

DCMC Emergency Department Radiology Case of the Month

These cases have been removed of identifying information. These cases are intended for peer review and educational purposes only.

Welcome to the DCMC Emergency Department Radiology Case of the Month!

In conjunction with our Pediatric Radiology specialists from ARA, we hope you enjoy these monthly radiological highlights from the case files of the Emergency Department at DCMC. These cases are meant to highlight important chief complaints, cases, and radiology findings that we all encounter every day.

If you enjoy these reviews, we invite you to check out Pediatric Emergency Medicine Fellowship Radiology rounds, which are offered quarterly and are held with the outstanding support of the Pediatric Radiology specialists at Austin Radiologic Association.

If you have any questions or feedback regarding the Case of the Month, feel free to email Robert Vezzetti, MD at rmvezzetti@ascension.org.

This Month: Gastrostomy buttons. We all see them and are familiar with them. Many of us have replaced them when dislodgment occurs and this seems to be a simple, straightforward procedure. But, is it really? What happens when you suspect a complication after tube placement? How can you discern if one is present? Special thanks to Dr Mark Tabarrok for this case.



FELLOWSHIP - PEDIATRIC EMERGENCY MEDICINE

PEM Fellowship Conference Schedule: May 2019

- 1st - 9:00 Single Ventricle Physiology.....Dr Vezzetti
10:00 UTI.....Dr Tabarrok
11:00 Inborn Errors of Metabolism.....Drs Ruttan & Sivisankar
- 8th - 9:00 Biostats.....Dr Wilkinson
10:00 Bone and Joint Infections.....Dr Schwartz
11:00 Conflict Resolution.....Drs Allen, Iyer, Arredondo
- 15th - 9:00 Back Pain.....Drs Leake, Vezzetti, Arredondo
10:00 OTC Overdose.....Drs Earp and Costello
11:00 Musculoskeletal Disorders.....Dr Kienstra
12:00 ED Staff Meeting
- 22nd - 8:00 Mass Casualty.....Dr Remick & Fusco
9:00 Simulation: Mass Casualty...Dr Floyed and Sim Faculty
- 29th - 9:00 M&M.....Dr Schwartz & Costello
10:00 Board Review: Misc.....Dr Higginbotham

Guest Pediatric Radiologist: Dr David Leake, MD
Dell Children's Medical Center

Simulations are held at the Seton CEC.
Lectures are held at DCMC Command Rooms 3&4.
Locations and topics are subject to change.
All are welcome!

ON MAY 1ST, THE CURRENT JAPANESE EMPEROR, AKIHITO, WILL ABDICATE (DUE TO HEALTH AND AGE REASONS - HE'S 85), ALLOWING HIS SON, NARUHITO, TO ASCEND TO THE CHRYSANTHEMUM THRONE. HE IS THE 125TH EMPEROR OF JAPAN.



JAPAN HAS THE WORLD'S OLDEST CONTINUOUS MONARCHY, WHOSE ORIGINS GO BACK TO 660 BC. IN JAPAN, THE EMPEROR IS ADDRESSED AS "TENNO" ("EMPEROR"); "MIKADO", ONCE POPULAR IN THE 19TH CENTURY, IS OBSOLETE.

Case History

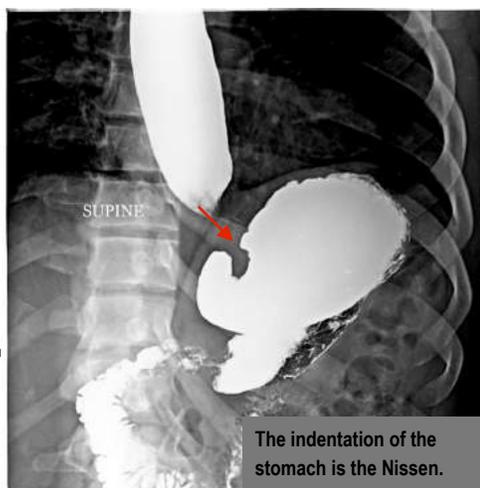
Things have not slowed down at all in the Pediatric Emergency Department lately. This is very unusual for the Spring, but high volumes make the shift fly by! The next chart you pick up is one you've seen multiple times over: a patient with a gastrostomy tube (G button) problem.

This is a seven month old male who has a G button that fell out approximately 3 hours ago, just prior to arrival. The mother tells you that the button "slipped out" during the child's feeding. She attempted to replace the button, but was unsuccessful. Other than that, there are no other symptoms or concerns.

You get a little more history from the mother. The child has a history of prematurity, having been born at 29 weeks of gestation. He was in the Neonatal Intensive Care Unit (NICU) for several months. During that time, the child was diagnosed with subglottic stenosis and had an entero-colic fistula. This led to the placement of a gastrostomy button by Pediatric Surgery and the child also had a Nissen fundoplication placed. He is dependent on G button feeding. This button was placed approximately 5 weeks ago.

The child's physical examination is unremarkable. The child's vital signs are appropriate for his age. There is a stoma noted, which has some minimal granulation tissue but no erythema/edema/discharge. Other than that, pretty boring. Of course, you need to place something in that stoma to help keep it open, while you decide what to do next. You find a Foley and place it in the stoma (that should help).

The gastrostomy site is about 5 weeks old. Does this change how you approach replacing it? And, once the button is back in, will the child need imaging? If so, are plain radiographs adequate or do you need computed tomography? Can you utilize ultrasound to help guide replacement of the button? Should you replace the button?



A Nissen fundoplication is commonly used in pediatric patients for treatment of complicated gastroesophageal reflux disease (GERD). Dr Rudolph Nissen (1896-1981) first performed this procedure

in 1955. In this procedure, a gastric fold is wrapped completely around the distal esophagus (306 degrees).

The main imaging technique to evaluate a Nissen fundoplication has been an upper GI with barium. CT imaging can also be used.

Complications include a "tight" fundoplication (results in dysphagia and achalasia like symptoms), slippage, disruption (the most common complication), and a twisted fundoplication resulting in a gastric volvulus.

IN JAPAN, IT IS CONSIDERED DISRESPECTFUL TO ADDRESS ANY PERSON BY THEIR GIVEN NAME, ESPECIALLY THE EMPEROR. SO, WHILE HE IS ALIVE, THE EMPEROR IS CALLED "TENNO HJEIKA" ("HIS IMPERIAL MAJESTY").



THE JAPANESE EMPEROR HAS NO RULING FUNCTIONS WHATSOEVER. HIS ROLE (AND CURRENTLY, EMPERORS IN JAPAN CAN ONLY BE MALE) IS PURELY CEREMONIAL.

Gastrostomy Tubes: A Refresher

Need a refresher on G buttons, GJ tubes, and PEG tubes? Well, here's a very brief refresher about these devices, which are very common in pediatric patients:

There are a variety of reasons these devices are utilized in pediatric patients, but common conditions that require long term feeding include neurological, gastrointestinal, and metabolic diseases.

These tubes can be placed using surgical techniques or under fluoroscopic guidance (often using a percutaneous retrograde gastrostomy technique). There is a high success rate of placement among pediatric patients but there are associated complications (although rare), including peritonitis, subcutaneous abscess formation, and gastrointestinal bleeding. Minor complications include tube dislodgment, tube leakage, site infection, and tube obstruction.



Low Profile Gastrostomy Button (MIC-KEY button)

Arguably one of the most common, if not the most common gastrostomy device seen in pediatric patients and in clinics and emergency departments around the country. This device is inserted into a stoma and held in place by a balloon filled with sterile water.

Advantages: Very low profile, does not migrate easily, easy to care for the stoma, and the tube can usually be replaced by a care provider if it comes out or at the bedside in the ED.

Disadvantages: The balloon can leak or break, causing dislodgment, an extension tubing set is used to provide feeds, and due to size limitations, not available for smaller patients (ie very young infants).



GJ (Gastrojejunostomy) Tube

This tube is often used in patients with severe GERD or with high aspiration risk. It has both gastric and jejunal ports.

Advantages: Two ports to use.

Disadvantages: Tube must be taped in place and needs fluoroscopic placement.



PEG Tube

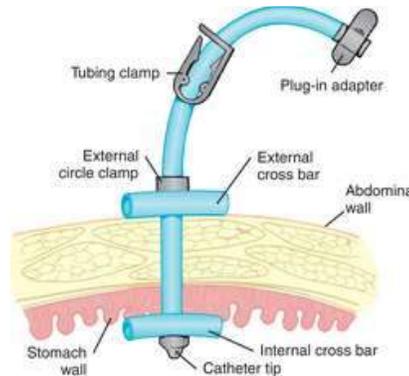
Used as an initial gastrostomy tube in percutaneous endoscopic gastrostomy procedures. Not as often used in pediatric patients.

Advantages: Well-anchored and the bulb does not deflate.

Disadvantages: Taping the device down can cause skin irritation, too heavy/large for small patients, the external retention ring can break down leading to migration, hard to clean the stoma.

Weird Stuff: Buried Bumper Syndrome

This is a rare but, let's face it, kind of cool complication that can be seen in patients with percutaneous gastrostomy tubes. This occurs when the internal bumper migrates along its track, leading to the tube becoming lodged between the gastric wall and the skin due to high grade tension between the internal and external bumpers, leading to necrosis of the gastric wall. Radiographic evaluation includes CT (see the image to the right), ultrasound, and fluoroscopy. Symptoms include pain, fever, and emesis.



Pigtail G Tube

Initial G tube used in percutaneous endoscopic placement procedures.

Advantages: A variety of sizes.

Disadvantages: Needs to be taped to the skin, can migrate.

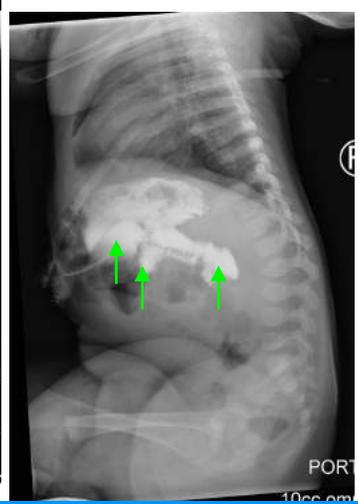
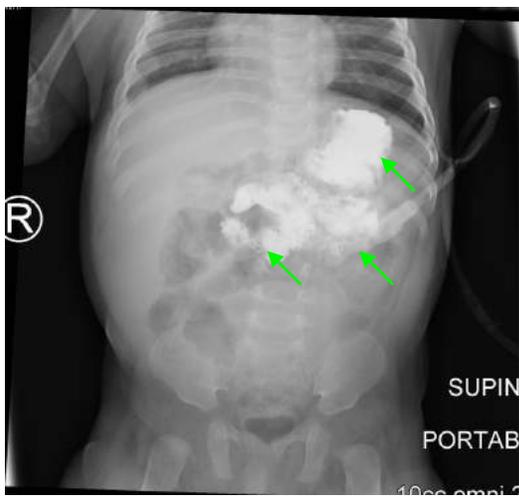
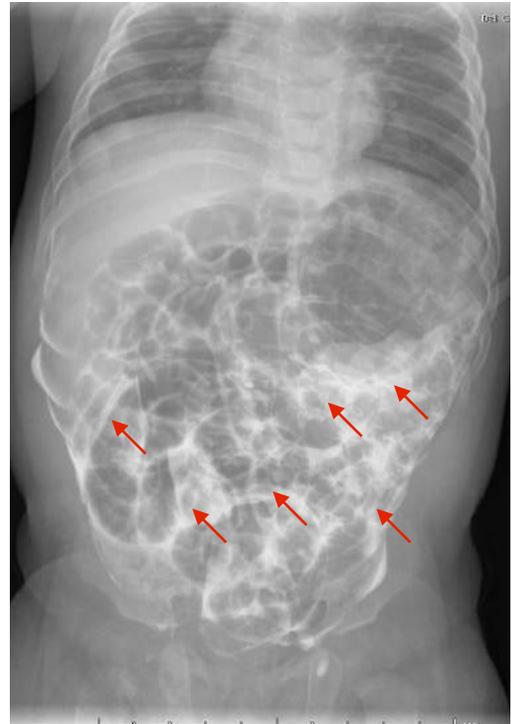
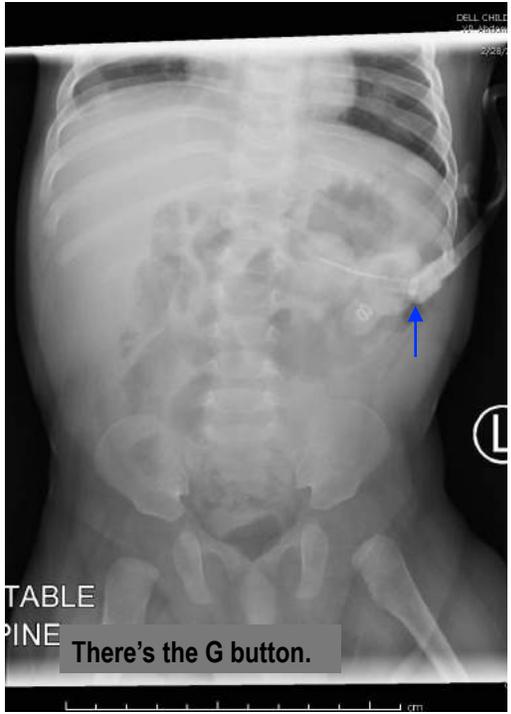


UPON HIS RETIREMENT, AKIHITO WILL BE CALLED "DAIJO TENNO" ("EMPEROR EMERITUS"). HOWEVER, AS IS TRADITION, UPON HIS DEATH HE WILL BE RENAMED "HEISEI TENNO". THIS IS BECAUSE THE TIME AN EMPEROR IS RULING IS ASSIGNED A SPECIFIC ERA NAME (IN THIS CASE, IT WAS THE HEISEI ERA).

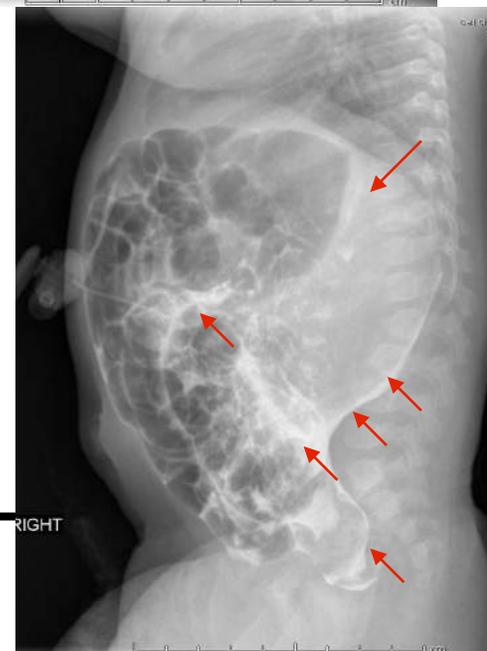


THE NEW EMPEROR COMES WITH A NEW ERA NAME, THE NEW ERA WILL BE CALLED "REIWA". UPON HIS DEATH, NARUHITO WILL BE CALLED "REIWA TENNO".

Since this child has a recently placed gastrostomy button, you decide that you should consult Pediatric Surgery for replacement of the button. The surgical team graciously agrees to evaluate the child in the Emergency Department. During that evaluation, they elect to attempt replacement at the bedside, which they do. Since the button was freshly placed, followup radiographic studies are obtained after instillation of Omnipaque. Those images are noted to the right.



OK, so the G button is not in the stomach. This is a bit of an issue, isn't it? Now what?



The images to the right are notable for extravasation of contrast material (Omnipaque) into the peritoneal cavity with outlining the mesentery (red arrow). This is consistent with extraluminal location of the G button. The images above demonstrate satisfactory placement of a gastrostomy button; note the contrast is located within the stomach and intestinal tracts (green arrow).

THE THRONE OF JAPAN IS CALLED THE CHRYSANTHEMUM THRONE. THE ACTUAL THRONE IS LOCATED IN KYOTO PALACE.



Here we see selected plain radiography with contrast enhancement of the child's post op gastrostomy button placement. Note the contrast is filling the stomach and proceeding into the duodenum, indicating satisfactory placement.

Case Resolution:

The G button was confirmed by plain radiography with contrast enhancement not to be in the stomach. At this point, the Pediatric Surgery team elected to take the child to the operating room for surgical placement of the button under laparoscopic guidance. During the procedure, no iatrogenic injury was noted. A gastrostomy button was placed without difficulty and confirmation of function was done as well (after the balloon was inflated with sterile water, the tube was then instilled with water which filled the stomach without extravasation). Repeat imaging was obtained post op (see above) and feeds were started, which the child tolerated well. Since he was also scheduled for evaluation of his subglottic stenosis by Pediatric Otolaryngology, this was done during his admission; findings from this evaluation showed improved appearance of the subglottis without inflammatory response. He was discharged on post-operative day 2 with followup with Pediatric Surgery in 2 weeks as well as with Pediatric Otolaryngology.

Teaching Points

1. There are a variety of gastrostomy buttons available that clinicians should be familiar with. The most common buttons encountered in pediatric patients are low profile buttons, commonly branded as MIC-KEY buttons.
2. Gastrostomy buttons, whether it is a MIC-KEY, PEG, or Pigtail G tube, should be left alone if they are freshly placed. That is, if a button is less than 2 months (this can vary) since being placed has any issues, such as leakage, signs of infection, or becomes dislodged, prompt Pediatric Surgical consultation is indicated. Do not attempt to replace a button under such circumstances. False tracks, perforation, and other complications are not uncommon in these patients and replacing such a button can be very difficult.
3. If a gastrostomy button has become dislodged, prompt replacement is indicated. In well-established stoma sites, this can be done at home by the child's parent or home provider.
4. Can't get the button in? While you are considering your options (ie dilating the stoma and/or Pediatric Surgical consultation), you must keep the stoma open. Placing an appropriately sized Foley catheter or a feeding tube does the trick nicely and buys you some time.
5. Not every g button replacement needs imaging. But, if the replacement was difficult, if dilation was needed, or if there is any doubt about the position of the button, obtain imaging. At DCMC, this is called a "Feeding Tube Study" and utilizes Omnipaque contrast agent that is placed into the G button feeding port.
6. Don't forget to fill the balloon! Water versus saline? Traditionally, sterile water has been used to fill balloons but there have been studies to suggest that it doesn't matter if one uses water or sterile saline. This is still up for debate, though, and many people prefer one over the other.

References

1. Soscia J and Friedman JN. A guide to the management of common gastrostomy and gastrojejunostomy tube problems. *Paediatr Child Health*. 2011. 16:281.
2. Friedman JN, Ahmed S, Connolly B, et al. Complications associated with image-guided gastrostomy and gastrojejunostomy tubes in children. *Pediatrics*. 2004. 114:458.
3. Myatt TC, Medak AJ, Lam SHF. Use of point-of-care ultrasound to guide pediatric gastrostomy tube replacement in the emergency department. *Pediatric Emerg Care*. 2018. 34:145.
4. Saavedra H, Losek JD, Shanley L, et al. Gastrostomy-related complaints in the pediatric emergency department: identifying opportunities for improvement. *Pediatr Emerg Care*. 2009. 25:728.
5. Fuchs S. Gastrostomy tubes: care and feeding. *Pediatric Emerg Care*. 2017. 33:787.
6. Baker L, Emil S, Baird R. A comparison of techniques for laparoscopic gastrostomy placement in children. *J Surg Res*. 2013. 184:392.
7. Goldberg E, Barton S, Xanthopoulos MS, et al. A descriptive study of complications of gastrostomy tubes in children. *J Pediatr Nurs*. 2010. 25:72.
8. Cyrany J, Rechr S, Kopacova M, et al. Buried bumper syndrome: a complication of percutaneous endoscopic gastrostomy. *World J Gastroenterol*. 2016. 22:618.
9. Church JT, Speck KE, Jarobe MD. Ultrasound-guided gastrostomy tube placement: a case series. *J Pediatr Surg*. 2017. 52:1210.
10. Baskin WN. Acute complications associated with bedside placement of feeding tubes. *Nutr Clin Pract*. 2006. 21:40.
11. McSweeney ME and Smithers CJ. Advances in pediatric gastrostomy placement. *Gastrointest Endosc Clin N Am*. 2016. 26:169.
12. Sulkowski JP, De Roo AC, Nielsen J< et al. A comparison of pediatric gastrostomy tube placement techniques. *Pediatr Surg Int*. 2016. 32:269.
13. Skucas J, Mangla JC, Adams JT, et al. An evaluation of the Nissen fundoplication. *Radiology*. 1976. 118:539.
14. Rosen R, Vandenplas Y, Singdonk M, et al. Pediatric gastroesophageal reflux clinical practice guidelines. *J Pediatr Gastroenterol Nutr*. 2018. 66:516.