Esophageal food impaction: epidemiology and therapy. A retrospective, observational study

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Background: Esophageal food impaction is common, but incidence data are lacking and management is controversial. This is a survey of its epidemiology, endoscopic findings, and treatment.

Methods: A retrospective study was conducted of 194 adults with 223 episodes of esophageal food impaction in a health maintenance organization. Of these, 192 (99%) patients were followed a median of 31 months (range 1-72) post-disimpaction.

Results: The estimated annual incidence rate of episodes was 13.0 per 100,000, and the male:female ratio was 1.7:1. The rate increased with age, especially after the seventh decade. The bolus was meat in 189 (85%) episodes. Flexible esophagoscopy was performed initially in 222 (99.6%) episodes and permitted disimpaction in 218 (98%). The push technique was used alone or in combination with extraction in 186 (84%). Immediate dilation was performed in 172 (79%). There were no major complications. A final diagnosis was made in 171 (88%), including 151 (78%) with a Schatzki’s ring or peptic stricture, and the diagnosis had changed during follow-up in 14 (7%). A diagnosis of Schatzki’s ring was associated with gender ($p = 0.03$) and decreased with increasing age ($p = 0.003$), especially among women.

Conclusions: Esophageal food impaction is common and can nearly always be treated safely with flexible esophagoscopy, usually with the push technique. (Gastrointest Endosc 2001;53:193-8.)

Esophageal food impaction is a common medical emergency that often requires endoscopic therapy, but the incidence of the disorder is unknown. Prior to about 20 years ago, rigid esophagoscopy performed with the patient under general anesthesia was the standard method of disimpaction used in most hospitals. Subsequently, flexible endoscopic management with conscious sedation became common, although there are few data on the success rate of this treatment. Furthermore, most investigators prefer bolus extraction but pushing the bolus into the stomach has also been suggested.

In most reported series, patients with esophageal food impaction have been designated as having “foreign bodies” and have been included with patients who swallowed objects that are not normally ingested, such as coins and bones. Some investigators have not distinguished the treatment methods used in these two groups. Ingestion of a true foreign object occurs accidentally in adults and children or intentionally in prisoners and patients with psychiatric disorders. If esophageal obstruction results, it is most often in the proximal portion of a normal esophagus. In contrast, food impaction occurs primarily in adults and tends to take place in the distal esophagus because of esophageal pathology, usually a Schatzki’s ring or peptic stricture. None of the published studies has been population-based, so referral bias could have affected the external validity of the findings. Outcome data after therapy of esophageal impaction are limited.

In a demographically-defined subgroup of a health maintenance organization (HMO), adults who underwent endoscopic therapy for esophageal food impaction during a 6-year period were retrospectively surveyed and the epidemiology, endoscopic findings, and therapy are described here.

PATIENTS AND METHODS

The members of the San Diego service area of the Kaiser Permanente Medical Care Program of Southern California, a group-model HMO, currently with over 500,000 members, were surveyed. Institutional Review Board approval was obtained. The age, gender, racial/ethnic distribution, and formal education of the members are known, and these characteristics resemble the census data on the residents of the San Diego region. Patients with esophageal food impaction between 1993 and 1998 were identified from endoscopy log books, which include data on all upper endoscopies performed on the members, including the indication for each procedure. In addition, hospitalized patients at least 20 years of age were identified from the International Classification of Diseases, 9th
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Figure 1. Annual incidence rate of patients with at least 1 episode of esophageal food impaction between 1993 and 1998.

Revision, Clinical Modifications (ICD-9-CM) discharge code 9351 (esophageal foreign body; food).

The medical records of 251 of the 262 (96%) patients identified in the log books and by ICD-9-CM code were reviewed; records of 11 patients could not be reviewed because of incomplete or illegible log book identifying data or unavailable records. Inclusion criteria were as follows: (1) age at least 20 years, (2) the presence of esophageal food impaction at the time of endoscopy, and (3) residence in the San Diego Kaiser Permanente service area. The 6 log book patients who were less than 20 years of age were excluded because the HMO member age and gender distribution data are available only by decades of life and patients in the first 2 decades were not included. Also excluded were 27 patients with a history consistent with food impaction that had resolved before endoscopy, 16 adult patients with true esophageal foreign bodies, and 8 patients from outside the San Diego service area. Therefore 194 patients were studied.

Data were recorded on printed forms and transferred to a spreadsheet (Excel, Microsoft Corp., Redmond, Wash.). Recorded data included the follow-up period from the index impaction to the most recent patient contact. Follow-up was available for 192 (99%) patients; 2 patients had no record of medical service after disimpaction. The median follow-up period was 31 months (range 1-72). If the pertinent data were available, denture use was recorded, and height and weight data were used to calculate body mass index (BMI). Obesity was defined as a BMI value of 27.3 or greater for women and 27.8 or greater for men, which are the gender-specific 85th percentile values for women and men 20 years through 29 years of age.

Statistical analysis was performed with SAS software (SAS Institute, Cary, N.C.). Descriptive statistics included the derivation of medians and ranges for continuous data because they lacked a normal distribution. Univariate group comparisons were made with the nonparametric Wilcoxon rank sum test for continuous variables and the chi-square test or Fisher exact test for categorical measures. Multiple logistic regression was used to examine potential predictive factors of age and gender for the outcome measure of final diagnosis. The modeling included a gender-age interaction term. To better address the interaction effect, a regression plot of estimated probability by age and gender was developed from the logistic model. The analysis was restricted to the main focus of the study, namely the examination of gender and age as predictors of the final diagnosis. In the comparison of patients with denture information to those without in terms of age and gender, multiple logistic regression was used. The same approach was used in the examination of subjects with or without BMI data. Annual incidence data were estimated for the entire adult population and age and gender-specific subgroups by dividing the total number of cases found in the 6-year survey period by the corresponding midyear HMO member (≥20 years of age) total for the 6 years. The level of statistical significance was \( p < 0.05 \).

RESULTS

There were 223 episodes of esophageal food impaction among 194 patients (126 men and 68 women). The estimated annual incidence rate was 13.0 episodes per 100,000. Because the data from patients with multiple episodes were not independent, only data from the first episode were used in the patient analysis. Therefore the estimated annual incidence rate of patients with at least 1 impaction was 11.3 per 100,000 (15.5 in men and 7.5 in women). The median age of men was 59 years (range 23-93) and that of women was 67 years (range 24-92), \( p = 0.03 \). Figure 1 shows that the annual incidence rate did not decrease with age and especially increased after the seventh decade of life. The rate was higher in men than women in every age group. Only 1 patient had an impaction after admission to the hospital for another disorder. Most of the remaining outpatients came to the emergency department where urgent gastroenterology consultation was requested; a few patients came directly to the endoscopy suite from home or a primary physician’s office. Contrast esophagography was obtained by an emergency department physician in 5 (2%) episodes before a gastroenterology consultation. Table 1 shows that some type of meat was the recorded bolus in 189 (85%) of all episodes (92% of 206 episodes with a specified food type); however, various other foods were involved.

The initial endoscopic procedure was flexible esophagscopy with conscious sedation in 222 (99.6%) episodes. A diagnosis was made in one patient in the emergency department of proximal esophageal beef impaction, and a head and neck surgeon was initially consulted who performed rigid
esophagoscopy with bolus extraction. In 4 (2%) episodes, initial flexible esophagoscopy was followed by hospitalization and disimpaction by a head and neck surgeon by using rigid esophagoscopy with the patient under general anesthesia. Three of these patients had a proximal esophageal meat impaction and were judged by an endoscopist to need airway protection during disimpaction. They included a woman with a beef bolus measuring 3 × 8 cm. The fourth patient had a distal esophageal beef bolus that resisted attempts to either extract it or push it into the stomach. Therefore flexible esophagoscopy alone was successful in 218 (98%) episodes. In these episodes, the techniques used were dislodgement of the bolus by pushing it into the stomach in 175 (79%); a combination of pushing and bolus extraction in 11 (5%); extraction in 26 (12%); unspecified method in 4 (2%); and no effort in 1 (<1%), a patient with obstruction caused by a piece of apple that passed spontaneously into the stomach during esophagoscopy. Some extracted boluses were large; for example, a beef bolus measured 3 × 10 cm. An overtube was used for bolus extraction in 3 (1%) episodes. In the episodes successfully managed by flexible esophagoscopy, immediate post-disimpaction dilation was performed with Maloney bougies (Medovations Inc., Milwaukee, Wis.) in 165 (76%), Savary bougies over a guidewire (Medivators Inc., Rochester, Minn.) in 2 (1%), and balloons (Microvasive Endoscopy, Boston Scientific Corp., Natick, Mass.) in 5 (2%). The proportions of patients who underwent immediate dilation were similar in those with an initial diagnosis of a Schatzki’s ring, peptic stricture, or hiatal hernia only.

Complications consisting of small distal esophageal lacerations with oozing of blood occurred in 3 (1%) episodes; each patient had been treated by pushing a bolus into the stomach, and 1 had undergone immediate stricture dilation. The events were clinically minor, and these patients as well as all other patients managed with flexible esophagoscopy were discharged home without hospitalization after disimpaction, except for 1 patient whose episode occurred while he was an inpatient.

An etiology for food impaction was described in 170 (88%) patients at the time of their index or only food impaction during the survey period. However in 14 (7%) patients, the initial diagnosis was changed during follow-up due to endoscopy performed for recurrent impaction or another indication (13 patients) or esophageal motility testing (1 patient), leading to a final diagnosis in 171 (88%). The most common changes in diagnosis were from a peptic stricture, hiatal hernia only, or no abnormality to a Schatzki’s ring (5 patients) and from a Schatzki’s ring or hiatal hernia only to a peptic stricture (5

### Table 1. Types of food in 223 episodes of esophageal food impaction

<table>
<thead>
<tr>
<th>Type</th>
<th>Number (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>78 (35)</td>
</tr>
<tr>
<td>Chicken</td>
<td>36 (16)</td>
</tr>
<tr>
<td>Turkey</td>
<td>11 (5)</td>
</tr>
<tr>
<td>Pork</td>
<td>15 (7)</td>
</tr>
<tr>
<td>Fish or shellfish</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Lamb</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td>Meat (unspecified)</td>
<td>44 (20)</td>
</tr>
<tr>
<td>Vegetable</td>
<td>6 (3)</td>
</tr>
<tr>
<td>Miscellaneous*</td>
<td>6 (3)</td>
</tr>
<tr>
<td>Fruit</td>
<td>5 (2)</td>
</tr>
<tr>
<td>Unspecified</td>
<td>17 (8)</td>
</tr>
<tr>
<td>Total</td>
<td>223</td>
</tr>
</tbody>
</table>

*Nuts, 2; rice, 2; egg sandwich, 1; pastry, 1.

### Table 2. Final diagnoses in 194 patients with esophageal food impaction

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schatzki’s ring</td>
<td>84 (43)</td>
</tr>
<tr>
<td>Peptic stricture</td>
<td>67 (35)</td>
</tr>
<tr>
<td>Hiatal hernia only</td>
<td>7 (4)</td>
</tr>
<tr>
<td>Miscellaneous*</td>
<td>13 (7)</td>
</tr>
<tr>
<td>No abnormality</td>
<td>23 (12)</td>
</tr>
<tr>
<td>Total</td>
<td>194</td>
</tr>
</tbody>
</table>

*Multiple esophageal webs, 4; postoperative stricture, 3; radiation stricture, 1; cervical web, 1; hiatal hernia and esophagitis, 1; esophageal squamous carcinoma, 1; esophageal adenocarcinoma, 1; nonspecific dysmotility, 1.

### Table 3. Factors independently associated with the final diagnosis of a Schatzki’s ring

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds ratio</th>
<th>95% C. I.</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0.032</td>
<td>(0.001, 0.737)</td>
<td>0.0315</td>
</tr>
<tr>
<td>Age†</td>
<td>0.939*</td>
<td>(0.900, 0.979)</td>
<td>0.0033</td>
</tr>
<tr>
<td>Gender-age interaction†</td>
<td>1.065*</td>
<td>(1.014, 1.118)</td>
<td>0.0112</td>
</tr>
</tbody>
</table>

*Odds ratios are per additional year.
†Age is a continuous variable.
patients). Table 2 shows the final diagnoses; 78% of patients had a Schatzki's ring or a peptic stricture. Twenty-two patients had multiple episodes. Of the 84 patients who had a final diagnosis of a Schatzki’s ring, 10 (12%) had multiple episodes, which is identical to the proportion of multiple episodes, 8 in 67 (12%), in those with a final diagnosis of a peptic stricture. The median age of patients with a peptic stricture was 68 years (range 23-92) and that for patients with a Schatzki’s ring was 57 years (range 24-93). There was a greater proportion of men among patients with a peptic stricture (70%) than in those with a Schatzki’s ring (57%). Table 3 shows the results of multiple logistic regression, and Figure 2 is a plot of estimated probability of a diagnosis of a Schatzki’s ring from the logistic model by age and gender. The results in Table 3 indicate that the diagnosis of a Schatzki’s ring decreased with age and was associated with gender. Figure 2 shows that the decrease with age was faster for women than for men. The younger women (age <53 years) had a higher chance of being given a diagnosis of Schatzki’s ring, whereas for older women a diagnosis of peptic stricture was more likely, in relation to men of similar age.

In 164 patients for whom denture use data were available, 54 (33%) used dentures, and of these, 31 (57%) were men. The median age of patients who used dentures was 74 years (range 38-93); that for patients who did not use dentures was 51 years (range 23-92). The differences were significant by the Wilcoxon rank sum test (p = 0.0001). Patients were further compared with or without denture use data in terms of age and gender. The median age of patients for whom denture use data were available was 59 years (range 23-93) and that for those without these data was 73 years (range 31-92). In an examination of the presence or absence of denture use data as a function of age and gender by using multiple logistic regression, the absence of these data was strongly associated with age (p = 0.008) but not with gender after adjustment in the multivariate analysis. Patients for whom denture use data were not available tended to be older.

In 141 patients whose records permitted calculation of BMI, 66 (47%) were obese, and of those, 42 (64%) were men. Multiple logistic regression results showed that the absence of BMI data was not related to age or gender.

**DISCUSSION**

This study of HMO members found 13.0 episodes per 100,000 of esophageal food impaction requiring endoscopic treatment from 1993 through 1998. The rate in men was twice the rate in women and was non-decreasing with age, especially increasing after the seventh decade of life. Because hospitalization rates in the same HMO for acute upper GI hemorrhage and acute lower GI hemorrhage were estimated to be 102.0 and 22.0 per 100,000, respectively, this disorder...
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impressions; only 1 was a distal impaction. In other series the success rate for treatment of food impaction with flexible esophagoscopy was 92% in 12 impactions and 93% in 30 impactions.

Dislodgement of the bolus by pushing it into the stomach was the only disimpaction method used in 79% of episodes. In an additional 5% of episodes dislodgement was successful after incomplete bolus extraction. In the latter cases fragmentation of the bolus during extraction often occurred and the endoscopist preferred the push technique to continued piecemeal removal with multiple passages of the endoscope. Bolus extraction alone with a polypectomy snare, retrieval basket, or tripod grasping device was used in 12% of episodes, and an overtube was used only 1% of the time. Some of the boluses were so large that they could not have been extracted through an overtube. Other techniques were not used, such as suctioning the bolus into a ligator adaptor on an endoscope tip, using a retrieval net, cooking the center of the bolus with a Nd:YAG laser, performing blind bougienage with a Maloney dilator, and suctioning the bolus into a modified gastric lavage tube.

Considerable disagreement exists concerning whether a bolus should be extracted or pushed into the stomach. Bolus extraction is advocated widely. Some investigators believe that blindly pushing the bolus forward is hazardous because of the high possibility of organic stenosis. Others state that the push technique is unsafe if the anatomy of the distal esophagus is unknown or there is a history of antecedent dysphagia. Webb advised an attempt at passing the bolus with the endoscope first, but condemned gentle pushing if this could not be accomplished. Shaffer and Klug reported a 68% success rate with the push technique without complication. Our patients had a high rate of anatomic abnormalities, and the endoscopists clearly favored the push technique, which was performed without serious complication. They generally restricted bolus extraction to boluses that could not be easily pushed forward. Unusually large boluses are resistant to being pushed into the stomach and must be removed, and some are too large to be extracted through an overtube. Bolus-induced mucosal trauma can interfere with the accuracy of endoscopic assessment whether the bolus is pushed forward or removed, so neither technique may have an advantage with respect to endoscopic diagnosis. Immediate esophageal dilation was used in the majority of episodes without serious incident. Other investigators have commented that immediate postdisimpaction dilation is safe if esophagitis is minor, but no published outcome data on this practice could be found.

Previous surveys of patients with food impaction have yielded scanty data on age and gender, and incidence rates could not be estimated. Our population-based data revealed a 1.7:1 male predominance and an increasing incidence with age. The marked rise after the seventh decade of life portends a growing number of future cases as the population of the United States ages. Denture use has been suggested as a risk factor in that this reduces palatal tactile sensation and impairs mastication. Few patients who received care at another institution than at the HMO hospital were overlooked, as a study of the HMO patients with acute upper GI hemorrhage found that only 2% were hospitalized for care away from the San Diego HMO hospital.

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Particularly important findings include the successful management by flexible esophagoscopy, specific methods used, and excellent patient outcome. Initial flexible esophagoscopy for food impaction replaced rigid esophagoscopy in the HMO hospital in the 1980s because of its improved diagnostic accuracy, lower cost, and greater safety. In 223 episodes only 1 patient underwent rigid esophagoscopy initially. In 98% of the remaining episodes flexible esophagoscopy with conscious sedation was successful. Of the 4 episodes in which this was unsuccessful, 3 were proximal esophageal

The use of endoscopy records and ICD-9-CM hospital discharge codes for case findings allowed comprehensive identification of both outpatients and inpatients. Probably, few patients who received care at another institution than at the HMO hospital were overlooked, as a study of the HMO patients with acute upper GI hemorrhage found that only 2% were hospitalized for care away from the San Diego HMO hospital.

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An anatomic abnormality was found in 88% of patients, most often Schatzki's rings or peptic strictures. Identical proportions of patients with these 2 disorders had multiple impactions. Others have reported abnormality rates of 78%³ and 97%⁴. Patient follow-up revealed that the initial diagnosis had changed in 7% of patients. Usually, there was interchange among the diagnoses of a Schatzki's ring, peptic stricture, or hiatal hernia only likely because of the interference by mucosal trauma with accurate endoscopic evaluation during disimpaction treatment. Only mild luminal stenosis may be present,¹⁸ as expected from the large size of some boluses. The diagnosis of a peptic stricture is important because recurrent stricture can be prevented with medical¹⁹ and surgical²⁰ treatment. This fact underscores the potential benefit of endoscopy a few weeks after disimpaction if the diagnosis is uncertain. Patients with a Schatzki's ring who were less than 53 years of age were more likely to be women, whereas those greater than age 53 were more likely to be men. Esophageal malignancy was uncommon. Dysmotility was identified in only 1 case,²¹ but other cases could have been overlooked due to the lack of consistent evaluation with esophageal manometry in patients lacking an anatomic abnormality. Four (2%) patients had multiple esophageal webs.²²

Esophageal food impaction is a common problem, especially in older people and men. Meat is most often impacted. A Schatzki's ring or peptic stricture is usually present, but subsequent evaluation may disclose an abnormality that was not seen during the initial endoscopy. Most patients can be safely treated with outpatient flexible esophagoscopy and conscious sedation, usually by pushing the bolus into the stomach.

ACKNOWLEDGEMENTS

We are grateful to Drs. Daniel Anderson, Richard Brower, Steven Feitelberg, Robert Oakley, Matthew Sitzer, and Ulrika Schumacher for managing patients and Dr. Girma Wolde-Tsadik for statistical consultation.

REFERENCES