



Esophageal perforations due to foreign body impaction in children^{☆,☆☆}



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ABSTRACT

Aims: The treatment of perforating esophageal foreign body impaction (FBI) is complex and unclear. We present the outcome of surgical treatment of esophageal perforations due to FBI in children along with a management algorithm.

Methods: During a period of 7 years, 7 cases of esophageal perforations due to foreign body (FB) ingestion were referred to our unit. We analyzed the FB types, lodging duration and location, complications, and the surgical approaches.

Results: There were 4 male and 3 female patients. Mean age was 28 months (5 months–6 years). Six patients had metal FBs of variable shapes and 1 had glass marble. Three patients had witnessed history of FB ingestion. Duration of ingestion was variable and unknown in half of the patients. The site of impaction was cervical (1) and thoracic (5) esophagus. One patient had a marble as FB in the superior mediastinum. One patient manifested with features of perforation after removal of the impacted FB and 5 patients presented with perforations. Two patients presented with subcutaneous emphysema. One patient had trachea–esophageal fistula (TEF) after disc battery ingestion. Rigid esophagoscopy failed in 4 out of 6 patients. Five patients underwent thoracotomy, and repair with a pleural patch reinforcement. One patient had lateral esophagotomy in the cervical esophagus for removal of the impacted FB. Mediastinal FB was removed without opening the esophagus. All the patients were discharged uneventfully.

Conclusions: Esophageal perforation following FBI is rare and requires prompt treatment. Surgical treatment tailored to the needs of individual patients is associated with a successful outcome and decreased morbidity.

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Foreign body ingestion is a common problem among pediatric populations. Some of the ingested foreign bodies are particularly harmful and life threatening such as button batteries, magnets, sharp pieces of metal and bones [1,2]. Coins are the most commonly ingested foreign bodies (FBs) and account for 70% of the ingested FBs in children [3]. The anatomic sites of constrictions in the esophagus, are the common locations for foreign body impaction (FBI). If the FBs reach the stomach and intestines, they often, tend to pass spontaneously [3,4].

Esophageal FBs are commonly removed by the endoscopic methods. The endoscopic approaches use either the flexible fiber optic or the rigid esophagoscope. Open surgical treatment may be unavoidable in cases of failure of the endoscopy or in the presence of esophageal perforation [4]. The treatment of FBI associated with esophageal perforation is complex and there is scarcity of the literature available on the management protocols [5]. This report describes the management and outcome of esophageal FBI with perforations.

1. Methods

During a period of 7 years from January 2005 to December 2012, 7 cases of esophageal perforations due to FB ingestion were managed by the Pediatric surgical unit in our institute. In contrast to this, a total of 350 cases of esophageal FBs were managed endoscopically during this period, by the unit of Pediatric gastroenterology in our institute. After undergoing unsuccessful flexible esophagoscopy, the patients were referred for rigid esophagoscopy and removal of FB. These patients underwent rigid esophagoscopy with immediate or delayed surgical intervention. We analyzed FB types, lodging, duration, location, complications, and surgical approaches.

2. Results

There were 4 male and 3 female patients. Mean age was 28 months (5 months–6 years). Six patients had ingested metal foreign bodies (FBs) of variable shapes; coins [2], screw [1], hairpin [1], metal toy [1] and 1 patient had ingested a glass marble (Table 1). The most frequent site of FB impaction was thoracic esophagus in 5 patients, followed by impaction in the cervical esophagus in 1 patient (Fig. 1). Another patient had an FB (glass marble) lying freely in the superior mediastinum, which had been ingested by the child 4–5 months back; however no perforation could be demonstrated in the esophagus (Figs. 2 and 3). Dysphagia (7patients) was the commonest presenting symptom

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Table 1
Patient data.

S No	Nature	Age	Duration	Site of impaction	Intervention	Hospital Stay
1	Screw	1 year 10 months	Unknown	Thoracic	Rigid esophagoscopy + repair of perforation	10 days
2	Hairpin	5 months	4 days	Thoracic	Open extraction + repair of perforation	9 days
3	Coin	11 months	Unknown	Thoracic	Rigid esophagoscopy + repair of perforation	13 days
4	Marble	19 months	4–5 months	Superior Mediastinum	Esophagoscopy: Normal Neck Exploration	5 days
5	Metal toy	5 years 4 months	3 days	Cervical	Lateral esophagotomy	8 days
6	Coin	1 year 9 months	Unknown	Thoracic	Open extraction + repair of perforation	8 days
7	Disc battery	4 years 6 months	Unknown	Thoracic	Rigid esophagoscopy extraction + delayed repair of perforation	3 + 18 = 21 days

followed by refusal to feed (6 patients), chest pain (5 patients), and fever (5 patients).

Three patients had a witnessed history of FB ingestion. Out of these, 2 patients presented early because of the accompanying respiratory distress. The 3rd child was initially asymptomatic, but subsequently developed dysphagia due to compression of the esophagus by the FB (marble) in the superior mediastinum. Four parents were unaware of the FB ingestion. Two patients presented with subcutaneous emphysema and respiratory distress. One of them had a metal toy impaction and perforation of the cervical esophagus along with tracheal compression. The other patient with hairpin impaction had a free perforation in the thoracic esophagus with pneumothorax and subcutaneous emphysema. All the patients had plain radiograph of the chest and 5 patients underwent contrast esophagograms as well. Preoperative contrast esophagogram was not performed in 2 patients with subcutaneous emphysema and pneumothorax. The patient with disc battery ingestion had developed a tracheoesophageal fistula (TEF) (Fig. 4), which was diagnosed by the contrast esophagogram. Computerized tomographic scan was performed in 2 patients only, 1 with glass marble and 1 with trachea-esophageal fistula (TEF) for exact localization of the FB and its relationship with the surrounding great vessels. Preliminary rigid esophagoscopy was unsuccessful in retrieving the FBs in 4 out of 6 patients. Three of these patients underwent removal of the FBs after exploration for perforations, which were repaired with reinforcements with pleura. One patient with FBI in cervical esophagus had multiple perforations. The child underwent lateral esophagotomy through a healthy area in the cervical esophagus for retrieval of the FB. The lateral esophagotomy gradually contracted and healed spontaneously without

the stricture formation. The patient with TEF underwent feeding gastrostomy initially followed by repair of the TEF after a period of 6 weeks of esophageal rest. The mediastinal FB was removed from the subcutaneous tissue without opening the esophagus (Table 1). Postoperative care consisted of nursing in propped up posture, slow infusion of nasogastric feeds, continuation of preoperative broad-spectrum antibiotics and general care of the chest including the chest drain. The hospital stay varied from 5 to 21 days (mean 10.5 days). None of the patients had postoperative esophageal leaks on contrast esophagogram that was performed on the 7th–14th postoperative day. All the patients were discharged on oral feeds. The follow up period ranged from 12 to 48 months (mean 30 months). In the follow up, one patient of TEF required esophageal dilatations twice and rest of the patients were doing well.

3. Discussion

The incidence of esophageal perforation in FBI varies from 2% to 15% [6,7]. The role of clinical history and presenting symptoms for early recognition of FBI has been repeatedly emphasized. Positive history of FB ingestion may be seen in up to 84% of the cases, however the numbers are much less in cases of FB impaction [4,5]. Only 3 parents in our patients recalled the ingestion of FB. In impacted FBs, there is a

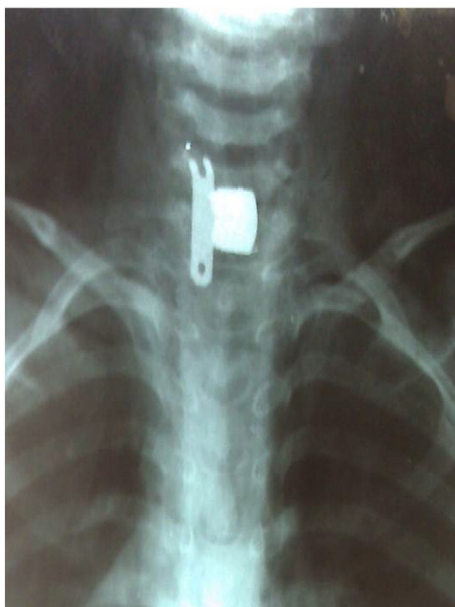


Fig. 1. X-ray of the neck showing impacted metal foreign body in cervical esophagus.



Fig. 2. X-ray of the chest showing a glass marble.

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