

# A Comprehensive Study of Foreign Body Lodgment in Digestive Passage in MGMGH, Trichy

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## ABSTRACT

**Introduction:** Foreign body (FB) among children is vital for clinicians to have a timely diagnosis and effective management. The study aimed to describe the profile and management of foreign body ingestion among children presenting to a tertiary care hospital

**Material and methods:** The study was a prospective observational study, conducted in the department of ENT of MGMGH, Trichy, a tertiary care teaching hospital in south India. All the FB ingestion cases among children aged 1 to 15 years were included. The type of FB, clinical presentation, level of lodgment, management etc. were analyzed. Mean and standard deviation was used to summarize quantitative variables and frequency and proportion to summarize categorical variables.

**Results:** Majority (86%) of cases were aged less than 10 years. Males were slightly higher than females (56% Vs 44%). Most common foreign body ingested was Coin 38 (76%) of cases, followed by safety pin and plastic objects. Majority (70%) of foreign bodies lodged in cricopharynx and 30% in proximal esophagus. Among boys, 71.43% of the FBs were found in cricopharynx and 68.18% of the girls had FB in cricopharynx. The only type of foreign body found in cricopharynx was coin. All the FBs in cricopharynx were managed by direct laryngoscopy. Out of the 15 foreign bodies in proximal esophagus, 80% were managed by esophagoscopy and 20% by direct laryngoscopy.

**Conclusion:** FB ingestion Strategies regarding safe behaviors have a key role in prevention of injuries due to FB and must be strictly implemented.

**Keywords:** Foreign Body, Esophagus, Cricopharynx, Endoscopic Removal, Radiology, CXR

## INTRODUCTION

Foreign bodies in the airway, pharynx and esophagus, continue to be a diagnostic and therapeutic challenge for practicing otolaryngologists overall with peak incidence of FB ingestion occurs between the ages of 6 months and 3 years, thankfully it is estimated that 80% of ingested FB will pass through the gastrointestinal system without complications. The remaining 20% become lodged in the aero -digestive tract where airway FB are far outnumbered by digestive tract FB lodgment (85% HSW and colleagues).<sup>1</sup> In 2011, the American Association of Poison Control Centers documented foreign body ingestion (6.9%) to be one of the top 5 most common exposures in children aged ≤ 5 years.<sup>2</sup>

A thorough history is essential in the diagnosis of foreign body ingestion. If history is unable to be obtained, an initial

radiographic assessment is preferred for the immediate management.<sup>3</sup> The size, location, shape and number of radiopaque foreign bodies<sup>4</sup> as well as any anatomical abnormalities like narrowing of esophageal lumen, external compression can be assessed by this method.<sup>5</sup> However for radiolucent objects, CT scanning without contrast and diagnostic endoscopy are preferred. Barium swallow studies are contraindicated due to possible mucosal perforation. Further these contrast agents may interfere with endoscopic evaluation (as endoscopy is often needed for the foreign body extraction after a CT scan). The sensitivity of CT scan may be improved with 3D reconstruction.<sup>6</sup>

Management of foreign body ingestion is different in each case. It mainly depends on type of the object that is being ingested. Occasionally mid and distal oesophageal coin may spontaneously pass over 8-16 hours of time (43% and 67% respectively), while proximal coins tend to remain and are less likely to pass spontaneously. Removal supports rigid and flexible endoscopic techniques. If rigid endoscopy is chosen, direct laryngoscope done before intubation allows tracheobronchial involvement to be ruled out. Assisted firm upward retraction of the overlying neck skin helps in better visualization of proximal esophagus in small children <3 years.<sup>1</sup> Objects failing to pass are usually those with a large diameter or a long length.<sup>7</sup>

Depending on the type of impaction, different devices can be used. Commonly used tools include endoscopy, polypectomy snares, grasping forceps, magnetic probes, retrieval snare net etc.<sup>8</sup> The risk-benefit ratio ought to be considered while assessing the complications expected to occur owing to the FB itself and those secondary to the procedure of FB removal.<sup>9</sup>

The risk of complications associated with removal of foreign bodies is low but includes impaction, Cricopharyngeal spasm, mucosal injury/ perforation, bleeding, ulceration, perforation second missed foreign body and fever.<sup>10</sup> Bleeding in the case

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of aorto-esophageal fistula may happen after removal of the foreign body which can cause serious bleeding following FB removal. Patients with previous gastrointestinal surgery, congenital abnormalities of the gastrointestinal tract, peptic stricture and cancer are at a higher risk for foreign body arrest and perforation. Although perforation is estimated to happen in less than 1% of the cases,<sup>11</sup> some investigators have reported a higher rate of 4.5% and 5.6%.<sup>12</sup>

Children with ingested FB lodging in the cricopharynx/proximal oesophagus present with highly variable symptoms that include choking, drooling, poor feeding, dysphagia, odynophagia, chest pain, nausea, vomiting and respiratory symptoms secondary to tracheal compression.<sup>13</sup> In some

cases children can be entirely asymptomatic. Hence primary care physician and otolaryngologists should have high index of suspicion thereby avoiding delay in management. They should be aware of the management of foreign body ingestion and impaction because the management of these is different in each case. Previous studies help the practitioners to deal with impacted foreign bodies. Further studies are needed for the early and effective management of foreign body impaction. Here, we are presenting our experience of 50 cases of different types of FBs in upper digestive tract, their clinical presentations, site of impaction, management options and treatment outcomes.

## MATERIAL AND METHODS

This is a prospective study conducted in ENT department, MGMGH, Trichy, between October -2017 and January 2019. A total-children, aged up to 15 years, with history of FB ingestion or circumstantial suspicion of possible FB ingestion were included in the study. The study had excluded FB ingestion cases like Fish bone, brush bristles and pin-sharp objects that tend to lodge in pharynx and are detected and managed in the outpatient department.

A detailed history including age and sex, number and type of foreign body, duration between incident and presentation, were documented. All patients underwent X-ray soft tissue neck and upper chest in anteroposterior and lateral view for determining the location of foreign body. X-ray abdomen was performed in patients with no radiological evidence of foreign body in neck and chest. Check X-rays were taken in those who presented with previous X-ray (30-40%) to assess for spontaneous distal passage. Data was analyzed using IBM SPSS statistical software. Quantitative variables were presented as mean and standard deviation, categorical variables were presented as frequency and proportion.

## RESULTS

### Profile of FB affected cases

Majority (72%) of the reported FB cases in our study were in the age group of 3-10 years and cumulative 86% of cases were aged less than 10 years. Seven (14%) cases have been observed in children above 10 years of age. The proportion of Males was slightly higher than females (56% Vs 44%) in the study. (Table 1)

Age	No of Cases	Percentage
Age group		
< 3years	7	14%
3-10 years	36	72%
>10 years	7	14%
Gender		
Male	28	56%
Female	22	44%

**Table-1:** Age and gender distribution of FB ingestion cases (N=50)

Type of FB	Number	Percentage
Coin	38	76%
Safety pin	3	6%
Plastic object	3	6%
Denture (Loose tooth)	3	6%
Meat	1	2%
Alkaline battery	1	2%
Miscellaneous	1	2%

**Table-2:** Descriptive analysis of type anatomical site of lodgment and pressing features (N=50)

Side of lodgment of foreign body	Number	Percentage
Cricopharynx	15	30%
proximal esophagus	35	70%

**Table-3:** Descriptive analysis of type anatomical site of lodgment and pressing features (N=50)

Parameter	Cricopharynx (N=35)	Proximal esophagus (N=15)	P value
Gender			
Boys (N=28)	20 (71.43%)	8 (28.57%)	0.803
Girls (N=22)	15 (68.18%)	7 (31.82%)	
Type			
Meat (N=1)	0	1 (100%)	*
Coin (N=38)	35 (92.10%)	3 (7.89%)	
Safety pin (N=1)	0	3 (100%)	
Plastic object (N=1)	0	3 (100%)	
Denture (Loose tooth) (N=1)	0	3(100%)	
Alkaline battery(N=1)	0	1 (100%)	
Miscellaneous (N=1)	0	1 (100%)	

\* No statistical test was applied-due to 0 subjects in the cell

**Table-4:** Comparison of profile and management of FBs lodged at different sites

### Duration at presentation

The shortest time taken for reporting was 3 hours and longest was 5 days from the history of ingestion. Children <10 years presented early due to parental suspicion and apprehension, children in Above 10 years present sometimes late due to awaiting spontaneous expulsion and trying traditional ways like ingesting bananas, laxatives etc., Some are diagnosed radiologically from nearby centers (around 50%).

Most common foreign body ingested was Coin in 38 (76%) of cases, followed by safety pin plastic objects and dentures in 3 (6%) children each. One child ingested meat and another child came with ingestion of Alkaline battery. (Table 2)

Majority (70%) of the foreign bodies lodged in cricopharynx and remaining 30% lodged in proximal esophagus. None of the foreign bodies in our study were found in mid or distal esophagus. (Table 3)

Among the boys, 71.43% of the FBs were found in cricopharynx and this proportion was slightly lower in females, as 68.18% of the girls had FB in cricopharynx, the difference was statistically not significant (P value 0.803). The only type of foreign body found in cricopharynx was coin. Out of 38 coins, 35 (92.10%) were found in cricopharynx, with rest of 3 (7.89%), found in proximal esophagus. All the other types of FBs including met, safety pins, alkaline batteries etc. were found in proximal esophagus. (table 4)

All the FBs in cricopharynx were managed by direct laryngoscopy. Out of the 15 foreign bodies in proximal esophagus, 80% were managed by esophagoscopy and 20% were managed by direct laryngoscopy.

### Management and procedure

FB initially found in Cricopharynx migrated a bit during induction of anesthesia and instrumentation. Endoscopic "Hopkin's rod telescope" assistance greatly facilitates visualization thereby effective removal.

### DISCUSSION

Aspiration of foreign body into the gastrointestinal tract is not an uncommon problem in the pediatric population and the management of each case differs depending on the scenario. More vulnerable age group who present with foreign body ingestion is during first 6 years of life, with peak incidence, around 3 years of age. In our study, >70% of cases reported were between 3 to 10 years of age. Children commonly come to medical attention after a caregiver witnesses the ingestion of foreign body or after child reports an ingestion to caregivers. They present with vague symptoms which manifest later and may not suggest foreign body immediately. Prior history before investigations plays important role in diagnosis. The signs and symptoms of foreign body ingestion may be different and are not specific. After thorough physical examination, even with apparent absence of signs and symptoms, investigation is mandatory regardless of the age. Although radiographs may not always confirm or rule out the presence of a foreign body, the advantages of finding one on a radiograph far outweigh the disadvantages of missing one. If the history of ingestion of a

foreign body which is likely to be radio-opaque is given but it is not noted on films of the neck and chest, a radiogram of the abdomen may reveal its progression into the stomach or beyond. They also give information regarding the condition of the cervical spine for rigid endoscopy.

As per the literature, FB are most commonly non-vegetable matter with coins being the most common object found in large case series (27-80%), followed by safety pin, dentures, toy parts, jewellery (5-15%), hardware screws, disc batteries and the like. In the current study also, most common FB was coin in more than 3/4ths of the cases, followed by safety pin, plastic objects and dentures 6% children each. One child ingested meat and another child came with ingestion of Alkaline disc battery. Disc batteries represent an especially dangerous hybrid between a potential FB and a potential caustic agent. The tissue damage could be due to caustic injury due to i) leakage of battery content, ii) electrical discharge and mucosal burn iii) pressure necrosis and iv) toxic heavy metal absorption. Typical radiological presentation includes "double shadow" or "halo effect" on chest x-ray. Immediate endoscopic removal is advised, as majority of complications occur due to delay in diagnosis and management. The use of Hopkin's rod telescope has reduced the incidence of missed or incomplete removal. Laryngeal edema and inflammation are minimized with use of appropriately sized endoscopic equipment.<sup>1</sup>

In accordance with the previous studies, our study have reported that, the most common site of lodgment is in the cricopharynx<sup>14-16</sup> as the cricopharynx is the narrowest part of the food passages and the relatively weak peristalsis in the upper oesophagus makes this site more vulnerable.

The leading factors to the injuries caused by FB in digestive tract include children's behaviour, anatomical characteristics, and physiological features such as immature swallowing coordination, development of chewing capacity.

Further assessment regarding the management depends on the level of lodgment and type of foreign body, following the algorithm, appropriate treatment modalities are ensured. Children with upper GI FB ingestion can be effectively treated by an experienced endoscopist with safe and uncomplicated removal of such FBs using pediatric and appropriate ancillary endoscopic equipment. If rigid endoscopy is chosen, direct laryngoscopy done before intubation allows tracheobronchial involvement to be ruled out. Assisted firm upward retraction of the overlying neck skin helps in better visualization of proximal esophagus in small children < 3 years. Endoscopic expertise often prevent complications. Repeat endoscopy may be used to evaluate any associated mucosal trauma. Contrast swallow studies are recommended to rule out perforation before a normal diet is resumed.

After removal of foreign bodies children with uncomplicated courses do not usually need further evaluation. Children with recurrent impaction of foreign bodies in the esophagus need work-up for possible esophageal disorder. Also patients with recurrent or unusual foreign body ingestion need psychological evaluation. The majority of patients can be safely discharged home with appropriate instructions

## CONCLUSION

As per the current study the majority of the FB ingestion cases belong to 3 to 10 year age group, with slight male preponderance. Coin was the most common type of FB. Majority of the large FBs were lodged in cricopharynx and smaller FBs were found in proximal esophagus, with none in mid and distal esophagus. All of them were successfully managed by rigid laryngoscopy and esophagoscopy, with no major adverse events.

### III Key issues

- Foreign body ingestion is a common problem.
- The majority of swallowed objects will pass spontaneously.
- Any object in the esophagus has to be removed.
- Observation of coins in the esophagus for up to 24 hours can be justified provided that the patient remains asymptomatic.
- Any object causing symptoms has to be removed.
- A repeated radiograph should be obtained prior to performing endoscopy.
- Follow the suggested algorithm for evaluation and management of children suspected to ingest a radiopaque foreign body:

IV. Prevention is ideal; increasing the public awareness, educating on age appropriate food, industrial standards for toy part sizes would help decrease fatality from choking.

V. The advent of fiber-optics endoscopes has facilitated removal of foreign bodies prevented the development of complications. In the near future we expect more advanced scopes and overtubes to retrieve foreign bodies. The development of new diagnostic modalities may help provide a more accurate and reliable diagnosis of foreign body ingestion and could conceivably lead to more effective therapeutic approaches.

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