



## Case Report

# A case of child death caused by intestinal volvulus following magnetic toy ingestion

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## ABSTRACT

An 8-year boy was admitted to the ER of one of Warsaw's pediatric hospitals with a history of having bloody vomiting the day before. During admission the boy collapsed and lost consciousness. CPR was unsuccessful. On medico-legal autopsy, two foreign objects (small magnetic spheres – 0.5 cm in diameter) were found in two different places in the small and large intestines and were notably attracted magnetically one to another. A loop of approximately 1-m length with features of small intestinal hemorrhagic necrosis and small intestinal mechanical obstruction was found. The cause of death was intestinal volvulus and small intestinal mechanical obstruction caused by ingestion of foreign objects (two neodymium magnets). Most likely these small magnetic spheres were part of a popular toy, the safety of which, lately has been widely discussed.

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## 1. Introduction

Foreign body ingestion is common among young children. Up to 80–90% of intestinal foreign bodies usually pass through the gastrointestinal (GI) tract and are evacuated spontaneously with no harm or treatment [1–4]. Magnet ingestions seems to be rare as between the years 1987 and 2010 149 cases all over the world were described [5]. They are more prone to cause severe GI tract damage like intestinal volvulus, perforation, bowel necrosis, obstruction, fistula formation and even death depending on their number (multiple magnet ingestion), shape and size [6–8]. Adults with psychiatric or neurological disorders may also ingest foreign bodies including magnets [9]. The following case report presents an 8 year child death caused by intestinal volvulus and small intestinal mechanical obstruction which resulted from the ingestion of two magnetic spheres (neodymium magnets) – most likely parts of a popular toy.

## 2. Case report

### 2.1. Case history

The death occurred at the emergency room of one of Warsaw's pediatric hospitals. An 8-year boy was brought in by his mother

complaining of malaise and a history of bloody vomiting since the previous day. Medical history was negative except for childhood infectious diseases (no details available). On physical examination during ER admission: an 8-year slender boy, without evidence of trauma, pale skin, patent nostrils and trace amount of vomit in the oral cavity. Chest auscultation revealed normal but decreasing heart tones and rhonchi. Stomach was painless and slightly bloated. Liver and spleen were not palpable. GCS 10 points. During examination the boy collapsed and lost consciousness. For that reason clinical data is incomplete (no X-rays or blood examination were taken). Rescue team was called immediately to find cardio-pulmonary arrest. During CPR patient had VF, then (after defibrillation) asystole. No response to the CPR (intubation, central venous catheter, 8 units of adrenalin, bicarbonates) was observed.

### 2.2. Autopsy findings

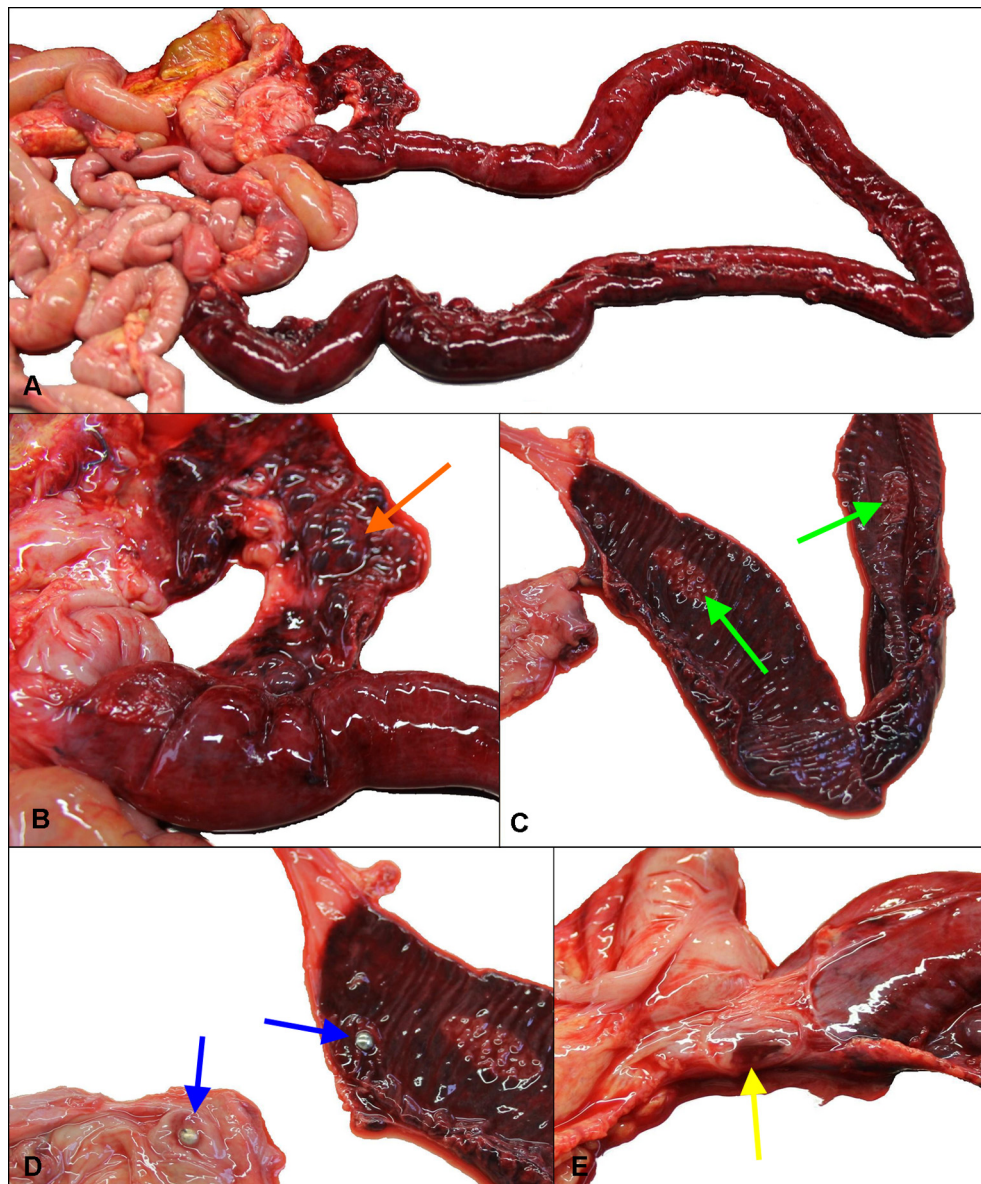
A body of a slender, Caucasian boy with adequate nutrition and recorded height of 134 cm, generalized pallor of the body with greenish putrefactive skin discoloration on the abdomen has been subjected to the forensic autopsy in Forensic Medicine Department of Warsaw Medical University with the prosecutor's request. The abdomen was slightly distended with its surface below the level of the chest. No fresh injuries were found except the signs of medical treatment and single contusions on the frontal surface of the

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left shank with features of healing. Autopsy findings were: two metal foreign objects (small magnetic spheres – 0.5 cm in diameter) at different levels of the intestines (one in the distal part of the small intestine, the other slightly beneath the ileocaecal valve) sticking to each other across intestinal walls and creating an intestinal loop while twisting the bowel mesentery. There was hemorrhagic necrosis of the small intestine (approx. 1 m), bloody content in the distal part of the small intestine, bloody fluid in the peritoneal cavity (approx. 700 ml), swelling of the lymphoid follicles of the small intestine, small intestine mesenteric lymph node swelling with packets formation, splenomegaly ( $15 \times 9 \times 3$  cm), coffee-grounds-like black content in the stomach and the main bronchi, single small contusions on the left shank with features of healing, signs of medical treatment. Superior mesenteric artery and celiac trunk with its branches were patent and unremarkable (see Fig. 1).

### 2.3. Histopatological examination

Histopatological examination revealed: brain: moderate congestion of the arachnoid, poor blood supply, oedema; heart: congestion, waviness of muscle fibers, ruptured myocardiocytes; lung: lung atelectasis, focuses of hemorrhagic infarction, iatrogenic emphysema, in Weigert staining: RBC aggregates and fibrin on the surface of the arterial wall; liver: hydropic degeneration of hepatocytes, poor blood supply; kidney: poor blood supply; tonsil: swelling of lymphatic nodules, purulent inflammation; thymus: unchanged; subcarinal nodes: reactive swelling; mesenteric lymph nodes: reactive swelling, nodes and mesenteric fat tissue hemorrhagic necrosis; spleen: severe congestion, reactive lymphatic nodules swelling; small intestine: extensive hemorrhagic necrosis of the mucosa and intestinal wall with destruction of the intestinal villi, pressure necrosis (necrolysis) in direct place where foreign



**Fig. 1.** In the distal part of the small intestine (130 cm above the ileocaecal valve) bloody content. 100 cm above the ileocaecal valve the circumference of the small intestine extended (from 2.5 cm in the unchanged part to 4.5–5 cm), its wall slightly fragile, uniformly brownish-cherry discolored (A), its mucosa in this area brownish-cherry with disseminated oval, convex (to the lumen of the intestine) lymph follicles aggregations (up to  $2 \times 1$  cm in diameter) (C – green arrows). On the initial section of the changed intestine and slightly beneath the ileocaecal valve two markedly thinned pockets of the intestine wall (0.5 cm in diameter) with dirty-reddish discoloration ring in the mucosa around the lower one (E). Shape and diameter of these pockets correspond to the shape and diameter of magnetic spheres found in the lumen of intestine during dissection (D – blue arrows). Dark-cherry, swollen (up to been seeds size) lymphatic nodes in the area of the ileocaecal valve with packets forming (B – orange arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

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