

Emergency admissions due to swallowed foreign bodies in adults

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Abstract

AIM: To study a retrospective analysis of patients who presented to the emergency departments (ED) with complaints related to foreign body ingestions.

METHODS: Patients older than 16 years of age who presented to the ED between January 1st and December 31st of 2010 with complaints related to swallowed foreign bodies were identified from electronic health records and patient charts.

RESULTS: A total of 100 patients presented with a complaint of foreign body ingestion during the study period. Overall, an X-ray was performed on 75 patients, and a fiberoptic evaluation was performed on 45 patients. A foreign body was detected in 46 (46%) patients. The diagnostic yield of the X-ray was 27 (36%)

out of 75 patients, while the diagnostic yield of the fiberoptic evaluations was 21 (47%) out of 45 patients. The detected foreign bodies were mostly located in the esophagus (17 out of 46 foreign bodies detected). When the types of ingested foreign bodies were evaluated, 52 (52%) patients reported ingesting food, and 19 (19%) patients reported swallowing pins. An X-ray was performed on 33 patients with accidental food ingestions but yielded a positive result in only two cases. In 12 out of 21 patients with accidental food ingestion who underwent fiberoptic evaluation, the foreign material was detected and removed.

CONCLUSION: Plain radiography is helpful in the localization of radiopaque swollen foreign bodies, while fiberoptic methods are useful as both diagnostic and therapeutic tools, regardless of radiopacity.

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Key words: Foreign body; Ingestion; Gastrointestinal tract; Endoscopy; Emergency

Core tip: The majority of foreign bodies swallowed by patients who present to the emergency departments cannot be detected using standard imaging studies and evaluation. Plain radiography is especially useful in the localization of radiopaque foreign bodies, while fiberoptic methods can be used as both diagnostic and therapeutic tools, regardless of the radiopacity of the foreign body ingested.

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INTRODUCTION

Visits related to gastrointestinal foreign bodies are relatively common causes of admission to emergency departments (ED)^[1,2]. The ingestion or insertion of a foreign body into the gastrointestinal (GI) tract can be a clinically serious condition with associated risks for morbidity and mortality^[2,3]. An estimated 1500 to 1600 patients die in the United States each year as a result of complications related to the ingestion or insertion of foreign bodies into the GI tract^[1,3-5]. Although this problem can be encountered in every age group, almost 80% of cases comprise patients in early childhood (18-48 mo), with a majority of cases resulting from swallowing coins, toys, crayons, or pen caps^[3,4]. The ingestion of foreign bodies is rarely seen in adults, is generally accidental and is commonly seen in the form of food (meat and bones) ingestion. Other risk groups for this type of injury include patients with psychiatric disorders, adults without teeth, prisoners and patients under the influence of substances that obscure judgment^[3,5-7]. The clinical presentation, symptoms and management of foreign bodies depend on their location within the GI tract. Depending on the size and shape, almost 80%-90% of such foreign bodies pass freely from the GI tract without any complication^[4,7,8].

The purpose of the present study was to conduct a retrospective analysis of patients who presented to our ED with complaints related to foreign body ingestions.

MATERIALS AND METHODS

Patients older than 16 years of age who presented to the Emergency Department between January 1st and December 31st of 2010 with complaints related to swallowed foreign bodies were analyzed retrospectively using the data obtained from electronic health records and patient charts. The patients' present complaints, demographic characteristics, previous medical history and medication use, physical exam findings, diagnostic studies performed, type and location of the foreign body, treatment provided, need for conservative or invasive/surgical treatment, complication rates, radiological findings and rate of survival/mortality were all recorded.

RESULTS

During the study period, we identified a total of 100 patients (42 male, 58 female; mean age 38 years, range 16-88 years) who were admitted with a complaint of foreign body ingestion. Of those, 65 (65%) localized their complaints to the pharynx, while 35 (35%) told us that they had ingested the foreign bodies. Among the list of complaints, 53 (53%) patients had difficulty swallowing; 33 (33%) had pain in the throat; 6 (6%) had difficulty breathing; 5 (5%) had abdominal pain; 4 (4%) had vomiting; 4 (4%) had bleeding from the mouth; 2 (2%) had a foreign body sensation in the throat; 2 (2%) had coughing; and 1 (1%) had chest pain. The incident was self-reported as

accidental in all patients. When facilitating factors were considered, 3 (3%) patients were undergoing dental interventions, and another 3 (3%) patients had dental plates. None of the study patients had any established diagnosis of psychiatric disease or history of substance abuse, alcohol or sedative use. Physical examination revealed oropharyngeal foreign bodies in 7 patients, epigastric tenderness in 1 patient, and rhonchus in 1 patient.

The diagnostic approaches to our patients are summarized in Figure 1. A foreign body was detected in 46 (46%) patients. The diagnostic yield of X-rays was 27 (36%) among the 75 patients evaluated by lateral neck, chest or abdominal X-ray. The foreign bodies were detected for 10 out of 51 patients using the chest X-ray, for 14 out of 29 patients using the abdominal X-ray and for 3 out of 52 patients using the lateral neck X-ray. The diagnostic yield was 21 (47%) out of 45 for all patients undergoing fiberoptic evaluations (Figure 1). The detected foreign bodies were mostly located in the esophagus (17 out of 46 foreign bodies detected) (Table 1). When the types of ingested foreign bodies were evaluated, 52 (52%) patients reported ingesting food, and 19 (19%) patients reported swallowing pins (Figure 2, Table 2). With respect to the types of ingested food, 20 were fish bones, 9 were bone fragments (Figure 3), and 23 were unknown food parts.

In 53 (53%) of the patients, a conservative approach for management was considered. Nineteen (19%) patients were followed with serial radiological examinations. In 21 patients, of whom 17 were undergoing upper GI endoscopy, 2 were undergoing laryngoscopy and 2 were undergoing bronchoscopy, the foreign body was removed by fiberoptic means. In total, 19 (19%) of the study patients were admitted for further evaluation and treatment. Out of all the patients, the clinical course was complicated by aspiration (food material) in two patients, by GI bleed (pin) in 1 patient and by mediastinitis (food material) secondary to perforation in 1 patient.

DISCUSSION

The medical history obtained from the patient is highly critical in the diagnosis of swollen GI foreign bodies. Therefore, the planning of the diagnostic work-up and the extent and urgency of a possible intervention are decided according to the information provided by the patient regarding the type of foreign body ingested, together with the clinical complaints and physical examination^[6,9-12]. Most GI foreign-body ingestions occur in pediatric patients aged between 6 mo and 6 years^[5,7,9]. GI foreign body exposure tends to be accidental in adults, with food particles and bones constituting the majority of the foreign bodies^[4,13]. The rest of the cases occur in the setting of facilitating factors, such as adults without teeth or with dental plates, prisoners and psychiatric patients^[4,6,9,14,15]. Our results were also similar among all of the patients evaluated in the study reporting accidental intake. Patients who suffer foreign body ingestion can present with a wide range of symptoms, which can vary

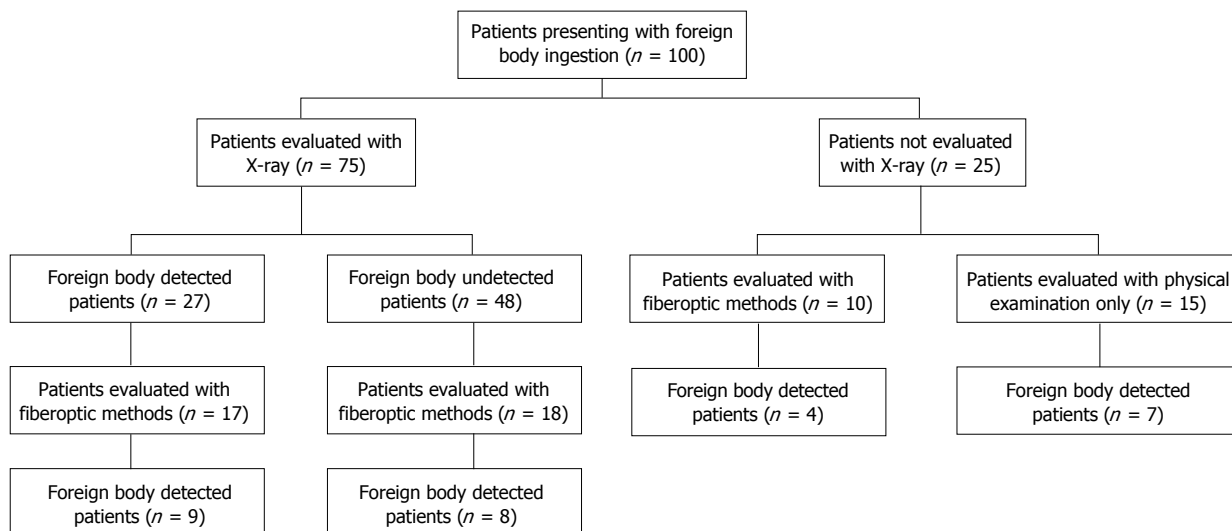


Figure 1 Diagnostic approach to patients presenting with foreign body ingestions.

Table 1 Location of the foreign bodies (n = 100)	
Foreign body location	n (%)
Esophagus	17 (17)
Oropharynx	8 (8)
Small intestine	6 (6)
Stomach	6 (3)
Trachea	2 (2)
Larynx	3 (3)
Colon	3 (3)
Undetermined location	1 (1)
Undetected	54 (54)

based on the physical characteristics and the content that is absorbed in the GI tract. Diagnosis is based on the patient’s history and complaints, which typically include the sudden onset of difficulty of swallowing during eating, chest pain, odynophagia or insufficiency in tolerating secretions. However, symptoms range from mild to life-threatening, including shortness of breath, abdominal pain, vomiting, hematemesis, foreign body sensation, coughing and chest pain^[3,5,9,11,16,17]. In agreement with the literature, the majority of patients in our cohort presented with difficulty in swallowing and foreign body sensations in the throat.

Different types of foreign bodies are observed in the GI tract based on the age group. During childhood, swallowed coins, small toys, crayons or batteries are observed, whereas during adulthood, food, bones and dental-related foreign bodies are more common^[4,6,7,9,13,16,17]. The types of foreign bodies may also differ by country. The high number of pin ingestions in our study group is thought to be related to the regional dress code, which results in women holding pins between their lips before attaching their headscarves. While certain conditions, such as parental attitudes and dietary habits, can provide clues for the types of foreign bodies that are ingested, prevention strategies are also dependent on various cultural, social,

religious and economic factors^[7,11,17-19].

The presentation, clinical findings, and management of foreign bodies are distinct and based upon the anatomical region where the foreign body is located^[4,9,11,17]. Determining the type and location of the foreign body in the ED changes the treatment approach^[5,9,16]. In our study, most of the foreign bodies were detected in the upper GI tract. The majority of the radiopaque foreign bodies in the GI tract can be detected using radiography. This simple modality provides crucial information, such as the number, size, location and direction of the foreign body, as well as the presence of sharp edges^[2,3,6,8]. However, the presence of fish bones, chicken bones, glass, wood and thin metals cannot be ruled out by plain radiographies^[2,3,6,11,13,20]. Neck, chest and abdominal radiographies are able to show perforations as well as metal objects and bones^[6,13]. In our study, we detected a foreign body with plain radiography in 27 (36%) out of 75 patients evaluated by X-rays; all of these foreign bodies were radiopaque. All of the 19 patients with radiopaque foreign bodies in whom an emergency intervention was not planned were admitted for serial radiographic evaluations to determine the passage of the foreign body. Serial radiographic studies can be used to determine the passage of the foreign body and the complications resulting from it. If perforation is suspected based on the clinical or radiological findings, neck, chest or abdominal computed tomography is then indicated^[13]. Computed tomography (CT) is especially useful when radiolucent materials cannot be detected with plain X-rays. A three-dimensional reconstruction with CT also increases the sensitivity of the detection modality^[2,6,21-23]. CT can also be useful in determining, treatment options and complications.

Foreign bodies in the GI tract are typically treated conservatively, based on the type of foreign body and the patient’s clinical condition. Between 80% and 90% of foreign bodies pass through the GI tract freely, while 10% to 20% require an endoscopic intervention, and 1%



Figure 2 Plain abdominal X-ray showing a pin (white arrow) in the bowel in an adult. The pin passed spontaneously.



Figure 3 Lateral neck X-ray showing a bone fragment (white arrow). The fragment was removed by fiberoptic means.

Table 2 Types of foreign bodies swallowed

	Foreign body type	Total detected foreign bodies	Patients underwent X-ray	Foreign bodies detected with X-ray	Patients who underwent fiberoptic evaluation	Foreign bodies detected with endoscopy
	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>
Food	52	20	33	2	21	12
Pin	19	17	19	17	10	6
Toothpick	5	1	3	-	4	1
Dental instrument	5	2	5	2	2	-
Tooth filling	4	2	4	2	2	1
Nail	2	2	2	2	2	1
Water gel beads (pearl shape crystal soil)	1	-	1	-	-	-
Gelatin paper	1	-	-	-	1	-
Pen cap	1	-	-	-	1	-
Earring	1	-	1	-	1	-
Coin	1	1	1	1	-	-
Medication	2	-	1	-	-	-
Chewing gum	1	1	1	1	1	-
Unknown	5	-	4	-	-	-
Total	100	46	75	27	45	21

require surgery^[4,6-9,11,13,17,24,25]. Physicians should determine if and when an intervention is needed. The patient management strategies depend on a patient’s age and clinical condition, the type and size of the foreign body, the presence of sharp edges, the anatomical location and the endoscopic capability of the treating unit^[2,3,5]. In general, foreign bodies larger than 2.5 cm in diameter cannot pass the pylorus, while objects longer than 6 cm cannot pass the duodenal curve. Therefore, these objects require endoscopic removal^[2,6,19,26]. Endoscopic intervention is also indicated if the patient’s condition is not stable or if the foreign body is impacted or presents risks of further damage to the patient^[13,27]. An emergent endoscopic removal should be performed in patients with esophageal obstruction (*e.g.*, cannot swallow secretions), those with disc batteries in the esophagus and those who have swallowed pointed objects^[6,13]. However, endoscopic removal is contraindicated if the foreign body is above the upper esophageal sphincter or if there is clinical or radiological evidence of perforation. Objects containing illegal drugs must be removed with endoscopy, but this technique should be avoided in cases where ruptured cocaine pack-

ages are present in the GI tract^[6,13]. Objects located proximal to the upper esophageal sphincters are suggested to be removed by ear-nose-throat specialists^[6,13]. Emergent endoscopy should be performed to remove magnets if they are within the reach of the technique^[6]. Monitoring of the spontaneous passage of coins in asymptomatic patients is recommended. If there is no spontaneous passage, then removal within 24 h of ingestion is recommended^[6,9]. We conducted conservative monitoring in slightly over half of our patients (53 out of 100). The diagnostic yield was 21 (47%) out of 45 for all patients undergoing fiberoptic evaluations. Endoscopic treatment options for meat or other food impactions included food extraction and advancement of the bolus into the stomach^[6,9]. In our study, an X-ray was performed on 33 patients with accidental food ingestions but yielded a positive result in only two cases. By contrast, among 21 patients with accidental food ingestion who underwent fiberoptic evaluation, 12 patients were found to have a foreign material, and the material was removed. Food ingestion, a subjective feeling of foreign body sensation, and other properties of foreign bodies may have resulted

in the poor yield of standard imaging studies and endoscopic and physical examinations^[11,27].

An alternative radiological tool that was not systematically assessed in our study was ultrasonography, which is uncommonly used to diagnose GI foreign bodies in adults^[28]. However, there are reports in the literature where ultrasonography proves to be useful in the detection of abdominal foreign bodies^[9,29]. However, abdominal ultrasonography can be used as an initial imaging modality in the diagnosis of GI foreign bodies in pediatric patients^[30].

Conditions such as acute abdomen due to intestinal perforations are seen in nearly 1% of patients who have ingested foreign bodies^[8,31]. This condition can lead to severe complications and even death^[32]. The most common complication of foreign body ingestion is perforation^[33]; the ingestion of a sharp and pointed object is more likely to cause perforations^[9,33,34]. Approximately 30%-35% of such objects can penetrate the GI tract, requiring endoscopic management^[35]. In the presence of complications or in the case of unsuccessful endoscopic interventions, emergency surgery is preferred^[35,36]. The majority of foreign bodies pass through the GI tract freely, without any complication, and only a small percentage of these cases require intervention^[4,9].

In conclusion, a majority of the swallowed foreign bodies in patients presenting to the ED cannot be detected using standard imaging studies and evaluation. Plain radiography is especially useful in the localization of radiopaque foreign bodies, while fiberoptic methods can be used both as diagnostic and therapeutic tools, regardless of the radiopacity of the foreign body ingested. The goal of ED management is to refer patients with clinical significance to the appropriate departments for further evaluation and treatment. It is therefore important to evaluate the type and location of the foreign body and to identify complications that might develop as a result of this entity.

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COMMENTS

Background

Ingestions or insertions of foreign bodies are rarely seen in adults, are generally accidental and are commonly seen in the form of food ingestion (such as meat and bones). Nonetheless, foreign body ingestions into the gastrointestinal tract can lead to clinically serious conditions with significant morbidity and mortality. Approximately 80%-90% of the foreign bodies pass through the gastrointestinal tract freely, while 10%-20% require an endoscopic intervention, and 1% require surgery.

Research frontiers

The majority of swallowed foreign bodies in patients presenting to emergency departments cannot be detected using standard imaging tools. The research hotspot discussed here is that fiberoptic methods were implemented in both the diagnosis and treatment of gastrointestinal foreign bodies.

Innovations and breakthroughs

The most common approach for the detection of ingested foreign bodies in the gastrointestinal tract is physical examination combined with radiological studies. While radiological examinations are especially helpful in the detection of radiopaque foreign bodies, these studies are unyielding in a significant proportion of patients, depending on the timing of presentation and the nature of the ingested foreign body. Early evaluation with fiberoptic methods helps not only in the diagnosis and localization of the foreign body but also in its removal.

Applications

Dietary habits and various cultural factors can provide clues for the types of foreign bodies likely to be ingested. Fiberoptic methods can be used to diagnose and treat accidental foreign body ingestions in an emergency department setting.

Peer review

The present study is a retrospective analysis of 100 patients with complaints related to foreign body ingestions. The data suggest that plain radiography is especially useful in the localization of radiopaque foreign bodies, while fiberoptic methods can be used as both diagnostic and therapeutic tools, regardless of the radiopacity of the foreign body ingested. This study highlights interesting points regarding the clinical treatment of complaints related to foreign body ingestions.

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