

Appendiceal foreign body in an infant

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Abstract

Rationale for this case report: Many children are hospitalized because of foreign body ingestion. In such circumstances, the gastroenterologist must consider the timing of ingestion; the size, type, and location of the object ingested; and the patient's symptoms. But appendiceal foreign body in infant is very rare.

Patient concerns: A 12-month-old boy visited because of swallowing small objects 2 weeks ago. Three small beads were found in the right lower quadrant on abdominal radiography. A 7-year-old boy was admitted for treatment of appendiceal foreign body, which was detected by accident 3 months ago.

Diagnoses, interventions, and outcomes: A 7-year-old boy had abdominal pain and underwent immediate appendectomy. However, the 12-month-old child was asymptomatic, which led to deliberation in regard to wait time for an appendectomy in younger children with asymptomatic appendiceal foreign body. He underwent prophylactic appendectomy after 2 months.

Main lessons: An appendiceal foreign body is very rare in infant and there are currently no treatment guidelines. We report 2 cases of appendiceal foreign body including infant who gave us difficult decisions.

Abbreviations: CRP = C-reactive protein, ESR = erythrocyte sedimentation rate, PLT = hemoglobin (Hb) platelets, WBC = white blood cells.

Keywords: Appendectomy, Appendicitis, Foreign body

1. Introduction

Unlike in adults, the ingestion of foreign bodies often occurs in children who do not have psychiatric diseases or mental disabilities. The frequency of foreign body ingestion is higher in children than in adults, and the relatively narrow gastrointestinal tract in children often poses a problem. The diagnosis and treatment of ingested foreign bodies vary according to the

circumstance. The therapeutic approach is determined after considering the type, size, and shape of foreign bodies, the patient's age, condition of the gastrointestinal tract, fasting time, time since ingestion, and the location of the foreign body. Small foreign bodies that reach the duodenum are mostly excreted, but <1% of cases require surgical treatment.^[1]

The possibility that small foreign bodies can cause appendicitis or perforation is as low as 0.0005%.^[2] According to literature, there have been reports of surgical intervention for the ingestion of a needle, pin, screw, dental prosthetic, and lead piece in adults.^[3] It has been reported that a long and sharp object poses a high risk of perforation, and for small objects, there is also the possibility of appendicitis owing to obstruction.^[2] This author intends to perform a literature review as well as report 2 cases of surgery recently performed on 2 children, aged 12 months and 7 years, because of a small object in the appendix.

2. Case 1

A 12-month-old boy visited our outpatient clinic because he swallowed a foreign body 2 weeks ago. The guardian reported that the child swallowed multiple small objects and did not present any specific symptoms. However, the foreign bodies were not excreted while the child was being observed at home. The swallowed objects were small lead beads, about 1mm in diameter, which were inside a plastic marble (Fig. 1). On abdominal radiography, 3 small beads were found in the right lower quadrant (Fig. 2A). The patient did not have gastrointestinal tract-specific symptoms such as fever, vomiting, and abdominal pain. His vital signs were stable, and the whole body condition was favorable. Blood tests showed white blood cells (WBC), segmented neutrophils, hemoglobin (Hb), platelets (PLT), and erythrocyte sedimentation rate (ESR) at 7190 cells/ μ L, 15%, 13.3 g/dL, 268,000 cells/ μ L, and 3 mm/h, respectively. There was no sign of infection as C-reactive protein (CRP) level

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Ethical Review and Patient consent: The institutional review board of Chonbuk National University Hospital stated that it was not necessary to achieve IRB approval for this case report, but that patient consent was required as the study dealt only with retrospective use of the patient's medical records and related images. Written informed consent was obtained from the patient before the publication of this case report and accompanying images.

The authors report no conflicts of interest.

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Figure 1. Metal beads about 1 mm in size were in a plastic alley, which is a kind of toy for children.

was in the normal range at 3.76 mg/L, and there was no abnormality in any other clinical chemistry tests. Serum lead concentration did not exceed 0.2 $\mu\text{g}/\text{dL}$. Upon analyzing the components of the bead, it was found to predominantly contain iron (Fig. 3). Once the major component of the object was discovered to be iron, it was decided that the progress be

observed. Abdominal radiography was performed once every 2 weeks while checking excrements (Fig. 2B–D). For 2 months, there was no clinical finding suggestive of appendicitis in the patient, but his guardian became more anxious. At approximately 2 months and 2 weeks after initial presentation, one of the 3 beads was excreted (Fig. 2D). Although observation of progress was suggested, the guardian wanted the foreign body removed, and preventive laparoscopic appendectomy was performed. The removed appendix appeared to be normal without inflammation, although its tip contained 2 beads (Fig. 4).

3. Case 2

A 7-year-old boy visited the hospital after a triangular foreign object was found in the right lower quadrant of his abdomen based on abdominal radiography performed in a private clinic 3 months before. The patient was followed up but developed abdominal pain. He had discomfort in the right lower quadrant of the abdomen without fever and vomiting. Although vital signs were stable, blood tests showed WBC, segmented neutrophils, Hb, PLT, and ESR at 13,170 cells/ μL , 83.3%, 12.6 g/dL, 295,000 cells/ μL , and 31 mm/h, respectively. Acute inflammation was suspected because of an elevated CRP level, which was 37.4 mg/L (normal range: upto 5 mg/L). On abdominal computed tomography (CT), it was found that a foreign object was located in the appendix, which appeared to be enlarged to 6-mm thickness (Fig. 5). Emergency laparoscopic appendectomy was

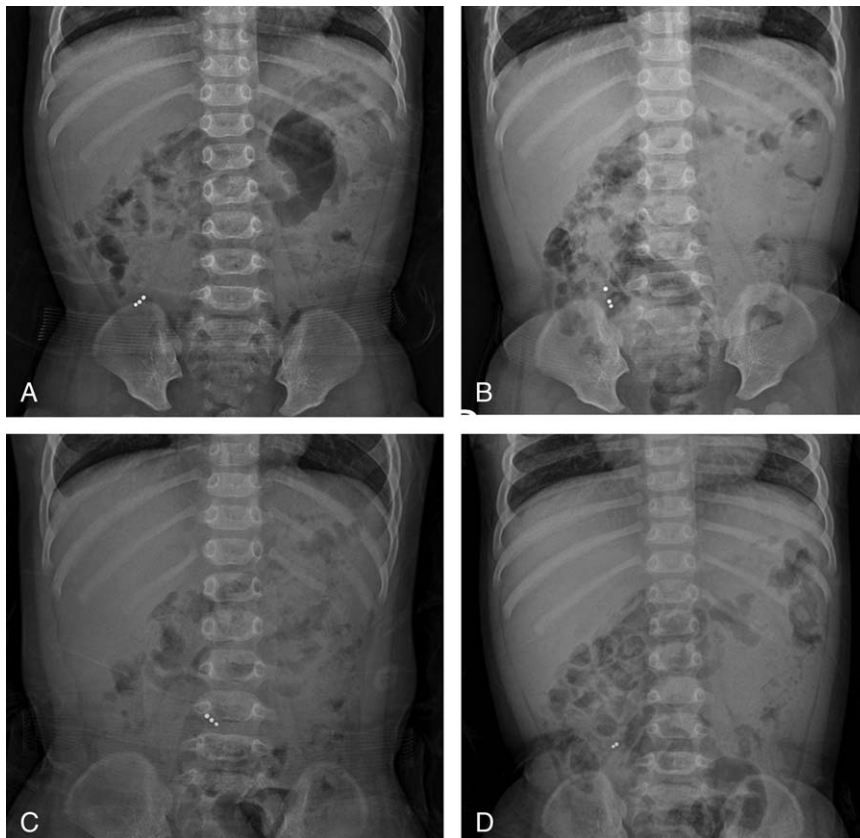


Figure 2. Simple abdominal x-rays. (A) At the first visit, there are 3 beads seen in the right lower abdomen. (B) After 4 weeks from the date of ingestion, the x-ray reveals the 3 beads remain in the same location. (C) After 2 months, the simple x-ray shows no interval change regarding the beads. (D) After 10 weeks, the x-ray shows 2 beads remaining.

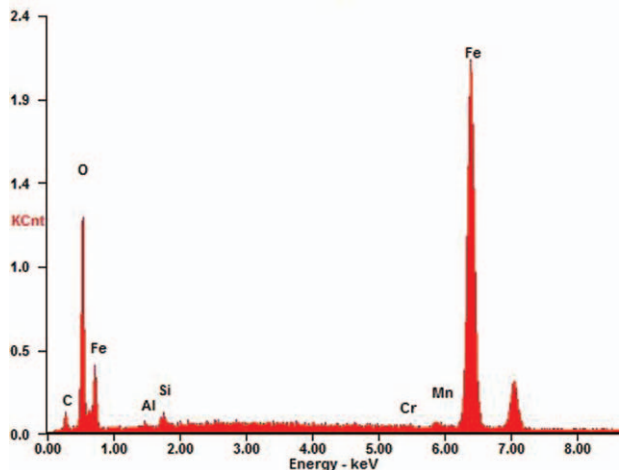


Figure 3. The metal beads were analyzed using the energy dispersive spectrometer-advanced microanalysis solutions (AMETEK). This graph shows that the beads consist of Iron (Fe), Carbon (C), Aluminum (Al), Silicon (Si), Chromium (Cr), and Manganese (Mn). Iron is the largest component.



Figure 4. Normal-appearing appendix without inflammatory change has 2 black beads in the appendix vermiformis.

performed and a 5-mm thin black plastic piece was found in the appendix. A histopathological diagnosis of mucinous appendicitis with dark red hemorrhage with a thickness of 6 mm was made.

4. Discussion

According to an announcement made in 2000 by the American Association of Poison Control Centers, 75% of the reported 116,000 (or more) foreign body ingestions occurred in children aged 5 years or younger, and 98% of the ingestions were accidental.^[4] Most children tend to swallow common objects found in the home environment, such as coins, toys, jewelry,

magnets, and batteries.^[4] Most ingested foreign bodies pass harmlessly through the gastrointestinal tract and are excreted through the anus without any complications. However, in <10% of cases, the foreign body is trapped in the esophagus or other organs, and causes complications such as bowel perforation and intestinal obstruction. Therefore, a proper examination and treatment are necessary, specifically considering the type, shape, size, number, and location of the foreign bodies. An early endoscopic or surgical removal is recommended for objects that increase the risk of complications, such as mercury batteries, sharp objects, and ≥ 2 magnets.^[5]

Acute appendicitis is a common medical condition that often requires an emergency abdominal surgery.^[6] However, acute appendicitis caused by a foreign body is rare. Examples of foreign bodies that have been found in the appendix are coins, pins, nails, screws, fish hooks, lead shots, teeth, stones, and hair.^[2]

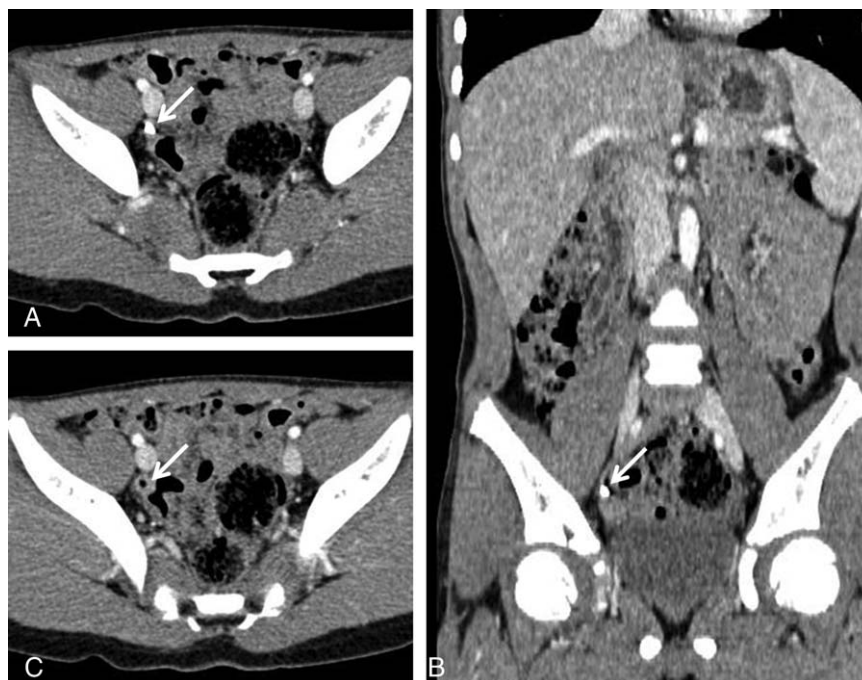


Figure 5. Transverse and coronal views of an abdominopelvic computed tomography image. (A, B) High enhanced, 5-mm sized, and triangular shaped material is seen in the appendiceal lumen (white arrow). (C) An enlarged appendix with an external diameter of 6 mm and a wall thickness of 2 mm is shown (white arrow).

Symptoms differ depending on the size, shape, and type of the foreign body. Once a foreign object enters into the appendix, it is difficult to come back out into the large intestine. As a result, acute appendicitis, perforation, hemorrhage, peritonitis, and abscesses can occur. If the object is long, thin, hard, or sharp, the risk of complications increases. For cases with high risk of complications, it should be removed endoscopically at an early stage. If the endoscopic removal fails, a surgical removal should be performed.^[7,8]

If foreign bodies are heavier than intestinal contents and reach the appendiceal area, they can sink by gravity and enter into the appendix, but the incidence of this is very rare.^[5] The incidence is different depending on the anatomical location of the appendix. It is unlikely for the foreign body to be introduced into the lumen of the appendix. However, the location of the appendix is not anatomically typical in 65% of the cases, so a foreign body could possibly be introduced.^[4] Appendiceal peristalsis is not sufficient to push out foreign bodies. As a result, the appendiceal lumen is occluded by rotation, occlusion, edema, and lymphatic hyperplasia.^[9]

To diagnose appendicitis caused by foreign bodies, the following should be determined: clinical symptoms, the type and size of the object, the time swallowed, among others. In addition, physical examinations should be conducted to determine whether peritonitis is present. However, if a typical symptom or physical abnormality is not seen, diagnosis is still difficult. Compared to that in adults, diagnosis in children can be delayed because of nonspecific symptoms.^[10,11] The most commonly used diagnostic methods for medical imaging are abdominal ultrasound and CT scan, or occasionally diagnostic laparoscopy.^[12] A CT scan can also suggest the location and size of the object, and determine whether there is a complication of the appendiceal foreign body. Generally, appendicitis can be diagnosed by CT scan if the scan shows an enlarged appendix with appendiceal wall enhancement, and thickening with periappendiceal fat infiltration or inflammatory changes. However, many children with indistinguishable changes in radiologic findings make it difficult to diagnose appendicitis. A child's appendix is longer and thinner than that of an adult, so perforation can be seen at an earlier stage. As the large intestine is relatively short until the age of 10 years, it cannot cover any perforated area, which can lead to generalized peritonitis in children. Therefore, if appendicitis is diagnosed late in children, the risk of complication is a lot higher than that in adults. For children, the diagnosis of appendicitis is often delayed, being made after rupture occurs. It is also difficult to predict the progression of symptoms. Therefore, this author suggests that aggressive resection may need to be considered for children aged up to 2 years, although empirical evidence is insufficient. In

particular, when the ingested material is sharp and long, with a high risk of perforation, preventive resection is required for adults, and mere observation until perforation is not a reasonable choice.

5. Conclusions

Routinely performing endoscopy for small foreign bodies is unnecessary, but endoscopic removal may be needed if the foreign body has a shape and weight that could enter the appendix. In Korea, pediatric endoscopy has recently been performed without complications using sedative drugs (midazolam and ketamine) rather than general anesthesia, in an endoscopy room. Active endoscopic removal can be considered in Korea where the pediatric endoscopy procedure is readily performed. Appendiceal foreign bodies are very rare, and the available case reports of this condition are generally limited to adults. As shown in this case, reports of an appendiceal foreign body in 12-month-old children are very rare. Moreover, it is challenging to make a diagnosis of appendicitis because of appendiceal foreign body in such a young age, unlike in older children or adults. Thus, this author suggests that performing prophylactic appendectomy would be ideal for younger children.

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