas have been described. The aim of this study is to characterize the clinic and endoscopic profile of adult patients who consult for this pathology in a tertiary center. **Methods:** Case series of patients aged over 15 years between 2008-2019 attended in the emergency room of Clínica Alemana de Santiago with suspected or confirmed esophageal foreign body impaction. Electronic clinical records, endoscopic reports and biopsies were reviewed. A descriptive analysis of the data was performed. **Results:** A total of 324 cases were analyzed. 60,5% of the cases underwent urgent upper gastrointestinal endoscopy. The most frequently reported symptoms were foreign body sensation (67,9%) and hypersalivation (35,4%). The most frequent type of foreign body found was red meat (36,7%). A significantly higher incidence of esophageal foreign body was observed on weekends. Eosinophilic esophagitis was suspected in 37%, there were no cases of malignancy. Complications were rare in our series (0,2%). **Conclusion:** Eosinophilic esophagitis was the most frequent underlying condition in this series. The results may account for some cultural aspects in the population of the study. Emergency endoscopic therapy is safe and effective. Limitations of this study include the retrospective character. A prospective study to propose a protocol should be developed.
**Key words**: Steakhouse syndrome, Eosinophilic esophagitis, Gastrointestinal symptoms.

## INTRODUCTION

Ingestion of Esophageal Foreign Body (EFB) represents a pathology that requires emergency care. Most of these patients consult for symptoms such as dysphagia, hypersalivation, chest pain or vomiting, associated with esophageal obstruction[1,2]. The initial conduct of the medical professional is based on the clinical history and physical examination, mainly looking for the time of evolution, type of EFB, complications and underlying pathologies. In case of diagnostic doubt or even of the type of EFB, support images can be used, such as chest radiography (for radiopaque objects) or computed tomography (in suspicion of complications such as perforation of the upper digestive tract). It is also recommended for use in patient follow-up[3].

Upper gastrointestinal endoscopy is considered the gold standard for the treatment of EFB[3,4], where flexible endoscopy is used as a first line over rigid endoscopy in the adult population and in no case should it be delayed by medical treatment[3,5]. For cases of complete esophageal obstruction, sharp objects or batteries, digestive endoscopy should be performed for up to 6 hours, while the rest of the cases can wait up to 24 hours[3].

The global annual incidence rate of this pathology is 13 cases per 100.000 inhabitants, with a growing trend in recent years in adults, although it always occurs more frequently in children[6]. Approximately 80% of cases resolve spontaneously, requiring endoscopic intervention in 10 to 20% of cases, with a percentage of associated complications close to 1%[3]. The main complications of this pathology are ulcers, lacerations, perforations, erosions and fistulas, reaching up to 17,8% of patients, where the associated risk factors were the time between ingestion and performance of endoscopy more than 12 hours, and the existence of underlying pathology of the esophageal mucosa[6,7]. Mortality associated with EFB is low, 0,85%[6].

It is common to find underlying esophageal pathology in EFB patients, with eosinophilic esophagitis being the most commonly encountered pathology, with an upward trend in recent years, while patients without esophageal pathology have decreased, being relatively common to still find[8].

Currently in Chile there are few epidemiological records of this pathology in adults, the most recent being from 1999, which shows a mortality of 4,99 per 100.000 inhabitants, which corresponds to 68% of deaths from otorhinolaryngological causes. Along with this, a 68% decrease in mortality from this cause is described in Chile during the years 1991-1999[9]. In adults, the main etiologies, time and costs of management are unknown, and there is no estimated recent complication rate. Given the time period that has since the latest update to the epidemiology of this condition we came to the conclusion that it would be in the best interest of the academic community to carry out a new quantitative study, in mayor depth, and including more variables that could give us a better understanding of the natural history of this disease.

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The latest study carried out in Chile dates from 2018 in the pediatric population, which described that the types of EFB were mainly coins (61,9%), the most frequent location of impaction being the stomach (42,8%). Cases with endoscopic extraction were performed mainly with forceps (90,4% of cases). 57,5% of the cases presented complications[10].

The objective of this study is to evaluate an epidemiological characterization of patients with foreign body impaction in the esophagus in an adult population in a tertiary center. The endoscopic findings and the results of the clinical course are described.

This article encompasses the methods we used, including our statistical analysis followed by our results, and ends with an in-depth discussion of our findings.

## METHODS

We report a case series of patients aged 15 years or more who attended the Emergency Room of Clínica Alemana de Santiago (CAS) with suspected or confirmation of EFB impaction, between 2008 and 2019. The main question this study aimed to answer was: "Which clinical characteristics and endoscopic profile has the patient consulting for EFB impaction in this tertiary Center?" The universe of the study consisted on 429 patients with the suspected diagnosis of EFB impaction attending the Emergency Room, only 324 of them met the inclusion criteria listed afterwards. These 324 patients were the sample of the study. The database was reviewed for bio-demographic information: age, sex, symptoms, time since onset of impaction, associated esophageal pathologies, type of foreign body, complications, total impaction time to endoscopic treatment and hospitalization time.

The patients selected were aged 15 or older, from both sexes and with the diagnosis of foreign body impaction in the electronic database of the center. Patients whose information was not fully documented, had airway compromise resolved by the Otorhinolaryngology/Bronchopulmonary department and those who completed the treatment in other centers were excluded.

For those patients that needed endoscopic therapy, information about the location of the foreign body, professional who performed the procedure, endoscopic accessories used, associated complications, biopsy and urease test results were collected. All professionals had more than 5 years of experience in diagnostic and therapeutic endoscopy. The endoscopic procedure was performed with the assistance of an anesthesiologist and with airway protection if required. The database was constructed with the clinical registries of each patient. Once the data was included, a procedure of anonymization was performed in order to guarantee the confidentiality of the patients. All procedures were performed after an informed consent was accepted by the patient or its respective tutors.

### Statistical analysis

Data was collected in Excel (v2007. Microsoft corporation) and then exported to SPSS (v15.0.1. 2006) for statistical analysis. Initial evaluation of continuous variables using standard cutoffs for skewness and kurtosis (+/- 2,0), showed that age had a normal distribution while evolution and hospitalization time did not. Descriptive statistics including mean (SD) or median (IQR) for continuous variables and frequency (%) for categorical variables were calculated. Frequency comparisons were performed using the Chi-square test. Median comparisons were performed using t-test or Mann-Whitney U for normal and non-normal distributed variables, respectively. Predictive capacity and independence of association was evaluated using Multiple Logistic regression (forced entry). In all cases, a $p<0,05$ was used to define statistical significance.

This study was reviewed and approved by the Ethical and Scientific Committee of the CAS-UDD Medicine School.

## RESULTS

### Study population characteristics

In the period covered by our study a total of 419 cases with a diagnosis of EFB were collected. A total of 324 patients met inclusion criteria and were analyzed. Patients were middle-aged (46,2 ± 19,1 years, 96,0% older than 18 years) and with male predominance (55,9% were men, X2=4,457, p=0,035). Almost every patient (98,8%) presented symptoms, the most frequent being globus (68,2%), sialorrhea (35,8%), chest pain (28,1%), dysphagia (20,1%), and vomiting (11,4%) (Table 1).

**Table 1:** Symptoms in patients with EFB. (N=324)

| Symptom | N (%) |
|---|---|
| Foreign body sensation | 220 (67,9) |
| Sialorrhea | 115 (35,4) |
| Pain | 91 (28) |
| Dysphagia | 65 (20) |
| Aphagia | 64 (19,7) |
| Other | 39 (12) |
| Odynophagia | 36 (11,1) |
| Vomit | 35 (10,8) |
| Dyspnoea | 15 (4,6) |
| Cough | 14 (4,3) |
| Regurgitation | 13 (4) |
| Asymptomatic | 4 (1,2) |
| Hematemesis | 3 (0,9) |
| Fever | 1 (0,3) |

Patients presented promptly in the emergency room, with a median of 3 h (IQR 11 h) from the symptom's onset. There was a short in-hospital stay, with a median of 4h (IQR 10 h).

The distribution of patients by day of the week was asymmetrical ($X^2$=18,7, p=0,05), with a preponderance of cases on weekend days (Figure 1).

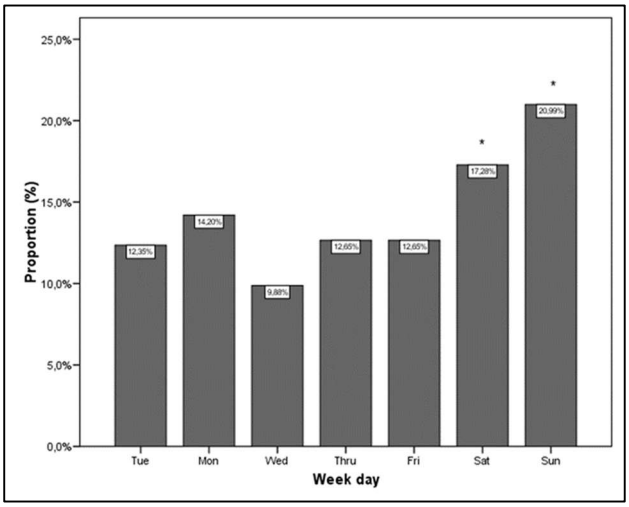


**Figure 1.** Distribution of cases by day of the week. (* = p<0,05)

There was no difference in the proportion of cases presented during weekends across the 11 years of the study. When comparing patients who attended the emergency service on weekdays to those on weekends, no difference in sex, age or presence of symptoms (p value non-significant for all) was found. Weekend patients seem to have the same severity profile as weekday patients, since there was no difference in the need for endoscopy (64,5% vs 58,5 %, respectively), the finding of the foreign body during the endoscopy (44,3% vs 33%, respectively), location of impaction, specific endoscopic diagnosis or in the requirement for endoscopic removal using accessories (49,4% vs 42,9%) (p value non-significant for all). Also, there was no difference in the hospitalization length time (9,3 hr. vs 10,5 hr., p value non-significant). An increasing incidence over time was observed, reaching its peak in 2017 (Figure 2).

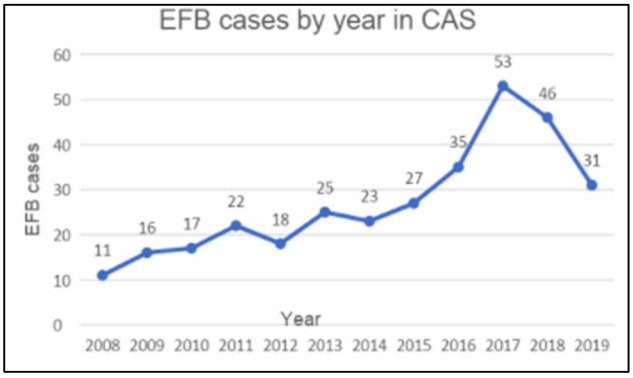


**Figure 2.** Incidence of EFB by year between March 2008 and September 2019

**Foreign body type, location, endoscopic findings, and accessories**

Regarding the type of foreign body, these were predominantly food related (73,8%). Among this group the main food referred or found by endoscopy was red meat (36,7%). A great variety of non-food related types of foreign body were found, being the most common pills (5,2%), toothpicks (1,8%), and glass shards (1,8%) (Table 2).

**Table 2:** Types of foreign bodies referred or found during procedures (N=324)

| Esophageal foreign body | N |
|---|---|
| Food | |
| Meat | 119 |
| Chicken | 18 |
| Chicken bone | 13 |
| Fish thorn | 20 |
| Pit | 6 |
| Vegetables | 15 |
| Nuts | 2 |
| Other food | 47 |
| Non-food | |
| Toothpick | 6 |
| Glass | 6 |
| Dental prostheses | 5 |
| Plastic | 4 |
| Drug | 13 |
| Other non-food | 17 |
| Not specified | 33 |

In 197/324 (60,8%) an upper endoscopy was performed according to the on call endoscopist's judgment. A logistic regression analysis that included all the epidemiological data and evaluated symptoms showed that only the presence of dysphagia was an independent predictor of the decision to perform an endoscopy (OR 1-16. IC 1,04-1,29. p=0,007). It should be noted that this model has a low predicting accuracy (R2=0,7).

In 127/197 (61,4%) endoscopies, an impacted foreign body could be found. It is important to mention that no esophageal-gastric tumors were found in our series. As expected, most of the foreign bodies were found in the esophagus (86,6%), predominantly located in the first (31,5%) and last third (39,4%). The main underlying condition was eosinophilic esophagitis, which was present in 23,9% of cases. There was an asymmetrical distribution of EFB, with significantly less than expected bodies in the middle esophagus (X2=12,727. p=0,002). Patients with a foreign body found in the endoscopy were significantly older and predominantly men (Table 3).

The evolution time was not associated with the probability of finding a foreign body. It is relevant to note that only age and the presence of sialorrhea were independent predictors for the presence of a foreign body, whereas aphagia was of limited

statistical significance. In relation to underlying conditions, only the suspicion of EoE and the finding of stenosis were correlated with the probability of finding the foreign body during the procedure (Table 4).

**Table 3:** Univariate analysis for the finding of foreign body during upper endoscopy

| | Foreign body found | Foreign body not found | Test statistic | P value |
|---|---|---|---|---|
| Age (years) | 49,89 (9,11) | 39,91 (9,6) | -3,74 (195) | <0,0001 (*) |
| Sex (% female) | 36,4% | 53,9% | 5,88 (1) | 0,015 |
| Evolution time (Hours) | 8,98 (2,7) | 12,49 (3,1) | 4777 | 0,43 (**) |
| Day (% weekend) | 45,5% | 32,9% | 3,053 (1) | 0,081 |
| % Symptomatic | 99,2% | 98,7% | 0,11 (1) | 0,739 |
| % Aphagia | 31,4% | 10,5% | 11,369 (1) | 0,001 |
| %Dysphagia | 26,4% | 22,4% | 0,415 (1) | 0,519 |
| % Odynophagia | 69,4% | 77,4% | 1,137 (1) | 0,286 |
| % Sialorrhea | 53,7% | 19,7% | 22,351 (1) | <0,0001 |
| % Vomit | 18,9% | 24,0% | 0,479 (1) | 0,489 |
| %% Pain | 33,1% | 26,3% | 1,002 (1) | 0,317 |

(*): t test; (**): Mann-Whitney U

**Table 4:** Endoscopic correlations to finding an impacted foreign body during the endoscopy

| | % of foreign body found (YES/NO) | OR (95% IC) | X2 | P value |
|---|---|---|---|---|
| Abnormal endoscopy | 76,9/23,1 | 1,592 (1,027-2,460) | 4,307 | 0,038 |
| Suggestive of EoE | 85,1/54,0 | 1,356 (1,174-1,567) | 14,164 | <0,0001 |
| Stenosis | 92,3/59,2 | 1,095 (1,027-1,169) | 5,603 | 0,018 |
| Erosive esophagitis | 60,0/69,1 | 0,716 (0,344-1-496) | 0,817 | 0,366 |

When a foreign body was found, it was predominantly food (88,9%. X2= 175,76. p<0,0001). The most common types of food found were red meat (54,0%), other meats (9,5%), and bones (9,5%). Among non-food bodies, the most common were metals (4/11. 36,4%), glass shards (2/11. 18,2%), and toothpicks (2/11. 18,2%). Food foreign bodies were significantly more common during weekend days (X2 21,662. p=0,041), whereas there was no difference for non-food bodies. There was no difference in sex, age, evolution time, hospitalization time nor in the location in the GI tract according to the type of foreign body (p ns for all). None of the evaluated symptoms showed an unexpected distribution according to foreign body type, except for aphagia (X2= 6,80. p=0,033). In fact, all patients with aphagia had food as a foreign body.

Among patients with food foreign bodies, there was no difference in age, sex nor hospitalization time according to the type of food. A different symptomatic profile could be suggested according to food type: red meat and stone pits presented significantly more aphagia and sialorrhea while vegetables and bones presented more odynophagia and chest pain.

In 87/191 (44,2%) endoscopic removal was performed. There was no difference in sex, evolution time nor hospitalization time when removal was performed. The requirement of removal was significantly higher in >50 years (54,4% vs 33,9%. X2=14,745. p< 0,0001). Food needed significantly more frequently endoscopic removal than non-food foreign bodies (51,0% vs. 31,0%. X2=11,872. p=0,003). Rice and bread never needed endoscopic removal, which was significantly less than all other food foreign bodies (X2 16,649. p=0,011). On a logistic regression model using the associated variables, only age and the presence of sialorrhea independently predicted the need for endoscopic removal (Table 5).

**Table 5:** Multivariate logistic regression for predictors of the need of endoscopic removal

| | B | OR (95% CI) | P value |
|---|---|---|---|
| Age | 0.43 | | <0.0001 |
| Symptoms (YES) | 2.616 | 1.002 (0.973-1.132) | 0.085 |
| Aphagia (YES) | 0.479 | 1.255 (0.947-1.493) | 0.228 |
| Sialorrhea (YES) | 0.822 | 1.527 (1.177-1.982) | 0.016 |
| Pain (YES) | 0.631 | 1.120 (0.920-1.361) | 0.77 |
| Food (YES) | 0.892 | 2.928 (0.908-6.509) | 0.75 |

In 121 (61,7%) cases during the procedures some kind of accessory was used, either through the push or retrieval technique. The most commonly used device was the snare (18,3%).

### Complications

In our series, only 4 (0,9%) cases presented complications, all of them related to an endoscopic procedure. 3 (0,7%) patients developed aspiration pneumonia subjects and there was a single case (0,3%) of perforation.

## DISCUSSION

The results of our study are consistent with those reported for the western population in the literature, being the ingestion of meat in adults the main cause of gastro-esophageal foreign body impaction[11].

It is of great relevance that EFB consultation is significantly more frequent on weekends. The patients who visit emergency services on weekends have the same epidemiological profile, endoscopic findings, need for removal and duration of hospitalization. It would be interesting to see if these events also occur in a higher proportion on holidays, as described by Shuja et al.[12]. It is also interesting to mention that a retrospective study carried out in China with more than 1000 patients[13], showed a different dynamic, where the cases were higher on weekdays than on weekends, considering cultural and nutritional factors different from the western population.

We have no reason to believe that the behavior of the population is different in other areas of the chilean country (meat being a common chilean weekend

meal). Therefore it is necessary that emergency services consider having on call endoscopists, to attend to these cases and avoid complications.

Age and hypersalivation are the only independent predictors of both finding: a foreign body and requiring endoscopic removal. Aphagia does not predict independently in logistic regression, but it is a specific symptom, since only patients with an impacted body at endoscopy had aphagia. Other characteristics that have been described in the need for endoscopic extraction are the sudden onset of symptoms, dysphagia, and the difficulty of locating the foreign body at the pharyngeal level, these are associated with a sensitivity and specificity of 86 and 63% respectively[14].

The clinical judgment of emergency physicians was able to choose appropriately which patients were in need of endoscopy, since 61,4% of the endoscopies done were consistent with an impacted body, this information agrees with what is stated in the literature, where specialists can identify the emergency context of the pathology and act quickly[15]. Furthermore only 60,8% of cases required an upper endoscopy, it is important to have this fact in mind considering that in comparison with other series, reporting this number up to 74 to 88% of the patients[8,16]. Given the retrospective nature of our study, we cannot predict what clinical characteristics the treating physicians used to decide the endoscopy.

A prospective study could better answer this question and possibly design a symptom score that maximizes diagnostic capacity, reducing the unnecessary endoscopy blank rate.

It is important to mention that in most cases we did not identify signs of structural or motility esophageal disease. Suspected eosinophilic esophagitis was the most frequent underlying condition. A biopsy could be useful and perhaps mandatory for the diagnosis of this pathology despite the normal appearance of the esophageal mucosa, since it's been described that 10 to 20% of the patients with eosinophilic esophagitis have normal appearance[17]. It is important to mention that other frequent pathologies have been described, such as Schatzki's ring or peptic stenosis, however they are not represented with the same proportion in the patients of this study[18].

Our study shows that endoscopy extraction is both effective and safe in gastro-esophageal foreign body impactions, with a complication rate of 0,9% reinforcing the idea that endoscopic therapy is the treatment of choice in foreign body impactions. After procedure, the patient could be discharged, according to the latest guidelines[3].

Limitations of this study include the retrospective aspects, which often is interfered by lost or incomplete registry of the data, preventing the researchers from knowing the complete evolution of the cases. Furthermore, being the patients of this series users of a private, free-choice emergency room, our study lacks a captive population which can be further studied for concomitant diseases, frequency and recurrence of impactions and other aspects (Motility disorders for instance).

Besides, these patients belong to a specific population group, which makes the extrapolation of the results to the entire chilean population difficult. Another important bias, this study presented is the possibility that cases who consulted with an already perforated esophagus may have been immediately referred to surgery and could have not been recorded as a foreign body impaction.

Some of the strengths of this study involve a large database of cases, encompassing 11 years of experience in foreign body impactions, with consistent records throughout time.

As a projection for this study, it would be interesting to observe the behaviour and management of this condition in other health centers and to compare them with the results of this study. Additionally, a prospective study to postulate a recommendation guide or protocol to follow for this pathology, may be proposed.

## CONCLUSION

In summary, this investigation reveals how frequent and relevant is the esophageal foreign body impaction and that it requires urgent evaluation and interventions in most cases. We observed a higher incidence on non-working days and that red meats are the foreign bodies most commonly found. Regarding these results, they may account for some cultural aspects in the population of the study, which may explain some of the differences with other reported international series.

This article contributed greatly to our development of a better understanding of the statistical analysis needed for a good, quality, quantitative research and brings our discipline a new point of consideration in the approach we take to esophageal foreign bodies.

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## REFERENCES

1. Pfau P. Removal and management of esophageal foreign bodies. Tech Gastrointest Endosc [Internet]. 2014 [cited 2022 May 7];16(1):32-9. Available in: https://doi.org/10.1016/j.tgie.2013.10.004
2. Ruan WS, Li YN, Feng MX, Qiang L. Retrospective observational analysis of esophageal foreign bodies: a

novel characterization based on shape. Sci Rep [Internet]. 2020 [cited 2022 May 7];10:4273. Available in: https://www.nature.com/articles/s41598-020-61207-8.pdf
3. 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 [Internet]. 2016 May [cited 2022 May 7];48(5):489-96. Available in: https://doi.org/10.1055/s-0042-100456
4. 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 [Internet]. 2015 [cited 2022 May 7];2015:658602. Available in: https://doi.org/10.1155%2F2015%2F658602
5. Tseng CC, Hsiao TY, Hsu WC. Comparison of rigid and flexible endoscopy for removing esophageal foreign bodies in an emergency. J Formos Med Assoc [Internet]. 2016 Aug [cited 2022 May 7];115(8):639-44. Available in: https://doi.org/10.1016/j.jfma.2015.05.016
6. Aiolfi A, Ferrari D, Riva CG, Toti F, Bonitta G, Bonavina L. Esophageal foreign bodies in adults: systematic review of the literature. Scand J Gastroenterol [Internet]. 2018 Oct-Nov [cited 2022 May 7];53(10-11):1171-8. Available in: https://doi.org/10.1080/00365521.2018.1526317
7. 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 [Internet]. 2015 Jul 14 [cited 2022 May 7];21(26):8125-31. Available in: https://doi.org/10.3748%2Fwjg.v21.i26.8125
8. Schupack DA, Lenz CJ, Geno DM, Tholen CJ, Leggett CL, Katzka DA, et al. The evolution of treatment and complications of esophageal food impaction. United European Gastroenterol J [Internet]. 2019 May [cited 2022 May 7];7(4):548-556. Available in: https://doi.org/10.1177/2050640619836052
9. Béjar M, Cevo J, Romero I, Iñiguez SR. Mortalidad nacional en otorrinolaringología. Rev Otorrinolaringol Cir Cabeza Cuello [Internet]. 2007 [cited 2022 May 7];67:31-7. Available in: http://dx.doi.org/10.4067/S0718-48162007000100006
10. Pastén G. Albert, González F. Bárbara, González J. Pablo, Figueroa R. Óscar. Enfrentamiento de la ingesta de cuerpo extraño en un Hospital Regional del sur de Chile. Rev Chil Cir [Internet]. 2018 Dic [cited 2022 May 7];70(6):517-22. Available in: http://dx.doi.org/10.4067/s0718-40262018000600517
11. ASGE Standards of Practice Committee, Ikenberry SO, Jue TL, Anderson MA, Appalaneni V, Banerjee S, et al. Management of ingested foreign bodies and food impactions. Gastrointest Endosc [Internet]. 2011 Jun [cited 2022 May 7];73(6):1085-91. Available in: https://doi.org/10.1016/j.gie.2010.11.010
12. Shuja A, Winston DM, Rahman AU, Mitty RD, Jaber BL, Keo T. Esophageal food impaction during cultural holidays and national athletic events. Gastroenterol Rep (Oxf) [Internet]. 2017 Feb [cited 2022 May 7];5(1):43-46. Available in: https://doi.org/10.1093/gastro/gow041
13. Zhong Q, Jiang R, Zheng X, Xu G, Fan X, Xu Y, et al. Esophageal foreign body ingestion in adults on weekdays and holidays: A retrospective study of 1058 patients. Medicine (Baltimore) [Internet]. 2017 Oct [cited 2022 May 7];96(43):e8409. Available in: https://doi.org/10.1097/md.0000000000008409
14. Ciriza C, García L, Suárez P, Jiménez C, Romero MJ, Urquiza O, et al. What predictive parameters best indicate the need for emergent gastrointestinal endoscopy after foreign body ingestion? J Clin Gastroenterol [Internet]. 2000 Jul [cited 2022 May 7];31(1):23-8. Available in: https://doi.org/10.1097/00004836-200007000-00006
15. Crockett SD, Sperry SL, Miller CB, Shaheen NJ, Dellon ES. Emergency care of esophageal foreign body impactions: timing, treatment modalities, and resource utilization. Dis Esophagus [Internet]. 2013 Feb-Mar [cited 2022 May 7];26(2):105-12. Available in: https://doi.org/10.1111/j.1442-2050.2012.01344.x
16. Sperry SL, Crockett SD, Miller CB, Shaheen NJ, Dellon ES. Esophageal foreign-body impactions: epidemiology, time trends, and the impact of the increasing prevalence of eosinophilic esophagitis. Gastrointest Endosc [Internet]. 2011 [cited 2022 May 7];74(5):985-91. Available in: https://doi.org/10.1016/j.gie.2011.06.029
17. Dellon ES. Eosinophilic esophagitis: diagnostic tests and criteria. Curr Opin Gastroenterol [Internet]. 2012 Jul [cited 2022 May 7];28(4):382-8. Available in: https://doi.org/10.1097/mog.0b013e328352b5ef
18. Fung BM, Sweetser S, Wong Kee Song LM, Tabibian JH. Foreign object ingestion and esophageal food impaction: An update and review on endoscopic management. World J Gastrointest Endosc [Internet]. 2019 [cited 2022 May 7];11(3):174-92. Available in: https://doi.org/10.4253/wjge.v11.i3.174