

Methods for esophageal foreign body removal among pediatric patients: 10 years' experience at a referral hospital.

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Abstract

Background and aim: Accidents with foreign bodies in children, including esophageal ones, are common in emergencies. Children are more prone due to infant curiosity, baby teeth and lack of attention from caregivers. We present the 10 years experience of an ENT referral service in the management of pediatric patients diagnosed with esophageal foreign body. **Methods:** Retrospective data analysis of 0 to 12 years old children attended from 2005 to 2014 with esophageal foreign body.

Results: We found 1535 children. The coins were the most prevalent foreign bodies. Batteries accounted for 36 cases. The Foley catheter removal was performed in 77,61%, rigid esophagoscopy was necessary in 22,02%, and in 1,37% cases the Magill forceps was used.

Discussion and conclusion: There are a variety of management options available. The Foley catheter removal guided or not by fluoroscopy is indicated to coins and other pointless objects, located in up to the middle third of the thoracic esophagus, shorter time of impaction and no history of previous disease or esophageal surgery. The esophagoscopy is better suited for proximal and sharp objects, longer duration of impaction and when the removal by Foley catheter was unsuccessful. Magill forceps removal under laryngoscopy is used to upper esophageal foreign bodies. The Foley catheter removal is a good tolerability and cost-effective option. The esophagoscopy may be reserved for cases of more complex foreign bodies. Magill forceps is also a minimally invasive method compared to rigid esophagoscopy.

Keywords: Foreign body, Foley catheter, Esophagoscopy, Magill forceps, Pediatric, Emergency.

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Background

Accidents with foreign bodies (FB) in children, including esophageal, are common in emergencies [1-4]. Children, especially younger ones, are more prone to accidental ingestion of foreign bodies because of childish curiosity, incomplete dentition, incomplete development of the neuromuscular mechanisms of swallowing and airway protection, inefficient chewing and lack of attention from caregivers [5,6].

The most of ingested foreign objects passes spontaneously without any complication (80%), while 10 to 20% require removal [4-8]. When symptomatic, the clinical presentation is variable. Gastrointestinal symptoms (dysphagia, sore throat, drooling and vomiting) or respiratory symptoms (such as cough and dyspnea) may occur. Most of the

time, relatives witness the FB ingestion or are alerted by the child. However, approximately 20% of cases are asymptomatic [7-10].

Data collection is important for identifying the foreign body swallowed and the point of maximum discomfort as well. In some cases, the diagnosis of foreign body, is only done during the investigation of clinical manifestations [5].

Radiographic study may be necessary. Plain radiography allows us to identify, characterize and locate some foreign bodies, and even detect air in the mediastinum and subcutaneous emphysema indicating esophageal perforation. The cervical and chest radiograph should be performed in the posterior to anterior (PA) and lateral projections. However, there are foreign bodies which are not radiopaque (wood objects, plastic objects). In these cases,

Table 1. Distribution of patients according to the year of attendance and procedure performed

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Foley catheter	125	92	98	107	103	123	129	139	125	135	1176
Rigid esophagoscopy	44	44	29	27	36	35	37	31	30	25	338
Magill forceps	3	0	3	1	3	2	1	3	3	2	21

contrast technique with barium swallow must be used before the exam. However, if the symptoms are not clear and radiography shows no change, computed tomography may be indicated to clarify the clinical condition and therapy to be performed [5,11,12]. Magnetic resonance imaging is helpful in both diagnosis and even in a presurgical planning for a esophageal foreign body removal, mainly if associated with airway compromise [7].

The longer the duration of impaction, the greater the frequency of complication. Prolonged FB permanency in the esophagus can lead to mucosal edema, infection, necrosis and perforation, mediastinitis, tracheoesophageal fistulas, vascular fistulas, extra-luminal migration, and formation of false diverticula [4-9].

The permanence of a esophageal FB for more than 24 h should not be allowed. The knowledge of FB features and its location determine the appropriate time for intervention, the material to be used and the precautions. Batteries, sharp or pointed objects, and food impaction that causes complete obstruction require urgent removal [5,13].

Understanding this problem can contribute to guide preventive measures, development of diagnostic and therapeutic protocols, as well as other measures that aim at improving the quality of care provided to these patients.

Our aim is to present the 10 years experience of the Department of ENT and Per-Oral Endoscopy at a referral emergency hospital (Souza Aguiar Municipal Hospital, Rio de Janeiro, Brazil) in the management of pediatric patients diagnosed with esophageal foreign body.

Methods

Cross-sectional study through data analysis of records of 0 to 12 years old children treated in the Department of ENT emergencies of Hospital Municipal Souza Aguiar, Rio de Janeiro, from January 1st in 2005 to December 31st in 2014.

Only those diagnosed with esophageal foreign bodies were included. We excluded files with incomplete or illegible data. We evaluated age, gender, type of foreign body and procedure performed to remove it.

The choice of procedure was performed according to the type of foreign body, age of patient, physical examination, symptoms, cooperation of patient, time since ingestion, agreement of parents or caregivers and experience of the otorhinolaryngologist.

Results

We selected 1535 profiles. 758 (49,38%) were female patients and 777 (50,62%) were male. The mean age was 4 years and 2 months. In 1176 cases (76,61%), the removal

of the foreign body was performed by ballon catheter (Foley catheter). In 338 cases (22,02%), rigid esophagoscopy was performed, and in 21 cases (1,37%) the Magill forceps was used. Eight patients underwent rigid esophagoscopy after the failure of Foley catheter technique. One patient underwent flexible upper videoendoscopy (4 years old male patient, attended in 2005). In one case there was no foreign body but a esophageal tumor instead. The distribution of patients according to the year of attendance and procedure performed is showed in Table 1.

According to the procedure of removal, the foreign bodies found are presented in Table 2. The term "small metal artifacts" was used to group small objects or fragments of objects such as metallic rings, magnets, wires, pins, medals and crucifixes. The term "small plastic artifacts" were used to denominate small plastic toys or fragments of plastic toys, beads, and others. The term "jewelry" was used for objects such as earrings, pendants, bracelets and rings.

All meat buns impacted in the esophagus, fish bones and chicken bones were removed by rigid esophagoscopy or using Magill forceps under general anesthesia. In 56 cases, the Foley removal has failed and the children underwent esophagoscopy under general anesthesia. Two children has presented mucosal damage because of battery and chicken bone impaction. One child (4 years) has suffered of esophageal perforation because of a pin impaction. One child (2 years old) has needed cervicotomy. No bleeding, aspiration or death was recorded.

Table 2. Distribution of patients according to the procedure performed and type of foreign body removed

Foreign Body	Foley catheter	Rigid esophagoscopy	Magill forceps
1 coin	1133	87	1
2 coins	20	10	-
Battery	8	28	-
Meat bolus	1	17	1
Jewelry	3	40	1
Small metal artifacts	3	40	7
Small plastic artifacts	2	18	3
Chicken bone	-	15	4
Fish bone	-	10	1
Marble	1	2	-
Rocks	1	-	-
Seeds	1	-	1
Denture	-	1	-
Esophageal tumor	-	1	-
Others	-	44	2
No foreign body found	-	14	-
Not identified foreign body	3	11	-
TOTAL	1176	338	21

Discussion

Children in all age groups are often treated in emergency services due to foreign bodies, because the first years of life correspond to a long phase of exploration and interaction with the environment, including swallowing and placement of objects in natural orifices [1,2].

In this study, most patients with esophageal FB were male (50,62%), corroborating to other studies, although no statistically significant difference between male and female was observed ($p>0,05$) [9,14-16]. In the literature, as in this study, coins were the most prevalent foreign bodies, specially in children [9,16-19].

There are a variety of management options available: pharmacological therapy, flexible endoscopy, rigid endoscopy, Foley catheter removal, esophageal bougienage, forceps extraction, surgery and pushing the FB to the stomach [5,6,16,19-21].

Inpatient or outpatient observation is also an option. Connors et al. suggested that we could wait for 24 h to coins to progress spontaneously to stomach if there is no esophageal disease or no respiratory compromise [21]. This conservative approach reduces complications and costs but must be accompanied by sequential radiographic study [8,17,22].

The treatment choice depends on several factors as follow: age and clinical conditions of the patient, shape, size, type, localization e number of FB, and personal experience and preference of the physician. The safety of performance and costs must be considered too [5,23,24].

In Souza Aguiar Municipal Hospital, the Foley catheter removal is indicated to coins and other pointless objects, located in up to the middle third of the thoracic esophagus, less than 36 h of impaction and no history of previous disease or esophageal surgery [9].

This procedure can also be performed if the duration of impaction is no longer than 72 h, but the chance of success decrease 50%. Also, the hospital must provide pediatric direct laryngoscope, rigid esophagoscope and bronchoscope, laryngeal and bronchial forceps, suction apparatus and oxygen supply; it all kept ready [13].

A previous radiographic study to confirm presence, location and shape of the FB (Figure 1A) is mandatory. The balloon of the Foley catheter number 14 to 18 is first tested to make sure it inflates symmetrically. The catheter is inserted transorally, advancing it inferiorly while the child swallow it, until it pass about 20-25 cm from the dental arch, passing distally to the ingested FB (Figures 1B and 1C). Then the balloon is inflated with 5 mL air or saline (Figure 1D). Before the catheter is withdrawn, the child is placed in a prone oblique position with mild cervical extension. With moderate traction, the inflated balloon pulls the foreign body out from the esophagus (Figures 1E and 1F). No child is sedated and he/she is kept in seated position, restrained by one of his/her parent. If the child is not cooperative, a tongue depressor may be used to prevent the child from biting the catheter. After a successful try, the child is monitored for 30 minutes before be discharged. The parents are instructed to feed the child with a soft diet and to return immediately if the child has symptoms of chest pain, fever, dysphagia, bloody saliva, respiratory difficulty or abdominal pain. If three attempts fail, this technique is suspended and the child must be referred to a new radiografic study and forwarded to the rigid esophagoscopy under general anesthesia, endoscopy or removal with Magill forceps [9,13].

This technique can also be performed with deep sedation and muscle relaxation, rather than physical restraint, to facilitate the procedure and be guided by fluoroscopy too [25-28]. However, some studies support the safety

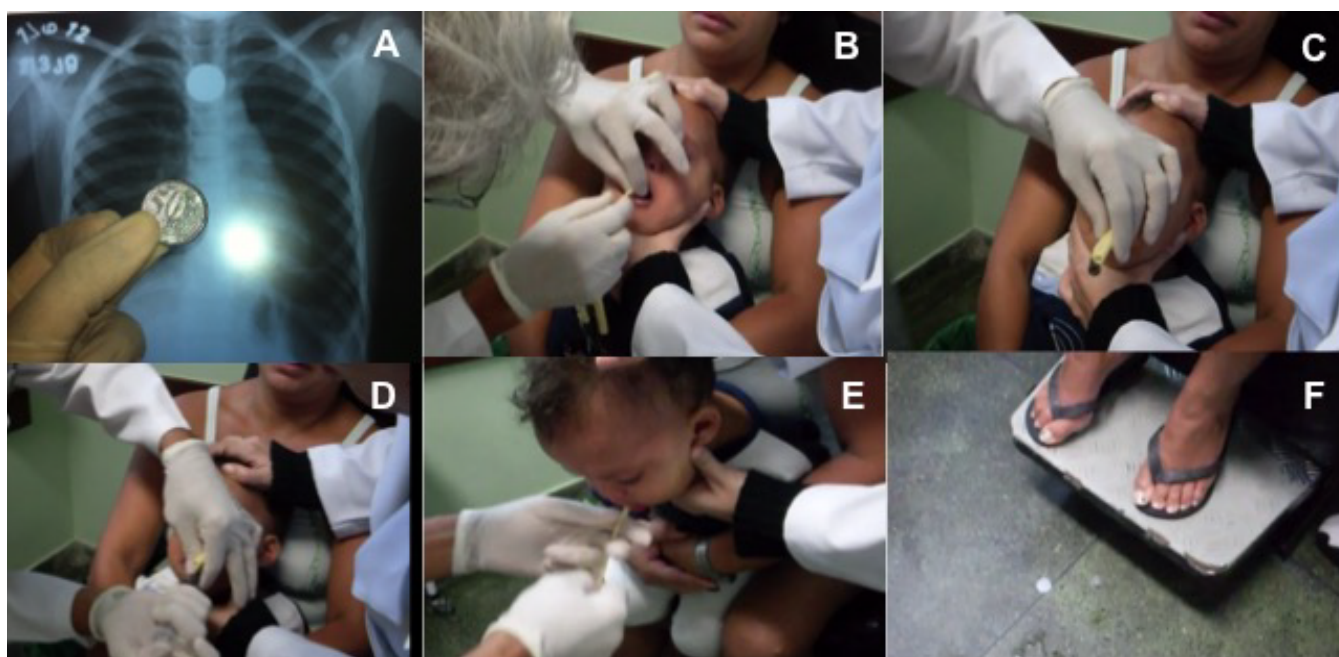


Figure 1. Radiographic study of foreign bodies

of non-use of fluoroscopy [9,12,29,30]. In Souza Aguiar Municipal Hospital, the use of contrast is avoided because of the risk of aspiration.

The removal of esophageal FB by Foley catheter is a procedure with few complications (about 4% with minor oral or nasal bleeding). However, the main critical concern about the use of Foley catheter is because it performed without direct visualization, carrying certain blindness, and can result in esophageal perforation and airway compromise but the complications of this procedure have been consistently low. The advantages of the procedure are: shorter time of hospitalization, easy to perform, no need for anesthesia, avoid the esophagoscopy, more comfort for the child, and lower costs if all the protocols for the procedure are observed [9,13,29]. About costs, the literature estimates that the removal of esophageal FB by Foley catheter is 20 to 50 times cheaper than esophagoscopy under general anesthesia [9,10,13,22].

The esophagoscopy had long been considered the gold standard and the most popular therapy because it can be used to any kind of FB [13,16]. It is better suited for proximal and sharp objects. In this study, we observed that esophagoscopy was indicated to more complex FB, longer duration of impaction, and when the removal by Foley catheter was unsuccessful [6,9,23].

Magill forceps under laryngoscopy can be used to remove esophageal FB as long as it is lodged at or immediately below the level of the cricopharyngeus muscle (upper esophagus) and better if it is a safety pin. This procedure is a minimally invasive method compared to rigid esophagoscopy [20,21].

The literature shows several complications of these procedures (iatrogenic complications, esophagitis, esophageal perforation, aspiration, infection, mediastinitis, tracheoesophageal fistulas, vascular fistulas, extra-luminal migration, formation of false diverticula) [5,9,10,31]. There were few complications reported in this study (mucosal damage and esophageal perforation).

Conclusion

The Foley catheter removal is a good tolerability and cost-effective option for the most prevalent esophageal foreign bodies (coins). The esophagoscopy may be reserved for cases of more complex foreign bodies, although more expensive and performed under general anesthesia. The Magill forceps is also a choice of minimal invasive method comparing to esophagoscopy.

It is important that the hospital provides emergency equipment (bronchoscope, laryngeal and bronchial forceps, suction apparatus, and oxygen supply), multidisciplinary team (ENT, paediatrics, general surgeon, thoracic surgeon, anesthesiologist), continuous training, and structure to the management of possible complications.

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