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## Editorial comment

## Comment on: Reversal of Roux-en-Y gastric bypass: largest single-institution experience

Ma et al. [1] have written a comprehensive review of 48 cases where the gastric bypass was reversed. The article offers crucial insights into the complex issues regarding evaluation and process of care of patients requiring reversal.

During the period from 2012 to 2016 the group used Roux-en-Y gastric bypass (RYGB) to treat 2458 patients with obesity and complications, including 401 (16%) revisions and 48 (1.9%) reversals. In all cases, the recommendation for reversal was only made when the preoperative analysis and course of care indicated the RYGB unsalvageable. The average length of time to reversal from original RYGB was 9.6 years. The rate of malnutrition in all patients undergoing reversal was 48%. Patients who required total parenteral nutrition or tube feedings were deemed severely malnourished (11%).

The leading indication for reversal was marginal ulcer (52%). Marginal ulcer was complicated by malnutrition in 71%. Patients with recurrent marginal ulcer had a high incidence of concurrent substance abuse (68%). Three patients were reversed relatively early after gastric bypass due to intractable and continuous nausea and vomiting without identifiable cause. Additional indication was postprandial hyperinsulinemic hypoglycemia, a complication known to occur in varying degrees after gastric bypass. Older data suggest an incidence of <2%, but newer data show a prevalence from 10% to 75% depending on the definition of hypoglycemia, time to follow-up, and diagnostic tool. In RYGB patients using continuous glucose monitoring and a mixed meal, 29% had glucose values <54.9 mg/dL. Patients have an increasing incidence from 1 to 5 years after gastric bypass and not all patients who have hypoglycemia are symptomatic (22%) [2]. Chronic hypoglycemia may have important health indications [3]. Continuous glucose monitoring and attempts at treatment with food and pharmaceuticals before reversal has become the standard of care. In addition, use of glucagon-like peptide agonists may also be useful before reversal [4]. Complete reversal of RYGB in a small prospective group showed reversal of postprandial hyperinsulinemic hypoglycemia similar to this retrospective review [5]. With an acknowledgment that the prevalence of postprandial hyperinsulinemic hypoglycemia is higher than previously thought and that chronic hypoglycemia may contribute to cardiac morbidity, it may be that reversal will be increasingly used in this group of patients.

One of the pearls in the manuscript describe the use of endoscopy intraoperatively to evaluate the integrity of the gastrogastrostomy as well as evaluation of the pylorus for stenosis, presumably due to interruption of the vagus nerves at the time of primary procedure. In patients in whom it was found, a Heineke-Mikulicz pyloroplasty was performed.

What influenced the complication rate of 29% and mortality of 2% in this series? One of the most devastating complications, leak at the gastrogastrostomy (10.4%), occurred in remarkable contrast to leak rates at the gastrojejunostomy in primary patients treated with laparoscopic RYGB in the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program data registry in 2015 to 2016, 476 leaks/77,596 patients (.6%), overall complication rate of 7.5%, and mortality of 1.55% [6]. Most of the reversals in this study were operated on by a single surgeon using a hand-sewn, single-layer technique that has been well studied and reported with a similar low-leak rate in primary cases. Could the combination of malnutrition and previous surgery interrupting blood supply or chronic inflammation require additional anchoring and support with a 2-layer approach to the gastrogastrostomy? What role does division of the vagus nerve at the time of primary operation have? Would treating all malnutrition to bring the albumin and protein levels to normal before surgery have an effect? Should larger trocar sites be closed in this population, due to the relatively low weight (body mass index of 26% in this series) and malnutrition? What is the best pathway before surgery? What type of preoperative study is necessary? There are many questions in both reversal and reoperative bariatric surgery difficult to answer with small series. However, experienced bariatric surgeons both in and outside the United States are doing reoperative bariatric in increasing numbers. A series with the thoughtfulness and detail as offered here both informs these questions and raises more of them. Implementing a module in MBSAQIP to capture this type of data on revisions and reversals would allow us to leverage the experience of all surgeons engaged in this complex level of care, compare outcomes, and determine best practice gradually driving the complication rate in reversal and reoperative bariatric surgery lower as has been collectively accomplished with complications in primary cases. There is no reason to accept a higher complication rate in these patients.

All patients had complete remission of the indication for reversal in keeping with the reports of other authors. This included indicators of malnutrition like albumin and protein levels, hypoglycemia and marginal ulcer, nausea and vomiting, and hypoglycemia. There was also the expected weight gain of 21% at 1 year after reversal, validating the crucial role of surgery in the treatment of obesity. Weight gain may bring a return of the complications of obesity and patients need to be consented for that possibility before reversal.

There was a tendency to noncompliance with follow-up noted in these patients before surgery. This tendency carried into the postreversal period with follow up at 1 year of <50% of patients. While evaluation of factors like noncompliance and psychological illness may be documented, the medical indications as noted in this manuscript, will necessarily tip the balance to operative therapy, despite the risk.

The patient who experiences complications after gastric bypass spend years seeking a solution. Their situation often creates economic hardship with progressive negative impact on their ability to earn a living and take care of their families. Truly desperate they may become high users of health-care services, be prescribed psychiatric medications, and undergo multiple tests. We cannot turn away from these challenges nor can we blame the patient for them. Even in the face of a high complication rate of reversal, the courage to carefully and thoroughly evaluate and treat these patients is most consistent with our mission as metabolic surgeons.

## Conclusion

Gastric bypass reversal will be required in a small group of patients to solve otherwise recalcitrant problems. It is remarkably effective (100%) to treat the complications that instigate the reversal. These patients need a setting where comprehensive services to detect complications and provide critical care, interventional endoscopy, and expert interventional radiology is available to rescue the patient

should a complication of reversal occur. Perhaps the most important factor is the experience of the surgeon with the use of gastric bypass as a metabolic therapy. Payers may want to direct these cases to comprehensive centers with experience in doing and treating obesity with gastric bypass and who have extensive reoperative surgery experience. Even in the hands of the Jedi Knight of bariatric surgery, Kelvin Higa, M.D., the complication rate was high.

Robin P. Blackstone, M.D., F.A.C.S., F.A.S.M.B.S.<sup>Q1</sup>  
Banner University Medical Center Phoenix  
Phoenix  
Arizona  
University of Arizona School of Medicine  
Phoenix  
Arizona

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