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The Management of Ingested Foreign Bodies in an Ear, Nose, and Throat Emergency Unit: Prospective Study of 204 Cases

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KEYWORDS
Foreign bodies; Ear, Nose, and Throat Emergency Unit; Morbidity; Management; Retrieval

Abstract

Aims: To determine how often ingested foreign bodies are found and what parameters may predict their retrieval.
Methods: During 1 year, we prospectively studied all patients referred to our Ear, Nose, and Throat Emergency Unit because of foreign body ingestion.
Results: During the study, 204 (median age 42 years [10 months–84 years]) patients were admitted because of ingested foreign body. The most common was fish bone (88%). Most patients were admitted 24-h after ingestion (72%) and complained of symptoms above the cricoid cartilage (79%). A foreign body was removed by Ear, Nose, and Throat team in 108 (53%) patients. Twenty-three (11%) patients were referred to Gastroenterology. In 9 (39%) of these patients, a foreign body was identified by esophagogastroscopy, always from the esophagus. Predictive variables for retrieval of foreign body by Ear, Nose, and Throat team were ingested fish bone (P=.000; odds ratio [OR]=17.3), short duration (<6 h) of symptoms (P=.001; OR=2.3) and symptoms above or at the level of cricoid cartilage (P=.000; OR=8.9). In patients with symptoms below the cricoid cartilage the rate of retrieval of foreign body by Ear, Nose, and Throat team (11%) was significantly increased by Gastroenterology (41%; P=.03).
Conclusions: Patients with ingestion of foreign body who ingest fish bone present within the first 6 h or complain of symptoms at or above cricoid cartilage deserve greater investment in terms of time and resources for retrieval of ingested foreign body by Ear, Nose, and Throat team.
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PALABRAS CLAVE
Cuerpos extraños; Unidad de Urgencias de Otorrinolaringología; Morbilidad; Tratamiento; Retirada

Tratamiento de la ingestión de cuerpos extraños en una unidad de urgencias de otorrinolaringología: estudio prospectivo de 204 casos

Resumen
Objetivos: Determinar la frecuencia con la que se encuentran cuerpos extraños ingeridos y los factores que pueden predecir su extracción.

Métodos: Durante un año estudiamos prospectivamente a todos los pacientes que fueron remitidos a nuestro servicio de Urgencias Otorrinolaringológicas por la ingestión de cuerpos extraños.

Resultados: Durante el estudio admitimos a 204 pacientes (edad media: 42 años [10 meses-84 años]) a causa de la ingestión de cuerpos extraños. El más frecuente fue la espina de pescado (88%). La mayoría de estos pacientes acudieron en las primeras 24 h posteriores a la ingestión (72%), y referían síntomas por encima del cartílago cricoides (79%). El cuerpo extraño fue identificado y extraído por ORL en 108 pacientes (53%). Veintitrés pacientes (11%) fueron remitidos a Gastroenterología. En 9 de estos pacientes (39%), el cuerpo extraño fue identificado mediante endoscopia digestiva alta, siempre en el esófago. Las variables predictivas para la extracción por el equipo de ORL fueron la ingesta de espina de pescado ($p=0,000$; odds ratio [OR] = 17,3), la corta duración de los síntomas (< 6 h) ($p=0,001$; OR = 2,3) y los síntomas por encima o a la altura del cartílago cricoides ($p=0,000$; OR = 8,9). En los pacientes con síntomas por debajo del cartílago cricoide la tasa de retirada del cuerpo extraño por el equipo de ORL (11%) fue significativamente superada por Gastroenterología (41%; $p=0,03$).

Conclusiones: Los pacientes con ingestión de cuerpo extraño, que han ingerido espinas de pescado, y que acuden durante las primeras 6 h, o se quejan de síntomas a la altura o por encima del cartílago cricoide, justifican una mayor inversión de tiempo y recursos en cuanto a la extracción de cuerpos extraños ingeridos por el ORL.

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Introduction

Foreign body (FB) ingestion occurs commonly both in children and in adults; therefore it is a common cause of reference to the emergency department. The majority of ingested FB will pass spontaneously. The most frequent clinical presentation includes pharyngeal pain, dysphagia, odynophagia, foreign sensation, and slaorthea. Nevertheless the presence of symptoms does not predict the identification of FB, with many patients presenting with symptoms related to superficial mucosal ulcerations. Older children and non-impaired adults may identify the ingestion and localize the area of discomfort. However, the area of discomfort often does not correlate with the site of impaction. The correlation is better the higher the area of discomfort. When compared with FB above the cricopharyngeus muscle, FB at or below this level are poorly localized. This suggests that for a patient who localizes discomfort above the cricopharyngeus muscle, FB are likely to be above it and accessible by ENT (Ear, Nose, and Throat) team.

Pre-endoscopic series show that 80% or more of FB will likely pass without intervention. However, in the setting of intentional ingestion, the rate of endoscopic intervention may be much higher (63%-76%) and the need for surgical intervention may range from 12% to 16%.

Although FB ingestion is a common cause of reference to the emergency department, and there is no consensus guideline for the management of these patients, which varies between centers. The management of these patients usually involves ENT and Gastroenterology, but there is no consensus regarding who should do the first evaluation and which parameters should drive that decision.

Ingestion of FB is associated with low morbidity but can potentially lead to serious complications such as esophageal perforation, parapharyngeal abscess, retropharyngeal abscess, mediastinitis, and aorto-esophageal fistula. Mortality rates are extremely low; a compilation of multiple studies including 2 large series report no deaths in 852 adults and 1 death in 2206 children.

We prospectively studied patients admitted to our ENT Emergency Unit for suspicion of FB ingestion in order to determine how often FB are found and what parameters may be used to predict whether FB will be found (indicating the need for emergent intervention).

Methods

The ENT Emergency Unit of our Hospital serves approximately 1.1 million patients and, at the time of this study, worked from Monday to Friday between 8 am and 8 pm. During 1 year period (July 2008–2009) we prospectively recorded several clinical aspects regarding all patients referred to the ENT Emergency Unit of our Hospital for suspicion of FB ingestion. The recorded elements included: (1) age; (2) gender; (3) date; (4) type of FB; (5) duration of symptoms; (6) location of discomfort regarding cricoid cartilage; (7) diagnostic tests; (8) presence and (9) location of FB; (10) method of retrieval; (11) complications; (12) destination after observation by ENT; (13) readmission (within 72-h after discharge). Regarding patients referred to Gastroenterology Emergency Unit after ENT
observation, we also recorded the result of esophagogastroscopy.

The management protocol of ingested FB of our ENT Emergency Unit is summarized in Fig. 1.

Statistical Package for Social Sciences (SPSS® 18.0 Package Facility, SPSS Inc., IL, USA) was used for data support and analysis. Continuous variables were expressed as median and range and categorical variables as absolute figures and percentages. By using logistic regression we searched for parameters associated with the retrieval of FB by ENT. This analysis was performed with retrieval of FB as the outcome, and with age, genre, type of FB, duration of symptoms and location of symptoms regarding cricoid cartilage as explanatory factors in the total number of cases. The relationship between each factor and the outcome was investigated by using univariate logistic regression, \( P<.05 \) being considered to denote significant associations. Continuous variables, such as weight, were dichotomized around the median. Parameters significantly associated with the outcome in univariate analyses were entered in a multivariate logistic model. Odds ratios were estimated from the model and are given with their 95% confidence intervals (CI). Diagnostic properties of parameters associated with the retrieval of FB by ENT were also calculated. Chi-square test or Fisher’s exact test (when <5 observations) were used for comparison of proportions. Statistical significance was set at \( P<.05 \).

Results

Descriptive Analysis

During the study, 6646 patients were referred to ENT Emergency Unit and 204 (3.1%) complained of ingested FB. Characterization of these patients is presented in Table 1. Of these patients, 126 (62%) were women and 78 (38%) were men. The median age was 42 years (ranging from 10 months to 84 years). Twenty-two (11%) patients were younger than 12 years.

The most common ingested FB was fish bone (88%), followed by animal bone (6%) and other (6%) (Table 1). Most patients (72%) were admitted less than 24-h after ingestion, with 51 (25%) patients recurring within the first 3 h. Most patients \((n=161; 79\%)\) complained of symptoms above cricoid cartilage. Sixteen (8%) and 27 (13%) patients complained of symptoms at level or below cricoid cartilage, respectively. Only 4 (2%) patients performed an X-ray.

A FB was identified and removed by ENT in 53% (108) patients (Table 1). The most common location was the tonsils (59%), followed by tongue base (18%), vallecula (16%), pyriform sinus (5%), and esophagus (2%). Retrieval of oropharyngeal FB was done with the help of FB forceps under direct visualization, indirect laryngoscopy or videolaryngoscopy. FB located in the esophagus were removed through rigid esophagoscopy. Most patients (89%) were discharged after observation by ENT within 12 h. Only 2 patients (1%) with a negative examination by ENT and not referred to Gastroenterology were readmitted because of persistence of symptoms, but in none of these patients a FB was identified after re-examination by ENT.

Twenty-three patients (24% of those with negative findings by ENT) were referred to Gastroenterology for digestive endoscopy, after a negative examination by ENT, based on the presence of symptoms below cricoid cartilage or signs suggestive of persistence of FB such as sialorrhea or saliva accumulation on piriform sinus (Table 1). In 39% (8 patients with symptoms below cricoid cartilage and 1 patient with symptoms at the level of cricoid cartilage) of these patients, a FB was identified by digestive endoscopy, always in the esophagus (Table 1). This means an overall identification and retrieval rate of FB of 57%. No patient discharged after a negative examination by ENT and Gastroenterology was readmitted. Fig. 2 presents a flowchart with the main data of the study.

The rate of morbidity was 1%, corresponding to 2 patients (1 case of esophageal laceration and 1 case of esophageal perforation). There was no mortality.

Predictive Parameters for Foreign Bodies Retrieval

After the univariate analysis, the predictive variables for retrieval of FB by ENT were ingested fish bone \((P=.000; \text{odds ratio } [OR]=16.7)\), short duration \((<6 \text{ h})\) of symptoms \((P=.001; \text{OR}=2.0)\) and symptoms above or at the level of cricoid cartilage \((P=.000; \text{OR}=8.7)\). When the multivariate analysis was performed the same variables were predictive for retrieval of FB by ENT (Table 2). The diagnostic properties of the 3 predictive variables for retrieval of FB by ENT are also presented in Table 2. Of note, ingested fish bone and symptoms above or at the level of cricoid cartilage had a high negative predictive value for retrieval of FB by ENT.

Table 3 presents the rate of retrieval of FB by ENT and ENT-Gastroenterology regarding the type of FB, duration of symptoms and location of discomfort in regard to the cricoid cartilage. Patients with ingestion of fish bone had a retrieval rate by ENT of 59% whereas patients with ingestion of other FB had a retrieval rate of 8%. When concerning the duration of symptoms, patients who presented within 6 h had a higher (71%) retrieval rate by ENT than those who presented later than 6 h (41%). Patients with symptoms at or above the cricoid cartilage had a retrieval rate by ENT of 59%, whereas the patients complaining below this level had a retrieval rate of 11%. In patients with symptoms below the level of cricoid cartilage (27 patients) the rate of retrieval of FB by ENT (11%) was significantly increased after evaluation by Gastroenterology (41%; \( P=.03 \)).

Discussion

In our study, we achieved an ingested FB retrieval rate by ENT of 53% which increased to 57% after examination of patients with ENT negative findings by Gastroenterology. Although this is a low retrieval rate, it is similar to other equivalent series.\textsuperscript{6-8} This low retrieval rate confirms that most ingested FB will pass spontaneously and that many patients with ingested FB recur to the emergency room because they have symptoms related to superficial mucosal ulcerations provoked by the passage of the FB or are concerned and want to be examined.
Since many patients with ingested FB will pass the FB spontaneously, it is important from a cost-effective perspective to determine the predictive variables for retrieval of ingested FB. In patients with positive predictive factors we should actively pursue identification and removal of FB, while in patients with negative predictive factors we should privilege a non-invasive approach. According to our multivariate analysis, ingested fish bone, short duration (<6 h) of symptoms and symptoms at or above the level of cricoid cartilage were independent variables that predicted retrieval of ingested FB by ENT. Patients with ingested fish bones had a higher retrieval rate (59%) that those who ingested other FB (8%) and we think this is because fish bones are more prone to get stocked at the oropharynx isthmus (e.g. the tonsils, the tongue base, the valecula and the pyriform sinus) as this was also the most frequent location of the foreign bodies. Patients with short duration (<6 h) of symptoms had a higher retrieval rate (71%) than those with long duration (>6 h) of symptoms (41%). We believe the higher rate of FB retrieval in patients with short duration of symptoms is likely linked to the fact that retained FB cause more severe symptoms that lead patients to recur to emergency room early. Patients with symptoms at or above the cricoid cartilage level had a higher retrieval rate (59%) than those with symptoms below the cricoids cartilage level (11%).
### Table 1  Characterization of Patients Included in the Study (n=204).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Patients evaluated by ENT n, %</th>
<th>Patients with FB retrieved by ENT n, %</th>
<th>Patients evaluated by gastroenterology n, %</th>
<th>Patients with FB retrieved by gastroenterology n, %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (median and range)</strong></td>
<td>42 years (6 months–90 years)</td>
<td>39 years (1–84)</td>
<td>46 years (6–90 years)</td>
<td>52 years (8–90 years)</td>
</tr>
<tr>
<td><strong>Genre</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>126 (62)</td>
<td>66 (61)</td>
<td>15 (65)</td>
<td>6 (67)</td>
</tr>
<tr>
<td>Male</td>
<td>78 (38)</td>
<td>42 (39)</td>
<td>8 (35)</td>
<td>3 (33)</td>
</tr>
<tr>
<td><strong>Type of FB</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish bone</td>
<td>179 (88)</td>
<td>106 (98)</td>
<td>13 (57)</td>
<td>4 (44)</td>
</tr>
<tr>
<td>Animal bone</td>
<td>13 (6)</td>
<td>2 (2)</td>
<td>9 (39)</td>
<td>5 (56)</td>
</tr>
<tr>
<td>Other</td>
<td>12 (6)</td>
<td>0 (0)</td>
<td>1 (4)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Duration of symptoms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;3 h</td>
<td>51 (25)</td>
<td>39 (36)</td>
<td>4 (17)</td>
<td>3 (33)</td>
</tr>
<tr>
<td>3–6 h</td>
<td>29 (14)</td>
<td>18 (17)</td>
<td>3 (13)</td>
<td>2 (22)</td>
</tr>
<tr>
<td>6–12 h</td>
<td>19 (9)</td>
<td>8 (7)</td>
<td>1 (4)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>12–24 h</td>
<td>48 (24)</td>
<td>27 (25)</td>
<td>8 (35)</td>
<td>3 (33)</td>
</tr>
<tr>
<td>24–48 h</td>
<td>16 (8)</td>
<td>8 (7)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>&gt;48 h</td>
<td>41 (20)</td>
<td>8 (7)</td>
<td>7 (30)</td>
<td>1 (1)</td>
</tr>
<tr>
<td><strong>Locality of discomfort regarding cricoid cartilage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above</td>
<td>161 (79)</td>
<td>98 (91)</td>
<td>3 (13)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>At the level</td>
<td>16 (8)</td>
<td>7 (6)</td>
<td>3 (13)</td>
<td>1 (11)</td>
</tr>
<tr>
<td>Below</td>
<td>27 (13)</td>
<td>3 (3)</td>
<td>17 (74)</td>
<td>8 (89)</td>
</tr>
<tr>
<td><strong>FB retrieved?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>108 (53)</td>
<td>108 (100)</td>
<td>9 (39)</td>
<td>9 (100)</td>
</tr>
<tr>
<td>No</td>
<td>96 (47)</td>
<td>0 (0)</td>
<td>14 (61)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Total number of patients</strong></td>
<td>204 (100)</td>
<td>108 (100)</td>
<td>23 (100)</td>
<td>9 (100)</td>
</tr>
</tbody>
</table>

FB: foreign body; ENT: Ear, Nose, and Throat team. Percentages are calculated using the total number of patients of each population as the denominator.

### Table 2  Predictive Variables for Retrieval of Foreign Body by ENT in Univariate and Multivariate Analyses and Their Diagnostic Properties.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate analysis</th>
<th>Multivariate analysis</th>
<th>Diagnostic properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OR (95% CI)</strong></td>
<td><strong>P</strong></td>
<td><strong>OR (95% CI)</strong></td>
<td><strong>Se (95% CI)</strong></td>
</tr>
<tr>
<td>Type of foreign body (fish bone versus other)</td>
<td>16.7 (3.8–73.0)</td>
<td>.0002</td>
<td>17.4 (3.7–81.9)</td>
</tr>
<tr>
<td>Duration of symptoms (≤6 h versus &gt;6 h)</td>
<td>2.0 (1.3–3.0)</td>
<td>.001</td>
<td>2.3 (1.4–3.8)</td>
</tr>
<tr>
<td>Location of symptoms (at or above cricoid cartilage versus below)</td>
<td>8.4 (2.8–25.3)</td>
<td>.0002</td>
<td>8.9 (2.7–29.5)</td>
</tr>
</tbody>
</table>

ENT: Ear, Nose, and Throat team; OR: odds ratio; CI: confidence interval; Se: sensitivity; Sp: specificity; PPV: positive predictive value; NPV: negative predictive value.
We believe that this is due to 2 factors: first, the main obstacles to the progression of ingested FB occurs at this level, which correspond to the superior cricoesophageal sphincter; second, this level is also more accessible to examination by ENT.

Few previous studies have evaluated the clinical factors that predict the retrieval of ingested FB. Ciriza et al. found that the immediate onset of symptoms, the presence of dysphagia, and the absence of pharynx localization of impaction were independent variables that predicted a positive FB in the upper GI endoscopy. Lim et al. found that dysphagia, positive laryngeal rub, and drinking water tests had high sensitivity and specificity for ingested FB. Further larger studies are needed to clearly determine the most important predictive factors for retained ingested FB.

Although FB ingestion is a common cause of reference to the emergency department, there is no consensus guideline for the management of these patients, which therefore varies significantly between centers. The management of these patients usually involves both ENT and Gastroenterology, but there is no consensus regarding who should do the first evaluation and which parameters should drive that decision. In our study in patients with symptoms below the cricoid cartilage the retrieval rate by ENT was low (11%), but was significantly increased by Gastroenterology (41%). This suggests that these patients should be evaluated by Gastroenterology.

We had a low morbidity and no mortality in our series. We assign this fact to the evolution of the resources that are available for the diagnosis and care of these patients (e.g. endoscopic procedures).

Considering our results we suggest that patients who ingested fish bone, present within the first 6 h after ingestion and complain of symptoms at or above the cricoid cartilage justify most attempts and use of resources for identification and retrieval of the ingested FB. Patients with symptoms with more than 6 h, at or above cricoid cartilage, who ingested foreign body other than fish bone, may be discharged after a negative examination by ENT. Patients with symptoms below cricoid cartilage should be examined by Gastroenterology after a negative examination by ENT.

## Conclusion

The rate of retrieval of ingested FB by ENT is low, but increases in patients who ingest fish bone, present within the first 6 h after ingestion and complain of symptoms at or above the cricoid cartilage. These patients deserve greater investment in terms of time and resources by ENT. In patients with symptoms below the cricoid cartilage the retrieval rate by ENT is low but can be significantly increased by Gastroenterology. These patients should be evaluated by Gastroenterology after a negative examination by ENT.

## Conflicts of Interest

The authors have no conflict of interests to declare.

## References

The Management of Ingested Foreign Bodies in an Ear, Nose, and Throat Emergency Unit


