Attraction-Not So Attractive: Case Series of Endoscopic Removal of Buckyballs from Colon Via Magnetism of Insertion Tube

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Background

What Are Buckyballs?

Neodymium magnets, also known as buckyballs, are powerful toy magnets that, when separated, can attract to one another with formidable force. Ingestion of 2 or more magnets or 1 magnet with a magnetic object, can result in bowel perforation. Retrieval of these magnets requires endoscopy, oftentimes emergently, to prevent pressure necrosis of bowel wall between the 2 magnets.

Colonoscope Components:

The bending section of the colonoscope assists with directing the scope and lumen visualization (Fig 2). While the bending section is non-magnetic, the insertion tube includes an inner metal tubing (Fig 1), making it magnetic (Fig 3).

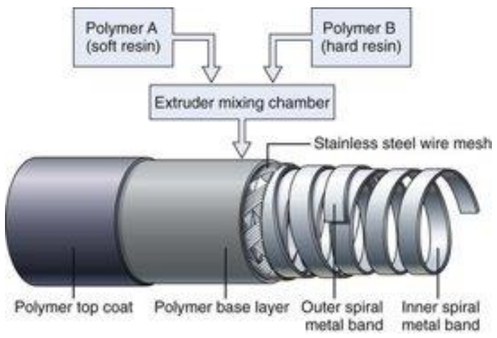

Figure 1. Components of Insertion Tube (Kohlie, D.R., Baillie, J., 2019)

Here, we describe two pediatric patients with magnets lodged in the right lower quadrant. The magnets were difficult to visualize in the distal small bowel/ colon due to their attraction to the insertion tube of the colonoscope.

Case Presentation

Case 1: A 14-year-old female accidentally swallowed 4 buckyball magnets. At presentation, the magnets were seen connected in a linear fashion in the stomach on X ray; however, the magnets had advanced before endoscopy could be performed. Repeat X rays over a 54-hour period showed persistence of the magnets in the right lower quadrant despite the use of laxatives. CT abdomen confirmed the magnets' position in the distal ileum or cecum. During colonoscopy and ileoscopy, no magnets were visualized. On careful withdrawal of the scope, the 4 magnets were seen attracted to one another in the rectum. The magnets were then removed with a Roth net.

Case 2: An 11-year-old male accidentally swallowed 2 buckyball magnets. The 2 attracted magnets moved to the right lower quadrant on X ray where they remained for 54 hours. During colonoscopy, no magnets were visualized in the cecum. However, during an attempt at ileoscopy, upon withdrawal of the scope from the ileum, the connected magnets appeared in the cecum. The magnets were then removed with a Roth net from the cecum.

These are the first known documented cases in which magnets were attracted to the insertion tube of the colonoscope during magnet retrieval.

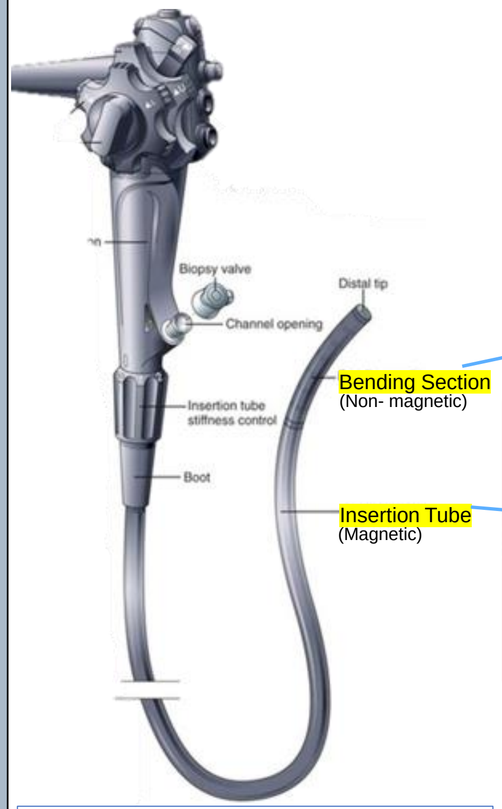

Figure 2 (above left): Components of videoscope used in colonoscopy (Kohlie, D.R., Baillie, J., 2019)

Figure 3 (above right):
A. Buckyballs placed by bending segment.
B. Buckyballs placed by insertion tube-magnets attracted to the tube.
Arrows point to coinciding components between figures 2 and 3.

Conclusion

In these patients, the magnets were not visualized initially during colonoscopy. It is our theory, that due to their powerful magnetic force, the magnets were attracted to the metallic insertion tube, approximately 15 cm proximal to the non-magnetic bending section of the scope (Fig. 3). Therefore, the endoscopist was not able to visualize the magnets until they were physically separated from the insertion tube. Endoscopists should be aware that magnets may adhere to the insertion tube, which is not in the field of vision, leading to confusion during colonoscopy.

Recommendations:

- If magnets are not initially visualized, consider retroflexion of the bending segment at the approximate location of the magnets based on imaging.
- Re-examine the rectum on withdrawal as magnets may disconnect from the insertion tube of the scope during with drawal from the anal sphincter.

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