Case report

Roux-en-Y gastric bypass for intractable biliary reflux in an individual with incomplete tetraplegia

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Context: Gastroesophageal reflux disease (GERD) is a common complication in the spinal cord injury (SCI) population. Surgical treatment of GERD has a unique risk/benefit profile in this population.

Findings: This 68-year-old male with chronic incomplete tetraplegia, dyslipidemia, and well-controlled diabetes mellitus underwent Roux-en-Y gastric bypass surgery (RYGBP) for intractable biliary reflux. Postoperatively, the patient had resolution of his symptoms but he also presented with significant weight loss and dumping syndrome. While he did have improvement in his dyslipidemia there was no change in his functional status.

Conclusions: RYGBP is an option for refractory GERD treatment in the SCI population but preoperative risk assessment and close monitoring postoperatively is essential.

Keywords: Gastroesophageal reflux disease, Incomplete tetraplegia, Roux-en-Y gastric bypass surgery

Introduction

In individuals with spinal cord injury (SCI), the prevalence of gastroesophageal reflux disease (GERD) has been reported to be approximately 22%, and there is a higher rate of severe GERD in people with SCI versus controls.¹ Initial treatment includes lifestyle and dietary modifications and as needed Histamine 2 receptor antagonists (H2RAs). If symptoms persist, proton pump inhibitors (PPIs) may be substituted for H2RAs. If patients fail high-dose PPIs, anti-reflux surgery may be considered. The most common anti-reflux surgical procedure is the Nissen fundoplication. For those patients in whom fundoplication fails, gastric bypass using Roux-en-Y reconstruction has been utilized, and it has been found to be a safe and effective surgical option, particularly in patients with evidence of biliary reflux.^{2,3}

Surgical management of refractory GERD with gastric bypass in patients with SCI is not currently reported in the literature, to our knowledge, and there is only one other case of Roux-en-Y gastric bypass (RYGBP) in the literature, which was for treatment of

obesity in a male with paraplegia.⁴ This report describes a case of a morbidly obese male with tetraplegia who underwent a RYGBP for refractory GERD. We discuss the unique benefits and challenges associated with this surgery in the SCI population.

Case report

A 68-year-old male with a medical history consisting of C5 AIS C tetraplegia secondary to a fall at age 60, metformin controlled diabetes mellitus, obesity, and GERD status post Nissen fundoplication in his 50s presented to the SCI clinic with complaints of burning mouth pain for 6 months. Regarding his C5 AIS C tetraplegia, he had preserved sensation to both light touch diffusely and a few dermatomal levels of altered pin prick sensation at C5, L3, and S2 on the right, no sensory alteration in the thoracic region. He was taking metformin 500 mg twice daily with a hemoglobin A1C of 5.9%, his total cholesterol was 195, low-density cholesterol (LDL) 104, high-density cholesterol (HDL) 45, and triglycerides 230 while using pravastatin 20 mg in the evening. The patient was a lifetime nonsmoker who described a cough with production of green phlegm but no signs of respiratory infection. He had a full cardiac work-up that was unremarkable. His

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primary care physician had increased his omeprazole from 20 mg daily to 40 mg twice daily without improvement. The patient was subsequently admitted to our veterans' medical center for workup.

After fiberoptic examination, Otolaryngology service diagnosed the patient with severe interarytenoid edema and added Ranitidine 150 mg every night to his treatment regimen. Upper endoscopy revealed two esophageal erosions and upper gastrointestinal (GI) series showed a functioning Nissen fundoplication. A pH study suggested active reflux of nonacidic contents. These episodes of reflux correlated with the patient's symptoms of burning mouth, and fiberoptic spectrophotometry confirmed the presence of bilirubin in the refluxed content, so the content was assumed to include bile. A gastric emptying study showed markedly abnormal delayed emptying with only 4% of gastric contents emptied 120 minutes after ingestion. Gastroenterology service recommended several agents including increasing baclofen to supplement lower esophageal tone, erythromycin, ursodiol, and then metoclopramide; none of these treatments relieved the patient's symptoms. After failing all medical interventions and with endoscopic evidence of esophageal erosion, he was referred to general surgery for consideration of a RYGBP in an attempt to bypass the common bile duct and prevent reflux of bile into the patient's stomach, which was presumptively then refluxing up into his esophagus causing pain.

The patient underwent RYGBP; he did not have an accompanying gastric resection or vagotomy. His postoperative course was complicated by symptomatic anemia and prolonged ileus. He had baclofen withdrawal characterized by hallucinations during his NPO period. After medical stabilization and reconditioning, the patient was discharged home with instructions to eat small meals. Weight at the time of discharge was 235 pounds. He did not have any further symptoms of reflux at the time of discharge.

Two months after the surgery, the patient was admitted for an upper GI series to rule out obstruction, as the patient was having significant nausea at meals and had lost 45 pounds. There was no evidence of outlet obstruction; however, there was antegrade flow of contrast to the cecum in 20 minutes. The patient was diagnosed with dumping syndrome and was encouraged to eat smaller meals and avoid a high carbohydrate load. This intervention did not improve symptoms; octreotide subcutaneous injections were initiated before meals. After approximately 2 months the patient's nausea had resolved. He continued to eat small meals with no complaints of painful reflux. Approximately 1 year

postoperatively, the patient's weight stabilized at 170 pounds. He continued to take metformin 500 mg twice daily with a most recent hemoglobin A1C of 5.6%. His total cholesterol was 157, LDL 84, HDL 44, and triglycerides 145; he is no longer taking pravastatin. Despite the weight loss, his functional status did not change.

Discussion

SCI has unique risk factors for GERD. Patients with SCI typically spend a greater amount of time in the supine position. Chronic constipation from neurogenic bowel can increase intra-abdominal pressure. This chronically increased abdominal pressure may lead to weakening of the gastro-esophageal junction and subsequent hiatal hernia formation.⁵ SCI above the T5 level tend to have excessive splanchnic activity resulting in gastroparesis. Prolonged exposure to food in the stomach leads to increased gastric acid secretion while gastric distension may transiently lower esophageal sphincter tone resulting in reflux.⁶

When medical management of GERD or bile reflux gastritis fails, a referral to a surgeon may be necessary for symptomatic management. Developed initially as a response to the bile reflux seen after partial gastrectomy, the Roux-en-Y anastomosis allowed diversion of bile away from the stomach, which decreased gross amounts of bile vomiting.⁷ RYGBP gained popularity in the 1990s as a treatment option in morbid obesity; subsequent studies published on RYGBP as surgical treatment for morbid obesity document a relief of gastric reflux symptoms and decrease need for anti-reflux medications, independent of the amount of weight loss after bypass surgery.^{8,9} In a typical RYGBP surgery, the stomach is divided into two pouches, a smaller pouch to accommodate food and a larger remnant pouch. The small intestine is divided distally and rearranged into a Y-configuration, connecting to the smaller pouch via a "Roux limb."

Although not exemplified in our patient, RYGBP may exacerbate gastroparesis already present in patients with SCI. Vagotomy, whether intentional or unintentional during the procedure, may lead to a stasis syndrome characterized by post-prandial abdominal pain, nausea, and vomiting.¹⁰ This Roux stasis syndrome is due to the interruption of the gastric connection to the duodenum leading to alteration of the upper gastrointestinal pacemaker which may result in delayed gastric and Roux limb emptying.¹¹ Dumping syndrome, which is characterized by nausea and abdominal cramping secondary to rapid transmission of food to the small intestine, can be seen in up to 42% of patients who have RYGBP.¹²

The SCI population has unique risk factors for surgical and medical complications that should be addressed with the surgical team prior to surgical intervention to prevent poor outcomes. Patients with tetraplegia are at increased risk of deep venous thrombosis, prolonged extubation, mucus plugging, atelectasis, and autonomic dysreflexia. Risk of deficiencies in vitamin B₁₂, zinc, or copper can increase due to impaired absorption from RYGBP or medications such as H₂ blockers, PPIs, anticholinergics, narcotics, ascorbic acid, and colestipol.¹³ Baclofen withdrawal is associated with abrupt cessation of baclofen usually seen in patients who have taken baclofen chronically or at higher doses and can lead to serious, potentially life-threatening effects.¹⁴ Pre-operative planning with the patient and surgical team should address a baclofen taper, expected increase in spasticity in conjunction with an appropriate taper as well as signs and symptoms to monitor for baclofen withdrawal.

Although this surgery was not performed to treat obesity, our patient did experience a significant, anticipated weight loss. Obesity is an epidemic in patients with SCI, with rates reported as high as two-thirds of the population.¹⁵ Functional independence measure scores have been shown to improve significantly after bariatric surgery in a cross-sectional study of able bodied patients¹⁶ and presumptively this could be expected in the SCI population, but this was not observed in our patient. Additionally, there is the benefit of potential reduction of the risk for diabetes,¹⁷ dyslipidemia, hypertension, stroke, and coronary artery disease from obesity; the patient here had improvement in his dyslipidemia.

In conclusion, RYGBP can be a successful treatment option for intractable reflux in the SCI population, including patients with tetraplegia. Due to unique medical problems in this population, each patient must be carefully assessed for risk of perioperative morbidity and mortality and be monitored closely in the post-operative period.

Disclaimer statements

Contributors DC was the lead physician in this case and provided information on the case report and authorship to discussion. DT reviewed case, researched topic for

sources cited and authored introduction and discussion. LG advised during the process and revised/edited the article.

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Ethics approval Ethical approval was not required in this case report.

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