

## Rigid esophagoscopy in the management of esophageal foreign bodies

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### Abstract

**Introduction:** Foreign body (FB) ingestion and impaction in the esophagus constitutes an important cause of morbidity and mortality worldwide. One third of foreign bodies retained in the gastrointestinal tract are present in the esophagus, mostly in children's populations. Most of the impacted foreign bodies in the esophagus require removal with rigid esophagoscopy.

**Objective:** This study seeks to highlight the challenges in the management of esophageal FB using rigid esophagoscopy. It will also evaluate the outcome of management. Their management depends on the anatomic location, shape, size of the foreign body and duration of impaction.

**Materials and Methods:** This was a retrospective study of 60 patients with confirmed esophageal foreign bodies that were managed in the Ear, Nose and Throat (ENT) department of Government medical college, Ratlam from May 2018 to April 2019. The records of all patients that presented to the hospital with history of FB ingestion were retrieved from admission registers, theatre records and case files. Demographic and clinical data were documented and simple statistical tables were used to illustrate the data. Their charts were reviewed for preoperative diagnosis, kind and location of foreign body, length of retention, management of patients, complications and length of hospitalization.

**Results:** The records of 60 patients were retrieved that presented with ENT emergencies. 50(83.33%) patients had radiologic confirmation of foreign bodies in their esophagus and 10(16.67%) were further confirmed during esophagoscopy. There were 35(8.33%) males and 25(41.67%) females with Male:Female ratio of 1:1.4. The age range was 1-70 years with a mean of 35+/-6.88 years. Majority of the foreign bodies 50(83.33%) were impacted in the cricopharyngeal sphincter of the esophagus. Dentures ranked highest among the adult population, 15(25%) cases while coins ranked highest in the pediatric populations, 20(33.33%) cases. 6(10%) cases presented to the hospital after 72 hours. Complications occurred in 5(8.33%) cases.

**Conclusion:** The management of impacted esophageal foreign bodies with rigid esophagoscopy was an effective procedure despite its challenges. Use of a rigid esophagoscope is safe and reliable.

**Keywords:** Esophageal, Foreign bodies, Management challenges, Perforations, Rigid esophagoscopy.

### Introduction

The sword swallows in Greece were the first group of people in 300BC whose act led to the further development of esophagoscope.<sup>1</sup> Esophagoscopy makes up an indispensable part of the practice of both otolaryngologist and cardiothoracic surgeons. Today's "rigid esophagoscopy" was designed by Chevalier Jackson, who broke new grounds in aerodigestive foreign body management.<sup>2</sup>

Foreign body ingestion is a well known occurrence worldwide in children, especially in their six year of life,<sup>3,4</sup> with a peak in children older than 3 years.<sup>5,6</sup> It usually presents as an emergency. Most ingested foreign bodies become impacted often in the esophagus. Occasionally, Foreign Body may pass through the esophagus into the stomach without any hitch to the patients.<sup>7</sup> Various reasons for this event can be pointed out, stressing that all the characteristics such as sex, age, socioeconomic status and parents' influences are closely interrelated.<sup>8</sup> Impacted esophageal foreign bodies are typically found at one of the following 3 anatomic esophageal narrowings: level of the cricopharyngeus muscle, the level of the aortic arch, and the lower esophageal sphincter.<sup>7,9</sup> Management of Foreign body depends on a number of factors, such as anatomic location, shape and size of the Foreign Body, duration of impaction, the surgeon's expertise and availability of appropriate instruments. The presence of an impacted Foreign body in

the esophagus is challenge to the both the otolaryngologists and cardiothoracic surgeons. Rigid esophagoscopy for the removal of foreign body remain the best mode of treatment. There are other modes of treatments reported in literature; the use of flexible esophagoscopy, cervical esophagotomy and the use of forley's catheter under fluoroscopic guidance.<sup>10,11</sup>

Complications such as esophageal perforations may arise especially when the instruments for rigid esophagoscopy are inappropriate and the surgeons are inexperienced.<sup>12,13</sup> Besides, sharp objects at any point of impaction may cause perforation before extraction. They can easily result in mediastinitis and mortality.<sup>14</sup> Oesophageal Perforation can be avoided when foreign bodies are pulled in to the scope before extraction.<sup>15</sup>

Common swallowed objects reported in literature include coins, button batteries, fish bones, ornaments, dentures, toy parts (plastic) and meat bones.<sup>16-18</sup>

It's rightly said that "our eyes sees whatever our mind knows" but many a times during esophagoscopy it has been seen that the co-relation of clinical findings and esophagoscopy findings are much different. Esophagoscopy for diagnosis is indicated in nearly all patients with unexplained symptoms and signs of esophageal conditions. In the most of the cases, a typical history of swallowing a foreign body was available, with no symptoms at all to an occasional vomiting. The most common aspects presented

in literature as leading factors to those injuries include children's behaviour, anatomical characteristics and physiological features such as immature swallowing coordination, development of chewing capacity and higher respiratory rates.<sup>19</sup> Details of FB characteristics and the dynamics of the traumatic events involved in FB inhalations are therefore important to understand the pathogenic pathways. Fortunately, most foreign bodies that reach the gastrointestinal tract pass spontaneously. Only 10 to 20 percent will require endoscopic removal. Although mortality from foreign bodies ingestion is extremely low.

The aim of the present paper is to highlight the challenges posed by rigid esophagoscopy in the management of impacted esophageal foreign bodies. It will also evaluate the outcome of management.

### Materials and Methods

This is a 1 years retrospective study of 60 patients with impacted esophageal foreign bodies that were managed in the Ear, Nose and Throat (ENT) department of Government medical college, Ratlam from may 2018 to april 2019

The records of all patients that presented to the hospital with history of FB ingestion were retrived from indoor registers, theatre records and case files. The data analyzed were age, sex, clinical presentations and impacted foreign bodies in the esophagus, type of foreign bodies, dimension and consistency of foreign bodies, foreign bodies' location in esophagus, investigations, treatments and complications of managements encountered by specialists. Simple statistical tables were used to illustrate the data. Categorical data were expressed as mean and standard deviation.

### Results

The records of 60 patients were retrieved that presented with ENT emergencies. 50(83.33%) patients had radiologic confirmation of foreign bodies in their esophagus and 10(16.67%) were further confirmed during esophagoscopy. There were 35(58.33%) males and 25(41.67%) females with female:male ratio of 1:1.4 (Table 2). The age range was 1 – 70 years with a mean of 35 years (Table 1). Majority of the foreign bodies 50(83.33%) were impacted in the cricopharyngeal sphincter of the esophagus. The remaining 10(16.67%) were impacted in the level of the aortic arch (Table 6). Coins 20(33.33%) were the commonest foreign bodies encountered in this study. Dentures ranked highest among the adult population 15(25%) cases. Metallic objects excluding coins ranked highest in the pediatric populations 8(13.33%) cases (Table 3, 4).

All the patients presented as an emergency, most of them having feeling of lump in the throat, dysphagia, odynophagia and neck pain. Only a few presented with difficulty in breathing. 6(10%) patients presented to the hospital after 72 hours (Table-5). All the patients had soft tissue radiograph of the neck (anteroposterior and lateral views) and chest. The plain soft tissue radiograph of the neck showed clearly some foreign bodies that were impacted in the esophagus. Besides, it showed air

**Table 4:** Esophageal foreign body and age group distribution

entrapment and increased prevertebral soft tissue shadows in some of the patients with impacted dentures. Rigid esophagoscopy was performed on all of the patients under endotracheal intubation with adequate muscle relaxation. All 60(100%) patients had extraction of foreign bodies with the aid of foreign body grasping forceps. Not a single case was recorded as failed extraction due to foreign body dislodged into the stomach. Plain abdominal radiograph were further done for the patients after rigid esophagoscopy after next day morning to rule out any esophageal complications. Complications occurred in 5(8.33%) cases. They include; mucosal lacerations and primary haemorrhage in 4 cases; esophageal perforations in 1 case.

All confirmed esophageal mucosal injuries were successfully managed conservatively with nasogastric tube feeding and parenteral broad-spectrum antibiotics like intravenous ceftriaxone and metronidazole for the first 24 hours. Besides, the patients had post-operative check radiographs of the chest to look out for features of mediastinitis before oral feeding, antibiotics and analgesics. For the patient with esophageal perforation the nasogastric feeding tube was left insitu for a period of 5 to 10 days post-operatively as a rule to allow for wound healing and prevention of further complications. No mortality was recorded.

**Table 1:** Age wise distribution of patients with esophageal foreign bodies (n=60)

Age(years)	Number of cases	Percentage (%)
1-10	20	33.33
11-20	10	16.67
21-30	10	16.67
31-40	10	16.67
41-50	5	8.33
51-60	3	5
61-70	2	3.33

**Table 2:** Sex wise ratio among the patients with esophageal foreign bodies (n=60)

Sex	Number	Percentage
Male	35	58.33
Female	25	41.67
Total	60	100

**Table 3:** Types of esophageal foreign bodies (n=60)

Foreign bodies	Number of cases	Percentage (%)
Coins	20	33.33
Dentures	15	25
Toy parts(plastic)	2	3.33
Fish bones	10	16.67
Button batteries	3	5
Ornaments	5	8.33
Mutton bones	5	8.33
Total	60	100

Foreign bodies	Age group distributions (years)						
	0-10	11-20	21-30	31-40	41-50	51-60	61-70
Coins	10	10	-	-	-	-	-
Dentures	-	-	-	-	-	8	7
Toy parts(plastic)	2	-	-	-	-	-	-
Fish bones	1	3	4	2	-	-	-
Button batteries	2	1	-	-	-	-	-
Ornaments	2	3	-	-	-	-	-
Mutton bones	-	-	1	-	1	3	-

**Table 5:** Duration of symptoms with esophageal foreign bodies before presentations to hospital

Duration of symptom	Number of cases	Percentage (%)
Less than 24 hours	49	81.67
More than 24 hours but less than 72 hours	5	8.33
More than 72 hours but less than 1 week	5	8.33
More than 1 week	1	1.67

**Table 6:** Site wise distribution of esophageal foreign bodies (n=60)

Site	Number of cases	Percentage (%)
Cervical	40	66.67
Upper thoracic	10	16.67
Mid thoracic	5	8.33
Lower thoracic	5	8.33
Total	60	100

## Discussion

FB impaction in the upper digestive tract continues to be a common health problem in paediatric patients. This study revealed that foreign body's impaction was commoner in the 1-10 age group, showing similarities with the result of the ESFBIs study and with Lin's study and also with Okoye and Erefah study, found more foreign bodies impaction in the 0-5 age group.<sup>16,20</sup> These studies have demonstrated that children are more prone to foreign body ingestion. Less often, older children have risky behaviours, and this decrease of risk is as well ensured by the augmented size of the esophagus.

Male preponderance was found in our study as a result of more male paediatric patients that had foreign bodies impacted in their esophagus due to in the paediatric age group male children appear to be more active and inquisitive; they tend to explore their environment more than female. Okoye and Erefah in 2001 found more foreign bodies' impaction in male patients.<sup>16</sup>

In scientific study, the most frequent foreign bodies result in fish bones, metal objects such as batteries and coins, and broken tooth fragments.<sup>21,22</sup> Tissue response to a foreign body varies according to the composition of the FB and to any associated bacterial overinfection. Organic fragments cause a greater acute inflammation in comparison to piece of metal, plastic or bone. From this study coins, button batteries, toy parts and ornaments were relatively common findings among children whereas; dentures, fish bones and mutton bones were common findings among the adult populations.<sup>20,23,24</sup> These findings were same as reported by Okoye and Erefah.<sup>16</sup>

Objects characteristics such as shape, dimension and consistency are important in order to determine the damage that might occur. Rimell and Stool performed a retrospective study in which they examined the characteristics of objects that had caused serious aerodigestive tract injuries, with the definition of serious being indicated by the need of operative removal or the occurrence of death due to choking, as reported from the Consumer Product Safety Commission (CPSC).<sup>25</sup> The risk of injury or death posed by food, toy or toy parts, or another object depends upon its size, shape and consistency.<sup>26,27</sup>

The radiographic diagnosis of foreign bodies' impaction in the esophagus was found to be very useful in our study. It cannot be relied upon solely because some foreign bodies like tiny fish bones, plastic toys and dentures may not be visible. Radiolucent materials that are lodged in the esophagus in some cases may pose diagnostic challenge and give false negative results.<sup>28</sup>

The majority of swallowed foreign bodies pass harmlessly and spontaneously through the gastrointestinal tract (GIT),<sup>20</sup> but in case of lodgement or toxicity of the object, the foreign bodies must be rapidly identified and removed. The most frequent lodgement site described in studies is the cricopharyngeus muscle,<sup>29,30</sup> while in our study the cricopharyngeal sphincter of the esophagus was most frequent. In Jos Adoga et al., found majority of their patient's foreign bodies impacted in the middle third of the esophagus. Although most objects pass easily through the intestine, entrapment can occur at the pylorus, at the ligament of Treitz and at the ileocecal valve.<sup>31</sup>

We observed that very less patient presented to the hospital after 72 hours of incidence but in other study

observed that most of patients presented to the hospital after 72 hours of incidence due to ignorance and poverty.<sup>32-34</sup> Most of the patients in hospital do not consider surgery first as a form of treatment. They will only consider surgery after the various means of treatment they have tried fail. Late presentation affected the prognosis of impacted foreign bodies in the esophagus. Perforating objects are potentially life threatening because they may provoke the formation of a fistula between the esophagus and the innominate artery thus ensuring catastrophic bleeding.<sup>35,36</sup> Other complications associated with retained esophageal foreign bodies are tracheal compression, erosion through the mucosa, foreign body migration into adjacent structures, such as the respiratory tract or the aorta.

At present the rigid esophagoscopy remains the universally preferred method of extracting foreign bodies from the esophagus with a success rate between 94 % to 100%.<sup>37</sup> Incidence of esophageal perforation with rigid esophagoscopy was 0.34% with a mortality rate of 0.05%.<sup>38</sup> In our study incidence of esophageal perforation was 8.33% due to sharp nature of some of the foreign bodies, long duration of impaction, late presentation to the hospitals and lack of appropriate facilities. All esophageal mucosal injuries and perforations were successfully managed conservatively with nasogastric tube feeding; parenteral vital signs were monitored closely, as we looked out for clinical features of mediastinitis. They were counseled and follow up in out-patients clinic for several weeks.<sup>11</sup>

Prompt endoscopic intervention is the gold standard for all complicated or high-risk situations, with particular relevance to sharp and pointed foreign bodies, such as dentures with protruding hooks, shaving blades, and open safety pins, which increase the danger of perforation. Extraction of these sharp objects also requires special attention and expertise. In our hospital we did not have functional flexible esophagoscopy, so we were left with only the option of using the rigid esophagoscope. In our study, 5 complications were observed; therefore removal techniques other than endoscopy were preferred. In planning the extraction, one of the important points to consider is the proper choice of the instruments. In our study, the greatest part of the extraction was performed through negus esophagoscope with esophageal forceps in general anaesthesia, and it showed a very low percentage of complications. The use of esophageal forceps was seen in all cases.

### Conclusion

The management of impacted esophageal foreign bodies with rigid esophagoscopy is an effective and safe procedure despite its challenges. The inadequacy of adult supervision has been largely reported and shows the importance of the implementation of education campaigns meant to properly estimate the overall risks decrease in preventing FB ingestion. So, doctor's role is fundamental in educating adult dealing with children, not only from a preventive point of view, but also in diminishing the impact that this kind of injuries has on Public Health.

**Conflict of Interest:** None.

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