

CASE REPORTS

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# Diamonds in the appendix

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## Abstract

**Background:** An uncommon cause of appendicitis is the entrapment of ingested foreign objects in the appendix. Although a rare event, it could remain asymptomatic for a prolonged time. The presence of foreign bodies in the gastrointestinal tract has a high potential for complications, in particular if sharp or large enough in size to cause obstruction. However, most often an ingested foreign object would be eliminated in the stool. Rarely, it may reside in the appendix depending on various factors such as the nature of the ingested body and the appendiceal peristaltic movements.

**Case presentation:** We report a case of abdominal pain due to a diamond earring trapped in the appendix for 2 years. A plain X-ray of the abdomen confirmed the diagnosis which prompted a laparoscopic appendectomy resulting in resolution of symptoms.

**Conclusion:** The initial presentation of an ingested foreign object can be similar to signs of symptoms of acute appendicitis and the patient must be monitored for several days to follow the trajectory of the foreign body in order to prevent complications. Even though the incidence is more common among the pediatric population, vigilance among adults should also be undertaken with a history of ingesting a foreign object, as this case demonstrates the importance of keeping a high index of suspicion when encountering such cases.

**Keywords:** Foreign body, Appendix, Pediatric, Earring, Case report, Laparoscopy

## Background

Foreign body (FB) ingestion is a common scenario among children ages between 6 months and 6 years. Ingested objects depending on their shape, sharpness, size and nature differ in how they could injure the appendix wall if entrapped at this site [1]. Most ingested FBs are easily accessible in the child's environment. Among all ingested FBs, coins (61.7%) occupy the highest frequency, followed by toys (10.3%), jewelry (7.0%), and batteries (6.8%) [2]. Even though it is a common accidental occurrence, most ingested FBs pass through the body without causing any injuries [3]. About 1% are retained in the gastrointestinal tract [4].

Some of the ingested FBs may be the causative factor in alimentary tract obstruction or fistulas when they

become lodged in the esophagus or the intestine. In the case of sharp rigid objects, they could tear the gastrointestinal lining resulting in perforations. Perforation arises in 70% and abscesses develop in 31%, with ingested sharp tipped objects [5]. In rare cases, the effect of gravity leads the ingested FBs, with a higher density than the bowel content, into the appendix contributing to an obstruction. The position of the appendix and the failure of adequate appendicular peristalsis to push out the FB may lead to inflammation that can potentially cause perforation if left untreated [6].

## Case presentation

A 5-year-old boy was referred to our surgery clinic at Almoosa Specialist Hospital in Al Ahsa, Saudi Arabia. He presented with recent occasional intermittent mild abdominal pain and a history of a FB ingestion that occurred 2 years prior to presenting at our clinic. On examination, vital signs were stable, the abdomen was soft without tenderness including over the right lower

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quadrant (RLQ), the bowel sounds were normal, rectal exam was unremarkable and occult blood negative. Labs were normal. Abdominal X-ray (Fig. 1A) revealed an irregular radiopaque (metallic) FB in the RLQ, without any other abnormalities.

The patient underwent elective abdominal laparoscopic exploration. Fluoroscopy was used to precisely locate the ingested object. The FB was found in the distal appendix. An appendectomy was performed and it was sent to histopathology. A diamond gold stud earring and clasp was extracted after dissection of the appendix (Fig. 1B). Histopathology showed no acute inflammation. The patient was discharged the following day and had an uneventful postoperative course.

### Discussion

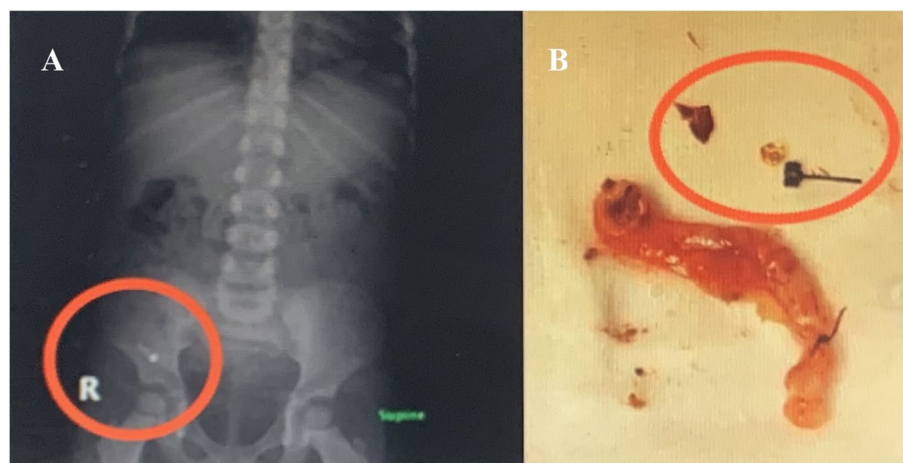
The management of gastrointestinal (GI) foreign bodies is routine observation. Sequential radiographs and stool follow-up are performed to confirm passage, unless it involves FB in the esophagus (FB lodged here should be removed), or FB consisting of batteries, sharp objects, long objects or magnets [7]. The majority of ingested FBs with a diameter less than 2.5 cm and a length less than 6 cm will within 5 days spontaneously pass through the gastrointestinal tract with excretion in the stools [8]. If they lodge in the intestines, it occurs around the curvature of the first part of the duodenum (duodenal sweep) and the physiologic narrowing just before the ileocecal valve [9].

In extremely rare cases, FBs may settle in the vermiform appendix [10–16]. These cases have been estimated to occur in 0.005% of ingested FBs [8]. Dr. Claudius Amyand performed the first successful appendectomy, at St. George's Hospital in London 286

years ago. The culprit was a swallowed pin lodged in the appendix causing perforation in an 11-year-old boy [17]. This is the first reported case in Saudi Arabia of an earring trapped in a pediatric appendix undetected for 2 years. The pathophysiology is not entirely clear, but it is believed that the characteristics of the FB plays an essential role in the occurrence of symptoms similar to acute appendicitis. If the FB is heavier than fecal matter, it may settle in the appendix due to gravity. The irregularity of the FB shape may also impede their evacuation by the peristaltic movements of the appendix. The size of the FB could occasionally obstruct the opening of the appendix. Examples of easily ingested objects that fit the above descriptions include balloons, toys with small parts, doll accessories, coins, safety pins, paperclips, pins, marbles, small balls, nails, bolts, and screws, erasers, batteries, broken crayons, jewelry (rings, earrings, pins, etc.), small magnets and small caps for bottles. Another factor contributing to this rare event is the relatively weak appendiceal peristalsis [8].

When a FB lodges itself, inflammation and edema are likely to occur as a result of increased intraluminal pressure leading to appendicitis. The consequences from not recognizing and failure to appropriately manage the early presentation may lead to complications varying from local infection, obstruction, perforation, peritonitis, septic shock and death. However, the course of these events does not develop suddenly, there may be signs that indicate something is brewing, starting from pain and tenderness over the RLQ to fever and abdominal distention and peritoneal signs.

Pediatric ingestions most commonly occur in the six months to six-year age range [9, 18–20] (<https://colum>



**Fig. 1** **A** Evidence of RLQ radiopaque metallic foreign body. **B** Unremarkable appendix with luminal fecal material and a diamond gold metal stud earring with clasp FB detected on X-ray

[biasurgery.org/news/2015/06/04/history-medicine-mysterious-appendix](https://biasurgery.org/news/2015/06/04/history-medicine-mysterious-appendix)). FB ingestion usually is initially asymptomatic in the pediatric population. Some FB may remain for long periods of time as in this case of a 2-year duration. Of note, 38% have reported recurrent pain for greater than a period of 1 month [5]. The majority of FB have an easy passage through the gastrointestinal tract. Nevertheless, the risk of complications remains present and proper management should be pursued. Most foreign bodies in the GI tract are radiopaque, therefore plain radiography as the first investigation is often diagnostic [21, 22]. When plain films are non-diagnostic, follow-up contrast radiography or CT is recommended [7]. In the majority of cases of trapped FB in the appendix, the X-ray does not show the specific location of the FB. With acute symptoms or a failed colonoscopy, laparoscopic exploration with the aid of the fluoroscope is the next course of action needed for the removal of the foreign objects [23, 24]. In this case, laparoscopy was preferred over colonoscopy for the following reasons; the prolonged time period between the FB ingestion and the serial diagnostic X-rays that suggested that the FB was not moving and the location of the FB; the high index of suspicion that the sharp pin-like object was trapped in the appendix; and the parents exaggerated perceived additional financial burden and risks of a CT and colonoscopy. The standard of care in such cases is serial diagnostic X-rays, followed by CT localization, if the FB is no longer migrating. Colonoscopy is initially recommended if the FB is found to be distal to the terminal ileum [23]. If the patient presented with acute symptoms or a failed attempt of retrieval via endoscopy, classical laparotomy and laparoscopic procedures are preferred [24] with or without the aid of intraoperative imaging. Identifying the exact location of the FB can save the patient unnecessary surgical exploration.

These cases have also been reported in adult patients [23], mainly found in the elderly, alcoholics, psychiatric patients, and prisoners [7]. In contrast to pediatric cases, adults are more likely to present with symptoms. It can be equally dangerous in adults as in children; however, not as prevalent.

## Conclusion

It can be life-saving to educate parents and educators through public awareness campaigns about how to reduce swallowing and choking hazards around the home, nurseries and school by keeping small objects away from children. FB in the appendix is a very rare condition. The greatest factor of successful GI foreign body removal is radiographically pinpointing the object's exact

location. However, if radiology indicates a foreign object in the abdomen, keep the appendix in mind as a possible location. A low threshold for surgery is suggested when there is a sharp rigid retained foreign body in the appendix as it may lead to an acute abdomen with perforation, abscess or appendicitis.

## Abbreviations

FB: Foreign body; RLQ: Right lower quadrant; GI: Gastrointestinal.

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## Authors' contributions

Conception of the work: CC. Data collection/literature review: HA/AsA/MA. Literature analysis and interpretation: HA/AsA/MA/AhA. Drafting the article: HA. Drawing/creating figures/tables: HA/AhA. Critical revision of the article: CC. Final approval of the version to be published: HA/AsA/MA/AhA/CC.

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### Ethics approval and consent to participate

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### Consent for publication

Parental consent to publish was obtained from the study participant.

### Competing interests

All authors declare that they have no competing interests.

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