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Original article

Management of Ingested Foreign Bodies in the Upper Gastrointestinal Tract in Childhood: An Experience of 66 Cases and Suggested Recommendations

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SUMMARY

Background and Study Aims: Foreign body ingestion is a common problem in children. This study presents a retrospective clinical analysis of endoscopic methods in the extraction of ingested foreign bodies from the upper gastrointestinal tract. Patients and Methods: The charts of 75 children who had ingested foreign bodies were retrospectively reviewed. Results: Of the 75 patients, 66 (88%) were managed endoscopically. The type of foreign bodies varied greatly: mainly coins, jewelleries, toy parts, and rarely batteries and chicken or fish bones. The foreign bodies were located in the stomach (n=47), esophagus (n=16), pharynx (n=2) and duodenum (n=1). The success rate of foreign bodies extraction, using mainly Roth-net and other endoscopic accessory devices, was 100%. There were no complications during endoscopic interventions. There were no readmissions for those patients who did not undergo endoscopic examination. Conclusions: Endoscopic approach is the preferable method for the extraction of upper gastrointestinal foreign bodies in pediatric patients. Roth-net is the best endoscopic device for safe retrieval of ingested foreign bodies.

Keywords: Foreign body, endoscopic intervention, upper gastrointestinal tract

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INTRODUCTION

Foreign body (FB) ingestion is a potentially serious problem that causes morbidity in almost 1% of all patients. Approximately 1500 deaths per year are attributed to ingestion of FBs in the United States.[1,2] In 80-90% of cases, FBs pass through the gastrointestinal tract spontaneously. However, in 10-20% of cases, they are removed endoscopically. Up to 1% of all cases require surgery.

Eighty percent of FB ingestions occur in the pediatric population, with a peak incidence between 6 months and 3 years of age.[3] However, there are no clear guidelines regarding the management of ingested FBs. We reviewed our experience of ingested FBs in a pediatric population during an eight-year period, in an attempt to report a rational approach in the management of future patients.

PATIENTS AND METHODS

From September 1999 to May 2007, all children with a history of FBs ingestion who were referred for endoscopic treatment in the Department of Endoscopy and Motility Unit of the Central Hospital in Thessaloniki and in the Department of Gastroenterology of the University Hospital of Larissa were analyzed. Data including age, gender, clinical findings, investigations, procedures and complications were registered and analyzed.

Endoscopies were performed at the first available opportunity following referral to our centers. All procedures were performed during the normal working hours of our centers when the appropriate support services were available.

With the exception of patients with FBs that were easily visualized in the oropharynx, all children underwent

an x-ray of the neck, thorax and/or abdomen. Esophagogastroduodenoscopies were performed using video gastroscopes; all procedures were performed under general anesthesia. For FBs extraction, Dormia baskets, polypectomy snares, grasping forceps and Roth-net of different sizes were used. From a FB management standpoint, the upper gastrointestinal tract was divided into four distinct areas: oropharynx, esophagus, stomach and the first part of the duodenum.

Complication was defined as any event with a negative impact on the patients' evaluation, and it included aspiration, perforation, penetration into solid organs, intestinal obstruction and mucosal abnormalities of the esophagus.

RESULTS

During a period of eight years, 75 children were referred to the Department of Endoscopy and Motility Unit of the Central Hospital, in Thessaloniki and in the Department of Gastroenterology of the University Hospital of Larissa because of ingestion of a FB. Children were defined as patients younger than 14 years of age. In the majority of cases, the FB ingestion was witnessed or strongly suspected by bystander. In 9 cases, the ingested FBs had already passed in the intestine resulting in inability to remove the FB by endoscopy.

There were 41 male (62.1%) and 25 female (37.9%) among the remaining 66 children. Their age distribution is demonstrated in Figure 1 with the mean age being 3.9 years. All children were treated within 72 hours after the ingestion of FB (median 7.3h, range 0.3-72h).

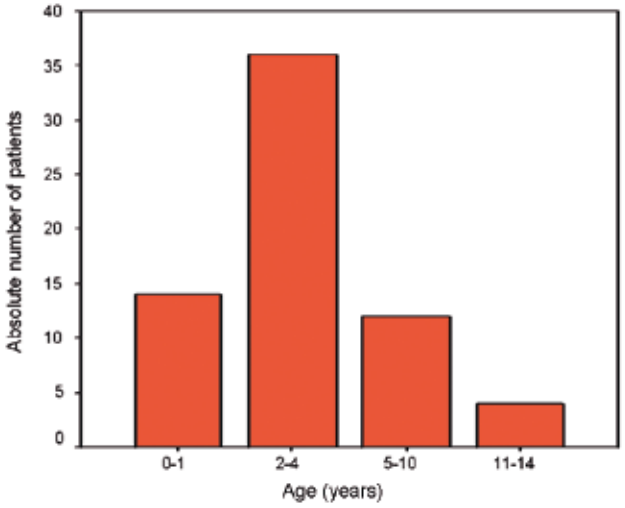

Figure 1. Age distribution of 66 children with foreign body ingestion

The FBs most frequently ingested by children were coins (47%) followed by jewelleries and toy parts (Table 1). The stomach (mainly) and the esophagus were the most frequent locations where the FBs were found during endoscopy (Table 2). Almost 85% of the children were asymptomatic. Only four patients with fish or chicken bones embedded in the pharynx (n=2) and esophagus (n=2) showed odynophagia. In addition, 6 patients with the FB in the esophagus complained for dysphagia.

During the endoscopic procedures, we were able to remove all FBs by using mainly Roth-nets of different sizes, especially for large blunted FBs such as coins (Figs. 2 and 3), glass beads, round batteries and jewelleries. Grasping forceps, such as alligator jaws, were also used to remove pointed FBs (Table 3). No other accessories, such as overtubes and Foley catheters, were used. In 13 children (19,7%), lacerations of the pharynx (n=4), esophagus (n=3) and stomach (n=6) were observed after the removal

Table 1. Nature and frequency of ingested foreign bodies

Foreign body	Number and frequency (%)
Coins	31 (46.97)
Jewellery	11 (16.67)
Toy parts	10 (15.15)
Batteries	3 (4.55)
Bones (fish, chicken)	4 (6.05)
Miscellaneous	7 (10.61)
Total	66 (100)

Table 2. Anatomic location in GI Tract where foreign bodies got stuck

Type of foreign body	Pharynx	Esophagus	Stomach	Duodenum
Coins		10	21	
Jewellery			11	
Toy parts		2	7	1
Batteries			3	
Bones (fish, chicken)	2	2		
Miscellaneous		2	5	

Table 3. Management of ingested foreign bodies

	N
Basket	12
Polypectomy snare	8
Forceps	4
Roth-net	42

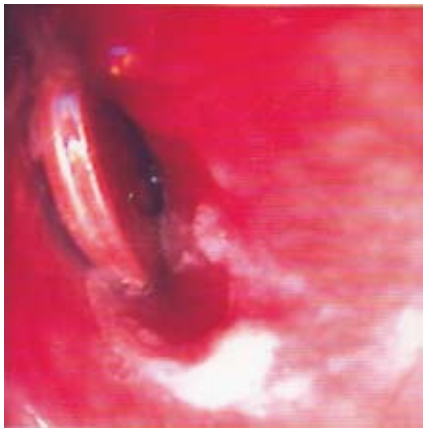

Figure 2. Endoscopic view showing a euro coin stucked in the lumen of lower esophagus

Figure 3. After capture, the coin is completely inside the Roth-net.

of FBs. The overall success rate of endoscopic management was 100% without any complications.

DISCUSSION

As with many other reports,[4-7] this retrospective study shows that endoscopic intervention is the preferred method for removing gastrointestinal FBs in children, especially for objects located in the upper gastrointestinal tract. The success rates reported in the literature range from 83% to 98.8%. In our study, an overall success rate of 100% was observed for endoscopic extraction. Similarly to other reported studies,[5,8,9] there were no complications such as bleeding, mucosal trauma, perforation or aspiration during the endoscopic procedures.

In the present study, coin ingestion, including euro coins, was noticed in 31 patients (47%), with esophageal impact in 10 patients (32.3%). Other studies[10,11] indicate that up to 89% of swallowed foreign bodies in the pediatric population are coins. Because 25-30% of esophageal coins in children will pass spontaneously without complications, treatment of these patients may reasonably include a period of observation for 8 to 16 hours.[12] We believe that all coins have to be removed without waiting to pass spontaneously in order to avoid any potential toxic effects. Some studies suggest a waiting period of up to several weeks if coins have passed into the stomach or even recommend no management at all if coins are already in the stomach.[13] This is in contrast with reports[14] of toxicity after coin ingestion. After excessive ingestion of zinc-based coins, toxicity has been observed in humans and animals living in zoos. The toxic effects of zinc absorption include nausea, vomiting, abdominal pain or local erosion and ulceration of the stomach. Systematically, massive zinc ingestion can also cause anemia, hemolysis and derangement of clotting factors, pancreatic dysfunction or pancreatitis with increase amylase activities, copper deficiency, hepatocellular necrosis, acute tubular necrosis, renal failure and even death from multisystemic organ failure.[14] A higher rate of toxicity due to euro coins compared with coins of other currencies is not expected unless an excessive coin ingestion occurs.[15] Notably, the 0.5, 1 and 2 euro pieces are magnetic and can possibly be removed with a magnet tube.[16]

The high rate of success of endoscopic methods in our study seems to be the result of the availability of accessories such as various types of grasping forceps, snares, baskets and, especially, of the extensive use of Roth-net of different size (Table 3). Moreover, no risky materials, such as razor, blades and large foreign bodies, were ingested by our patients. We prefer the Roth-net for the removal of blunted FBs, because it allows easy capturing and it also protects the esophageal mucosal from injury. It should be pointed out that to the best of our knowledge, such extensive use of Roth-net in children with ingested FBs has not been reported.

According to our data, we believe that an initial roentgenogram should be performed promptly at admission to determine the location and confirm the type of the ingested FB. Based on this information, the clinician should establish whether the FB needs immediate removal or simply outpatient observation for a short time (no more than 72h). Batteries containing corrosive substances which may cause necrosis of the mucosa in case of leakage, as well as sharp objects must be extracted as do impaction of FBs is diagnosed, since these FBs may cause life threatening complications such as retropharyngeal or mediastinal ab-

scess formation and perforation. Non-radio-opaque foreign bodies represent a much more difficult diagnostic challenge. A negative radiological investigation does not rule out the presence of a FB in the gastrointestinal tract. Indeed, in these cases we recommend a complete evaluation of the patients with barium swallow upper gastrointestinal series or endoscopy even in asymptomatic ones. If observation is chosen in asymptomatic patients with radiolucant FB, daily radiographs should be performed to document its passage. A high roughage diet is suggested, but laxatives should not be used.

In conclusion, endoscopy is the preferred method for the extraction of upper gastrointestinal tract FBs in pediatric patients because of its high success rate. In addition, we recommend the Roth-net as the accessory of choice for a safe extraction of a FB except they are long and sharp.

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