ISSN 0973-2063 (online) 0973-8894 (print)

Bioinformation 22(7): 4546-4549 (2026)

BIOINFORMATION
Discovery at the interface of physical and biological sciences

BIOMEDICAL INFORMATICS

www.bioinformation.net

Volume 22(7)

Research Article

Received July 1, 2026; Revised July 31, 2026; Accepted July 31, 2026, Published July 31, 2026

DOI: 10.6026/973206300224546

SJIF 2026 (Scientific Journal Impact Factor for 2026) = 8.478
2022 Impact Factor (2023 Clarivate Inc. release) is 1.9

Edited by P Kangueane

Citation: Baghel *et al.* Bioinformation 22(7): 4546-4549 (2026)

Silicone foley catheter extraction of pediatric esophageal foreign bodies in the sitting position without anesthesia

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ISSN 0973-2063 (online) 0973-8894 (print)
Bioinformation 22(7): 4546-4549 (2026)

Abstract:
Pediatric esophageal foreign body ingestion needs urgently removal, yet in low resources facilities, they lack an endoscopy. Therefore, it is of interest to assess the bedside silicone Foley catheter removal in children aged 2 to 16 years. Most ingested objects were coins (84%), followed by button batteries (13%) and metal washers (3%). The reclamation of the sitting position was successful in all the cases, with an average of 1.5 attempts and a minor bleed in one instance. Thus, data shows that six-month follow-up, this non-operative approach is safe, simple and effective.

Keywords: Esophageal foreign body, foley catheter, resource-limited settings

Background:
Foreign body (FB) ingestion is a common pediatric emergency and children under 5 years of age account for up to 80% of cases in the esophagus **[1]**. The maximum occurrence takes place in children of 1-5 years owing to oral exploratory behaviour, lack of molars and immature swallowing **[2]**. The most common esophageal FB swallowed by children is the coin, followed by the button battery and other blunt objects **[3]**. Most esophageal foreign bodies lodge at physiological narrowings, with the cricopharynx and upper esophagus being the most common impaction sites. While the most ingested objects usually pass spontaneously, about 7.3% of cases require some active intervention due to complications **[4]**. The clinical presentation is influenced by the size and location of the object, with common features being dysphagia, drooling, vomiting and odynophagia and chest pain. Button batteries pose a life-threatening danger as the apposition of esophagus leads to rapid liquefactive necrosis, producing serious injury and perforation within two hours **[5, 6]**. The direst sequelae to occur in the young child are airway injuries, namely tracheoesophageal fistulae and vocal cord paralysis **[5]**. Plain radiography is the first choice of the diagnostic modality which can offer as high as sensitivity as 98% for large radiopaque fb like coins and batteries **[1].** The removal of such bodies is usually performed via endoscopy, the gold standard method for retrieval requiring trained personnel, anesthesia and specialized equipment, none of which are usually available in low-income settings. The Foley catheter technique is an effective bedside and non-operative method for retrieval of blunt proximal esophageal foreign bodies in children. In a landmark series of 100 children, Foley catheter removal without anesthesia was 98% successful and 0% morbidity **[7].** Large-scale studies showed this safety profile procedural fluoroscopic foley extraction was successful in 91% of 415 episodes and only 1% had major complication **[8]**. A recent series of 773 children with esophageal coins showed a successful silicone Foley catheter removal in 94.17% with discharge the same day for most **[9].** In patient position (either sitting or decubitus), there was no significant difference in outcomes. Meanwhile, longer training for the operator significantly raised success; therefore, emphasizing the training of operators **[10].** Managing esophageal foreign bodies in developing countries provides a different set of challenges including delayed presentation of cases, limitations of endoscopic means, trainee-related incidents, *etc.* Resource-limited settings report high use of rigid esophagoscopy with satisfactory outcomes, although open esophagotomy is sometimes required **[11].** Therefore, it is of interest to standardize and disseminate this technique to improve pediatric esophageal foreign body outcomes in resource-limited healthcare facilities.

Materials and Methods:
Study design and setting:
This observational trial with prospective design conducted at two centers Yash hospital, Satna and Sardarvallabhaipatel government hospital attached to Government medical college (GMC), Satna, Madhya Pradesh, India during a period of two years, January 2022 to January 2024. Prior to initiation of the trial, ethical clearance was obtained from the institutional ethics committee GMC Satna. Prior to the procedure, informed written consent was taken on outpatient department (OPD) documentation from the child's parent or legal guardian.

Study population:
A total of 68 children were consecutively enrolled with history of esophageal foreign body ingestion. The study included children of all ages with vomiting, pain, choking, or respiratory distress following witnessed or suspected foreign body ingestion. All children underwent prompt anteroposterior and lateral x-rays of the neck, chest and abdomen to check for the foreign body. The study excluded children whose foreign bodies had moved to the stomach or further down the gastrointestinal tract.

Inclusion and exclusion criteria:
Inclusion criteria:
Children with radiopaque foreign bodies in the esophagus proven radiologically.

Exclusion criteria:
Foreign body lying below the gastroesophageal junction; suspected esophageal perforation or mediastinitis; sharp or pointed foreign body; hemodynamic instability; and unavailability of consent.

Preparation before the procedure:
None of the procedures were done in the hospital on an outpatient basis. Before starting the procedure, emergency resuscitation equipment was kept ready *i.e.* self-inflating bag-valve mask (Ambu Bag) of appropriate size, endotracheal tube of appropriate diameter, laryngoscope and injection adrenaline. To comfort younger children and toddlers, music, rhymes and distraction techniques were used, while older children were counseled verbally about the procedure. All children were tightly wrapped in a bedsheet to reduce any sudden movements during procedure. Sedation or general anesthesia was not given.

In the present experiment, elevated plus-maze was used for the assessment of anxiolytic and anxiogenic activities of drugs and tested animals. This test apparatus consists of two open arms (with no wall) and two closed arms. Testing apparatus having open and closed arms creates a conflict between the tendency to escape high in an open area and the tendency of the animal to remain on the ground away from predators. This conflict elicits a critical anxiety-like behaviour pattern in rodents, *i.e.* increase in entries and time spent on the open arms, decreased entries and time spent on the closed arms. Most importantly, a number of entries and time spent in either set of arms provides an index of anxiety. For example, in a subject having low anxiety, more entries will be made in open arms and more time will be spent there as well. In the contrary case, more entries will be made in the closed arms and more time will be spent there as well if anxiety level is high. However, drugs that have anxiolytic activity will increase exploration in the two sets of arms thus indicate their effectiveness. One should keep in mind that behaviour in the elevated plus-maze is mediated by the activity of monoaminergic neurotransmitter.

Procedure:

A sterile silicone Foley catheter with an 8–12 French gauge selection was chosen based on age and upper trunk diameter of the child. The insertion length was derived from external measurements of the distance from the pinna to the angle of the mouth to the epigastrium. Using the pre-measured length, the catheter was introduced orally with the child in the lateral decubitus position until the pre-measured length was reached to ensure the catheter's tip passes beyond foreign body. The size of the balloon depended on the size of the esophagus and the character of the foreign body. 5– 15 ml normal saline was then injected. The child was returned to the upright sitting position, slightly forward leaning and the catheter was withdrawn slowly and steadily so that gravity assisted the dislodgement and expulsion of the foreign body through the oral cavity. If the foreign body was not removed on the first attempt, the procedure was repeated in the same manner, with a maximum of five attempts allowed per child.

Post-procedure monitoring and follow-up:

After the procedure, the children were observed in the outpatient area for 3–4 hours for any immediate complication such as bleeding, respiratory distress and pain. All children started oral feeding before they were discharged. Children were discharged with a short course of antacids and advice on follow-up. Phone follow-up was done at 3 days, 1 month and 6 months. At each follow-up, caregivers were asked specifically about symptoms like bleeding, vomiting, fever, difficulty in feeding and breathing.

Data collection and analysis:

All clinical data were prospectively noted in a structured data collection proforma which included patient demographics, type and duration of a foreign body impacted, number of attempts at extraction, immediate complications and follow-up outcome. The data were analysed using descriptive statistics; categorical variables were expressed as frequencies and percentages and continuous variables as means with standard deviations.

Table 1: Demographic and foreign body profile (n=68)

Variable	Category	n	%
Foreign body type	Coin	57	84%
	Button battery	9	13%
	Washer	2	3%
Extraction outcome	Successful	68	100%

Table 2: Duration of presentation after ingestion (n=68)

Time to Presentation	n	%
0–1 hour	14	21%
1–3 hours	42	62%
3–24 hours	11	16%
>24 hours	1	1%

Table 3: Symptoms at presentation (n=68)

Symptom	n	%
Pain/Discomfort	67	99%
Vomiting	52	76%
Choking	46	68%
Other symptoms	15	22%
Breathing difficulty	14	21%

Table 4: Number of extraction attempts (n=68)

Attempts	n	%
1	34	50%
2	16	24%
3	12	18%
4	5	7%
5	1	1%
Mean attempts	1.5	–

Table 5: Post-procedure outcomes and follow-up (n=68)

Parameter	Finding
Monitoring duration post-procedure	3–4 hours
Immediate complications	1 minor bleeding (8-day impaction case)
Major complications	None
Discharge within 4 hours	100%
Complications at Day 3 follow-up	None
Complications at 1-month follow-up	None
Complications at 6-month follow-up	None

Results and Discussion:

This study involved a total of 68 children presenting with esophageal foreign bodies. The procedure showed a 100% successful extraction rate **(Table 1)**. Coins were the commonest foreign body ingested (84%, n=57). This is in line with Indian data where coins predominate **[1].** Of the cases, 13% (n = 9) ingested button batteries. This finding reflects an increasingly universal trend. A large-scale study showed that 79.8% of cases involved children under the age of three years, indicating predominantly very young children were affected **[12].** All the cases in that series showed different degrees of erosion of mucosa. Foreign bodies was accounted majorly by washers, 3% (n=2). Although less common, these objects have been deemed important in this age group. 62% of children presented in less than 1–3 hours. 21% arrived in the first hour **(Table 2)**. The results indicate that parents should seek for health care immediately. On the contrary, a previous cohort reported that 75.7% showed up in 24 hours **[13].** The study also showed that 18.6% had underlying predisposing factors delaying recognition

[13]. In our study, there was only one child after 24 hours. In higher resource-limited settings delayed presentation is reported more **[14].** Ninety-nine percent (99%) experienced pain or discomfort at presentation. Common incidents also included vomiting (76%) and choking (68%) **(Table 3)**. Less frequently arise are breathing difficulty (21%) and other symptoms (22%). One of the most common presenting symptoms is drooling and vomiting **[13].** The high incidence of pain in this area may be due to pressure effects caused by impacted coins. The occurrence of vomiting and dysphagia is quite common in button battery impaction. As reported in **[12],** early-stage brown foamy vomiting is a characteristic feature of battery cases.On average, only 1.5 attempts were made. Just over 50% of the children were managed on the first attempt. This resembles a classic series that had 98% success with 0 complications **[7].** A high success rate of 91% was reported on large fluoroscopic Foley catheter series. That success rate dropped to 50% when the impaction was more than 3 days **[8].** A single child needed five attempts and had an 8-day impaction **(Table 4).** Extended impaction reduces the likelihood of successful extraction. The Foley catheter extraction is usually accomplished with high success rates and no complications related to the procedure. As operator training experience increases, so do these success rates **[10].** Post-procedural results were satisfactory at all intervals **(Table 5)**. There was just one case of minimal bleeding during the eight-day impaction. This research did not have any major complications. There is significantly higher complication rates with foreign bodies long retained in the esophagus. These complications involve perforation and fistula formation **[9].** All children left the hospital four hours after the procedure. No complications occurred at the 3-day, 1-month or six-month follow-up. This advantageous safety profile is in agreement with earlier Foley catheter series **[7].** Recent data further confirms same-day discharge and low complication rates.

Conclusion:

We show the sitting-position silicone Foley catheter technique is a safe, effective and an anaesthetic-free bedside intervention that can be used for the removal of an esophageal foreign body in children before a prolonged impaction can exacerbate mucosal injury. It is essential to standardize this protocol at district and peripheral hospitals in order to improve emergency paediatric outcomes in resource-poor settings lacking endoscope.

References:

[1] Soni A *et al. Indian J Otolaryngol Head Neck Surg*. 2023 **75**:1421 [PMID: 37636667]
[2] Reilly JS *et al. Pediatr Clin North Am*. 1996 **43**:1403 [PMID: 8973519]
[3] Singh B *et al. Ann Otol Rhinol Laryngol*. 1997 **106**:301 [PMID: 9109720]
[4] Loh K *et al. Otolaryngol Head Neck Surg*. 2000 **123**:613 [PMID: 11077351]
[5] Philteos J *et al. JAMA Otolaryngol Head Neck Surg*. 2022 **148**:677 [PMID: 35616924]
[6] Rossi A *et al. J Pediatr Gastroenterol Nutr*. 2017 **65**:496 [PMID: 28248795]
[7] Campbell JB *et al. Pediatr Radiol.* 1983 **13**:116 [PMID: 6408591]
[8] Schunk JE *et al. Pediatrics*. 1994 **94**:709 [PMID: 7936900]
[9] Erginel B *et al. BMC Pediatr*. 2023 **23**:605 [PMID: 38031091]
[10] Lim D *et al. Clin Exp Emerg Med*. 2021 **8**:30 [PMID: 33845520]
[11] Orji FT *et al. World J Surg*. 2012 **36**:1083 [PMID: 22382767]
[12] Xu G *et al. BMC Pediatr*. 2024 **24**:388 [PMID: 38851720]
[13] Altokhais TI *et al. Asian J Surg*. 2017 **40**:362 [PMID: 26922630]
[14] Adoga AA *et al. Ann Afr Med.* 2017 **16**:81 [PMID: 28469122]