Journal of Surgery
Alyaseen M, et al. J Surg 7: 1506
www.doi.org/10.29011/2575-9760.001506
www.gavinpublishers.com
Review Article

# Proposed Management Protocol for Ingested Oesophageal Foreign Bodies - A Case Series And Review of Literature

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**Citation:** Al Yaseen M, El-Matbouly MA, Sallam D, Massad E, Suliman AM, et al. (2022) Proposed Management Protocol for Ingested Oesophageal Foreign Bodies - A Case Series And Review of Literature. J Surg 7: 1506 DOI: 10.29011/2575-9760.001506

**Received Date:** 17 May, 2022; **Accepted Date:** 23 May, 2022; **Published Date:** 26 May, 2022

## Abstract

Foreign body impaction in the esophagus is an important emergency that carries significant morbidity and potential mortality. Essential steps in the management include: immediate assessment of the airway, assessment of the urgency of removal, radiological evaluation to localize the object, endoscopic or surgical retrieval, and subsequent monitoring for complications. We present a retrospective analysis of 17 patients with esophageal impaction of foreign body in a single-institution. Dysphagia was the most common presentation occurring in 13 out of the 17 patients (76.4%), followed by throat and neck pain. Rigid esophagoscopy was used in 6 cases (35%) and the rest of the foreign bodies were retrieved using the flexible endoscopy. Overall, flexible endoscopy is an adequate technique for retrieval of impacted foreign objects in the esophagus. However; upfront rigid esophagoscope should be considered from the start to avoid failed and repeated attempts using flexible scope. Predictors for using rigid esophagoscope include: days the object has been in the esophagus, size of the foreign body, sharp objects, and evidence of perforation in CT scan like gas bubbles and esophageal wall thickening.

## Introduction

Oesophageal foreign body ingestion and impaction is not uncommon and is a true emergency with the potential for serious complications and thus poses a challenge for treatment providers. This is more common in children due to accidental ingestion of foreign material such as coins or button batteries. Foreign body ingestion can also commonly occur in specific groups of adults namely the elderly with cognitive impairment, dysphagia due to stroke, intoxicated individuals as well as intentional ingestion in those with psychiatric illnesses and prisoners. [1,2] Foreign bodies that are commonly ingested are dental prostheses and meat or fish bones, however, the most common cause of foreign body obstruction in adults has been found to be due to meat bolus ingestion in almost 60% of cases in a previously diseased oesophagus (commonly due to distal oesophageal mucosal ring, peptic or malignant oesophageal stricture, or eosinophilic esophagitis) [2,3,4]. Impaction can occur at any site within the length of the oesophagus however in the absence of the previously mentioned pathologies, obstruction commonly occurs at sites of anatomic and physiologic narrowing; upper oesophageal sphincter, the transition between striated and smooth muscle in the cervical oesophagus, and the aortic arch, with the cervical oesophagus accounting for nearly 60% of all sites of impaction [1,5,6]. It is noteworthy to mention that most foreign bodies pass spontaneously (up to 90%) without incident [5].

Complications occur due to perforation of the oesophageal wall commonly by penetration of sharp edges of the ingested object or due to prolonged mucosal contact resulting in ischemia and

eventually breach of the wall [2,4] Complications include infectious sequelae such as mediastinitis and/or structural damage to the trachea resulting in trachea-oesophageal fistulas, injury to the aorta with subsequent fatal consequences and even rarely myocardial perforation [4,7,8]. Alert adults and older children may be able to give a reliable history of FB ingestion along with symptoms which commonly include acute dysphagia with difficulty in swallowing saliva [1]. Other common clinical features include but are not limited to odynophagia, choking, vomiting, chest pain mimicking cardiac pathologies, fever, subcutaneous emphysema in upper oesophageal perforations [1,2,4,7]. Initial clinical evaluation of the patient can guide us to selecting relevant diagnostic modalities. In most cases, patients presenting to the emergency department with the above symptoms would have a plain radiograph of the chest which can give us reliable information with regards to the aetiology as well as presence of complications. The number, location and size of the object can be gauged If they are radio-opaque and differentiating between a tracheal and oesophageal FB can be done by performing a lateral chest radiograph [1,2]. In spite of the detail provided by plain radiographs they have a high false negative rate of 47% rising up to nearly 85% in small or radio-opaque objects such as bones [1,2].

It is now recommended to perform routine Computed Tomography (CT) scans in patients with FB ingestion. Sensitivity and specificity have been shown to be as high as 100% and have the added advantage of providing detailed evidence of complications of FB impaction described above [1]. Endoscopic management of impacted FBs are now regarded as the first line therapeutic option especially in patients presenting early (within 24 hours) given its advantages of minimal invasiveness and faster patient recovery in comparison to a surgical approach which is now restricted to patients with glaring signs of perforation with sepsis and instability presenting late [1, 2,6,9,10]. Endoscopy can be performed with either flexible or rigid scopes each one having its own advantage. Flexible Endoscopy (FE) can be performed easily under local anaesthesia or sedation and allows visualisation of the entire upper gastro-intestinal tract in addition to allowing therapeutic procedures to be performed, however its use in dealing with sharp FB impaction has not shown to be very effective [1,2,6] On the other hand Rigid Endoscopy (RE) requires general anaesthesia with airway protection but allows better manipulation of foreign bodies due to its wider lumen, however its use is restricted to the upper oesophagus and the skills for performing this procedure are not widely available [6]. In this review we describe 10 cases of oesophageal FB impaction managed at our hospital and will discuss the role of endoscopy (FE and RE) in the early management course.

## Results

This is a retrospective study of the foreign body cases managed in the main tertiary hospital in Doha- Qatar (Hamad medical Corporation). The study included 17 patients (15 males and 2 females) with an average age of 42.64± 13.78 years. Dysphagia was the most common presentation occurring in 13 out of the 17 patients (76.4%), followed by throat and neck pain that occurred in 12 out of the 17 patients (70.5%), 2 patients (11/7%) presented with central chest pain and were investigated for acute coronary syndrome, 2 patients (11.7%) had left sided neck pain, and one patient (5.8%) presented with hemodynamic instability for which he was shifted to intensive care unit and intubated. On average most patients had the foreign body impacted for 20-24 hours and the longest period was 6 days for a patient who swallowed his denture. two out of the 17 patients had surgical emphysema evident by examination and on chest X-rays. The foreign bodies retrieved were; Fishbone (6 patients), meat bone (3 patients), chicken bone (2 patients), denture teeth (2 patients), 1 patient had metallic pin, 1 patient had garlic clove and 1 patient had drug packets (80 capsules). Figure 3 shows multiple foreign bodies retrieved from the esophagus in our study population. All patients had pre-operative chest X-ray and CT neck and thorax with contrast to assess emphysema, complications, level of impaction, and shape of foreign body. Figure 1 shows multiple coronal and cross sectional cuts of CT as well as 3D reconstruction of a CT for a patient who ingested circular meat bone. 16 of the 17 patients underwent successful upper endoscopy and retrieval and one patient had diagnostic laparoscopy that was converted to laparotomy. From the cases retrieved endoscopically; rigid esophagoscopy was used in 6 cases (35%) and the rest of the foreign bodies were retrieved using the flexible endoscopy. Figure 2 shows multiple endoscopic images of impacted foreign bodies (A: shows impacted fish bone, B & C are post retrieval of other impacted objects showing the ulcerations in the wall of the esophagus). The average length of hospital stay was 3.7 ±2.98 days. All patients had good outcome upon follow up with no complications. Table 1 includes detailed description of the study population.

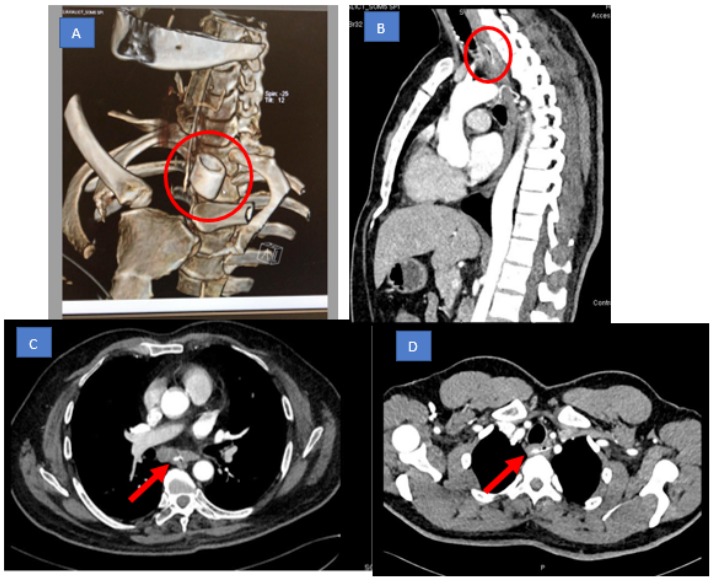


**Figure 1: A:** 3D reconstruction showing circular bone at the level of T4 (meat bone) surrounded by red circle. **B:** Coronal section showing longitudinal foreign body with gas around it (red circle). **C:** cross section CT showing foreign body radiopaque with gas bubbles around it (Red arrow). **D:** Cross section CT scan showing radiopaque longitudinal foreign body lying horizontally with bubbles around it (red arrow).

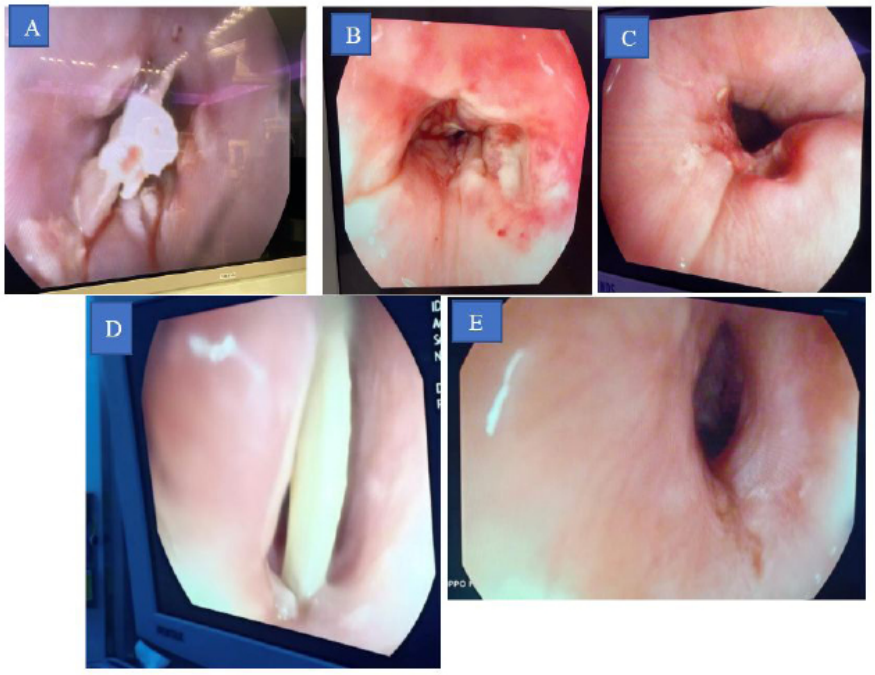


**Figure 2:** endoscopic images post retrieval of foreign bodies. **A:** fishbone stuck at 27 cm from incisor prior to removal. **B:** post removal of the fishbone with ulcer and over the scope clip was applied. **C:** another scope image showing the deep ulcer with suspicious. Perforation due presence of emphysema and managed with stent placement caused by the fishbone. **D:** endoscopy showing the impacted fishbone. E: images post retrieval of the fishbone, showing the ulcer/laceration due to the impacted fishbone.


**Figure 3:** multiple examples of the foreign bodies retrieved in the study.

| Age/ sex | Foreign body | Clinical presentation | Surgical Emphysema (Y/N) | Imaging used for diagnosis | Level of Foreign body | Retrieval: Flexible/ Rigid/Surgery | LOS | outcome / Follow up (Days) |
|---|---|---|---|---|---|---|---|---|
| 31/M | Sharp metallic pin | Sudden onset of severe chest pain, radiating to the back and decreased consciousness | Yes | CT Angiogram - FB with esophageal perforation | T6-T7 | Flexible+ surgery<br>On table endoscopy+ clipping of suspected site of erosion with clip+ thoracoscopy and placement of chest tube followed by left anterior lateral thoracotomy with esophageal repair | 12 | Recovered/ 120 |
| 47/M | Chicken bone | Throat pain | No | CT neck - FB in pharyngoesophageal junction | C7-T1 | Rigid | 3 | Recovered/ 40 |
| 68/F | Fish bone | Dysphagia, neck and throat pain | No | CT Neck- FB in cervical part of esophagus measuring 3.0cm in length with lateral end piercing the lateral wall of esophagus | C7-T1 | Flexible | 3 | Recovered/ 40 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 37/F | Fish bone | Dysphagia, neck and throat pain | No | CT neck | C5-T1 | Flexible | 2 | Recovered/ 60 |
| 40/M | Denture teeth | Dysphagia and throat pain | No | CT thorax- Impacted swallowed FB at upper thoracic esophagus with significant prevertebral soft tissue thickening, stranding, multiple air locules and of small amount of contrast extravasation and the esophagus cannot be delineated separately with suspected esophageal perforation. | T5-T7 | Rigid | 4 | Recovered/ 50 |
| 26/M | Cocaine capsules | Abdominal pain and vomiting | No | CT Abdomen: well defined tablets(packers) in the GI tract. The first one seen in the distal oesophagus up to duodenum | T10-T12 | Surgery | 8 | Recovered/ 40 |
| 60/M | Denture teeth | Throat pain, retching, dysphagia | No | CT neck | T1-T2 | Rigid | 1 | Recovered/ 60 |
| 23/M | Meat bone | Neck pain and dysphagia | No | CT neck | C6-C7 | Laryngoscope/ Magill forceps | 5 | Recovered/ 90 |
| 30/M | Meat bone | Dysphagia | No | CT neck | T1 | Rigid | 7 | Recovered/ 90 |
| 53/M | Chicken bone | Dysphagia and neck pain | No | CT neck | T1 | Rigid | 2 | Recovered/ 60 |
| 33/M | Garlic clove | Dysphagia and throat pain | No | CT neck | T2 | Rigid | 1 | Recovered/ 90 |
| 45/M | Fishbone | Dysphagia | No | CT neck | T1 | Flexible | 2 | Recovered/ 60 |
| 42/M | Meat bone (circular) | Dysphagia and drooling | No | CT neck | T2-T3 | Rigid | 2 | Recovered/ 80 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 39/M | Fish bone | Dysphagia and throat pain | No | CT neck | T2 | Flexible | 2 | Recovered/ 60 |
| 50/M | Fish bone | Dysphagia and central chest pain | Yes | CT neck | T6-T7 | Flexible | 2 | Recovered/ 60 |
| 32/M | Food bolus | Dysphagia and central chest pain with drooling | No | Chest x-ray and CT neck | T3-T4 | Flexible | 2 | Recovered/ 65 |
| 69/ M | Chicken bone/ food bolus | Central chest pain with throat pain | no | Chest X-ray and CT neck | T4 | flexible | 1 | Recovery |

**Table 1:** Clinical information.

## Discussion

Key factors to consider in assessing patients with ingested foreign bodies include type and number of objects, location, time since ingestion and presenting signs and symptoms. These factors will help determine if the object needs to be retrieved emergently, urgently or if the patient can be safely managed with observation and follow-up [11-13]. Assuming a stable airway and no developing complications, the treatment and management are guided by the type of foreign body, the location, the degree of obstruction and the duration. Management can be either endoscopically or surgically. Endoscopic management can be divided into emergency, urgent and nonurgent which is displayed in details in Table 2. In our study population; one patient had an emergency intervention while the rest were managed as urgent cases and were scoped within 12-24 hours from their arrival to ED. For the case that was managed emergently; our study group has published a new approach in tackling suspected cases of esophageal perforations after managing this patient. He presented with severe chest pain that radiated to the back associated with profuse sweating after his meal. He ingested as sharp metal object that has injured the thoracic esophageal wall, approaching the aorta and injuring the left atrium and causing hemopericardium. The initial approach involved an urgent esophagoscopy in the operating theatre. Erosion was found in the thoracic esophagus which was the suspected site of perforation and no foreign body was visualized. The area of erosion was clipped. This was followed by thoracoscopy that reveled mediastinal hematoma in close proximity to descending aorta with frank blood in the thorax [14].

| Indication | Emergency | Urgent (within 12-24 hours) | Nonurgent |
|---|---|---|---|
| | • Esophageal Obstruction: Inability to handle oral secretions<br>• Disk batteries in the esophagus<br>• Sharp-pointed objects in the esophagus | • Esophageal objects that are not sharp-pointed<br>• Food impactions without complete obstruction<br>• Sharp-pointed objects in the stomach or duodenum<br>• Objects greater than 6 cm in length above duodenum<br>• Multiple magnets (or single magnet plus another ferromagnetic object within endoscopic reach)<br>• Coins in esophagus | • Objects in the stomach greater than 2.5 cm diameter<br>• Disk battery in stomach up to 48 hours if asymptomatic<br>• Blunt objects that fail to pass stomach in 3 to 4 weeks |

**Table 2:** Endoscopic management for impacted esophageal foreign objects.

Eighty percent to 90% of ingested foreign bodies will pass spontaneously within 3 to 7 days [12]. Adults with food impactions have abnormalities 85% to 90% of the time and will need evaluation and treatment of the underlining abnormalities [2]. Although not formally examined, eosinophilic esophagitis is increasingly a responsible cause for food bolus or foreign body impaction in the west, while peptic ulcer disease with associated strictures is responsible for esophageal foreign body impaction for most cases in developing countries [13]. In our study 7 out of 17 cases had eosinophilic esophagitis on follow up endoscopies. Some patients with esophageal perforations that are imme- diately recognized at the time of endoscopy may be treated with removable plastic or covered metal esophageal stents [15]. One of the patients in the study had retrieval of large fish bone that left a deep-seated ulcer in the wall of the esophagus with suspected perforation due to the presence of multiple gas bubbles within the wall of the esophagus as well as presence of surgical emphysema as shown in Figure 2C. After the retrieval of the fishbone with flexible endoscopy; we placed a partially covered stent that the patient tolerated well and was removed after 6 weeks.

Endoscopy, using a flexible forward-viewing endoscope under conscious sedation or general anesthesia, is the procedure of choice and is successful in >90 % of cases with <5 % complication rate, while Rigid esophagoscopy requires general anesthesia and carries a 10 % complication rate [16]. In our study 35% of the foreign bodies were retrieved using rigid esophagoscopy while the rest were removed using the flexible endoscope. Rigid esophagoscopy requires certain skills; as a result, we decided to generate certain guidelines to predict the need for the use of rigid esophagoscopy versus flexible in retrieval of impacted foreign bodies in the esophagus. Our algorithm is presented in Figure 4. Having the advantages of avoiding general anesthesia for majority of adults, flexible esophagoscopy reduces the cost, and has good visualization. However, in view of the sharp, blunt and round objects, which can injure the mucosa with a high likelihood of perforation, it is difficult to grasp the sharp objects with flexible esophagoscopy's small forceps. Usually, the Rigid esophagoscope comes with larger forceps that makes the retrieval of large or sharp objects easier.

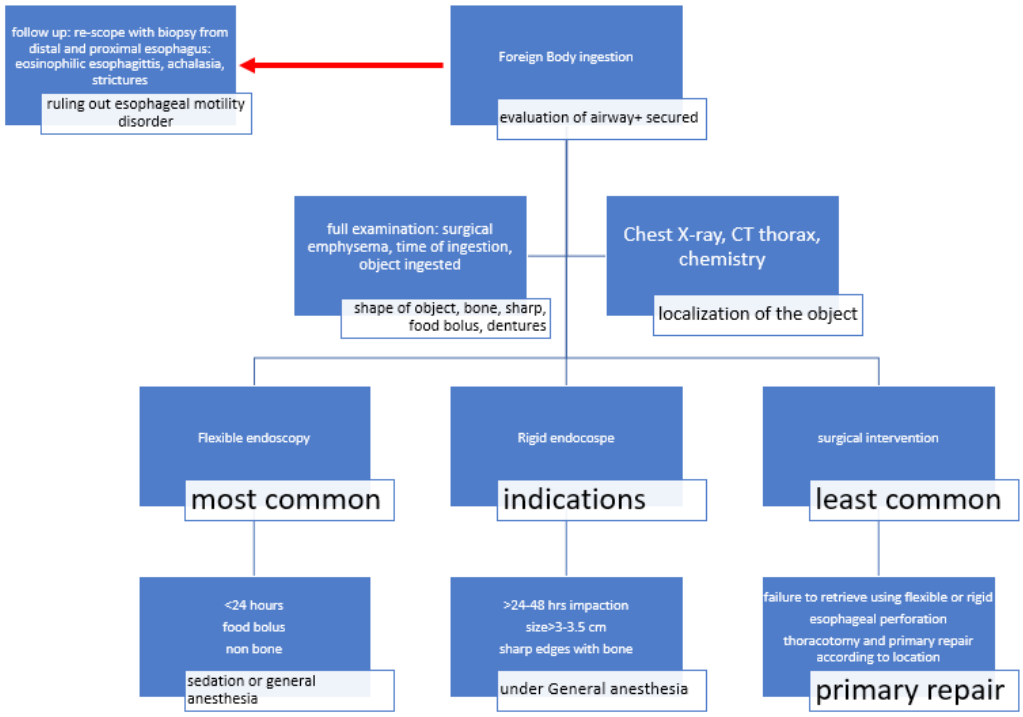


**Figure 4:** Algorithm for management of impacted esophageal foreign bodies.

In one series, the complications associated with foreign body impactions were ulcers (21.2 %), lacerations (14.9 %), erosions (12.0 %), and perforation (1.9 %) [17]. In 2013 Triadafilopoulos Et al performed multivariate analysis which showed that the duration of impaction ($p<0.001$), and the type ($p<0.001$) and size of the foreign bodies ($p<0.001$) were significant independent risk factors associated with the development of complica- tions in patients with esophageal foreign bodies [18].

## Conclusion

The assessment and management of esophageal foreign body impactions requires an urgent multidisciplinary ap- proach, expert endoscopic removal and careful monitoring for complications that may require medical, endoscopic or surgical management. Majority of cases are managed endoscopically and rarely surgical intervention is needed.

Over-all, flexible endoscopy is an adequate and safe technique for retrieval of impacted foreign objects in the esophagus. However; upfront rigid esophagoscope should be considered from the start to avoid failed and repeated attempts using flexible scope. Predictors for using rigid esophagoscope include: days the object has been in the esophagus, size of the foreign body, sharp objects, and evidence of perforation in CT scan like gas bubbles and esophageal wall thickening.

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