

Gastrojejunal Fistula with Jejunal Rotation Caused by Two Ingested Magnets in a Child: A Case Report¹

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Among the common foreign bodies that are ingested by children, ingesting multiple magnets is known to be hazardous due to the gastrointestinal complications caused by the magnets attracting each other across the bowel walls. We present here a case of gastrojejunal fistula and jejunal rotation that was caused by two ingested magnets in a 5-year-old girl, and we also present the findings of simple abdomen radiography, a small bowel series and computed tomography. The unchanged position of the radiopaque metallic foreign bodies on the serial abdominal radiographs suggests the inadvertent ingestion of multiple magnets.

Index words : Foreign bodies in air and food passages

Gastrointestinal tracts, radiography

Gastrointestinal tracts, CT

Fistula, gastrointestinal tracts

Although ingestion of foreign bodies in childhood is a common clinical situation, the case of single or multiple magnet ingestion is rare (1 - 8). An ingested small magnet with a smooth margin tends to be evacuated spontaneously (1, 5). However, when multiple magnets are ingested and they are separated into groups, they may lie in adjacent bowel loops within the range of each other's magnetic force, and so they attract each other across the bowel walls, leading to pressure erosion or necrosis, perforation, fistula formation, adhesion, and intestinal obstruction including volvulus, peritonitis and etc (1, 2, 6 - 8). We report here a case of gastrojejunal fistula and jejunal rotation that was caused by two ingested magnets in a 5-year-old girl, and we include the findings of the sim-

ple abdomen radiography, a small bowel series and CT (computed tomography).

Case Report

A 5-year-old girl was transferred to our hospital from a local clinic due to the unchanged position of metallic foreign bodies in the left upper abdomen, and she had received appendectomy at the local clinic 43 days ago. Simple abdominal X-ray in our hospital showed two small round metallic opacities adhering to each other in the left upper quadrant of the abdomen (Figs. 1A, B) at the same location as was seen on the radiographs taken earlier at the local clinic. A small bowel series demonstrated two small magnets inferior and posterior to the gastric antrum (Figs. 1C, D). Abdominal MDCT (multi-detector computed tomography), including 3D volume rendering, revealed two abutting magnets between the gastric antrum and proximal jejunum (Figs. 1E - G). Laparoscopic surgery was done under the impression of

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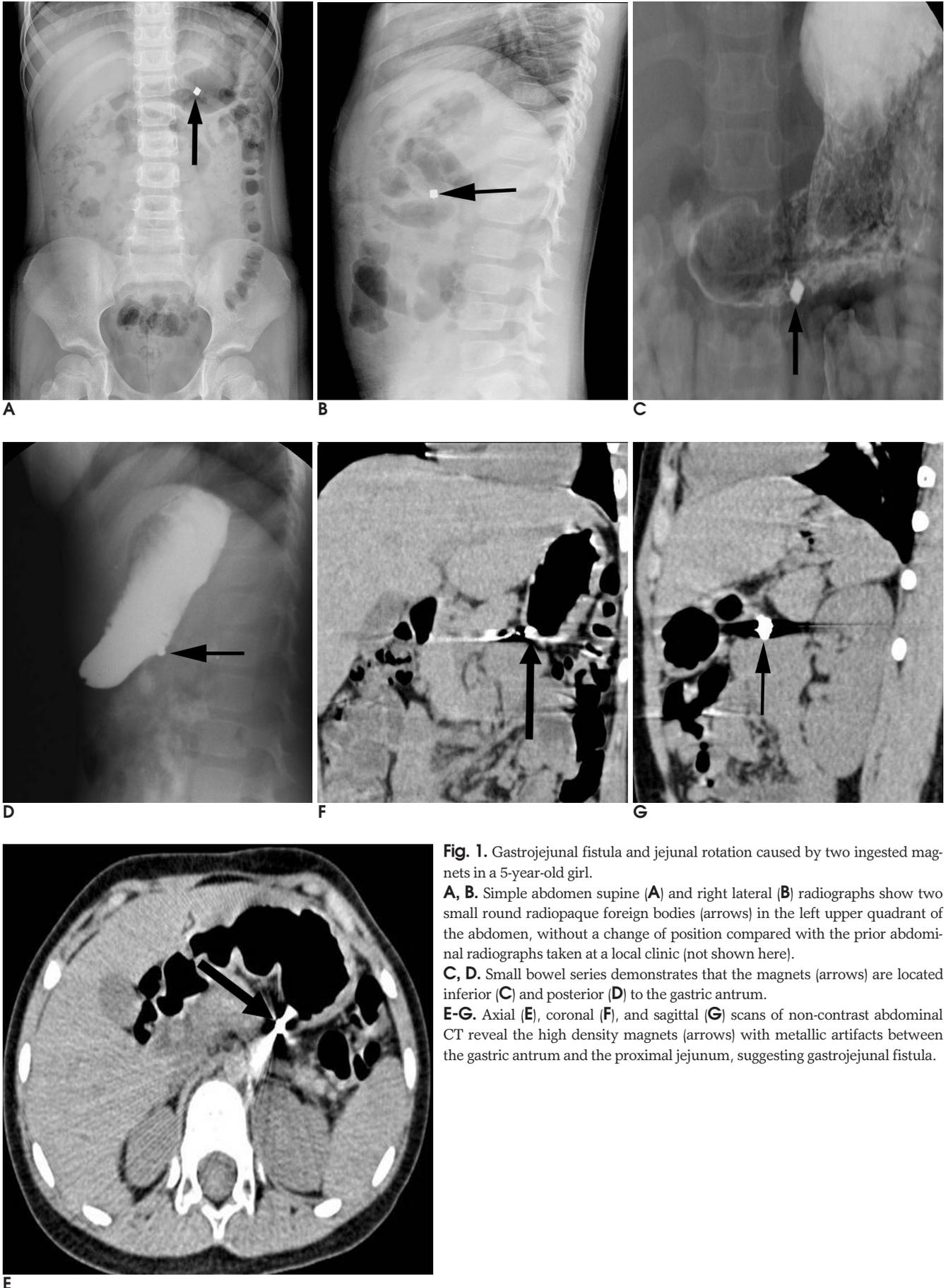


Fig. 1. Gastrojejunal fistula and jejunal rotation caused by two ingested magnets in a 5-year-old girl.

A, B. Simple abdomen supine (**A**) and right lateral (**B**) radiographs show two small round radiopaque foreign bodies (arrows) in the left upper quadrant of the abdomen, without a change of position compared with the prior abdominal radiographs taken at a local clinic (not shown here).

C, D. Small bowel series demonstrates that the magnets (arrows) are located inferior (**C**) and posterior (**D**) to the gastric antrum.

E-G. Axial (**E**), coronal (**F**), and sagittal (**G**) scans of non-contrast abdominal CT reveal the high density magnets (arrows) with metallic artifacts between the gastric antrum and the proximal jejunum, suggesting gastrojejunal fistula.

gastrointestinal complication due to the ingestion of two magnets. On the operation field, thick adhesion was found between the posterior wall of the gastric antrum and the wall of the proximal jejunum (about 30 cm distal to the duodenojejunal junction) through the perforated mesentery caused by the two attracting small round magnets. The jejunal loop above the adhesion was somewhat rotated. Laparoscopic fistulectomy with wedge resection of the adhered walls of the gastric antrum & the proximal jejunum and release of the rotated jejunal loop were performed.

Discussion

Ingestion of foreign body is a common clinical problem encountered with young children and infants, especially for children between the ages of six months and three years (1, 7). The child in our case was five years old, which is slightly older than the known average age of foreign body ingestion.

The case of magnet ingestion is rare among the various kinds of ingested foreign objects in childhood (1 - 8). In our country, small ring-like magnets (usually 5 - 15 mm in diameter and 2.5 - 10 mm in thickness) are widely used as components of many commercial wellbeing or health-giving products (such as bracelets, necklaces, seat or floor cushions, belts, rings and etc.); they are advertised for their effects of relieving muscle stiffness (such as in the shoulder, neck and etc.) or neuralgia, and for improving circulation. A single ingested small magnet with smooth margins tends to be passed and evacuated spontaneously through the alimentary tract (1, 5). However, when two or more magnets are ingested and then they pass into the gastrointestinal tract separately or in more than two groups, they tend to attract each other rather forcibly and hold the intestinal walls between them, leading to pressure erosion or necrosis, perforation, fistula formation, adhesion and intestinal obstruction, including volvulus, peritonitis and etc (1, 2, 6 - 8). In our case, laparoscopy revealed two attracting small magnets in a thick adherent lesion between the posterior wall of the gastric antrum and the wall of the proximal jejunum (about 30 cm distal to the Treitz ligament) through the perforated mesentery, and there was a partially rotated jejunal loop above the adhesion. These surgical findings suggested the possible course of gastrojejunal fistula formation due to pressure effect of the two attracting magnets holding both the gastric antrum and the proximal jejunum: erosion or necrosis of

walls of gastric antrum and proximal jejunum led to perforation and then to fistula formation, a sealed-off adhesion and finally a partial intestinal volvulus around the narrow mesenteric base.

Unfortunately, the magnet ingestion was not noticed early at the local clinic or by the parents, and this was probably due to the physicians' lack of prior experience and knowledge of such a rare situation. Therefore, laparoscopic surgery in our hospital was performed more than one and half months later after the presumptive date of magnet ingestion. This fact emphasizes that clinicians should be well acquainted with the characteristic imaging findings of multiple magnet ingestion, such as a fixed position of radiopaque metallic foreign bodies on serial abdominal radiographs, as was seen in our case. MDCT gave us more information concerning the three-dimensional location of the magnets and the adjacent anatomic detail, in spite of the metallic artifacts interfering with the image quality. When accidental magnet ingestion is suspected either clinically or radiologically, magnetic resonance imaging, as a matter of course, should be absolutely avoided because of the possible catastrophic results.

When the abdominal radiographs show ingested magnets in the upper gastrointestinal tract, they may be retrieved by endoscopy (9), Foley balloon catheter extraction (10) and etc. If the ingested multiple magnets are found to pass the pylorus on the abdominal radiographs, they should be removed immediately by laparotomy before any symptoms or complications occur (1) to prevent severe complications.

In conclusion, it is very important for clinicians (including radiologists, pediatricians or psychiatrists) to be aware that a fixed position of radiopaque metallic foreign bodies on serial abdominal radiographs may suggest the inadvertent ingestion of multiple magnets.

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