Foreign body (FB) ingestion is common in the pediatric age group. However, diagnosing these cases is challenging, as history of FB ingestion is usually lacking. Management is based on presenting symptoms as well as on the nature of the FB. Here, we present an unusual case of water absorbent ball (WAB) ingestion, requiring simultaneous endoscopic and surgical exploration with the use of intraoperative ultrasound.

Case Report

A 19-month-old female child presented with multiple episodes of bilious vomiting. She also vomited out part of a hair clip in one episode. History revealed that the child had ingested three gel balls 96 h prior to presentation. Radiological investigations reported the presence of multiple, round structures in both the stomach and duodenum, which was assumed to be either a FB or a duplication cyst and planned for surgical removal at a different hospital. Repeat ultrasound of the abdomen at our center confirmed multiple, rounded, thin-walled, anechoic structures, two in the stomach (2 cm in diameter), one in the proximal jejunum (2.5 cm × 1.6 cm), and another in the distal jejunum (3.6 cm × 2.0 cm) with dilated edematous duodenal and jejunal loops and collapsed ileal and colonic loops [Figure 1]. With a diagnosis of small bowel obstruction, a combined endoscopic and open surgical approach was planned. Initial endoscopy identified two round FBs in the fundus of the stomach, each about 2 cm in size [Figure 2]. Removal was attempted with a basket retriever, but the FBs were friable and broke into several pieces. A Roth Net® standard retriever was then used to bring out all pieces individually. Further endoscopy revealed another FB, 5 cm distal to the duodenojejunal flexure, about 4 cm in size, obstructing the lumen, and was retrieved similarly. An intraoperative ultrasound confirmed a 2–3-cm, round anechoic structure in the distal jejunum. A left periumbilical transverse incision was taken, and enterotomy was performed to recover a partially broken gel ball piece. A repeat ultrasound confirmed clearance of all but few small FB pieces measuring about 7 mm in size within the duodenum. The bowel appeared healthy, and enterotomy was closed in a transverse manner. The patient had an uneventful recovery with escalation to full feeds by the 4th postoperative day.

Discussion

The peak incidence of FB ingestion in the pediatric age group is between 12 months and 3 years. It poses diagnostic and therapeutic challenges and can cause significant morbidity and mortality. Fortunately, most FBs pass through the gastrointestinal tract spontaneously and only 10%–20% need endoscopic intervention, while <1% need surgical exploration.[1] Open exploration is required if there is nonprogression of FB or
complications such as intestinal obstruction, perforation, or peritonitis occur.

Commonly ingested FBs are coins, toy parts, button batteries, marbles, and magnets. Occasionally, unusual objects such as safety pins, screws, and water absorbent gel ball have also been recovered. WABs are also known as jelly balls, expandable water toys, fairy/dragon eggs, water/hydro orbs, gel beads, and water monkey. They are made up of super absorbent polymer (SAP) composed of polyacrylate/polyacrylamide copolymer and range between the sizes of 1 and 4 mm. They are capable of absorbing water 500 times their weight, swelling up to 30–60 times of their original volume. The use of WABs was popularized in horticulture for water storage, but they are increasingly being used as decorative items, in crafts, photography, floral decorations, science kits, and as learning aids for autistic children.

WABs are round, are often brightly colored, and may appear candy like to children. Younger children have an instinctive tendency for oral exploration of objects, while older children might accidentally ingest them while playing. Often, the ingestion goes unnoticed as multiple small beads are packaged together. Although WABs are nontoxic, are biodegradable, and are easy to swallow, they begin expanding while transiting through the gastrointestinal tract. Patients can develop symptoms within 24 h of ingestion as these balls enlarge progressively, causing obstruction in either distal jejunum or ileum.

Patients may be asymptomatic or suffer from vomiting, refusal to eat, abdominal pain, constipation, and symptoms of dehydration. Although WABs are radiolucent, X-rays play an important role in evaluation as features of acute intestinal obstruction will become apparent as the presence of air–fluid levels and dilated bowel loops. For definitive identification, ultrasound scans and computed tomography scans are helpful.

The management depends on patient’s clinical parameters. Asymptomatic patients can be observed for spontaneous expulsion. However, WABs progressively grow in size, increasing the risk of intestinal obstruction. These patients require hospital admission and early, elective attempt at endoscopic removal of the FB. There are few case reports in literature where WAB removal was done by open surgical exploration or laparoscopy, especially in patients below 2 years of age.

Spontaneous expulsion usually occurs within 24 h, but if symptoms worsen, urgent removal of the FB is warranted. Rarely, complications such as perforation, peritonitis, and even death might occur. Mirza and Sheikh theorized that

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**Figure 1:** Ultrasound images showing suspected foreign bodies

**Figure 2:** Sequential images showing endoscopic removal of foreign bodies
perforation can occur either by induction of chemical injury to the intestinal wall or progressive increase in WAB size, causing pressure necrosis of the intestinal wall. They have reported two cases, one wherein an 18-month-old child suffered perforation after WAB ingestion and required ileal resection and anastomosis, whereas another 6-month-old child developed burst abdomen due to anastomotic leak, 6 days postenterotomy for WAB removal and succumbed to septicemia.[4]

Mohamed et al. reported two cases of WAB ingestion, requiring surgical removal. One of the patients required re-exploration as two more ingested balls were missed at initial exploration. Thus, it is advisable to assume that the child might have ingested more than one WAB and thorough exploration or intraoperative ultrasound should be made to ensure complete removal.

An in vitro study re-enacting conditions after WAB ingestion, reported that such FBs can grow five times their original diameter at 96 h postingestion.[5] Several countries such as Poland, Italy, Malaysia, Turkey, and the United Kingdom have banned toys incorporating SAP-containing gel balls.

CONCLUSION

We report this case to increase awareness within the community as well as among medical practitioners about the risks that accompany accidental ingestion of SAP products. Such items should be kept out of reach of children below 2 years of age. A timely intervention can significantly decrease the morbidity and mortality. Endoscopy as well as intraoperative ultrasound scan before enterotomy can be successfully utilized for the removal of such FBs.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Acknowledgement

Dr. Saumil Shah, Consultant Gastroenterologist at Lilavati Hospital, for his contribution of the therapeutic endoscopy.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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