

Case Series

How Did That Get There? A Case Series of Adolescent Foreign Bodies

Justin Ian Hanson, DO¹; Paul Bomar, MD¹; Sarah Kleist, MD¹;
Denver Rogalla, DO¹; Lori Crihfield, DO¹; Scott Gutovitz, MD¹

Author affiliations are listed at the end of this article.

Correspondence to:
Sarah Kleist, MD
ED Administrative Office
809 82nd Parkway
Myrtle Beach, SC 29572
(Sarah.Kleist@teamhealth.com)

Abstract

Introduction

Pediatric foreign bodies (FBs) come in many shapes and sizes, and the method by which they enter the body can greatly impact the level of acuity at presentation. Most FBs in children are found in those younger than 5 years old, but the following 3 cases were found in adolescent patients.

Case Presentation

We report on 3 adolescent patients who presented to a single community-based emergency department with the chief complaint of abdominal pain and were found to have complications of abdominal FBs. If undiagnosed, the initial indolent courses of FBs can lead to serious complications, as shown in these examples.

Conclusion

These cases emphasize the need for physicians to maintain a high level of suspicion, to perform detailed histories, and to consider advanced imaging despite reassuring vital signs or physical examination.

Keywords

pediatric, emergency medicine; foreign bodies; ingestion; penetrating; adolescents; pediatrics

Introduction

Pediatric foreign body (FB) ingestion is a common complaint in the emergency department (ED).¹ The majority of FBs are either ingested or aspirated by children under the age of 5, with peanuts, seeds, pins, toys, and coins as the most common culprits.² Depending on the size and shape, FBs can present with a wide variety of symptoms. Additionally, FBs in adolescent patients can have atypical avenues of entry and are frequently found incidentally. The following 3 cases were in adolescent patients who presented to a single community-based ED and were each found to have a penetrating or ingested FB. These cases demonstrate the need to have a high level of suspicion for FBs in adolescent patients with abdominal pain and to consider advanced imaging when indicated.

Case Presentation

Case 1: Barbeque Grill Brush Bristle

A 16-year-old male presented to the ED with dull, achy right-lower quadrant abdominal pain for 3-4 weeks. The pain radiated to the right-upper quadrant (RUQ). His symptoms included nausea, emesis, diarrhea, anorexia, and fatigue. Eating made his pain worse and his symptoms gradually worsened for 2 weeks. He had been seen multiple times at an urgent care facility. At the most recent urgent care visit, he had laboratory studies and an ultrasound of the RUQ which were normal. He was referred to the ED for further evaluation.

In the ED, physical examination findings revealed a thin adolescent male with diffuse

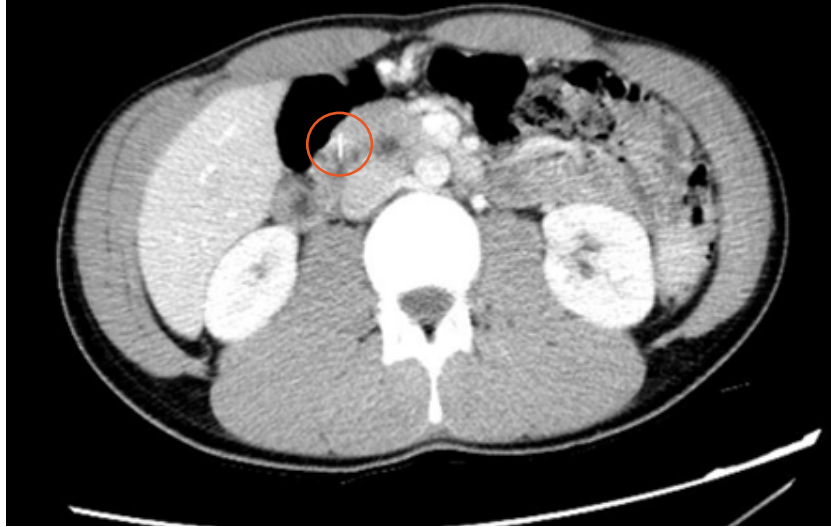


Figure 1. A CT scan of the abdomen/pelvis showed the foreign body as a bright white line (orange circle) and a duodenal perforation.

abdominal tenderness without guarding or rebound tenderness. His vital signs were normal. Laboratory studies, including complete blood count (white blood cells (WBC) 6.6 K/mm^3), complete metabolic panel, and urinalysis (UA) were all unremarkable. Computerized tomography (CT) identified a linear metallic FB in the RUQ adjacent to the medial wall of the descending duodenum (**Figure 1**).

The general surgery team attempted removal of the FB by esophagogastroduodenoscopy and visualized up to the second portion of the duodenum; however, no FB was identified. The procedure was then converted to an open laparotomy and a 2.5 cm metallic barb was found perforating the duodenum at the junction of the second and third portions, with penetration

into the pancreatic head (**Figure 2**). The FB was removed and the duodenal perforation was repaired. He had an uneventful hospital course and he was discharged home in good condition. The FB was identified as a copper wire from a barbeque brush used to clean barbeque grills. Later, the patient recalled using the grill and likely accidentally ingested the metallic object in his food.

Case 2: BB Projectile

An 11-year-old male with a history of constipation presented to the ED for constant, crampy, diffuse abdominal pain for 12 hours. His mother believed the pain was due to worsening constipation, as his last bowel movement was 2 days prior. Despite giving him multiple therapies, he did not produce any bowel movement, and his



Figure 2. A barbeque brush bristle removed during exploratory laparotomy.

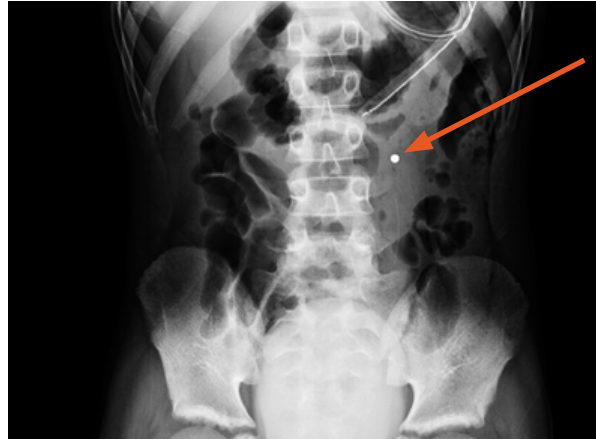


Figure 3. An abdominal x-ray showed a BB pellet in the abdomen (orange arrow).

pain worsened. He denied any fevers, nausea, vomiting, dysuria, or urinary frequency. His vital signs were normal. Overall, he appeared mildly uncomfortable without signs of distress. His abdomen had generalized tenderness to palpation without peritoneal signs. Close visual inspection of the chest and abdomen yielded a 2mm healing circular wound at the left 6th intercostal space in the anterior axillary line. The ED physician performed an abdominal x-ray, and this showed a spherical radiopaque object in the abdomen (**Figure 3**).

The patient reluctantly shared that he was shot with a BB gun in the left side of his abdomen by his aunt's boyfriend. He was concerned they would be punished, and thus didn't share this information. A focused abdominal assessment with sonography for trauma (FAST Exam) was positive for free fluid in the pelvis (**Figure 4**).

His UA showed gross hematuria. Otherwise, his laboratory studies were unremarkable, including blood cell counts. The surgical trauma team

took him for emergent exploratory laparotomy where they discovered a moderate-to-large volume hemoperitoneum, with penetrating injuries to the left hemi-diaphragm, the inferior aspect of the spleen, and the left kidney. The injuries to the left hemi-diaphragm and inferior spleen were repaired. The injury to the kidney resolved without surgical intervention. He spent several days recovering on the pediatric floor and was eventually discharged home with no further complications.

Case 3: Magnets

A 12-year-old female presented to the ED after waking up at around 4 AM with sudden, sharp diffuse abdominal pain. Initially, the pain was intermittent but quickly became constant. She complained of anorexia and emesis. Her last bowel movement was 2 days prior and it was normal. She denied any fevers, diarrhea, dysuria, or urinary frequency. Her physical examination was unremarkable except for slight discomfort due to pain. Her vital signs were normal. She was tender to palpation in all 4

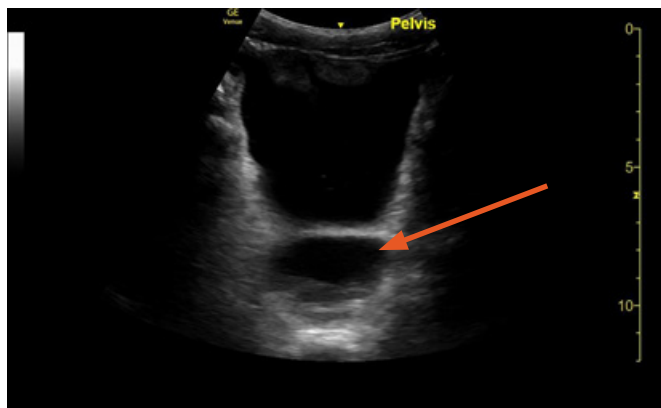


Figure 4. A bedside ultrasound, transverse plane, showed free fluid in the pelvis (orange arrow).



Figure 5. A bedside ultrasound of the abdomen, right lower quadrant, showed a 5.3 mm non-compressible appendix (orange arrow).

quadrants without rigidity, rebound tenderness, or distension. Bowel sounds were present in all 4 quadrants. She had no costovertebral angle tenderness, a negative Murphy's sign, and negative McBurney's point tenderness.

The ED physicians obtained basic laboratory tests, which showed a leukocytosis (WBC of 17.5 K/mm^3 [normal range: $4.5\text{-}13 \text{ K/mm}^3$]) and a normal chemistry panel. Next, they ordered an abdominal ultrasound to evaluate her for appendicitis, and this demonstrated a 5.3 mm non-compressible appendix concerning for acute appendicitis (**Figure 5**).

The pediatric surgeon examined her and requested a confirmatory CT scan. This identified 2 previously unrecognized small metallic circular objects in the small bowel and multiple dilated

loops of bowel, concerning for a small bowel obstruction (**Figure 6**).

She then admitted to ingesting 2 small magnets approximately 4 days prior, but on different days. The patient stated, "I thought it was harmless." She denied attempting to harm herself by ingesting these magnets. The general surgery team then performed an emergent exploratory laparotomy. Here they discovered a magnet had migrated into the appendix and adhered itself to the other magnet in the small bowel, creating a fistula. They removed the magnets and also performed an appendectomy. She recovered on the pediatric floor without complication and was discharged home in good condition after 5 days.

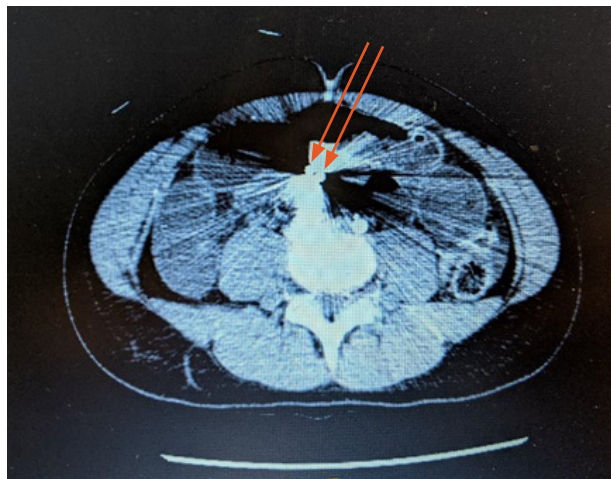


Figure 6. A CT scan of the abdomen/pelvis demonstrated 2 small, metallic, circular objects in the small bowel (orange arrows) and multiple dilated loops of bowel, concerning for a small bowel obstruction.

Discussion

These cases demonstrate the necessity to consider FBs in the differential diagnosis of pediatric patients with abdominal pain regardless of their age or presentation. FBs are typically higher on the differential for younger patients, but when it comes to adolescent patients, FBs are often overlooked. In a review of the literature, we did not find any case series or research studies that address FBs in adolescents.

It is easy to assume that a conscious, speaking patient would inform you about the concern for a FB, but this is not always the case. Patients of all ages may hide information for many reasons that the clinician may not anticipate. Several of our cases involved adolescents who did not disclose their FB because of concern for parental repercussions. Adolescents frequently decide not to disclose their careless activities in order to avoid parental disapproval or punishment.^{3,4}

The case of the wire barbecue brush bristle illustrates that pediatric abdominal pain presentations may be minimized. The patient had been evaluated multiple times without escalation of care. A higher index of suspicion is often needed in adolescent patients, as they are easily dismissed as having abdominal pain from constipation or functional abdominal pain.^{5,6} Unexplained recurrent symptoms may represent an undiagnosed FB, and it is imperative to consider advanced imaging.

All 3 of these cases demonstrate that pediatric patients can present with deceiving physical exams, reassuring vital signs, and relatively normal laboratory findings, and yet still have a serious condition that requires immediate intervention. As radiation exposure is appropriately minimized in the pediatric population, we rely more on the History and Physical Exam to trigger laboratory work and imaging. The typical frameworks and decision trees that help guide the workup for more common pathologies in the ED can lead us to miss unusual diagnoses, such as a FB.⁷ These cases showed surprisingly little inflammation, making localization of the problem difficult. As a result, we must maintain a high level of clinical suspicion for FBs and other more unusual pathologies in children of all ages.

CT has long been the imaging modality of choice in the ED. This is evidenced by a 30-400% increase in CT utilization between 2000-2006.⁸ However, due to high amounts of ionizing radiation, there has been pressure to decrease the use of CT imaging in pediatric ED patients. Recently, a study showed that CT use in all pediatric ED encounters decreased from 3.9% to 2.9%.⁹ There must be a balance between minimizing radiation to pediatric patients and reducing missed diagnoses of serious pathology. Ultrasound continues to expand its usefulness in the ED, but no one tool can substitute for a high clinical suspicion, detailed history, and thorough consideration of the individual patient. When concerned, a physician should discuss the risks and benefits of a CT scan with the parents and pursue further imaging.

Conclusion

Ingested FBs are a common presentation in children under 5 years of age, but the diagnosis can be unrecognized in adolescents. Often adolescent patients who present with nonspecific abdominal pain are disregarded as a benign problem. While most FBs are seen promptly after the initial event, delayed diagnosis should be considered in all patients with recurrent symptoms. Even though one may perform a detailed history and physical exam, adolescent patients may conceal information due to concerns about parental repercussions. Undiagnosed retained FBs, despite a possible indolent initial presentation, may result in serious medical complications. In our cases, when a FB was found, there were few objective signs that aided in the diagnosis. Physicians should have a high level of suspicion for potential FBs in adolescent patients who present for repeat visits, have unexplained physical exam findings, or are not improving with regular standards of care. Providers should consider obtaining a CT scan to identify FBs.

Conflicts of Interest

The authors declare they have no conflicts of interest.

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Author Affiliations

1. Grand Strand Medical Center, Myrtle Beach, SC

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