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Bypass and Trapped Gas: Exacerbation of Retrograde Cricopharyngeal Dysfunction After RYGB

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Background	Retrograde cricopharyngeal dysfunction (RCPD) is characterized by impaired relaxation of the cricopharyngeus (CP) muscle in response to esophageal distention, resulting in symptoms such as inability to belch, gurgling, bloating, and excessive flatulence. Often underdiagnosed despite extensive gastroenterological investigation, RCPD's interaction with post-gastric bypass physiology is not well-described. Gastric bypass, a common bariatric procedure, creates a reduced-capacity gastric pouch.
Summary	We present a 39-year-old woman with undiagnosed, lifelong RCPD who experienced acute symptom exacerbation following laparoscopic Roux-en-Y gastric bypass. Postoperatively, her RCPD symptoms significantly worsened, causing nutritional compromise, weight loss, and dehydration requiring intravenous hydration. Following multiple consultations, she was diagnosed with RCPD and treated with botulinum toxin (BTX) injection into the CP muscle, resulting in substantial symptom improvement. However, this intervention induced transient but significant laryngopharyngeal reflux/regurgitation (LPR).
Conclusion	This case highlights the potential for RCPD symptom exacerbation after gastric bypass due to the loss of gastric distensibility, which normally serves as a crucial air pressure reservoir in RCPD. While BTX injection into the CP muscle can effectively treat RCPD, it may precipitate severe, albeit temporary, LPR in post-gastric bypass patients. Preoperative screening for RCPD (e.g., assessing the ability to belch) is recommended for all bariatric surgery candidates. In patients with confirmed RCPD, prophylactic CP BTX injection at least three months prior to gastric bypass may mitigate postoperative symptom exacerbation and LPR.

Key Words	retrograde cricopharyngeal dysfunction; gastric bypass; botulinum toxin; cricopharyngeus muscle; laryngopharyngeal reflux

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Case Description

A 39-year-old woman presented with severe exacerbation of retrograde cricopharyngeal dysfunction (RCPD) following laparoscopic Roux-en-Y gastric bypass. Prior to surgery, she had experienced lifelong inability to belch, gurgling chest sounds, painful bloating, and excessive flatulence, consistent with undiagnosed RCPD. Still, she lived reasonably comfortably and had not sought medical evaluation.

Postoperatively, her RCPD symptoms rapidly deteriorated. Her oral nutrition was severely disrupted by postprandial retrosternal gas bubbles and chest pain, resulting in a 75-pound weight loss within three months. She self-induced air vomiting for symptom relief and required bi-weekly intravenous hydration. Following an unremarkable swallow study, she was referred to the authors for suspected RCPD. Her Eating Assessment Tool-10 (EAT-10) score was 33/40 (≥3 indicating dysphagia), her Generalized Anxiety Disorder-7 (GAD-7) score was 13/21 (moderate anxiety), and her symptom impact on quality of life, measured using a visual analog scale (VAS), was 10/10 (0=normal, 10=unbearable) (Figure 1). A pre- and postoperative RCPD symptom and quality of life questionnaire demonstrated a marked increase in all major RCPD symptoms, embarrassment, and social interaction limitations following bypass (Figure 2).

Figure 1. Patient-reported Outcome Measures Following Botulinum Toxin Injection.

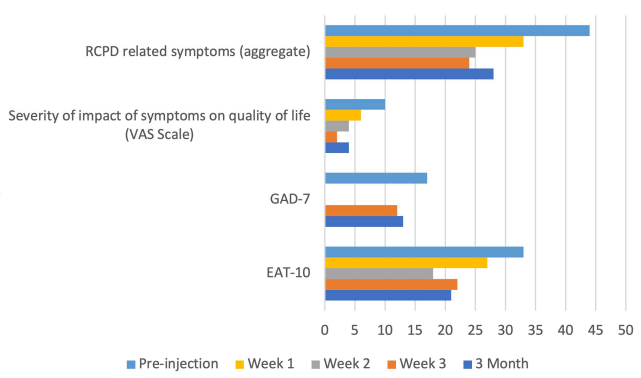
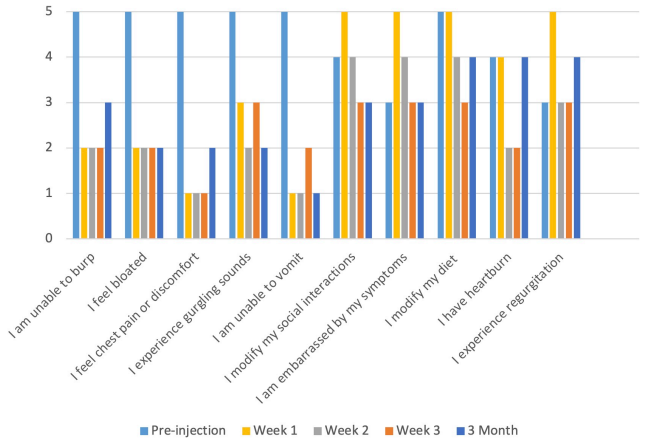
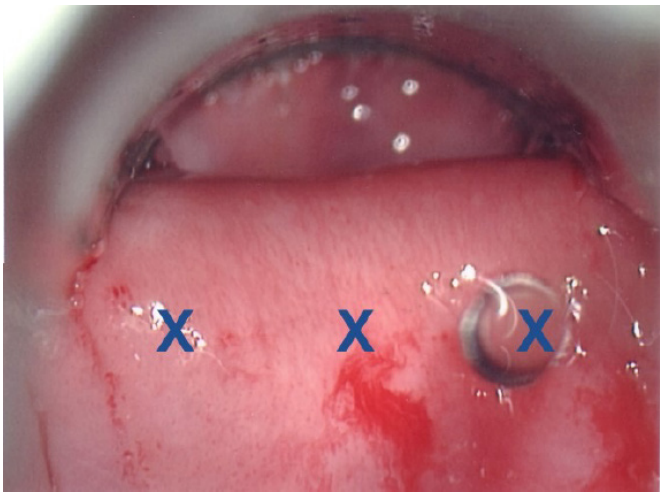


Figure 2. Preoperative and Postoperative RCPD Questionnaire Results.



Following RCPD diagnosis, she underwent uncomplicated cervical esophagoscopy with botulinum toxin (BTX) injection of the cricopharyngeus muscle (CP). Under general anesthesia, the CP was exposed and suspended using a slimline diverticular scope. 80 units of onabotulinumtoxinA (10 U/0.1 mL) were injected: 30 U centrally and 25 U bilaterally into the lateral aspects of the muscle (Figure 3).

Figure 3. Intraoperative View of Suspended Cricopharyngeus Muscle. Published with Permission



Injection sites are marked with "X".

Post-injection, she experienced significant symptom improvement. One week post-procedure, she could belch freely, drink without pain, and experienced minimal retrosternal pain, gurgling, and flatulence. These improvements persisted at two- and three-week follow-up (Figure 2), and she no longer required intravenous hydration. However, she developed severe laryngopharyngeal reflux/regurgitation (LPR), a preoperatively discussed potential complication. Management included maximum-dose pantoprazole (40 mg BID), sodium alginate after meals (Reflux Gourmet–Napa, CA, USA), small frequent meals, avoidance of eating within three hours of bedtime, and head-of-bed elevation.

Despite these measures, she experienced persistent daytime LPR, including one episode of laryngospasm lasting one minute and recurrent nocturnal aspiration, which improved with sleeping in an upright position. After two weeks, she could eat and drink without difficulty, with LPR only occurring when supine. At three-month follow-up, she reported a mild return of RCPD symptoms but required no further intervention. Her EAT-10 score decreased to 21, her GAD-7 score to 12, and her RCPD questionnaire scores demonstrated continued improvement (Figure 2). Despite early LPR complications and mild symptom recurrence, she reported satisfaction with treatment at all follow-up visits.

Discussion

This report describes the first documented case of acute symptom exacerbation of RCPD following Roux-en-Y gastric bypass. While CP botulinum toxin injection resulted in near-total resolution of RCPD symptoms, it also induced temporary albeit significant LPR. To our knowledge, this is the first report of RCPD exacerbation secondary to gastric bypass.

RCPD is characterized by the CP's failure to relax in response to esophageal distention, preventing belching and hindering air venting from the stomach and esophagus.[1,2] This dysfunction of the upper esophageal sphincter belch reflex leads to repeated reflux of accumulated air into the esophagus, followed by return to the stomach via secondary peristalsis. In addition to belching inability, this process generates the other cardinal RCPD symptoms: loud gurgling, bloating, and excessive flatulence—the primary mechanism for air expulsion.[2] These symptoms can be embarrassing and often cause social inhibition and anxiety.[1,3] Despite its prevalence, RCPD remains under-recognized due to its recent characterization, often leading to undiagnosed cases despite extensive gastroenterological investigations.

Roux-en-Y gastric bypass, a common and effective bariatric procedure, creates a small gastric pouch and a narrow gastrojejunal anastomosis.[4,5] Its efficacy stems from reducing gastric pouch volume and distensibility to approximately 5% of the original capacity, promoting early satiety and smaller meal consumption.[6] We hypothesize that RCPD exacerbation post-gastric bypass resulted from the loss of gastric distensibility, a crucial air pressure reservoir. This reduced accommodation capacity likely leads to a sudden symptom surge: increased air reflux into the esophagus exacerbates pain and gurgling, while increased distal air transit worsens flatulence. The rapid symptom improvement following RCPD treatment supports this hypothesis.

CP BTX injections weaken the muscle, facilitating belching and gas venting. However, the CP also prevents regurgitation of gastric contents refluxed into the esophagus. While Roux-en-Y bypass typically reduces gastroesophageal reflux, it can also induce or worsen it.[7] In this case, CP injection precipitated severe LPR, which, although anticipated, persisted for three weeks despite high-dose proton pump inhibitor and sodium alginate therapy.

The therapeutic benefits of BTX injection for RCPD typically persist beyond the drug's paralytic effect in approximately 80% of patients.[1,3,8] Most experience minor, transient (2–3 weeks) dysphagia. Patients with pre-existing GERD may experience increased LPR for up to three months, coinciding with the BTX's waning paralytic effect. Despite the augmented side effects in this post-gastric bypass patient, she experienced sustained RCPD symptom relief without ongoing complications at 3-month follow-up.

Conclusion

RCPD is a common, underdiagnosed condition causing debilitating bloating, gurgling, and flatulence. This case demonstrates that Roux-en-Y gastric bypass can significantly exacerbate pre-existing, undiagnosed RCPD. CP BTX injection can effectively treat post-bariatric surgery RCPD symptoms, although it may transiently induce significant LPR.

Lessons Learned

Pre-bariatric surgery evaluation should include screening for RCPD by directly questioning patients about difficulty burping. Patients with diagnosed RCPD may benefit from prophylactic CP BTX injection at least three months prior to gastric bypass to potentially prevent postoperative symptom exacerbation, LPR, and regurgitation. RCPD recurrence after BTX injection occurs in approximately 20% of cases, typically within 3–6 months. Repeat BTX injection is generally effective for these recurrences. While the need for a third injection is rarely reported, it appears to be extremely rare.[1,3,9] For patients undergoing gastric bypass, a more definitive treatment for RCPD may be warranted. In rare cases of persistent recurrence after BTX injection, partial cricopharyngeal myotomy has been described as a permanent surgical option.[10]

References

1. Bastian RW, Smithson ML. Inability to Belch and Associated Symptoms Due to Retrograde Cricopharyngeus Dysfunction: Diagnosis and Treatment. *OTO Open*. 2019;3(1):2473974X19834553. Published 2019 Mar 15. doi:10.1177/2473974X19834553
2. Kahrilas PJ. Retrograde upper esophageal sphincter function… and dysfunction. *Neurogastroenterol Motil*. 2022;34(5):e14328. doi:10.1111/nmo.14328
3. Karagama Y. Abelchia: inability to belch/burp-a new disorder? Retrograde cricopharyngeal dysfunction (RCPD). *Eur Arch Otorhinolaryngol*. 2021;278(12):5087-5091. doi:10.1007/s00405-021-06790-w
4. Peterli R, Wölnerhanssen BK, Peters T, et al. Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity: The SM-BOSS Randomized Clinical Trial. *JAMA*. 2018;319(3):255-265. doi:10.1001/jama.2017.20897
5. Colquitt J, Clegg A, Loveman E, Royle P, Sidhu MK. Surgery for morbid obesity. *Cochrane Database Syst Rev*. 2005;(4):CD003641. Published 2005 Oct 19. doi:10.1002/14651858.CD003641.pub2
6. Cummings DE, Overduin J, Foster-Schubert KE. Gastric bypass for obesity: mechanisms of weight loss and diabetes resolution. *J Clin Endocrinol Metab*. 2004;89(6):2608-2615. doi:10.1210/jc.2004-0433
7. Santonicola A, Ruggiero L, Palma R, Angrisani L, Iovino P. Gerd symptoms after laparoscopic Roux-en-Y gastric bypass: an emerging scenario. *Int J Obes (Lond)*. 2022;46(5):1076-1078. doi:10.1038/s41366-022-01072-9
8. Hoesli RC, Wingo ML, Bastian RW. The Long-term Efficacy of Botulinum Toxin Injection to Treat Retrograde Cricopharyngeus Dysfunction. *OTO Open*. 2020;4(2):2473974X20938342. Published 2020 Jun 29. doi:10.1177/2473974X20938342
9. Siddiqui SH, Sagalow ES, Fiorella MA, Jain N, Spiegel JR. Retrograde Cricopharyngeus Dysfunction: The Jefferson Experience. *Laryngoscope*. 2023;133(5):1081-1085. doi:10.1002/lary.30346
10. Bastian RW, Hoesli RC. Partial Cricopharyngeal Myotomy for Treatment of Retrograde Cricopharyngeal Dysfunction. *OTO Open*. 2020;4(2):2473974X20917644. Published 2020 Apr 16. doi:10.1177/2473974X20917644