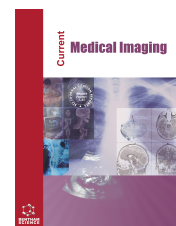




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CASE REPORT

Small Bowel Obstruction Caused by a Rare Foreign Body: A Case Report and Literature Review

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Abstract:

Background:

Ingestion of gastrointestinal foreign bodies (FB) is a common clinical problem worldwide. Approximately 10–20% of FBs require an endoscopic procedure for removal, and < 1% require surgery.

Case Description:

An 89-year-old male with Alzheimer's disease was hospitalized because of abdominal pain, abdominal distention, vomiting for three days, and cessation of bowel movements for six days. Abdominal computed tomography (CT) scan showed a small intestinal obstruction and an atypical FB in the small intestine. A pill and remaining plastic casing were removed from the small intestine during surgery. FB is a square with four sharp acute angles at its edge. The patient was discharged after two weeks of treatment, and no recurrence or complications were observed during the 6-month follow-up.

Conclusion:

Atypical intestinal FBs may cause misdiagnosis and easily lead to serious complications. Therefore, an appropriate radiological examination, such as CT, is necessary for unexplained intestinal obstruction. Symptomatic intestinal FBs should be actively removed to avoid serious complications.

Keywords: Case report, Foreign body, Small bowel obstruction.

Article History

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1. INTRODUCTION

The ingestion of gastrointestinal foreign bodies (FB) is a common clinical problem worldwide [1, 2]. Although children are most likely to swallow FBs [2, 3], the remaining patients (20%) are adults. Adult patients with mental or psychiatric disorders, alcoholism, and drug abuse may ingest FBs. In 2019, the American Association of Poison Control Centers documented 94,051 cases of FB ingestion across all age groups (67,186 children < 5 years and 12,223 adults > 20 years). Three of the 5 patients died from the ingestion of batteries [4].

Coins, pins, chicken bones, and fish bones are the most

ingested FBs. However, in recent years, the number of lithium batteries and strongly magnetic FBs has increased annually [5 - 9]. Most ingested FBs pass spontaneously. However, approximately 10–20% of FBs require an endoscopic procedure for removal, and < 1% require surgery to remove the FB or treat associated complications [6]. Intestinal FBs that cannot be eliminated from the body may cause serious complications, such as intestinal perforation, intestinal obstruction, diverticulitis, or acute appendicitis [10, 11]. Endoscopic FB removal has been reported to have a success rate of 88.5–100%. However, if the intestinal FB is in the distal small intestine and is difficult to remove endoscopically, laparoscopy or surgery is required [10 - 12].

Even if the patient is asymptomatic, all patients suspected of ingesting an FB should undergo radiographic examinations. Radiographs should be used to evaluate mediastinal and

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peritoneal free air and the presence and number of FBs. The positive predictive values of the X-rays are 100% for metallic objects, 43% for glass objects, 26% for fish bones, and 0% for splinters and woody objects. Magnetic resonance imaging (MRI) is not recommended before metallic FBs are excluded because metallic FBs may cause secondary damage and MRI artifacts and can take a long scan time. No data regarding the use of ultrasonography or metal detectors are available [5, 13].

This paper reports a rare case of an FB that induced small intestinal obstruction and was surgically removed.

2. CASE DESCRIPTION

An 89-year-old Chinese male with Alzheimer's disease was admitted to the Affiliated Hospital of Traditional Chinese Medicine of Southwest Medical University on March 6, 2023, because of abdominal pain, abdominal distention, vomiting for three days, and cessation of bowel movements for 6 days. On admission, vital signs were as follows: body temperature, 38.9 °C; blood pressure, 161/92 mmHg; heart rate, 107 beats/min; respiratory rate, 22 breaths/min; and oxygen saturation, 95% with ambient air. Laboratory findings included a white blood cell count of 15,400/ μ L (reference range, 3800–9000/ μ L) with 78.9% neutrophils. On physical examination, the patient had abdominal distension, refused to be pressed by a physician, had positive signs of peritoneal irritation, and had no bowel sounds on auscultation. As the patient could not stand, a radiographic examination could not be performed; therefore, an acute abdominal computed tomography (CT) scan was selected. Abdominal computed tomography (CT) showed dilation and fluid accumulation in the small intestine, consistent with changes in the small intestinal obstruction. Additionally, an irregular mixed-density image was observed in the pelvic ileum segment, with a strip-shaped high-density shadow at the top, an “air half-moon sign” change in the middle, and a nodular high-density shadow at the bottom (Fig. 1A). The imaging diagnosis was atypical small intestinal FB.

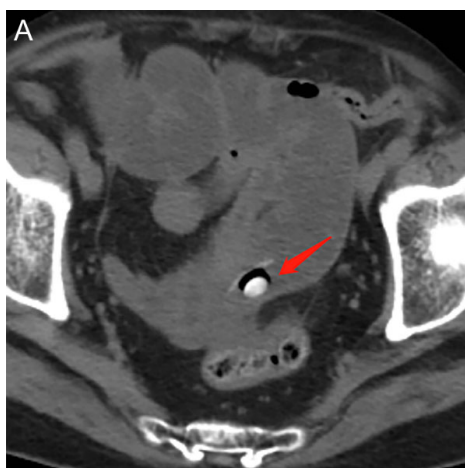


Fig. (1A). Abdominal CT tomography showed dilation and fluid accumulation in the small intestine, consistent with changes in the small intestinal obstruction. In addition, an irregular mixed-density shadow was observed in the pelvic ileum segment, with a strip-shaped high-density shadow at the top, an “air half-moon sign” change in the middle, and a nodular high-density shadow at the bottom.

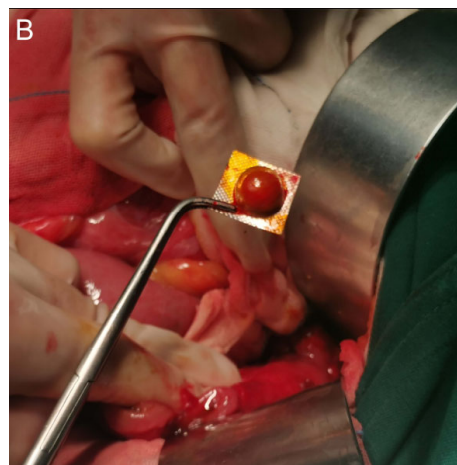


Fig. (1B). The pill and remaining plastic casing were removed from the small intestine during surgery.

A physical examination revealed signs of peritoneal irritation and intestinal obstruction. The patient experienced symptoms related to intestinal root obstruction for more than 72 hours without significant relief; therefore, further surgical intervention was needed. If the sharp-edge FB had not been removed in time, it may have further aggravated the intestinal perforation. Because patients with Alzheimer's disease are unable to independently accept the right to informed consent for surgery, we could only inform the patient of the necessity of surgery for his two sons to sign the informed consent form for surgery. The patient was treated for small intestinal fecal stones, and decompression surgery was performed on March 7, 2023. During the operation, the abdominal cavity was entered layer by layer. Some small intestinal tubes were significantly dilated, and there was edematous, with no ischemia in the intestinal wall or perforation of the intestinal tube. Mild peritoneal edema and a small amount of ascites were observed in the abdominal cavity. The obstruction point was found at the junction of the dilated and normal small intestinal tubes, resembling a square FB. The small intestine was removed, and the FB was approximately 100 cm from the ileocecal portion. The intestinal tube was cut longitudinally, and a pill and the remaining plastic casing were found, which was approximately 1.5x1.5 cm in size. The FB pierced the mucosa and embedded it in the intestinal wall. The FB was a square with four sharp acute angles at the edges (Fig. 1B). The FB was removed, the proximal small intestine was decompressed, and the area was disinfected using iodophor. The intestinal tube was repaired with a full-thickness 4-0 absorbable suture and a seromuscular layer, and the intestinal tube was checked for patency. The abdominal cavity was flushed with normal saline, a plasma drainage tube was installed, and excess air in the abdominal cavity was aspirated with negative pressure [14]. On the pelvic floor, the incision was closed layer by layer.

The patient was discharged after two weeks of treatment, which included acid suppression, stomach protection, anti-infection, correction of electrolyte imbalance, and nutritional support. No recurrence or complications were observed during the 6-month follow-up.

3. DISCUSSION

The presence of FBs in the digestive tract is a global problem. Most intestinal FBs can be eliminated by themselves; however, some symptomatic patients require removal *via* endoscopy or surgery. Accidental ingestion of sharp foreign objects can lead to perforation, extraluminal migration, abscess, peritonitis, fistula, appendicitis, necrotizing fasciitis, liver, bladder, heart, lung penetration, incarcerated umbilical hernia, common carotid artery rupture, aorto-esophageal fistula, and even death [5, 15, 16]. If an asymptomatic sharp object is found in the esophagus or stomach, it should be removed within the first 24 hours. Approximately 30% of the cases were operated on by surgeons during the follow-up. If the patient is symptomatic, the sharp object should be removed immediately, as in other FBs [5].

Accurate diagnosis of intestinal FB is key to successful treatment. Medical history is critical; however, a few patients, such as children and adults with mental disorders and Alzheimer's disease, do not have an accurate medical history. Therefore, imaging offers a reliable basis for diagnosing intestinal FBs. Imaging examinations include radiography, CT, MRI, and ultrasonography, which can be objectively distinguished based on the composition, size, and position of the FBs [3, 8, 11, 16 - 18]. Radiological characteristics are dependent on the timing between FB ingestion, symptom onset, and imaging. X-ray is one of the oldest but most effective, convenient, and inexpensive methods for detecting intestinal FBs. Radiographs should be used to evaluate mediastinal and peritoneal free air, as well as the presence and number of FBs. Because of the low radiation dose, they are also the first choice for pediatric patients [2]. In this case, a radiographic examination could not be performed because the patient was unable to cooperate in the plain radiographic position. The detection rate of X-ray-impermeable positive FBs, such as animal bones, magnetic FBs, and metal FBs, is high. However, for some X-ray-permeable negative FBs (plastics [11], plant FBs [19], Orbeez balls [18], *etc.*) or tiny positive FBs, only some indirect signs can be observed, such as intestinal obstruction and free gas caused by intestinal perforation. Therefore, X-rays have a specific misdiagnosis rate in diagnosing intestinal FBs, which needs to be supplemented by imaging methods. CT imaging is ideal for diagnosing intestinal FBs because it avoids interference from intestinal gases and feces. Three-dimensional CT reconstruction can accurately identify small FBs, such as fish bones and X-ray-permeable negative FBs, through obstruction points [18, 20]. In this case, we report a pill FB with a package, CT images with a strip-shaped high-density shadow at the top, an "air half-moon sign" change in the middle, and a nodular high-density shadow at the bottom. Such small intestinal FBs have rarely been reported in the literature. As the FB was square and had four sharp acute angles at the edge, it could not be self-excluded, and damage to the intestinal mucosa became embedded in the intestinal wall, causing small bowel obstruction. In previous reports, MRI and ultrasound were only used as supplements to other imaging modalities because they are limited by intestinal gas interference and spatial resolution [11, 18]. However, MRI is not recommended to distinguish FBs because metallic FBs may cause secondary damage and MRI artifacts. Therefore, CT or

radiography is an ideal examination method for patients with suspected intestinal FBs.

Most ingested FBs typically resolve with conservative management, and 80-90% of gastrointestinal FBs pass spontaneously. However, 10-20% require endoscopic resection, and less than 1% require surgical removal of FBs or treatment of related complications [6]. The treatment depends on the size, shape, and consistency of the FB. Endoscopy should be considered as an emergency in all symptomatic cases. FBs in the esophagus and gastric cavity can generally be removed by endoscopy to avoid entering the small intestine and causing severe complications, such as intestinal obstruction and perforation [6, 21]. Sharp foreign objects may cause perforation if not removed immediately. They are usually fish and chicken bones, with fish bones being the most common cause of perforation. The ileum (39%) and jejunum (27%) were the most frequent perforated sites [22]. The risk of perforation and intestinal obstruction is higher in the distal small intestine due to its relatively small lumen, particularly if the FB is sharp or hard. In this case, the FB had four sharp angles at the edge, and the damage to the intestinal mucosa became embedded in the intestinal wall, causing severe intestinal obstruction. Poor intestinal peristaltic function in elderly patients is another factor leading to small bowel obstruction. Some FB in the duodenum can be removed by endoscopy, but surgical removal of the FB in the distal jejunum and ileum is often the only option. If the FB is not removed in time, it may further aggravate the intestinal perforation and necrosis. The best opportunity to remove the FB using endoscopy was missed in this case because the patient's family did not provide a history at an earlier time. When the FBs in the intestine reach the distal small intestine, they inevitably pass through the pylorus and duodenum. The sharp edges of the FBs may damage the structures, which may cause pain in the early stages of the patient. Postoperative treatment included acid suppression, stomach protection, anti-infection, correction of electrolyte imbalance, and nutritional support.

In this case, the intestinal FB contained air and thus had typical imaging features that had not been reported previously. FBs with this shape may cause serious complications. In clinical practice, if similar imaging signs are found in the intestine, great attention should be paid, and active treatment should be performed to avoid serious complications. Regardless of whether the patient shows symptoms, it is essential to admit all individuals suspected of ingesting an FB to the emergency department for radiographic examination, especially radiography or CT. Bidirectional radiographs of the neck, chest, abdomen, and pelvis should be obtained if required. In addition, we should raise the awareness of patients and teach them that once an FB is swallowed, it is necessary to seek timely medical attention to prevent serious consequences. Simultaneously, care for people with disabilities should be strengthened.

This study aims to remind clinicians that in patients with unexplained intestinal obstruction, atypical FBs should be excluded to avoid serious complications due to misdiagnosis. The case report has a limitation in that there were no imaging examinations during the follow-up process, and subsequent imaging changes were not observed.

CONCLUSION

In summary, intestinal FB is a typical clinical emergency. Atypical intestinal FBs may cause misdiagnosis and easily lead to serious complications. Therefore, an appropriate imaging examination, such as CT, is necessary for unexplained intestinal obstruction. In addition, if the FB in the upper gastrointestinal tract is removed by endoscopy, it should be actively removed to avoid subsequent inflammatory complications, such as small bowel obstruction and perforation.

AUTHORS' CONTRIBUTIONS

It is hereby acknowledged that all authors have accepted responsibility for the manuscript's content and consented to its submission. They have meticulously reviewed all results and unanimously approved the final version of the manuscript.

LIST OF ABBREVIATIONS

CT	=	Computed tomography
FB	=	Foreign body
MRI	=	Magnetic resonance imaging

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was reviewed and approved by the local ethics committee of the Affiliated Hospital of Traditional Chinese Medicine of Southwest Medical University.

HUMAN AND ANIMAL RIGHTS

These procedures were performed in accordance with the 1975 Declaration of Helsinki, which was revised in 2000.

CONSENT FOR PUBLICATION

Informed written consent was obtained from the patient for publication of this case report and accompanying images.

STANDARDS OF REPORTING

CARE guidelines were followed.

AVAILABILITY OF DATA AND MATERIAL

All data generated or analysed during this study are included in this published article.

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CONFLICT OF INTEREST

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interests in the subject matter or materials discussed in this manuscript.

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