

ENDOSCOPIC MANAGEMENT OF PEDIATRIC FOREIGN BODY INGESTION: A
RETROSPECTIVE STUDY

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ABSTRACT

Background: Foreign body ingestion is prevalent among pediatric patients, with most accidental cases resolving naturally without intervention. However, immediate action is required in certain situations to mitigate risks and complications.

Methods: The present study was conducted at Hevi Pediatrics Teaching Hospital in Duhok Governorate which analyzed 58 pediatric patients diagnosed with foreign body ingestion from August 2022 to February 2025. Data included demographics, symptoms, clinical presentations, radiological findings, localization, and outcomes.

Results: The mean patient age was 4.63 ± 3.55 years, with 67.2% older than 2 years. Most foreign bodies were metallic objects, including, Turkish lira (29.3%), followed by disk batteries (17.6%), food, sharp objects, and others. Foreign bodies were found in the upper esophagus (75.9%), with symptoms such as drooling/dysphagia (25.9%) and drooling/vomiting (22.4%). Upper gastrointestinal endoscopy was performed for all cases, achieving successful retrieval in 56 patients.

Conclusion: Endoscopic intervention proved to be an effective and well-tolerated method for managing foreign body ingestion in the upper gastrointestinal tract.

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Keywords: Foreign body ingestion; Pediatric; Turkish lira; Batteries; Endoscopy; Accidental

The ingestion of foreign bodies poses a serious risk to children. It mostly affects children between the ages of 6 months and 5 years, usually around the age of 4. Children at this age often put small objects in their mouths to investigate their surroundings; they may not have teeth to break food into small pieces for swallowing, they often play while they eat, and they lack the mental capacity to distinguish between foods that are edible and those that are not.^[1] Over 75% of the more than 100,000 cases of foreign body ingestion that are recorded in the US each year involve children under the age of five^[2]. Some objects, such as button batteries, magnets, and sharp objects, provide serious hazards of perforation, blockage, and chemical burns, even though the majority of swallowed foreign bodies

pass through the gastrointestinal tract without any problems.^[3] Dysphagia, food rejection, drooling, and respiratory symptoms like wheezing, stridor, or choking are some of the symptoms that patients may exhibit, or they may be asymptomatic. Complications include damage to the entire esophageal wall, perforation, fistula, bleeding, stricture, and blockage when objects stay in the esophagus for longer than twenty-four hours^[4].

Because button batteries are frequently used as power sources in electronic gadgets, the frequency of button battery ingestion has been rising. Since button batteries and Turkish lira are similar in size and shape, a thorough X-ray examination is necessary to prevent a delay in diagnosis because these two FBs are frequently indistinguishable.

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Button batteries may result in small electrical burns due to lithium, caustic harm due to high pH, and serious damage due to local hydrolysis and the impact of hydroxide on the mucosa. Burns can occur within four hours if button batteries get lodged in the esophagus^[4].

Generally speaking, major issues that are linked to larger button batteries (diameter ≥ 20 mm) are not caused by small button batteries (diameter ≤ 20 mm)^[5]. Although they are uncommon, complications can include ulcers, erosion, and occasionally even perforation. In certain cases, necrosis was discovered, particularly when a button battery became stuck in the esophagus, and endoscopic treatment was postponed^[6].

In pediatric patients, endoscopic management has become the gold standard for removing swallowed foreign materials. This minimally invasive technique makes it possible to safely and effectively remove things that get lodged in the stomach, intestines, or esophagus. In pediatric situations, endoscopy has a high success rate and a good safety record, according to retrospective research. A number of variables, such as the foreign body's size, position, and type, as well as the amount of time that has passed since ingestion, influence the management approach selection^[7].

Clarifying local data on the incidence, types of swallowed items, risk factors, clinical presentation, diagnostic processes, and patient outcomes related to foreign body ingestion is the aim of the current study. This study will assist medical professionals in better understanding the local population's patterns of foreign body ingestion and in developing preventative and treatment plans that are suited to the community's unique needs.

METHOD

This study was conducted on a population of pediatric patients who visited the emergency department of Hevi Pediatrics Teaching Hospital in Duhok Governorate

and were referred to the endoscopy unit between August 2022 and February 2025 with the diagnosis of foreign body ingestion.

The demographic data, admission complaints, length of presentation, clinical manifestations, radiological findings, type and localization and the management outcome were documented. The study excluded patients who had a foreign body or corrosive ingestion, in which case the foreign body passed, and who were scheduled for vigilant observation until the foreign body was naturally expelled.

Every patient who ingested a foreign body was evaluated and referred for further research, as necessary. Those who required endoscopic intervention received flexible esophagogastrosopies and Pentax colonoscopies (HI20419). Esophageal lesion presentations were categorized using the Zargar classification criteria for corrosive injuries: Grade 0 indicates normal mucosa; Grade 1 shows hyperemia and mucosal edema; Grade 2A involves superficial erosions, hemorrhages, and the presence of a white membrane on the mucosa; Grade 2B is characterized by deep and annular ulcers; Grade 3A presents necrotic areas and multiple ulcerations; Grade 3B denotes extensive mucosal necrosis; and Grade 4 indicates perforation. The SPSS version 27 was used to analyze the data. Numbers and percentages were used to express data pertaining to categorical variables. The mean \pm standard deviation was used to express continuous variables. The chi-square test was used to compare groups of categorical variables. A p-value < 0.05 was considered statistically significant.

RESULTS

The present study included a sum total of 58 pediatric patients with foreign body ingestion, with demographic and clinical characteristics summarized in Table 1. The majority of patients were older than 2 years (67.2%), and males slightly outnumbered

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females (53.4%). The mean age was noted to be 4.633 ± 3.5 years. Foreign body impaction duration was most commonly <6 hours (62.1%), followed by 6–24 hours (22.4%) and >24 hours (15.5%). The meantime of presentation to the hospital after ingestion was 4.15 ± 1.40 hours. Eight patients (13.8%) were asymptomatic at time of presentation, while the rest of patients had one or more GI symptoms which included refusal to feed (25.9%),

drooling/dysphagia (25.9%), drooling/vomiting (22.4%), other symptoms (e.g., accidental findings, irritability; 13.8%) followed by cough/stridor (12.1%). Foreign bodies were most frequently located in the upper esophagus (75.9%), followed by the middle esophagus (12.1%), lower esophagus (6.9%), small intestine (3.4%), and stomach (1.7%).

Table 1: Descriptive Characteristics of Pediatric Patients with Foreign Body Ingestion (N = 58)

Variables	Description	N (%)
Age (years) mean ± SD	(4.6331 ± 3.55120)	
Age Category	≤ 2 years	19 (32.8%)
	> 2 years	39 (67.2%)
Gender	Male	31 (53.4%)
	Female	27 (46.6%)
Duration of Foreign Body Impaction (hours) mean ± SD	(1.93 ± .617)	
Duration Categories of Foreign Body Impaction (Hours)	< 6 hours	36 (62.1%)
	6 - 24 hours	13 (22.4%)
	> 24 hours	9 (15.5%)
Symptoms	Symptomatic	50 (86.2%)
	Asymptomatic	8 (13.8%)
Clinical presentation	Refuse to feed	15 (25.9%)
	Drooling, Vomiting	13 (22.4%)
	Drooling, Dysphagia	15 (25.9%)
	Cough and Stridor	7 (12.1%)
	Others*	8 (13.8%)
	Upper Oesophagus	44 (75.9%)
Site of Foreign Body Impaction	Middle Oesophagus	7 (12.1%)
	Lower Oesophagus	4 (6.9%)
	Small Intestine (Not visible)	2 (3.4%)
	Stomach (posterior)	1 (1.7%)
	Location	Duhok
Location	Akre and periphery	19 (32.8%)
	Zakho	12 (20.7%)
	Semel	4 (6.9%)
	Amedi and periphery	3 (5.2%)

A cross-tabulation analysis (Table 2) showed no significant association between age category (≤2 vs. >2 years) and foreign body impaction site (p = 0.554). Upper

esophageal impaction was most common in both groups—**84.2% (95% CI: 62.4–94.5) in ≤2 years and 71.8% (95% CI: 56.2–83.5) in >2 years**. Similarly, no significant

association was found between age and foreign body type ($p = 0.138$). However, older children tended to ingest more **disc batteries (23.1%, 95% CI: 12.6–38.3 vs. 5.3%, 95% CI: 0.9–24.6)** and **sharp objects (15.4%, 95% CI: 7.2–29.7 vs. 5.3%, 95% CI: 0.9–24.6)**, while younger children more frequently ingested **other**

objects (42.1%, 95% CI: 23.1–63.7 vs. 17.9%, 95% CI: 9.0–32.7). Turkish lira was the most commonly ingested foreign body (29.31%), followed by disk batteries (17.58%), food (15.31%), sharp objects (12.06%), and others (25.86%) (Figure 1 A, B, C, D, E).

Table 2. Cross-Tabulation of Foreign Body Impaction Sites and Types by Age Category

Variables	Foreign Body Impaction Sites/ Types	Age category		P value
		≤2 years (%) [95% CI]	>2 years (%) [95% CI]	
Site of Foreign Body Impaction	Upper Esophagus	84.2% [62.4–94.5]	71.8% [56.2–83.5]	0.554
	Middle Esophagus	10.5% [2.9–31.4]	12.8% [5.6–26.7]	
	Lower Esophagus	0.0% [0.0–16.8]	10.3% [4.1–23.6]	
	Small Intestine	5.3% [0.9–24.6]	2.6% [0.5–13.2]	
	Stomach (posterior)	0.0% [0.0–16.8]	2.6% [0.5–13.2]	
Foreign Body Type	Turkish lira	26.3% [11.8–48.8]	30.8% [18.6–46.4]	0.138
	Disc Battery	5.3% [0.9–24.6]	23.1% [12.6–38.3]	
	Food	21.1% [8.5–43.3]	12.8% [5.6–26.7]	
	Sharp Object	5.3% [0.9–24.6]	15.4% [7.2–29.7]	
	Other	42.1% [23.1–63.7]	17.9% [9.0–32.7]	

* Pin, Needle, Screw, metallic pull tab (Pepsi)

**Metals, Toys, Necklace of different shapes

CI= confidence interval.

The association between clinical symptoms and the site of foreign body impaction in pediatric patients is shown in table 3. The upper esophagus was the most frequently affected site, with significant correlations to symptoms such as drooling and vomiting (76.9%), drooling and dysphagia (86.7%), cough and stridor (85.7%), and refusal to eat (86.7%), as reflected by a statistically

significant p value of 0.022. The middle and lower esophagus were less frequently impacted, with lower percentages across symptoms. Foreign body impaction in the small intestine and stomach was noted to be rare. This analysis underscores the upper esophagus as the primary site linked to clinical presentations in pediatric cases.

Table 3: Association Between Clinical Presentation and Site of Foreign Body Impaction in Pediatric Patients (N = 58)

Site of foreign body impaction	Drooling, Vomiting	Drooling, Dysphagia	Cough and Stridor	Refused food	Others	P value
Upper Oesophagus	10 (76.9%)	13 (86.7%)	6 (85.7%)	13 (86.7%)	2 (25.0%)	0.022
Middle Oesophagus	3 (23.1%)	1 (6.7%)	1 (14.3%)	0 (0.0%)	2 (25.0%)	
Lower Oesophagus	0 (0.0%)	1 (6.7%)	0 (0.0%)	2 (13.3%)	1 (12.5%)	
Small Intestine*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (25.0%)	
Stomach (posterior)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (12.5%)	

* The patient underwent an upper and lower endoscopy.

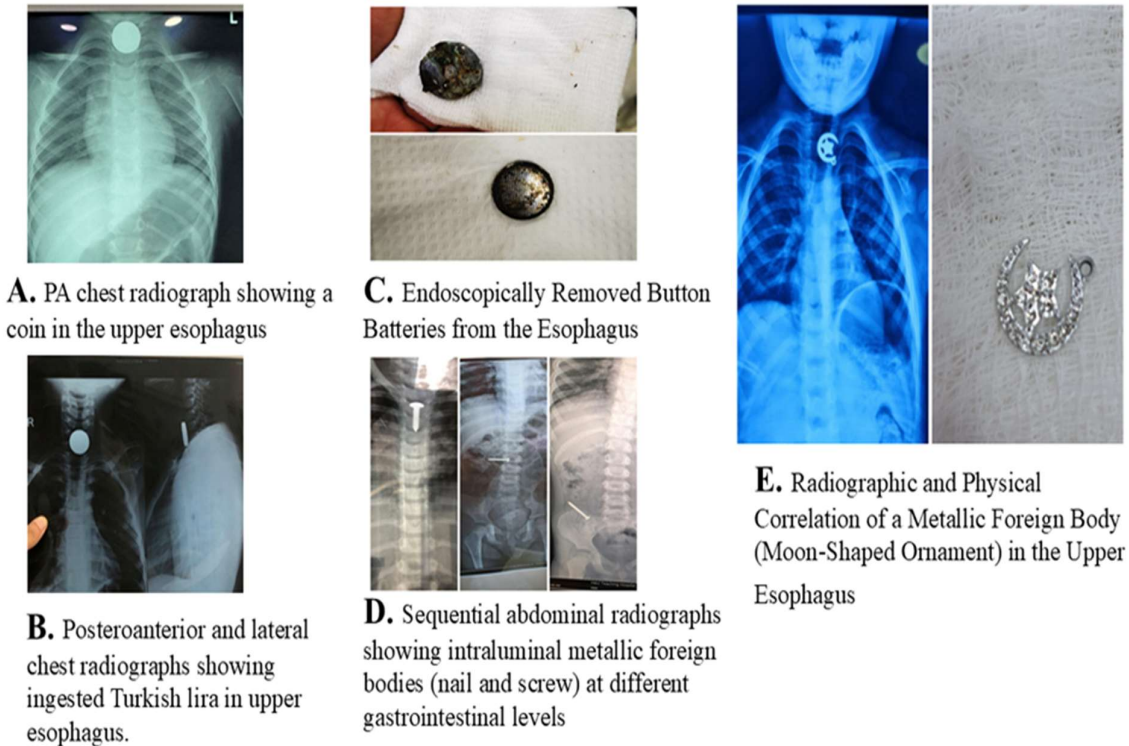


Figure 1: Various cases of foreign body ingestion

DISCUSSION

Foreign body ingestion is a prevalent issue in young children, especially those between the ages of six months and three years. Some objects, such as magnets, button batteries, or sharp objects, can cause serious problems and require immediate medical attention, even though most objects pass through without harm^[8]. In these situations, endoscopy is vital because it enables to remove objects lodged in the stomach or esophagus effectively. In order to lower the risk of consequences like blockage or perforation, early endoscopic therapy is crucial^[9].

According to the current study, the median age at presentation was 4.633 ± 3.5 years, and the majority of patients (67.2%) were older than 2 years. The present observation is in agreement with other reported studies where foreign body ingestion occurred in children under the age of five^[10-12]. Children are vulnerable to ingesting foreign bodies because of their propensity for putting anything and everything in their

mouths at this age, as well as their teething period, premature neural networks that coordinate aspiration and ingestion, and their habit of laughing and playing while they eat^[13]. The current study found a male preponderance. This is in accordance with reported studies where male predominance was observed^[10,14]. The more active and exploratory temperament of males may be the reason for their predominance 14.

The average period of foreign body impaction was less than six hours. After ingestion, the average time to present to the hospital was 4.15 ± 1.40 hours. Parental vigilance contributed to the quicker diagnosis of FB ingestion in kids. The parents' ignorance of the importance of the symptoms and indicators could be one factor contributing to the delayed presentation. Delays in hospital presentation were also caused by patients traveling from far locations, receiving treatment from local healthcare bodies, and lacking a clear history of FB intake^[15].

Age, the type of FB, the anatomical location of lodgement, and the amount of time since ingestion can all affect the symptoms and signs that a patient may exhibit. The most typical presenting symptoms include breathing difficulties, vomiting, dysphagia, salivary drool, retrosternal pain, and the sensation of presence of a foreign body^[16]. In the present study refusal to feed (25.9%) and drooling/dysphagia in 25.9%, followed by drooling/vomiting in 22.4% of the patients were observed. The results of this investigation showed that the oesophagus had the highest number of FBs, followed by the small intestine and stomach. This aligns with previous documented research that revealed the esophagus and stomach to be the most frequent locations for FBs to lodge^[17,18].

No statistically significant association between age category (≤ 2 years vs. > 2 years) and foreign body impaction site and type was observed in the present study. Many studies support the observation of no statistically significant association between age category (≤ 2 years vs. > 2 years) and foreign body (FB) impaction site or FB type. A study involving 1,199 cases of pediatric foreign body ingestion over a 13-year period reported that while certain objects like Turkish lira were commonly ingested across all age groups, the site of impaction showed no significant variation between children aged ≤ 2 years and those > 2 years^[19]. Research comparing esophageal foreign body impaction in pediatric and adult populations highlighted that in children, the upper esophagus was the most common site of impaction, regardless of age category^[20]. The study concluded that age did not significantly influence the site of impaction.

A retrospective analysis of foreign body ingestion in emergency settings noted that the distribution of impaction sites was consistent across different pediatric age groups, with no significant differences observed between younger and older children^[21]. These findings collectively

support the notion that age category does not have a statistically significant impact on the site of foreign body impaction, or the type of foreign body ingested.

Studies on foreign body ingestion patterns can support the finding that younger children are more prone to eating non-specific objects, whereas older children are more likely to ingest disk batteries and sharp objects. Younger children, particularly those under two, mouth objects carelessly as a way to investigate their surroundings. This conduct results in the consumption of a broad range of non-specific foods^[22]. Due to their increased movement and dexterity, older kids can reach smaller, more specialized goods like disc batteries and sharp objects. These patterns are influenced by their curiosity and object manipulation skills. While older children might avoid these safety measures, parents of younger children might be more careful to keep dangerous objects out of their reach.

In the present study, the most commonly ingested FB was observed to be inorganic in nature such as Turkish lira (29.31%), followed by disk batteries (17.58%), food impaction (15.31%), sharp objects (12.06%) and other objects like metals, toys, and necklace of different shapes (25.86%). The observed rates corroborate with the findings reported elsewhere [23,24]. Because of their accessibility and tiny size, Turkish lira are sometimes inadvertently ingested. Because they can result in serious injury, disk batteries—especially button batteries—are a serious problem. Numerous cases of their consumption have been reported, and their frequency has been rising over time [25]. Batteries' electrochemical makeup and great potential for local harm make them more hazardous to swallow than Turkish lira or other inert objects.

Upper gastrointestinal endoscopy was performed on all patients for foreign body extraction, successfully retrieving the ingested object in 46 patients (79.31%). In

9 patients (15.1%), the foreign bodies, primarily food, were safely pushed into the stomach. The effectiveness and safety of upper GI endoscopy in treating swallowed foreign bodies in pediatric patients have been repeatedly shown by retrospective investigations.

An analysis of 368 pediatric cases, for instance, in a tertiary care hospital revealed that endoscopic retrieval was effective in 97.63% of cases with only a few associated complications^[26]. The success rate of selective endoscopic intervention was 96.1%, according to another examination which included a sum total of 675 cases, highlighting the procedure as the recommended technique for removing foreign bodies.²⁴ These results highlight the importance that prompt endoscopic care plays in lowering hospital stays and averting serious consequences.

Among the included patients, three had particularly intriguing cases of foreign body ingestion. The first one experiencing recurrent wheezing and stridor for six months underwent a CT scan, which revealed a radiopaque shadow in the mid-esophagus. However, both the esophagogastroduodenoscopy (OGD) and bronchoscopy results were negative. Upon further exploration via thoracotomy, it was discovered that the child had swallowed a detached Pepsi bottle cap, which had become embedded within the esophageal wall, causing pressure-related symptoms. The foreign body was successfully removed by open surgery. The second one was a 1-year-old girl with a history of liver transplant due to biliary atresia. A foreign body remained lodged in her small intestine for 25 days without changing position. Although the upper and lower endoscopy were performed, the object could not be reached. Eventually, it passed naturally through the stool on the same day. This could be attributed to the increased pneumatic expansion and enhanced peristalsis that occur during endoscopy. The third one involved a 2-year-old child

who had swallowed disk batteries, which remained in the small intestine for six days. Upper and lower endoscopy were conducted, but no foreign body was detected. However, the batteries were spontaneously expelled through the stool later that same day. While this should not be regarded as a standard approach, it strongly indicates that the management of ingested foreign bodies should be tailored to each case. Therefore, all factors concerning the child and the foreign body must be thoroughly assessed before proceeding with an invasive procedure. Additionally, even for radiolucent foreign bodies, a basic X-ray should not be overlooked, as it aids in ruling out alternative diagnoses and can be a cost-effective option for patients in countries without universal healthcare.

CONCLUSION

The removal of foreign objects stuck in the upper gastrointestinal system can be accomplished safely and successfully with endoscopic intervention. Anxiety in parents may be reduced and consequences avoided with early intervention. Turkish lira is the most frequently consumed foreign object, therefore addressing this issue and increasing awareness would undoubtedly lessen its severity.

Children with FBs require appropriate management, qualified medical professionals, sufficient equipment, and, if required, inpatient admission in order to receive the right care. It may be possible to slow the spread of injuries and problems in the future by implementing defined diagnostic and therapeutic strategies in pediatric emergency rooms. To halt the observed trend, more preventive actions are required, with a special emphasis on the preschool-toddler demographic. These measures should include increased consumer safety regulations and public health programs.

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پوخته

چارهسهریا زاروکا و دهرمانکرنا وان ب ریکا نافیشکی (منظار) ل دهمی داعویرانا تشنتین بیانی:
فهکولینهکا پشتراستفقهکرنی (استعادیة)

پیشهکی: داعویرانا تشنتین بیانی لدهف زاروکان حالتهکی بهربهلاقه ل پراکتیکین ساخلمی. پتربا وان حالمتان ب خوڤه بیی دهستیوردا نا پزیشکی خلاس دین. لی، هندهک رهوش بیدقی دهستیوردا نا زور بلهزه بو قورتالکرنی ژ مهترسی و سهربارکین مهزن.

شیوازین فهکولینی: فهکولینهکا وهسفی-شروفهکار (وصفیة تحلیلیة) هاته نهجامدان ل نهخوشخانا هیقی یا زاروکان یا فیرکرنی ل پاریزگهها دهوکی. 58 زاروکی کو ب داعویرانا تشنتین بیانی هاتبونه دهستیویشانکران ل ناقهرا نابی 2022 و شوباتا 2025 ئ تیدا بهشدار بوون. زانیاریین گریدا تایبهمندیین دیموگرافی، نیشانین نهخوشی، نهجامین پشکنینین تیشکی (نهشعه)، جهی تشنتی بیانی، و ریکار و نهجامین دهرمانی هاته کومکران و شروفهکران.

نهجام: ناقهندیی ژیی نهخوشان $4.63 \text{ } \mu\text{m} \text{ } 3.55$ \$ سال بوو، و پتربا وان (67.2%) ژیی وان ژ دوو سالان پتر بوون. تشنتین کانزایی پترترین ب شیوهیهکی گشتی نه ماده بوون بین هاتینه داعیران. پاری لبرهیا تورکی یا هسه بهربهلاقی بوو (29.3%)، ل پاشی وان پاتریین قورسکی (17.6%) هاتن، پاشی ماددهیین خارنی، تشنتین تیژ، و تشنتین جوداجودا بین دی. جهی تشنتی بیانی ل بورییا خارنی یا سهری (مریء) ل 75.9% ژ حالمتان بوو. نیشانین نهخوشی بین هسه بهربهلاقی بریتی بوون ژ هاتنا لیکا دهقی ب گهل عهسری بلعی (141.5% - نهه بهشه ژ نهجامی وئ بوویه) و هاتنا لیکا دهقی ب گهل فهرشینی (22.4%). ههمی نهخوشان نافیشکا دهقی یا سهری (تنظیر) بو هاتهکران، و تشنتی بیانی ب سهركهفتیانه ل 56 حالمتان هاته دهرهینان.

دهر نهجام: دهستیوردا نا ب نافیشکی یا سهری ریگهکا زور ب مفا و نارامه ل دهستیویشانکران و چارهسهرکرنا حالهتین داعویرانا تشنتین بیانی ل بهشی سهری بی کونهدامی ههرسی ل زاروکان، و ب شیوهیهکی مهزن ب پشکا خو رادبیت د کیمکرنا ریژهیا نالوزیبیان و سهربارکان و باشترکرنا چارهسهری.

الخلاصة

العلاج بالمنظار لابتلاع الأجسام الغريبة لدى الأطفال: دراسة استيعادية

الخلفية والأهداف: يعد ابتلاع الأجسام الغريبة من الحالات الشائعة في الممارسة السريرية لدى فئة الأطفال، حيث تنتهي معظم الحالات العرضية بشكل تلقائي دون الحاجة إلى تدخل طبي. إلا أن بعض الحالات تستدعي تدخلا عاجلا لتفادي المضاعفات الخطيرة.

طرق البحث: أجريت دراسة وصفية تحليلية في مستشفى هيفي التعليمي للأطفال بمحافظة دهوك، وشملت 58 طفلا تم تشخيصهم بابتلاع أجسام غريبة خلال الفترة الممتدة من أغسطس 2022 وحتى فبراير 2025. تم جمع وتحليل البيانات المتعلقة بالخصائص الديموغرافية، الأعراض السريرية، نتائج الفحص الشعاعي، موضع الجسم الغريب، والإجراءات المتبعة ونتائج العلاجية.

النتائج: بلغ متوسط عمر المرضى 4.63 ± 3.55 سنوات، وكانت الغالبية (67.2%) من الأطفال تزيد أعمارهم عن سنتين. شكلت الأجسام المعدنية النسبة الأكبر من المواد المبتلعة، حيث كانت عملة الليرة التركية الأكثر شيوعا (29.3%)، تليها البطاريات القرصية (17.6%)، ثم المواد الغذائية، والأجسام الحادة، وأخرى متنوعة. تم تحديد موضع الجسم الغريب في المريء العلوي في 75.9% من الحالات. تمثلت الأعراض السريرية الأكثر شيوعا في سيلان اللعاب المصحوب بعسر البلع (25.9%) وسيلان اللعاب مع القيء (22.4%). خضع جميع المرضى لتنظير الجهاز الهضمي العلوي، وتم استخراج الجسم الغريب بنجاح في 56 حالة.

الاستنتاج: تعد التدخلات بالمنظار العلوي وسيلة فعالة وآمنة في تشخيص وعلاج حالات ابتلاع الأجسام الغريبة في الجزء العلوي من الجهاز الهضمي لدى الأطفال، وتسهم بشكل كبير في تقليل معدلات المضاعفات وتحسين المال السريري.