

## Complications related to unwitnessed magnet ingestion in paediatrics:

### Case series

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#### Abstract

Foreign body ingestion is one of the most common problems among children. There is a great tendency among children between the age of six months to six years to place objects, such as coins, fish bone, pins, button batteries, magnets and other household items, in their mouth and often swallow them. Magnet ingestion is not uncommon. Hazardous effects can occur owing to the fact that these are usually unwitnessed leading to disparity in history and delayed presentation. Nowadays these magnets are made of Neodymium which is a strong element and can be moulded into various shapes and sizes, making them more attractive to children. Single magnet ingestion may pass without complication, but multiple ingested magnets pose risk of severe complications such as obstruction, inter bowel fistulae, and perforation often requiring urgent intervention. Here, we present three cases who presented to the emergency department with unusual presentations and ultimately underwent exploratory Laparotomy with surprising intra-operative findings along with magnetic objects.

**Keywords:** Foreign body, Magnet ingestion, Inter bowel fistulae.

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#### Introduction

Foreign body ingestion is one of the most common problems in children. Among all documented cases of foreign body ingestion, the prevalence of magnet ingestion is approximately 3.06 cases per 100,000 people.<sup>1</sup> Cases of magnet ingestion have increased five-fold over the last decade because of increased production of magnetic toys and its colourful attractive nature.<sup>1</sup> Single magnet ingestion may pass without complications, but multiple ingested magnets pose risk of severe complications such as obstruction, inter bowel fistulae, perforation which often require urgent endoscopic or surgical intervention.<sup>2</sup> When ingested separately, new rare-earth magnets have shown to attract one another even through six layers of

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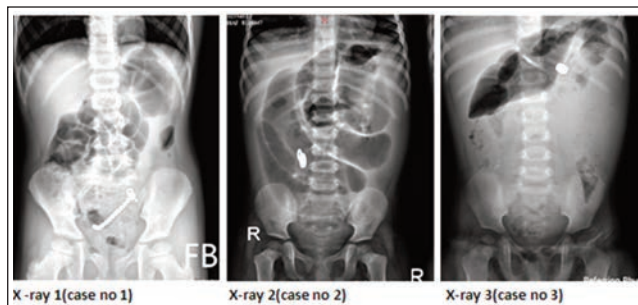
repositioned bowel wall. Therefore, paediatric patients with non-specific abdominal pain should be considered for magnet ingestion because of serious complications. Here, a series of three patients with un-witnessed magnet ingestion is presented. These cases presented between February 2021 and August 2021 to the paediatric surgery ward of Indus Hospital, a tertiary care hospital in Karachi, Pakistan. All had different clinical presentations, required exploration and were observed to have inter bowel fistulae. In postoperative period all were discharged without any complication.

Verbal consent was taken from parents of all three children included in this report.

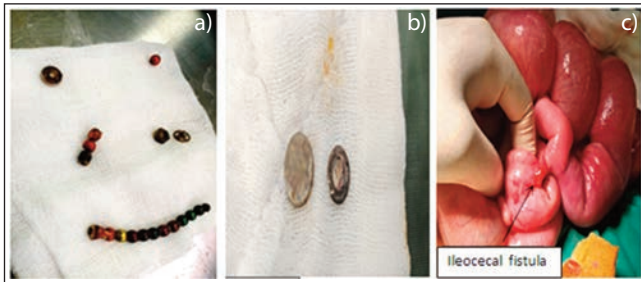
All patients were followed-up in the outpatient department within 1-3 weeks of discharge with good recovery and no complaints.

#### Case 1

A six-year-old girl presented to the Emergency Department with complaints of abdominal pain and non-bilious vomiting for two to three hours, and constipation for the last few days. She had history of recurrent para-umbilical abdominal pain since three to four months and visited the hospital twice. Due to unremarkable examination and insignificant workup, she was discharged on symptomatic treatment with explanation of red flag signs. On examination this time in ED, her pulse was 110 beats/min, temperature 98°F, and the abdomen was soft and non-tender. X-ray of the abdomen showed a chain of beads with prominent small bowel loops and faecal loading (X-ray 1).



**Figure-1:** Abdominal X-ray showing ingested magnets. X-ray 1 showing chain of magnetic beads and bolt nut washer, X-ray 2 showing two magnets in right side of abdomen with dilated bowel loops, X-ray 3 showing single magnet with metallic object overlap with each other.



**Figure-2:** a) showing multiple colourful magnetic beads with bolt nut washer and touch button, b) showing magnetic and washer, c) showing caecum making a fistula with distal ileum.

CT scan of the abdomen showed linear metallic beaded density in the small bowel loops on the left side of the abdomen with significant metallic streak artefacts and no radiological evidence of intestinal obstruction. With the impression of subacute obstruction due to foreign body ingestion, the family was counselled and surgery was planned. Intra-operatively, multiple jejuno-jejunal fistulae were revealed. On releasing inter-bowel adhesion, the jejunum was observed to be perforated at six sites. Sixteen magnetic balls, two touch buttons and a bolt-nut washer (Figure 2a) were retrieved. About 65cm of the jejunum was involved; 25cm of the jejunum was excised with end-to-end anastomosis and two perforations were repaired about 20cm from the DJ flexure. The magnetic balls retrieved had been brought as a toy, chain of magnetic balls by the child herself from an online store. The patient had smooth postoperative recovery and was discharged on the third post-operative day.

### Case 2

A two-year-old female child presented to the emergency department with complaints of non-bilious vomiting for the last 24 hours, constipation, and gradually progressive abdominal distention for three days. She was admitted to a local hospital and managed conservatively, but since her symptoms did not improve she was referred to our tertiary care hospital. X-ray of the abdomen showed dilated bowel loops with a foreign body in the right lower abdomen (X-ray 2). On revisiting her history with the parents, they denied foreign body ingestion and on CT scan there was evidence of large spiral metallic density measuring approximately 1.5cm in size within the distal ileal loop which had resulted in significant proximal small bowel loop dilatation with diameter measuring 2.7cm. After informed consent and preparation, the patient underwent exploratory laparotomy. Intraoperatively, the jejunum and proximal ileum were significantly dilated, distal small bowel loops were collapsed, one magnet and one metallic washer (Figure 2b) were seen in the distal ileal loop and caecum forming an ileocecal fistula (Figure 2c) with 20cm trapped ileum in between. After dividing the fistula, caecum and

ileum were primarily repaired. Postoperatively, feeding was gradually resumed which the child tolerated well and was discharged.

### Case 3

An 18-month-old female child presented to the ED with complaints of vomiting and abdominal pain for one week, along with low grade non-documented fever. On arrival her pulse was 150, respiratory rate was 38, temperature 102°F, the chest was clear and abdomen was full with generalised tenderness. X-ray of the abdomen showed metallic foreign body in the upper abdomen with paucity of air in middle and lower abdomen (X-ray 3). With clinical history and findings, an impression of peritonitis secondary to FB ingestion was made. Intra-operatively, there was purulent fluid on the opening of peritoneum and flimsy inter bowel adhesions were noted. There were two perforations; one at the jejunum 5cm distal to DJ and the other was at posterior wall of the stomach near the lesser curve, single round thin magnet was removed around the site of the perforation with small metal pieces attached to it. Both perforations were repaired. Fluid culture showed growth of Klebsiella, for which antibiotics according to sensitivity were given and the patient was discharged on the fourth postoperative day.

### Discussion

The earliest report of magnetic ingestion causing intestinal obstruction in a child was reported from Japan in 1995.<sup>3</sup> There is a recent increase in the incidence of magnet ingestion among children; this may be attributed to the commercial availability of such magnets in toys. These new magnets are 5–20 times more powerful than ordinary iron magnets.<sup>4,5</sup> Ingestion of multiple magnets or a single magnet and a second metallic object is particularly dangerous, as it leads to a significantly high risk of complications including intestinal ischaemia, perforation, fistulisation (mesenteric or oesophago-aortic fistula), haemorrhage, intestinal obstruction from internal herniation and volvulus, especially if the patient's presentation is delayed for >12 hours.<sup>6,7</sup> Because of the array of possible complications, the initial presentation may vary, based on timing and quantity of magnet ingestion. Whereas some children present with abdominal pain, others present with nonspecific symptoms.

Thus un-witnessed cases of magnet ingestion can be a diagnostic dilemma, especially if the child is not symptomatic or presents with non-specific symptoms. Baily et al reported a case of multiple magnet ingestion leading to gut perforation, after performing MRI in a patient complaining solely of neck pain.<sup>8</sup> It is difficult to distinguish a magnetic foreign body from a metallic one in un-

witnessed cases as initial X-ray imaging can be misleading. Literature review suggests that emergency surgical intervention should be pursued to avoid potentially life-threatening complications, such as intestinal fistula formation, perforation, and peritonitis.<sup>9,10</sup> In our case series, three patients came in with different presentations and all were unwitnessed. One had incidental finding on X-ray, the second presented with signs of obstruction, while the third presented with peritonitis.

## Conclusion

Unwitnessed ingestion of magnets by young children is becoming common now-a-days. They can present differently clinically and need prompt diagnosis by appropriate history, examination, and with plain abdominal X-ray. If history or X-ray is suggestive of magnetic ingestion, immediate laparotomy is indicated. In addition to addressing the issue, special focus should be on proper counselling and awareness of the patients and their parents/caretakers.

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**Conflict of Interest:** None.

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## References

1. Silverman JA, Brown JC, Willis MM, Ebel BE. Increase in pediatric magnet-related foreign bodies requiring emergency care. *Ann Emerg Med* 2013;62:604-8.e1. doi: 10.1016/j.annemergmed.2013.06.019.
2. Waters AM, Teitelbaum DH, Thorne V, Bousvaros A, Noel RA, Beierle EA. Surgical management and morbidity of pediatric magnet ingestions. *J Surg Res* 2015;199:137-40. doi: 10.1016/j.jss.2015.04.007.
3. Honzumi M, Shigemori C, Ito H, Mohri Y, Urata H, Yamamoto T. An intestinal fistula in a 3-year-old child caused by the ingestion of magnets: report of a case. *Surg Today* 1995;25:552-3. doi: 10.1007/BF00311314.
4. Tay ET, Weinberg G, Levin TL. Ingested magnets: the force within. *Pediatr Emerg Care* 2004;20:466-7. doi: 10.1097/01.pec.0000134926.03030.a7.
5. Brown JC, Otjen JP, Drugas GT. Pediatric magnet ingestions: the dark side of the force. *Am J Surg* 2014;207:754-9. doi: 10.1016/j.amjsurg.2013.12.028.
6. Hussain SZ, Bousvaros A, Gilger M, Mamula P, Gupta S, Kramer R, et al. Management of ingested magnets in children. *J Pediatr Gastroenterol Nutr* 2012;55:239-42. doi: 10.1097/MPG.0b013e3182687be0.
7. Hernández Anselmi E, Gutiérrez San Román C, Barrios Fontoba JE, Ayuso González L, Valdés Dieguez E, Lluna González J, et al. Intestinal perforation caused by magnetic toys. *J Pediatr Surg* 2007;42:E13-6. doi: 10.1016/j.jpedsurg.2006.12.066.
8. Bailey JR, Eisner EA, Edmonds EW. Unwitnessed magnet ingestion in a 5-year-old boy leading to bowel perforation after magnetic resonance imaging: case report of a rare but potentially detrimental complication. *Pediatr Surg* 2012;6:16. doi: 10.1186/1754-9493-6-16.
9. Kim Y, Hong J, Moon SB. Ingestion of multiple magnets: the count does matter. *J Pediatr Surg Case Rep* 2014;2:130-2. doi: 10.1016/j.epsc.2014.02.013.
10. Taher H, Azzam A, Khowailed O, Elseoudi M, Shaban M, Eltagy G. A case report of an asymptomatic male child with multiple entero-enteric fistulae post multiple magnet ingestion. *Int J Surg Case Rep* 2019;58:50-3. doi: 10.1016/j.ijscr.2019.03.043.

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### Author Contribution:

SK: Conceptualization and idea, writing original draft, investigation the clinical case.

AZ: Revising the original draft, investigation, resources, investigating, writing the original draft.

ML: Visualization, writing review and editing. managing the radiological and gross images, reviewing and editing the manuscript.

AB: Supervision, project administration, writing, review and editing. overall supervision and administered the project activities.