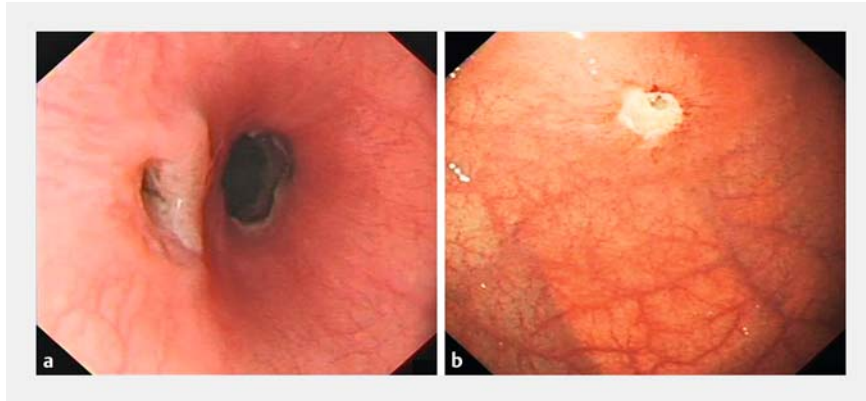


## Endoscopic removal of two magnets impacted in the lower esophagus and gastric fundus



► **Fig. 1** Radiograph taken on the first day showing the two separate magnets in the lower esophagus and gastric fundus, and an apparent break in the gastric mucosa.



► **Fig. 2** Upper gastrointestinal endoscopy views showing: **a** the esophageal opening of the fistula; **b** the gastric opening of the fistula.

A 13-year-old healthy child was referred with a 12-day history of epigastric pain following the inadvertent ingestion of two round magnets. Radiographic inspection on the first day demonstrated two separate foreign bodies in the lower esophagus and gastric fundus (► **Fig. 1**), which did not pass spontaneously after 3 days of follow-up. Upper gastrointestinal endoscopy on the fourth day revealed the formation of an esophagogastric fistula (► **Fig. 2**), but conventional endoscopic methods failed to remove the impacted magnets after repeated attempts. The patient and his parents refused a surgical operation, therefore another endoscopic intervention was performed.

Preprocedural radioscopy identified that the two magnets were close together. An endoscopic radial incision was initially made at the gastric opening of the fistula using an IT-knife and a Hook-Knife (► **Video 1**). This revealed that the magnets were located in the muscular layer. Grasping forceps were then used to try to grasp the magnets, but this also failed. To avoid further iatrogenic injury and having obtained informed consent from his parents, a special apparatus consisting of a powerful ring-shaped sterilized magnet with string attached



► **Video 1** Endoscopic removal of two magnets impacted in the lower esophagus and gastric fundus.

was selected. The device was carried into the gastric lumen using forceps and the impacted magnets were easily removed once they had been drawn together (► **Fig. 3**). The incision was closed by means of purse-string suture. The patient started eating on postoperative day 3 and no complications were noted. Endoscopic re-examination on day 7 also showed significant improvement of the fistula (► **Fig. 4**).

Gastrointestinal injuries caused by ingested magnets can be severe or even fatal [1]. It is suggested that all ingested magnets should be removed urgently whenever possible [2–4]. In the present case, the discomfort and the first radiograph after ingestion suggested that the attractive force between the two magnets had trapped a portion of the esophagogastric wall. Although successful removal of the magnets was achieved with



► **Fig. 3** The impacted magnets following their successful removal.



► **Fig. 4** View during endoscopic re-examination showing healing of the esophageal mucosa.

the use of another magnet, emergent endoscopy might have reduced the injury and avoided fistula formation.

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### Competing interests

None

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