

Foley catheter removal of blunt esophageal foreign bodies. Experience with 100 consecutive children

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Abstract. One hundred consecutive children with blunt esophageal foreign bodies were treated with a non-operative method of foreign body removal utilizing a Foley catheter. Dislodgement was successful in 98 children. There were no complications. Performed properly, the technique is rapid and safe. It precludes hospitalization and the slight hazards of endoscopy and general anesthesia.

Key words: Foley catheter, balloon – Fluoroscopic table – Oral approach – Nasal approach – Glucagon – Barium

Ingestion of foreign bodies is a common occurrence in children. Occasionally a swallowed foreign body will lodge in the esophagus producing symptoms of obstruction. The majority of the objects have smooth edges and may be removed utilizing a non-operative method. This presentation describes our experience with 100 consecutive children with blunt esophageal foreign bodies in whom a non-operative method of foreign body removal was employed using a Foley catheter.

Method

The precise location of the swallowed foreign body is determined by plain film examination in the case of opaque objects and by cautious opacification of the esophagus with those that are non-opaque. If the foreign body is smooth, non-operative removal is contemplated, whereupon the patient and/or parent is questioned to determine if the foreign body has been in place less than two weeks and that there is no past history of esophageal disease. The materials required for foreign body removal include a mouth gag, water soluble contrast material, a 10-ml syringe and a number 14 or 16 French Foley catheter (Fig. 1).

Cooperative patients approximately 10 years of age and older are allowed to sit on the edge of the radiographic table while the catheter is inserted. The catheter passage is usually preceded by spraying the oropharynx with a small amount of local anesthetic to facilitate swallowing without gagging. Most patients are in the younger age group and require efficient immobilization. This is accomplished by wrapping the patient securely in a sheet.

Prior to inserting the Foley catheter it is essential to evaluate the balloon to insure that it inflates and that it does so symmetri-

cally. A balloon that inflates eccentrically is more apt to slip past the foreign body during withdrawal. Utilizing the contrast material when pre-inflating the balloon renders it slightly radiopaque which will facilitate later fluoroscopic identification. The Foley catheter is inserted orally. After the tip of the catheter is just beyond the foreign body, the balloon is inflated with contrast material. Prior to removing the catheter, the patient is placed into a prone oblique position and the fluoroscopic table is turned into a relatively steep head down position (Fig. 2). The catheter is then withdrawn from the esophagus with moderate, steady traction, its balloon pulling the foreign body ahead of it (Fig. 3). With aid of gravity, as the foreign body is pulled from the esophagus, it will usually fall out of the mouth, slide down the table and spill onto the floor. The advantage of the oral approach becomes apparent when it is seen that the catheter, its inflated balloon and the foreign body are withdrawn in a smooth, uninterrupted motion without complication. By utilizing the oral approach one insures that the foreign body is in the oropharynx only a brief moment, considerably reducing the possibility of contact with the larynx during respiration. If steady traction fails to dislodge the foreign body, intravenous glucagon, 0.05 mg/kg, may be considered in an attempt to induce sufficient esophageal relaxation to permit successful extraction. If these measures are unsuccessful, the patient should be promptly referred to the endoscopist. To persist with numerous intubations or the application of forceful traction is unwarranted and contra-indicated.

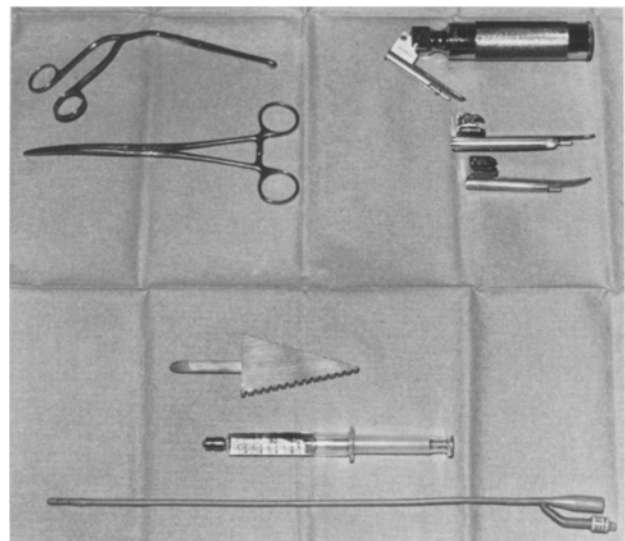


Fig. 1. Foreign body tray. Locally fabricated wooden mouth gag. Foley catheter, contrast agent in syringe. Also pictured are emergency items including pediatric laryngoscope, blades and forceps



Fig. 2. Position for foreign body removal. Child in prone-oblique orientation and fluoroscopic table in relatively steep head down position. (From Campbell, JB (1982) Esophageal foreign bodies. In: Franken, Jr., EA (ed) Gastrointestinal imaging in pediatrics. Harper and Row, Hagerstown, Maryland)

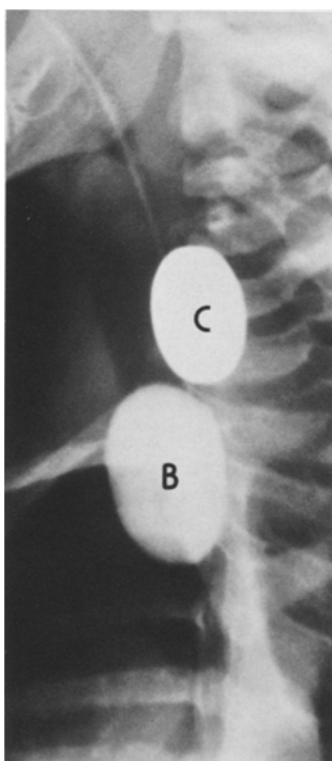


Fig. 3. Balloon of Foley catheter (B) inflated with contrast material pulling nickel (C) from proximal esophagus

Results

One hundred consecutive children with blunt esophageal foreign bodies were treated with the Foley catheter method of extraction over a period of approximately 12 years. The children ranged in age from 7 months to 12 years with most being under 5 years (Table 1). There were 53 males and 47 females.

Table 1. Age range of 100 consecutive patients with blunt esophageal foreign bodies

Age distribution	Females (53)	Males (47)
0- 5 Years		75%
5-10 Years		21%
10-12 Years		4%

Table 2. Location of 114 blunt esophageal foreign bodies

Location	%
Thoracic inlet	74%
Aortic arch	18%
Esophageal hiatus	4%
Other	4%

Table 3. Results of Foley catheter method of removing blunt esophageal foreign bodies in 100 consecutive children

Results	
Removal attempted	100
Successfully dislodged	98
Failures	2
Complications	0

There was a total of 114 foreign bodies in the 100 patients. The vast majority of the foreign bodies (103) were coins. Other foreign bodies included buttons (3), food (3), and one each of the following: parking slug, metal washer, locket, good luck coin, soft nylon wire mesh. The majority of the foreign bodies lodged at the level of the thoracic inlet between C6 and T1 (Table 2).

We were successful in dislodging the foreign body in 98 of the 100 patients (Table 3). In most instances, particularly when the foreign body was in the proximal half of the esophagus, we were able to pull the object out of the esophagus with the Foley balloon. This accounted for 91 patients. Occasional foreign bodies, especially those in the distal esophagus, were successfully dislodged by pushing them on into the stomach. This occurred in seven instances. In the two failures, one patient had an esophageal stricture secondary to previous repair of esophageal atresia, and it was not possible to tease the partially inflated balloon through the stricture and place it satisfactorily between the stricture and the foreign body. In the other child, firm, steady traction simply failed to dislodge the foreign body. The patient was subsequently proved to have an intrinsically normal esophagus.

Discussion

We have concluded that the Foley catheter technique is easily performed, that it is safe, and that it is highly cost-effective (Table 4). It obviates the necessity for

hospitalization and avoids the slight risks of general anesthesia and endoscopy. Performed properly, this should be the method of choice for removal of blunt esophageal foreign bodies in children [1, 2, 4–6].

It is important to observe several precautions during the procedure to insure that the airway is not compromised and the esophagus is not injured. We feel that an important aspect of this method is inserting the Foley catheter through the mouth into the esophagus. Although the nasal approach is simpler, there are potential disadvantages to this approach. First, one may convert an esophageal foreign body to a nasopharyngeal foreign body during withdrawal. Second, at the most crucial time of the foreign body removal, namely when the foreign body is in the hypopharynx, the nasal approach requires temporary cessation of withdrawal while the catheter's balloon is deflated. Furthermore, the foreign body is delivered onto the posterior aspect of the tongue where the patient is required to sense its presence and assist in its expulsion. These delays, just at the time the foreign body has the potential for contact with the adjacent airway, are of considerable concern and motivate us to employ the somewhat less convenient oral approach. To further eliminate the possibility of the foreign body contacting the airway, maneuvering the child into a prone oblique orientation and placing the fluoroscopic table into a steep head down position just prior to withdrawing the catheter is strongly advised [1]. In addition, there must be a pediatric laryngoscope at the ready along with appropriate forceps for grasping a foreign body even though we are confident that this technique in experienced hands, correctly applied and under constant fluoroscopic monitoring, precludes inadvertent compromise of the airway by the foreign body.

To insure protection of the esophagus one should, without exception, limit the technique to objects that cannot possibly have sharp or ragged edges which could lacerate the esophagus. Thus, most foreign bodies removed will be coins. Objects lodged

for more than 2 weeks are apt to show early and potentially significant esophageal mucosal reaction. Such cases are therefore best referred to the endoscopist. Indeed, cases that are not acute, i.e. presenting within 24 to 48 h of ingestion, tend to have less reliable histories thus requiring more discretion on the part of the radiologist. Because the vast majority of esophageal foreign bodies, particularly coins, lodge at the level of the thoracic inlet, it is wise to administer a very small quantity of barium to children whose foreign bodies are found in any other locations to be sure that no abnormality of the esophagus is present which predisposed to foreign body entrapment. This seems justified even in the absence of a history of previous esophageal problems. Over-distention of the esophagus by the Foley balloon is best avoided by erring on the side of under-inflating the balloon initially. If the balloon readily slips past the coin, one merely repositions the balloon and reinflates accordingly. It should be obvious that overly aggressive traction or forceful jerking of the catheter out of the esophagus is contra-indicated. With experience, one gains considerable skill at estimating the appropriate degree of balloon inflation and the amount of traction necessary for each age group. The use of glucagon [3] or pro-banthine for an intrinsically normal esophagus in which the foreign body is difficult to dislodge may be of some use although these agents were not employed in this series of patients and our personal experience with subsequent patients has not been sufficient to establish their value.

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Table 4. Comparison of cost of non-operative versus endoscopic esophageal foreign body removal in two young children

Type of fee	Treatment charges (\$)	
	Catheter method	Endoscopy
Emergency room fee	27.00	27.00
Radiographs	41.80	41.80
Removal fee	94.00	210.00
Hospital charge	31.50	730.00
Anesthesia fee	—	110.00
Total cost	194.30	1,118.80