Duodenal perforation as a complication of gastrostomy tube migration

Avery C Rossidis, Steven E Raper and Kristoffel R Dumon
Department of Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA 19104, USA
Corresponding author: Avery C Rossidis. Email: avery.rossidis@uphs.upenn.edu

Lesson
Gastrostomy tube placement is a routinely safe procedure; however, this report and its accompanying images highlight a rare but serious complication of tube migration — duodenal perforation.

Keywords
- gastrostomy
- G-tube
- enteral nutrition
- intestinal perforation

Introduction
The gastrostomy tube is widely used as the method of choice for providing long-term enteral nutrition to patients who are unable to tolerate oral intake. Gastrostomy tube placement, whether by the percutaneous or open method, is known as a common and safe procedure. A review of the literature reveals a minor complication rate of 7.4%–40% and a major complication rate of 0.4%–4.4%.1–3 When an open approach is undertaken, a variety of conduits have been employed, including mushroom-type tubes such as a Malecot or Pezzer, as well as balloon-type tubes such as a Foley catheter or MIC tube. Gastrostomy tube migration is a known phenomenon that is predominantly associated with the use of balloon-type tubes without external bumpers and can result in complications such as gastric outlet obstruction, pancreatitis, small bowel obstruction, and even intestinal perforation.4–7

Here, we report a rare case of gastrostomy tube migration resulting in duodenal perforation.

Case report
The patient was a 65-year-old male with muscle invasive bladder cancer (T2N0) who underwent neoadjuvant chemotherapy followed by radical cystectomy, prostatectomy, bilateral pelvic lymph node dissection, and orthotopic neobladder reconstruction (Studer pouch). His post-operative course was complicated by dysphagia of an uncertain cause and consequent aspiration pneumonia, and therefore a gastrostomy tube (G-tube) was requested for feeding. Given that recent imaging demonstrated colon overlying the stomach, the decision was made to proceed with an open approach. The abdomen was opened via a small left upper quadrant paramedian incision and a Stamm gastrostomy was performed using a 20 French silicone Foley catheter. The catheter’s balloon was inflated with 10 ml of sterile water and the catheter was sutured to the skin with a polypropylene stitch. The patient recovered appropriately from the operation and was discharged home on post-operative day (POD) 7 tolerating bolus gastric feeds at goal.

The patient then represented to the Emergency Department on POD 9 complaining of acute, severe, diffuse abdominal pain after flushing his G-tube that morning at home. Computed tomography with contrast injected via the G-tube revealed that the tube had migrated into the duodenum and the tip was visible perforating the duodenal wall; extraluminal enteric contrast and gas was also appreciated emanating from the tube and tracking along the anterior pararenal space towards the right paracolic gutter (Figure 1). The patient was taken emergently to the operating room where he underwent exploratory laparotomy via an upper midline incision. A Kocher manoeuvre was performed and the site of perforation was identified in the distal descending duodenum (Figure 2); this was repaired primarily with absorbable sutures followed by an omental patch. A feeding jejunostomy tube (J-tube) was also placed and the pre-existing G-tube was pulled back to the appropriate position within the stomach and re-secured to the skin. The patient recovered uneventfully and was discharged home on POD 7 tolerating jejunal feedings at goal. He was seen in follow-up two weeks post-operatively where he was noted to be doing well and a fluoroscopic examination with contrast injected via the G-tube demonstrated no leak at the site of the prior perforation. He transitioned to G-tube feedings pending an ongoing neurologic work-up for his dysphagia and his J-tube was subsequently removed in the office.
Discussion

When patients are unable to tolerate an oral diet, G-tube feedings are generally the method of choice for providing long-term enteral nutrition. Whether they are placed percutaneously, laparoscopically, or in an open fashion, a variety of tube types are available for use. Tubes with balloons are appealing because they can prevent leakage of gastric contents as well as unintentional removal. They are also easily
replaceable when necessary. If the G-tube migrates, however, these balloons can cause significant complications. The presence of a terminal balloon makes the tube more susceptible to migration secondary to gastric peristalsis. Foley catheters, in particular, are even more likely to migrate given the lack of external bumper, and their migration can be difficult to recognise given the absence of interval markings along the shaft of the catheter.

In our case, a silicone Foley catheter was used as a G-tube that was placed in an open manner. The catheter subsequently migrated into the duodenum and the tip perforated the bowel at this location. Upon review of the literature, only a handful of case reports of duodenal perforation secondary to a G-tube were found. One series reported five patients who experienced viscus perforation (three into the duodenum, one through the posterior stomach, and one with a gastrocolic fistula) by the distal limb of a modified Wills-Oglesby-type gastrostomy catheter during a 30-month period. This particular type of tube had a semi-rigid pointed tip that likely predisposed it to visceral erosion, especially when it migrated out of the stomach. Another more recent report presented a case more similar to ours – a percutaneous endoscopic gastrostomy (PEG) tube with an inflated balloon near the tip was found to have migrated out of the stomach and perforated the duodenal bulb. The authors hypothesised that the perforation was due to compression necrosis by the tip of the tube. This is also the likely mechanism in our case given the relatively rigid tip of a silicone Foley catheter, though a pre-existing ulcer at this location in the duodenum rendering the tissue especially vulnerable to perforation cannot be excluded. In response to this case, we have modified our practice and now use a type of tube in which the balloon extends all the way to the end of the catheter, thus eliminating the exposed firm tip and making it less likely to penetrate the bowel wall. Based on our and others’ experiences, Foley catheters as conduits for enteral access should be used with great caution, if not avoided altogether, and intestinal perforation, though rare, should not be forgotten as a potential consequence of tube migration.

Declarations
Competing interests: None declared
Funding: None declared
Ethical approval: Written informed consent for publication was obtained from the patient.
Guarantor: KRD
Contributorship: ACR: conception, design, data acquisition, drafting, revising and final approval; SER: data acquisition, revising and final approval; KRD: data acquisition, revising and final approval.
Acknowledgements: None
Provenance: Not commissioned; peer-reviewed by Ish Ahmed.

References
1. Shah A, Shah N and DePasquale J. Replacement gastrostomy tube causing acute pancreatitis: case series with review of literature. J Pancreas 2012; 13: 54–57.
2. Potack JZ and Chokhavatia S. Complications of and controversies associated with percutaneous endoscopic gastrostomy: report of a case and literature review. Medscape J Med 2008; 10: 142.
3. Blumenstein I, Shastrl YM and Stein J. Gastroenteric tube feeding: techniques, problems and solutions. World J Gastroenterol 2014; 20: 8505–8524.
4. Schrag S, Sharma R, Jaik N, Seamon M, Lukaszczyk J, Martin N, et al. Complications related to percutaneous endoscopic gastrostomy (PEG) tubes. A comprehensive clinical review. J Gastrointestin Liver Dis 2007; 16: 407–418.
5. Bumpers H, Collure D, Best I, Butler K, Weaver W and Hoover E. Unusual complications of long-term percutaneous gastrostomy tubes. J Gastrointest Surg 2003; 7: 917–920.
6. Hawatmeh A, Alkhateeb A, Arqoub A, Jumean K and Shaaban H. Gastrostomy tube migration complicated with acute pancreatitis: two case reports with review of literature. Int J Crit Illn Inj Sci 2016; 6: 48–50.
7. Moriwaki Y, Arata S, Tahara Y, Toyoda H, Kosuge T and Suzuki N. Duodenal perforation due to compression necrosis by the tip of percutaneous endoscopic gastrostomy tube. Nutrition 2011; 27: 979–981.
8. Scott R and Bowling TE. Enteral tube feeding in adults. J R Coll Physicians Edinb 2015; 45: 49–54.
9. Kanterman R, Hicks M, Simpson K, Malden E, Picus D and Darcy M. Nonsurgical management of gastric or duodenal perforation from a Wills-Oglesby-type gastrostomy tube. JVIR 1996; 7: 737–741.