Eastern Journal of Medicine 15 (2010) 21-25

Original Article

Management of esophageal foreign bodies: A report on 26 patients and literature review

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Abstract. The purpose of this study is to present our experience of the removal of esophageal foreign bodies in children and adults using rigid esophagoscope under general anesthesia. A total of 26 patients with a history of ingested foreign body in the esophagus were admitted and treated in our hospital between July 2005 and August 2007, of whom 20 children and 6 adults. There were 14 male and 12 female patients between 6 months and 70 years of age. All patients except one had a clear history and symptoms of foreign body ingestion. The main symptoms were difficulty in swallowing, acute onset of pain, dysphagia, choking and excessive salivation. A lateral neck plain radiograph and a posteroanterior view that included the oropharynx, neck, chest, and abdomen were made routinely before esophagoscopic examination. Foreign bodies were most commonly identified in the cervical esophagus, usually immediately below the cricopharyngeus (16 children). Remaining foreign bodies were as follows: 6 (4 children, 2 adults) foreign bodies were lodged in the midesophagus and 4 (all adults) in the distal esophagus. All foreign bodies were removed under general anesthesia. A rigid esophagoscope was used to remove them. Coins were the most common foreign body removed from the esophagus, occurring in 14 patients, all children. Other foreign bodies were bones mixed with pieces of meat, button battery, staples, safety pins, chicken bones, and fish bone. There were no deaths, no perforations, no cases of mediastinitis, and actually no complications secondary to insertion of the esophagoscope and removal of the foreign body. Rigid esophagoscopy remains as safe method of esophageal foreign body removal. The timely diagnosis and endoscopic removal should be performed to prevent serious life-threatening complications.

Key words: Esophagoscopy, foreign body, impaction

1. Introduction

Patients with esophageal foreign bodies require prompt diagnosis and therapy. The first tasks are to determine the type of object, the time since ingestion, the location of the object, and the likelihood of associated complications (1). The best method of removal of an esophageal foreign body remains controversial. Over the past decade, the flexible fiberoptic esophagoscope has gained great popularity, mainly owing to its safety. However, the rigid endoscope is equally safe and effective in the hands of an experienced cardiothoracic surgeon (2). Its advantages include the ability to perform the procedure, with a high degree of success, in a controlled environment (3).

The most commonly used method in our hospital for removal of esophageal foreign bodies is rigid esophagoscopy. Its wide lumen is of great help in manipulating and extracting the most foreign bodies and removing it, in one setting and without withdrawing the endoscope (2,4). The purpose of this study is to present our experience of the removal of esophageal foreign bodies in children and adults using rigid esophagoscope under general anesthesia, with a review of the pertinent literature.

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2. Materials and methods

A total of 26 patients with a history of ingested foreign body in the esophagus were admitted and treated in our hospital between July 2005 and August 2007, of whom 20 were children and 6 were adults. There were 14 male and 12 female patients aged 6 months to 70 years. The mean age

of children was 3.4 years, ranging from 6 months to 5 years. The adult patients ranged from 50 to 70 years. All patients except one had a clear history and symptoms of foreign body ingestion. The main symptoms were difficulty in swallowing, acute onset of pain, dysphagia, choking and excessive salivation (drooling). History of ingestion with vomiting, vague sensation of foreign body and odynophagia were the main diagnostic criteria.

A lateral neck plain radiograph and a posteroanterior view that included the oropharynx, neck, chest, and abdomen were made routinely before esophagoscopic examination. For patients with ingestion histories and who had negative radiological finding, computed tomography investigations were performed.

3. Results

All patients were managed on the cardiovascular surgery service, including children, who were boarded on the pediatric service, under the responsibility of cardiothoracic surgeon. The duration from the foreign body's ingestion to the time of endoscopic removal was as follows: less than 6 hours: 8 patients, 6-10 hours: 15 patients, 1-3 days: 2 patients and in one patient the duration of impaction was unknown.

Foreign bodies were most commonly identified in the cervical esophagus, usually immediately below the cricopharyngeus (16 children). Remaining foreign bodies were as follows: 6 (4 children, 2 adults) foreign bodies were lodged in the midesophagus and 4 (all adults) in the distal esophagus.

All impactions were accidental and endoscopic procedures were performed in the operating room. The extraction of foreign bodies was undertaken after a fasting period of at least 5 hours, except 8 patients who underwent endoscopic procedure immediately following admission. All foreign bodies were removed under general anesthesia. A rigid esophagoscope (Karl Storz, Tuttlingen, Germany) was used to remove them. If the procedure lasted more than 10 minutes, methyl prednisolon was given to prevent possible soft-tissue edema. In one patient with severe respiratory symptoms, bronchoscopy was also performed and mucus plugs were aspirated.

Search for preexisting changes in the esophagus, including strictures, failed to disclose any. Coins were the most common foreign body removed from the esophagus, occurring in 14 patients, all children. Other objects removed were bones mixed with pieces of meat, button battery, staple (Figure 1), safety pins, chicken bones, and fish bone (Table 1).

Fig. 1. Chest radiograph showing staples impacted at upper esophagus opposite 6th cervical vertebra.

Table 1. Types of foreign bodies found

Foreign body	Children	Adult
Coins	14	
Safety pins	3	
Bone/meat combination		3
Stapples	2	
Chicken bone		2
Fish bone		1
Button battery	1	

15 patients were discharged on the day of the procedure, after 6 to 8 hours of observation. 10 patients were kept for observation for 24 hours. The remaining one was a 70 years old woman and discharged after 7 days due to mucosal bleeding and erosion. This patient was unaware of having swallowed the bone with meat and for the first 3 days did not seek medical attention. At that time, because of pain and inability to swallow any food, she was referred to our hospital. Foreign body was successfully extracted at rigid esophagoscopy. There were no deaths, no perforations, no cases of mediastinitis, and actually no complications secondary to insertion of the esophagoscope and removal of the foreign body.

Follow-up is available in the majority of our patients. Within a period of 6 months to 2.5 years. There were no complications.

4. Discussion

Impaction of a foreign body in the esophagus causes edema of the mucosa, and the esophageal wall becomes weakened. Additionally, esophageal peristaltic activity may be inadequate to prevent retention of swallowed objects. Retention leads to perforation, which is only a matter of time. Therefore, all foreign bodies retained in the esophagus should be removed as soon as diagnosed (2,5).

Many alternative methods for removal of foreign bodies have been described in the literature, such as dislodgement by a Foley catheter, advancement with bougie, papain or carbonated fluid treatment, glucagon therapy, balloon extraction during fluoroscopy, removal-using magnet (6). These are all blind methods of extraction providing no control of the foreign body as it is removed. They can only be used for blunt foreign bodies of short duration and with no preexisting esophageal disease. Their major disadvantage is that if pathology is present it cannot be assessed. In addition, any failure of the above methods still requires rigid esophagoscopy (6).

Besides history and physical examination, radiological examination is a very important diagnostic tool to identify the foreign body and its location (6). Postero-anterior, lateral cervical and chest radiographs are basic radiological methods of foreign body detection. For non-opaque objects, indirect findings such as larynx and tracheal deviation, as well as computerized tomography, can aid in the diagnosis (7). Radiolucent objects will require direct visualization or contrast radiographs for location specification (8).

Sharp esophageal foreign bodies, such as needles, pins, and hairclips can perforate the esophagus and lead to pneumomediastinum, and must also be removed urgently. Also, smooth foreign bodies such as coins may become sagitally oriented and can encroach on the trachea, causing biphasic stridor and requiring urgent removal (8). Therefore, patients with retained esophageal coins, whether symptomatic or asymptomatic, are at potential risk of complications. Patients who are symptomatic often complain of pain, difficulty breathing or difficulty swallowing. These patients are often agitated and should undergo immediate removal (9).

Esophageal button batteries, although similar in shape and size to coins, require emergent endoscopic removal in all cases. An impacted button battery may cause mucosal injury in as little as 4 hours. Injury can extend transmurally within 6 hours, creating the potential for perforation and possible fatal outcome (10). In patient with esophageal button battery impaction, emergent endoscopic removal should be performed to prevent complications, as was done in our one patient.

It is found that the risk of perforation to be higher in children who had swallowed coins more than 3 days prior to admission (11). Impacted esophageal foreign bodies can easily cause mucosal ulceration, esophageal stricture, mediastinitis, lung abscess and can also result in various fatal complications such as aorticoesophageal fistula (6-11).

The longer the foreign body remains in the esophagus, the greater the incidence of respiratory symptoms. Cough, fever, and congestion are often interpreted as upper respiratory infections, and stridor mimics croup. An esophageal foreign body can cause these respiratory symptoms by three mechanisms. Cough or stridor occurring soon after ingestion of an esophageal foreign body probably results from direct pressure on the trachea by the foreign body itself or by secondary esophageal dilatation (12).

In elderly patients inadequate mastication may be a sufficient explanation for impaction of an abnormally large bolus of food. Also, wearing artificial dentures, especially the full upper denture, can obliterate tactile sensation in the roof of the mouth so that bones and other sharp objects are not detected until they have entered oropharynx (13). We had one elderly patient who was unaware of foreign body impaction probably due to upper artificial denture.

Esophageal perforation is a rare condition that has a mortality rate of about 22%. The high mortality in this condition results from the lack of clinical suspicion and the late initiation of treatment (14). Although perforation of the esophagus is more likely due to prolonged impaction of the foreign body, it can occur immediately after a sharp object has entered the esophagus.This often leads to periesophagitis and mediastinitis if not only immediately treated (15). In this study, we have not encountered any complication including death which may be partly associated with relatively short time of endoscopic intervention.

The site of impaction of foreign bodies differs with age. In children, the foreign body is usually impacted in the upper esophagus at the level of

the cricopharyngeus muscle, which is the narrowest part of the esophagus. This is followed by the mid esophagus where it is crossed by the aortic arch and left bronchus. In adults, the foreign body is usually impacted in the lower third of the esophagus (4,13). as seen in this series.

Endoscopy has been the mainstay of management of esophageal foreign bodies. Additionally rigid esophagoscopy can assist to remove by causing esophageal dilatation (11). Endoscopy does pose its own risks of complications, including pharyngeal bleeding, bronchospasm, accidental extubation, stridor, hypoxia, esophageal perforation and mediastinitis (9). Therefore, endoscopist should be skilled. Additionally, endotracheal anesthesia should be used to provide an adequate airway and to minimize the incidence of aspiration during the procedure. Muscle relaxation induced by anesthesia may also assist to remove the object.

A barium or contrast study should never be performed in the case of radiopaque objects to determine the location of the foreign body. Barium swallow involves a risk of aspiration and can impede a subsequent endoscopy (16). We have not used a barium or contrast study to avoid aspiration.

Different endoscopic techniques were described (push into the stomach, push-plus-fragmentation, pull with retrieval forceps, pull with Dormia basket) (16). We have used alligator-jaw forceps or biopsy forceps without a protective hood or sheat. Sharp or pointed objects were removed through endoscope to avoid complications in this series.

Both rigid and fiberoptic esophagoscopes have similar success and morbidity rates (2). Flexible endoscope can be cost effective because it is performed on an outpatient basis, without general anesthesia, but, when sharp or penetrating foreign bodies are present, rigid esophagoscopy is required (6). Rigid endoscopy has the larger lumen and allows removal of the most objects under direct vision without withdrawn the endoscope (6). Weisberg et al. (2) and Al-Qudah et al. (4) have also recommended the use of the rigid endoscope as the instrument of choice for extracting foreign bodies from the esophagus. Therefore, we have preferred rigid esophagoscope for removal of foreign bodies.

In this study, the most common site of foreign body impaction was the level of cricopharyngeal muscle (61.5 %) and the most common impacted foreign body was coin (54%). These results are similar the experience of other authors (17). Our results are also similar to the findings of Al-Qudah et al. (4) regarding site of foreign body impaction and the nature of the esophageal foreign body.

Surgical treatment must be performed in cases of irretrievable foreign body or esophageal rupture. The surgical approaches may be cervicotomy, thoracotomy or gastrostomy according to the location of the foreign body (6). The esophageal perforation should be sutured in two layers. Although recently encouraging results were reported about the sealing of esophageal perforations by insertion of endoluminal prosthesis (18). surgical repair of esophageal perforations is still considered the treatment of choice.

According to McGuirt (19). the alternative methods generally have been advocated by physicians who were not specifically trained in foreign body endoscopy (4). Also, removal of foreign bodies by non-endoscopists carries the risk of serious complications unless certain safeguards are taken. These include trained personnel, use of fluoroscopy, a cooperative patient with a single-smooth, radiopaque foreign body lodged in the esophagus and a barium esophagogram with negative results for total obstruction and underlying esophageal disease (19). Therefore, rigid esophagoscopy is supported by many authors since it has the advantage of direct inspection of the esophageal lumen, evaluation of the degree of mucosal injury inflicted by the foreign body and search for multiple foreign bodies (4).

Although the overall incidence of gastrointestinal perforation due to foreign body ingestion is less than 1%, sharp and pointed objects result in perforation rates of up to 35% (20). When removing sharp or pointed foreign bodies, Chevalier Jackson's axiom should be adhered to: Advancing objects puncture, trailing object do not (20).

The endoscopic protector hood reportedly permits easy and safe removal of sharp or pointed foreign bodies (21). However, the foreign body must be moved to the stomach to flip the protector's hood back to its original shape for withdrawal through the lower esophageal sphincter (21). In this series, endoscopic protector has not been used.

5. Conclusion

Rigid esophagoscopy remains as an easy and safe method for esophageal foreign body removal

in trained hands. In symptomatic patients, timely diagnosis and endoscopic removal should be performed to prevent serious life-threatening complications, as was done in this series. Based on our experience and that of other authors (2). cardiothoracic surgeons in training should be taught rigid endoscopy.

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