

Bariatric Surgery for ESKD Patients

Why, When, and How?

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Obesity is increasingly common among patients with ESKD (1). Despite a seemingly paradoxical association between obesity and lower risk of death among patients receiving dialysis, obese patients with ESKD are less likely to receive a kidney transplant and have lower allograft survival after kidney transplantation (2,3). For some obese patients with ESKD, weight loss from bariatric surgery could improve access to kidney transplantation and health outcomes. Because of its favorable perioperative safety profile, surgeons are shifting from laparoscopic Roux-en-Y gastric bypass (RYGB) to sleeve gastrectomy as the preferred method of bariatric surgery.

In this issue of CJASN, Sheetz *et al.* (4) analyzed national Medicare claims data between 2006 and 2016 to identify trends in bariatric surgery in patients with ESKD, and to assess postoperative health outcomes. The authors examined trends among the three most common bariatric surgeries: RYGB, sleeve gastrectomy, and gastric banding. They also compared risk-adjusted length of stay during hospitalizations for bariatric surgery, 30-day postoperative hospital readmissions, and rates of common postoperative complications among patients with and without ESKD. They used International Classification of Diseases (ICD) codes from claims to ascertain the following common postoperative complications: pulmonary failure, pneumonia, myocardial infarction, deep venous thrombosis, pulmonary embolism, kidney failure, surgical site infection, gastrointestinal bleed, and hemorrhage. Analyses of health outcomes involved multilevel regression models followed by estimated marginal means. Regression models adjusted for patient demographic information and medical comorbidities, hospital characteristics, and hospital-level random effects.

They found that laparoscopic sleeve gastrectomy procedures increased substantially in patients with ESKD over the study period from <1% in 2006 to >84% in 2016, corresponding with a nine-fold rise in the overall number of bariatric surgeries performed on patients with ESKD. Meanwhile, the use of both RYGB and gastric banding in patients with ESKD declined steadily throughout the study period. In comparisons of patients with and without ESKD, the authors did not find significant differences in selected postoperative complications after risk adjustment. However, patients with ESKD had significantly longer length of

stay and more 30-day hospital readmissions after bariatric surgery compared with patients without ESKD. In the case of sleeve gastrectomy, these differences corresponded to an estimated length of stay that was 0.3 days (95% confidence interval, 0.1 to 0.4) longer on average among patients with ESKD, and an estimated average increase of 3.2% (95% confidence interval, 1.9% to 4.6%) in the absolute probability of 30-day hospital readmissions.

The most striking finding from the study by Sheetz *et al.* (4) is the sheer magnitude of increase in bariatric surgery observed among patients with ESKD. Between 2014 and 2016, bariatric surgery was performed on 1329 patients with ESKD. As greater numbers of patients with ESKD receive bariatric surgery—sleeve gastrectomy in particular—questions about its long-term safety and effectiveness in this population become increasingly important. Taken at face value, the finding by Sheetz *et al.* (4) that there was no significant difference in 30-day postoperative complications among patients with and without ESKD, and the low overall rate of complications after bariatric surgery in patients with ESKD (2.5%–6.4%), suggests that weight loss from bariatric surgery may offer obese patients with ESKD a relatively safe method of increasing access to kidney transplantation. However, several key study limitations along with prior research on the topic warrant a more cautious optimism when interpreting the findings.

Previous comparisons of health outcomes after bariatric surgery among patients with and without ESKD have yielded conflicting results. Although some studies have not found significant differences in the rate of adverse health outcomes (5), other studies indicate worse postoperative outcomes in ESKD populations. In an analysis of 925 patients with ESKD in 2015–2016 (where 84% of patients received sleeve gastrectomy), patients with ESKD were at a higher risk of reoperation, readmission, and mortality within 30 days of undergoing bariatric surgery (6). In another study of bariatric surgery in patients with CKD, the rate of postoperative complications among those with stage 5 CKD was 9.9%, and complications were more common among patients with more advanced kidney disease (7). Although the absolute risk for complications was relatively low (<10%) in all studies, previous comparisons do not uniformly

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demonstrate relative safety of bariatric surgery in patients with ESKD.

In the study by Sheetz *et al.* (4), despite its notable strengths, some key methodologic limitations, combined with the narrow scope and time frame considered when examining postoperative complications, leaves many questions about the role of bariatric surgery in patients with ESKD unanswered. First, this analysis did not examine whether differences in health outcomes among patients in the general population and those with ESKD varied over time and by surgical procedure. It remains entirely possible that patients with ESKD are at higher risk of complications when compared with the general population after some bariatric procedures but not others, or that relative changes in surgical risk have changed over time. Second, postoperative complication rates were low for all bariatric procedures, occurring at 30%–40% the frequency of 30-day hospital readmissions, and there was no examination of mortality. The discrepancy between 30-day postoperative complications and hospital readmissions could simply be due to high rates of hospitalization and hospital readmissions among patients with ESKD that are unrelated to the bariatric surgery. Alternatively, it is possible that the claims-based method that the investigators use missed many postoperative complications. Finally, the exclusion of kidney failure as a potential complication among patients with ESKD could bias the study toward finding fewer surgical complications among those with ESKD.

In addition to unanswered questions about the safety of bariatric surgery in patients with ESKD, the overall effectiveness of this procedure in improving longer-term health outcomes in patients with ESKD is largely unknown. Higher body mass index can limit access to kidney transplantation, and weight loss achieved from bariatric surgery might improve a patient's likelihood of transplantation. But, to our knowledge, this has yet to be demonstrated in large prospective studies. It is also unknown whether differences in the magnitude and durability of weight loss from different gastric bypass procedures lead to differential success in providing access to kidney transplantation and in long-term allograft function.

Black patients are disproportionately represented in the ESKD population. In a study of the general population, black patients undergoing bariatric surgery were at higher risk of complications and experienced lower weight loss at 1-year follow-up (8). Whether a similar phenomenon exists in patients with ESKD is of interest. Bariatric surgery reduces body weight through the loss of both fat and fat-free mass, and black patients have higher average muscle mass. Among patients with ESKD who undergo bariatric surgery and who do not receive a kidney transplant, it is unknown whether the loss of muscle mass is harmful. It will also be important to understand whether metabolic benefits observed after RYGB (9) occur after sleeve gastrectomy in patients with ESKD.

Although the analysis by Sheetz *et al.* (4) focused on the ESKD population, observed growth in the use of sleeve gastrectomy may also be relevant to the much larger population of patients with obesity and CKD. Clinical trial evidence suggests that bariatric surgery may lead to reduction in urinary albumin excretion, and long-term follow-up of patients with nondialysis requiring CKD who

were enrolled in the Swedish Obesity Study found that fewer people who underwent bariatric surgery reached ESKD compared with controls (10). However, a substantial proportion of patients in these studies received RYGB. If sleeve gastrectomy is being used increasingly in patients with CKD, it will be important to determine whether this less "potent" surgical procedure has similar moderating effects on kidney function decline.

As clinicians increasingly refer their ESKD patients for bariatric surgery, it is worth noting several important clinical considerations. First, before patients can successfully undergo bariatric surgery, they typically undergo an intensive multistep evaluation process. This includes medical and psychosocial evaluations and the need for patients to demonstrate their prior commitment to pursuing intense lifestyle modifications to lose weight. For many patients who are already spending three or more days per week undergoing dialysis treatment, completing this evaluation process may be challenging. Second, bariatric surgery may increase the complexity of managing nutritional and electrolyte disorders in patients receiving dialysis. Though perhaps less common with sleeve gastrectomy compared with RYGB, it remains important for clinicians to monitor post-surgical patients closely for nutritional and electrolyte disorders, and the need for medication dose adjustments.

In summary, the study by Sheetz *et al.* (4) demonstrates rapid growth in the use of bariatric surgery to reduce body weight in obese patients with ESKD in the United States, and that this growth is driven largely by increases in the use of sleeve gastrectomy. Although the investigators found relatively low rates of postsurgical complications in the cohort, questions remain about the safety and longer-term effect of bariatric surgery on patient health and access to kidney transplantation. Clinical trials comparing the benefits and risks of these procedures in dialysis population would be ideal. While we wait for those studies, it would be prudent for clinicians to present a balanced assessment of both the potential long-term benefits of weight loss using bariatric procedures and possible negative health effects to patients on dialysis who are considering bariatric surgery.

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References

1. Kramer HJ, Saranathan A, Luke A, Durazo-Arvizu RA, Guichan C, Hou S, Cooper R: Increasing body mass index and obesity in the incident ESRD population. *J Am Soc Nephrol* 17: 1453–1459, 2006
2. Segev DL, Simpkins CE, Thompson RE, Locke JE, Warren DS, Montgomery RA: Obesity impacts access to kidney transplantation. *J Am Soc Nephrol* 19: 349–355, 2008
3. Hill CJ, Courtney AE, Cardwell CR, Maxwell AP, Lucarelli G, Veroux M, Furriel F, Cannon RM, Hoogveen EK, Doshi M, McCaughan JA: Recipient obesity and outcomes after kidney transplantation: A systematic review and meta-analysis. *Nephrol Dial Transplant* 30: 1403–1411, 2015
4. Sheetz K, Woodside K, Vahakn S, Dimick J, Montgomery J, Waits S: Trends in Bariatric Surgery Procedures Among Patients with ESKD in the United States. *Clin J Am Soc Nephrol* 14: 1193–1199, 2019
5. Andalib A, Aminian A, Khorgami Z, Navaneethan SD, Schauer PR, Brethauer SA: Safety analysis of primary bariatric surgery in patients on chronic dialysis. *Surg Endosc* 30: 2583–2591, 2016
6. Cohen JB, Tewksbury CM, Torres Landa S, Williams NN, Dumon KR: National postoperative bariatric surgery outcomes in patients with chronic kidney disease and end-stage kidney disease. *Obes Surg* 29: 975–982, 2019
7. Turgeon NA, Perez S, Mondestin M, Davis SS, Lin E, Tata S, Kirk AD, Larsen CP, Pearson TC, Sweeney JF: The impact of renal function on outcomes of bariatric surgery. *J Am Soc Nephrol* 23: 885–894, 2012
8. Wood MH, Carlin AM, Ghaferi AA, Varban OA, Hawasli A, Bonham AJ, Birkmeyer NJ, Finks JF: Association of race with bariatric surgery outcomes. *JAMA Surg* e190029, 2019
9. Courcoulas AP, Christian NJ, Belle SH, Berk PD, Flum DR, Garcia L, Horlick M, Kalarchian MA, King WC, Mitchell JE, Patterson EJ, Pender JR, Pomp A, Pories WJ, Thirlby RC, Yanovski SZ, Wolfe BM; Longitudinal Assessment of Bariatric Surgery (LABS) Consortium: Weight change and health outcomes at 3 years after bariatric surgery among individuals with severe obesity. *JAMA* 310: 2416–2425, 2013
10. Shulman A, Peltonen M, Sjöström CD, Andersson-Assarsson JC, Taube M, Sjöholm K, le Roux CW, Carlsson LMS, Svensson PA: Incidence of end-stage renal disease following bariatric surgery in the Swedish Obese Subjects Study. *Int J Obes* 42: 964–973, 2018

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