Intestinal Obstruction Due to Super Absorbent Polymer Bead Ingestion in Children

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ABSTRACT

Ingested foreign bodies (Fb) in children usually pass out in stools without any sequels. However, Fbs like open safety pins, button batteries, and super absorbent polymer (SAP) / jelly toys are associated with complications such as intestinal obstruction, and bowel perforation. Intestinal obstruction in children of uncertain nature should raise a suspicion of foreign body ingestion such as SAP, which may not be obvious at the initial presentation. The study reports two such children, outlining the presentation and management.

Key Words: *Children, Intestinal obstruction, Foreign body, Health hazard, Bilious vomit, Super absorbent polymer beads.*

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In children, sudden onset of bilious vomiting usually points to a surgical cause such as intestinal malrotation and volvulus.[1] Occasionally, foreign body ingestion can result in a similar presentation. As a rule, majority of the swallowed foreign bodies transit out uneventfully in the stools and surgical intervention is rarely required. However, surgical removal of SAP beads is required as these absorb water and impact the gut lumen.[2]

This report describes two cases to highlight the morbidity associated with ingestion of the SAP beads, which needed surgical intervention.

A two-year girl child presented with a 2-day history of bilious vomiting and dehydration. The child was resuscitated with intravenous fluids and inotropes. Investigations were suggestive of deranged renal function. Plain X-ray of the abdomen showed dilated bowel loops. After written and informed high-risk consent, the child was taken up for emergency laparotomy in view of abdominal distension. On laparotomy, loops of proximal small bowel were dilated with collapse of the distal small bowel and colon (Figure 1a). Multiple SAP beads impacted in the distal small bowel were removed by enterotomy (Figure 1b). Post-operatively, child had a turbulent course. Re-laparotomy and Ileostomy were performed in view of worsening general condition with abdominal distension.

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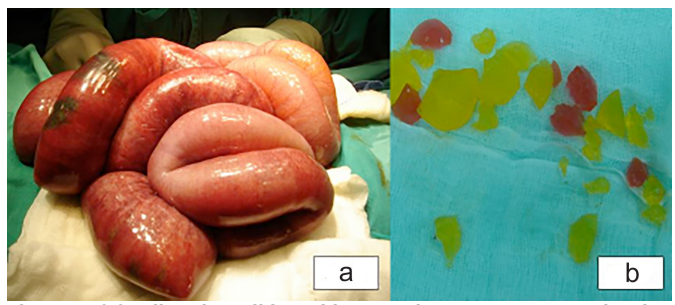

Figure 1: (a): Dilated small bowel loops at laparotomy, some showing discoloration. (b) SAP beads removed from the small bowel.

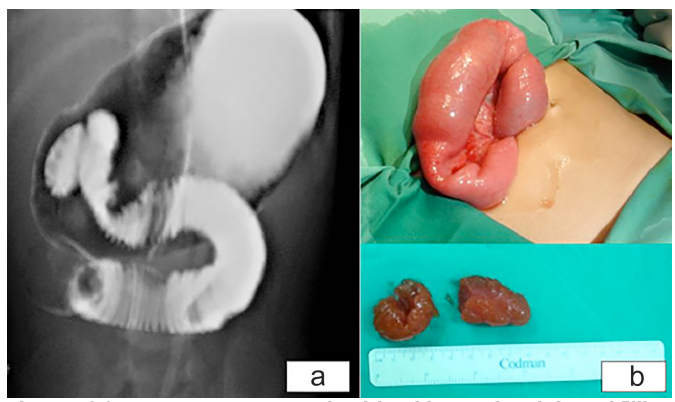

Figure 2 (a): Upper GI contrast study with evidence of oval shaped filling defect in the proximal Jejunum. (b): Loop of Jejunum with the impacted SAP beads and the extracted beads.

Child was managed with parenteral nutrition and dialysis for renal failure. General condition improved and stabilised. Subsequently, stoma closure was performed. At 6 months follow-up, she was well. Retrospectively, the parents gave history of domestic use of SAP in the garden.

In another case, a one-year infant boy presented with rapid onset of bilious vomiting. On examination, the child was stable with upper abdominal distension. In view of prominent dilated

stomach on plain X-ray abdomen, an upper GI series was done (Figure 2a), which suggested an intraluminal mass causing obstruction. After resuscitation, the child was taken up for surgery. Intra-operatively, jelly toys 4x3 cm and 5x3 cm impacted at 15 cm from the duodenojejunal flexure in the jejunum, were removed by enterotomy (Figure 2b). Postoperatively recovery was uneventful and discharged on day 4. On follow-up at 6 months, the boy was thriving well. The parents admitted to the recent usage of SAP beads in indoor plants.

Introduction of these SAP beads as ornamental objects in flower beds have brought these into close contact with children. SAP beads are used in concentrating water samples for better enablement of identification of pathogenic bacteria.[3] SAPs are characterised by their ability to absorb water and hold up to 1000 times their weight.[4] The SAP jelly beads swell to 4-5 times the original size leading to impaction, non-progression, and intestinal obstruction. Late presentation as in case one, may mimic an enterocolitis-like picture, secondary to relocation of gut flora with accompanying morbidity including sepsis, acute renal shutdown, and multi-organ failure. The consequences of late presentation are evident in the early recovery of case two, as opposed to case one.

Overall the number of children with ingested foreign bodies undergoing surgical intervention is rare.[2] In case of large bezoars, sharp foreign bodies, double magnets complications such as bowel obstruction, perforation, *etc.* can occur. Magnets can cause adherence and ischemic necrosis with resultant perforation peritonitis.[5] Also, failure of progression of ingested foreign body may indicate impaction. Association of background lesions like bowel stricture can precipitate foreign body impaction. These are the principal indications for surgical intervention in ingested foreign bodies in children.[2,5] The type of ingested foreign body depends on the geographical location. Coins are the commonly encountered ingested foreign bodies in North America and Europe, whereas toys and fish bones are seen in Asia.[5]

History and high index of suspicion are vital. When the parents do not reveal the information on accidental foreign body ingestion at admission, the clinical suspicion of an associated complication such as intestinal obstruction may not arise. As the parents were unaware of the morbidity of the SAP beads, they possibly ignored the relation of vomiting to its accidental ingestion. Pitfalls in the management of complications of ingested foreign body include atypical history and non-specific symptoms.[6]

The domestic SAP bead usage is to be viewed as a serious health hazard. Of importance is the need for public awareness of the nature of SAP beads / objects, which can be easy targets of accidental ingestion in children with disastrous consequences.

History of accidental ingestion of SAP / jelly toys should prompt early surgical intervention as spontaneous passage is unlikely. Parents and general public are to be educated regarding the serious morbidity due to accidental ingestion of SAP and hence cautioned against the use of SAP / jelly toys, forbidding their contact with children.

COMPETING INTEREST:
The authors declared no competing interest.

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KKG: Conception and final approval.
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REFERENCES

1. Godbole P, Stringer MD. Bilious vomiting in the newborn: How often is it pathologic*? J Pediatr Surg* 2002; **37(6)**: 909-11. doi: 10.1053/jpsu.2002.32909.
2. Arana A, Hauser B, Hachimi-Idrissi S, Vandenplas Y. Management of ingested foreign bodies in childhood and review of the literature. *Eur J Pediatr* 2001; **160(8)**:468-72. doi: 10.1007/s004310100788.
3. Xie X, Janina B, Siwen W, Yang Y, Michael RH. Nanofiltration enabled by super-absorbent polymer beads for concentrating microorganisms in water samples. *Sci Rep* 2016; **6**:20516. doi: 10.1038/srep20516.
4. Zohuriaan-Mehr MJ, Kabiri K. Superabsorbent polymer materials: A review. *Iran Polym J* 2008; **17**:451-7.
5. Panieri E, Bass DH. The management of ingested foreign bodies in children-a review of 663 cases. *Eur J Emerg Med* 1995; **2(2)**:83-7. doi: 10.1097/00063110-199506000-00005.
6. Messner AH. Pitfalls in the diagnosis of aerodigestive tract foreign bodies. *Clin Pediatr* 1998; **37**:359-65.