

CLINICAL VIGNETTE

Candy Cane Syndrome: A Rare Complication of Roux-en-Y Gastric Bypass

Chris Gornes, MD, Mindy Goh, DO and Saloni Gupta, MS3

Case

A 58-year-old male with a history of Roux-en-Y gastric bypass surgery 15 years prior developed periumbilical abdominal pain that radiated upwards into his chest at the midline and laterally towards both flanks. He also noted acid reflux and abdominal distention. He tried Pepto-Bismol for acid reflux without relief. After three or four days he developed constipation and started ex-lax. He reported taking 5 bottles of Pepto-Bismol and 2 bottles of ex-lax in the same day, without relief. He also reported drinking 5 liters of Diet Coke per day. Despite large fluid intake he developed oliguria and severe edema, especially in his feet with weight gain of 33 pounds above baseline. After 6 days without a bowel movement and worsening abdominal symptoms, he messaged his PCP and was advised to present to the ED.

In the ED, vital signs were within normal limits. On exam, his abdomen was mildly distended, but soft and diffusely tender. Bowel sounds were normoactive and there were no masses. The remainder of the physical exam was unremarkable. Labs included hemoglobin of 10.4 gm/dL with an MCV of 76.9 fL. A BMP was notable for a creatinine of 11.74 mg/dL with baseline creatinine of 0.9 mg/dL 6 months prior, BUN 62 mg/dL, albumin 3.4 mg/dL, sodium 129 mmol/L, potassium 5.3 mmol/L, and anion gap of 16. Point of care urinalysis revealed 1+ protein, 3+ blood, 21-50 white blood cells per high power field, 3+ bacteria, and 2+ leukocyte esterase. There were rare hyaline casts positive nitrites. Random urine chemistry included creatinine 27.6 mg/dL, BUN 115 mg/dL, and sodium 26 mmol/L. Troponin, iron studies, and creatinine kinase were within normal limits. A CT scan of the abdomen and pelvis without contrast showed no acute abnormalities, and showed some stool in the rectal vault.

The patient was admitted to the hospital. In addition to IV fluids, he received daily lactulose 20 grams, MiraLAX 17 grams, and Senokot 50 mg-8.6 mg PRN. Shortly after admission he developed good output of clear urine. A tunneled catheter was placed due to the hyperkalemia and he started on hemodialysis. Nephrology determined that the kidney injury was intrinsic and likely due to acute tubular necrosis given the FeNa of 8.6% and BUN:creatinine ratio of 5.28. Renal ultrasound was negative for any post-renal obstruction or hydronephrosis, but noted some echogenicity suggesting dense tissue. Kidney biopsy was deferred given improvement in urine output.

The patient was also receiving prior acetaminophen for his generalized abdominal pain. Given unremarkable initial imaging, laparoscopy was performed on hospital day 2. "Candy Cane Syndrome" was found and the elongated afferent limb was resected. His abdominal pain resolved within 1 day of surgery.

His kidney injury was due to multiple possible etiologies. These include: toxin release from the infection that was a part of his "candy cane" syndrome, his excessive consumption of Diet Coke which is high in phosphorus; and his excessive consumption of over-the-counter medications including Pepto-Bismol and ex-lax. Nonsteroidal anti-inflammatory drugs used very infrequently were not thought to play a significant role in the pathogenesis of his kidney injury given. His anemia was thought to be due to erythropoietin deficiency from the kidney injury given normal iron studies.

The patient was discharged home on his fifth hospital day. He was placed on a kidney diet that was approved by the bariatric surgeon. Elements included 2 liters of water per day, some clear broths, and 60 to 90 grams of protein shake. The prognosis for this patient's kidney injury uncertain though the nephrologist was optimistic for recovery. His first follow up creatinine 6 days after discharge was 6.10. His weight also decreased back to baseline and bowel movements returned to being soft. Repeat creatinine 20 days after discharge was 3.0 and his hemodialysis port was removed 3 days later. His diet progressed to vegetable soup, eggs, and other low-sodium soft foods. A third follow up creatinine 25 days after discharge was 1.65. At three-month follow up, he had no pain, was tolerating a regular diet, and his creatinine had returned to his baseline.

Discussion

Bariatric surgery for the treatment of obesity has become more common, and Roux-en-Y gastric bypass (RYGB) is the one of the most commonly performed weight loss surgeries in the United States. Bariatric surgery produces greater weight loss than medical therapy in morbidly obese patients, with greater improvement of obesity-associated metabolic parameters. Bariatric surgery is currently recommended for patients with BMI over of 40 kg/m² or with BMI between 35 and 40 kg/m² with obesity-related comorbidities.¹

Bariatric surgery can be associated with post-operative complications including anastomotic strictures, marginal ulcers, leaks, and fistulas. "Candy cane" syndrome is a less well-known complication that can present with nausea, vomiting, and epigastric pain, often after a meal with heavy meat or fibrous foods.² It is associated with excessive length of the non-functional afferent limb proximal to the gastrojejunostomy.

Abdominal pain after bariatric surgery is sometimes attributed to maladaptive eating behavior, bacterial overgrowth, functional gastrointestinal motility disorder, symptomatic cholelithiasis, and pouch related complications such as anastomotic ulcer or stricture. Since the presenting symptoms can be vague and non-specific, a thorough diagnostic workup is recommended to exclude other reasons for pain and identify the rarer complication of "candy cane" syndrome. The diagnosis is based on clinical symptoms, endoscopy, and radiological imaging. Initially in evaluation pain and emesis, upper GI series and endoscopy are performed. CT scan, right upper quadrant ultrasound, and labs are often normal. Classic findings for "candy cane" syndrome include a UGI showing filling of the afferent limb before spilling into the Roux limb, and EGD showing that the blind afferent limb seems to be the most direct outlet from the gastrojejunostomy.³

Excessive length of the afferent limb can result in chronic dilation with stasis of food. Resultant overgrowth of bacteria may result in distention of the candy cane, which may cause abdominal pain, nausea, and emesis.⁴ This distended candy cane becomes a pseudo-pouch, which acts as an obstructed loop that becomes distended and causes pain until the food can spill into the Roux limb. Given the vague symptoms, explorative laparoscopy is considered with abdominal pain, nausea, and vomiting after gastric bypass.

"Candy cane" syndrome can be managed safely with excellent outcomes with resection of the blind afferent limb, with one study reporting a 94% success rate.² Surgeons should minimize the size of the blind afferent loop left at the time of initial RYGB to reduce the risk of "candy cane" syndrome.^{5,6}

REFERENCES

1. **Cosentino C, Marchetti C, Monami M, Mannucci E, Cresci B.** Efficacy and effects of bariatric surgery in the treatment of obesity: Network meta-analysis of randomized controlled trials. *Nutr Metab Cardiovasc Dis.* 2021 Sep 22;31(10):2815-2824. doi: 10.1016/j.numecd.2021.06.018. Epub 2021 Jul 2. PMID: 34348877.
2. **Aryaie AH, Favezizadeh M, Wen Y, Alshehri M, Abbas M, Khaitan L.** "Candy cane syndrome:" an underappreciated cause of abdominal pain and nausea after Roux-en-Y gastric bypass surgery. *Surg Obes Relat Dis.* 2017 Sep;13(9):1501-1505. doi: 10.1016/j.soard.2017.04.006. Epub 2017 Apr 8. PMID: 28552743.
3. **Khan K, Rodriguez R, Saeed S, Persaud A, Ahmed L.** A Case series of candy cane limb syndrome after laparoscopic Roux-en-Y gastric bypass. *J Surg Case Rep.*

2018 Oct 5;2018(10):rjy244. doi: 10.1093/jscr/rjy244. PMID: 30310639; PMCID: PMC6172698.

4. **Kamocka A, McGlone ER, Pérez-Pevida B, Moorthy K, Hakky S, Tsironis C, Chahal H, Miras AD, Tan T, Purkayastha S, Ahmed AR.** Candy cane revision after Roux-en-Y gastric bypass. *Surg Endosc.* 2020 May;34(5):2076-2081. doi: 10.1007/s00464-019-06988-4. Epub 2019 Aug 8. PMID: 31392513; PMCID: PMC7113192.
5. **Cartillone M, Kassir R, Mis TC, Falsetti E, D'Alessandro A, Chahine E, Chouillard E.** König's Syndrome After Roux-en-Y Gastric Bypass: Candy Cane Twist. *Obes Surg.* 2020 Aug;30(8):3251-3252. doi: 10.1007/s11695-020-04563-8. PMID: 32377990.
6. **Dallal RM, Cottam D.** "Candy cane" Roux syndrome--a possible complication after gastric bypass surgery. *Surg Obes Relat Dis.* 2007 May-Jun;3(3):408-10. doi: 10.1016/j.soard.2007.02.011. PMID: 17533103.