CURRENT CONCEPTS REVIEW

Strategies for Weight Reduction Prior to Total Joint Arthroplasty

Michael J. Chen, MD, Subhrojyoti Bhowmick, MBBS, MD, Lucille Beseler, MS, RDN, LDN, CDE, Kristin L. Schneider, PhD, Scott I. Kahan, MD, MPH, John M. Morton, MD, Stuart B. Goodman, MD, PhD, and Derek F. Amanatullah, MD, PhD

Investigation performed at the Department of Orthopaedic Surgery, Stanford University Medical Center, Stanford, California

➤ The number of total joint arthroplasty (TJA) procedures done in patients with obesity is increasing in the United States.

➤ Compared with patients without obesity who undergo TJA, patients with obesity are at increased risk for numerous complications including periprosthetic joint infection and revision TJA.

➤ Weight reduction prior to TJA in patients with obesity may mitigate these severe complications and the associated costs.

➤ A multidisciplinary approach is most effective in order to achieve durable long-term weight loss.

➤ Numerous therapies including behavioral, pharmaceutical, and surgical options exist but must be tailored to the individual patient.

Thirty-seven percent of American adults currently have obesity, and >50% are expected to have obesity by 2030 if predicted trends continue[1]. Concomitant with the epidemic of obesity is the forecasted exponential increase in the demand for total joint arthroplasty (TJA). In the United States, the number of total hip arthroplasty (THA) procedures more than doubled from 2000 to 2010, while the number of total knee arthroplasty (TKA) procedures performed in 2015 exceeded 1 million per year[2,3]. Revision TJAs are also more frequent, with 67,534 revision TKAs having been performed during 2010[4]. By 2030, the estimated number of revision THAs is projected to surpass 95,000 in addition to the 500,000 cases of primary THA that will be performed[2].

Obesity is an independent risk factor for osteoarthritis, and patients with a body mass index (BMI) of ≥35 kg/m^2 are more likely to undergo TJA at a younger age[5,6]. A growing percentage of TKAs being performed are in patients with obesity[7]. From 2002 to 2009, the number of TKAs performed in patients with a BMI of ≥30 kg/m^2 almost doubled from 11% to 20%[8]. This trend is concerning given the increased complications, which include wound infection, periprosthetic joint infection (PJI), dislocation, and revision TJA observed in patients with obesity (Table I)[9-20].

There is a growing body of literature surrounding the increased arthroplasty-related risks associated with obesity, most notably infection and revision TJA. Kerkhoffs et al.[11] found a significantly higher risk of superficial infection (odds ratio [OR] = 2.17), PJI (OR = 2.38), and revision surgery (OR = 1.79) in patients who underwent TKA with a BMI of ≥30 kg/m^2 compared with those with a BMI of <30 kg/m^2. Similarly, Wagner et al.[12] found increased risks for PJI (hazard ratio [HR] = 2.01) and revision surgery (HR = 1.66) for a BMI of ≥40 kg/m^2 in patients who underwent TKA compared with those with a BMI of <25 kg/m^2. Obesity is an independent risk factor for PJI (OR = 1.22) of magnitude comparable with heart failure (OR = 1.28), diabetes (OR = 1.19), and renal disease (OR = 1.38)[13]. Electricwala et al.[14] found a 130% increased relative risk and a 30% increased absolute risk of earlier revision TKA for

Disclosure: The authors indicated that no external funding was received for any aspect of this work. On the **Disclosure of Potential Conflicts of Interest** forms, *which are provided with the online version of the article*, one or more of the authors checked "yes" to indicate that the author had a relevant financial relationship in the biomedical arena outside the submitted work (http://links.lww.com/JBJS/E960).

TABLE I Worse Outcomes in Patients with Obesity Undergoing TKA and THA*

Studies	Level of Evidence	Methodology	BMI Comparison	Significant Complications from Elevated BMI	Conclusion
TKA					
Kerkhoffs et al.[11] (2012)	II	Meta-analysis of 20 studies	BMI of ≥30 kg/m² compared with <30 kg/m²	Superficial infection (OR = 2.17), PJI (OR = 2.38), revision TKA (OR = 1.79)	Obesity has a negative influence in patients treated with TKA
Wagner et al.[12] (2016)	IV	Retrospective series: 22,289 consecutive TKAs from 1985 to 2012	BMI of ≥40 kg/m² compared with ≤25 kg/m²	PJI (HR = 2.01), revision TKA (HR = 1.66)	Modifying preop. risk factors, such as BMI, should be considered prior to elective procedures
Electricwala et al.[14] (2017)	IV	Retrospective series: 666 consecutive TKAs from 2005 to 2014	BMI of ≥25 kg/m² compared with <25 kg/m²	Earlier revision TKA for infection (RR = 2.3), late revision TKA for infection (RR = 3.3)	Elevated preop. BMI is a risk factor for revision TKA for infection
THA					
Werner et al.[15] (2017)	IV	Retrospective series: 705,604 patients from 2005 to 2012	BMI of ≥50 kg/m² compared with <30 kg/m²	Infection (OR = 12.2), dislocation (OR = 1.8), revision THA (OR = 1.8), 90-day readmission (OR = 2.1)	Super-obesity (BMI of ≥50 kg/m²) is a risk factor for complications and revision THA
Goodnough et al.[19] (2018)	IV	Retrospective series: 684 consecutive failed THAs from 2004 to 2013	BMI of ≥30 kg/m² compared with <30 kg/m²	Primary THA failure due to aseptic loosening before 5 yr (OR = 1.88)	Obesity is a risk factor for early THA failure due to aseptic loosening
Electricwala et al.[20] (2016)	IV	Retrospective series: 257 consecutive failed THAs from 2011 to 2014	BMI of ≥30 kg/m² compared with <30 kg/m²	Revision THA needed within 5 yr for aseptic loosening (RR = 4.7)	Obesity increases risk of early THA due to aseptic loosening

*OR = odds ratio, BMI = body mass index, HR = hazard ratio, PJI = periprosthetic joint infection, and RR = relative risk.

infection in patients with an elevated BMI (>25 kg/m²) compared with subjects with a normal BMI.

With regard to THA, 1 study comparing patients who underwent THA with a BMI of ≥50 kg/m² and those with a BMI of <30 kg/m² found increased rates of infection (OR = 12.2), medical complications (OR = 8.2), dislocation (OR = 1.8), revision THA (OR = 1.8), and readmission (OR = 2.1)[15]. Other studies have identified obesity as an independent risk factor for THA dislocation, component malpositioning, decreased implant survivorship, and increased revision rates[16-18]. Aseptic loosening is a common mechanism for early failure of primary THA and subsequent need for revision in patients with obesity[19,20]. Obesity is also a risk factor for reinfection (18% compared with 2%) and reoperation (61% compared with 12%) after revision THA for PJI[21].

On the contrary, some studies have emphasized the benefits of TJA realized in patients with obesity. A large series of 3,598 THAs stratified by a BMI of ≥40 kg/m² compared with a BMI of <40 kg/m² found significant improvements in validated outcome scores after THA in patients with morbid obesity, with no differences in revision rates[22]. However, revision rates due to sepsis were significantly increased in patients with morbid obesity[22]. Rajgopal et al. similarly found improved function and satisfaction after THA in patients with a BMI of ≥50 kg/m², comparable with those with a BMI of <35 kg/m², but with increased rates of infection, dislocation, PJI, readmission, and reoperation[23]. Another series comparing THA and TKA in patients with a BMI of ≥30 kg/m² and those with a BMI of <30 kg/m² found no difference in overall survivorship; the mean BMI of patients in the obese category was only 34 kg/m², however, making the conclusions less generalizable to patients with morbid obesity[24].

Weight loss in patients with an elevated BMI prior to surgery reduces complications. Werner et al. demonstrated that in patients with severe obesity, bariatric surgery with weight loss prior to TKA reduces infection (1.8% compared with 5.0%), minor postoperative complications (15.1% compared with 22.6%), and major postoperative complications (9.6% compared with 19.0%)[25]. This review summarizes the effective treatment options currently available to clinicians for reducing weight in a patient with obesity scheduled for TJA.

Strategies for Weight Reduction

Weight stigma and discrimination lead to poor weight loss outcomes, maladaptive eating behaviors, and a range of metabolic and mental health consequences[26-28]. Surgeons should seek to develop supportive, productive interactions with patients to facilitate successful weight loss. Neutral terminology (such as "unhealthy body weight," rather than "morbidly obese") and patient-first language ("patient with obesity") rather than condition-first language ("obese patient"), are considered by patients to be more motivating and preferred[29]. These patient-centered counseling strategies can improve satisfaction and behavioral change outcomes[26,29]. In addition, a multidisciplinary approach is most effective in order to achieve durable long-term weight loss.

Behavioral Counseling

Behavioral counseling to achieve lifestyle changes in diet and physical activity is a cornerstone of obesity treatment (Table II). Achieving as little as 5% to 10% weight loss leads to substantial metabolic improvements, including improved glycemic control, lipids, blood pressure, and overall cardiac risk[30-32]. Of patients who achieve an initial 10% weight loss, just under 50% are able to maintain the weight loss at 1 year and only 25% at 5 years[33]. Difficulty in maintaining weight loss may be problematic for patients having TKA who are already at risk for weight gain after the surgery itself[34]. Compared with patients who achieve weight loss after TKA, increased reoperations for aseptic loosening are observed in subjects who fail to lose weight (67% compared with 0%)[35]. Given that many patients do not achieve sufficient weight loss with behavioral counseling alone, pharmacologic or surgical interventions may be considered as adjunct treatments. Intensive behavioral counseling, when paired with pharmacologic or surgical interventions, bolsters the efficacy of these interventions[36,37]. Even modest weight losses of 5% to 10% of initial body weight can improve perioperative risk factors and reduce surgical complications in patients with obesity undergoing TJA[25,31].

TABLE II Lifestyle Modifications for Long-Term Weight Reduction According to Wadden et al.[44]

Dietary modifications	Caloric restriction and long-term adherence rather than macronutrient composition of a diet are key for short and long-term weight loss
Exercise	Limited efficacy for short-term weight loss but critical in long-term maintenance, improves cardiovascular health and overall metabolic profile, and attenuates fat-free mass loss. Multiple short bouts of exercise daily, <10 minutes at a time, are effective
Behavioral therapy	Encourages and provides support to continue exercise and dietary restrictions

The 5 A's (assess, advise, agree, assist, and arrange) model for assessment and intervention, originally developed for smoking cessation, has been adapted for behavioral counseling of obesity in clinical settings[38,39]. The Society of Behavioral Medicine developed the 5 A's model, in which the physician provides a brief assessment and counseling and facilitates additional treatment for patients who are unsuccessful at losing weight with less intensive interventions[39,40]. The 5 A's components, with added content tailored to patients trying to lose weight prior to a TJA, are as follows:

- Assess—Determine BMI, identify conditions that hinder weight loss (e.g., depression, sleep disorders, and chronic pain and stress), and assess willingness for change[40]. For patients who report little interest in making lifestyle changes, clinicians with appropriate training may utilize a motivational interviewing approach. In motivational interviewing, the clinician attempts to address patient ambivalence about change by helping to elicit the patient's own reasons for change[41]. Motivational interviewing is a powerful tool that can be used to facilitate weight loss[42,43].
- Advise—Counsel about the advantages of weight reduction. The specific benefits of achieving weight loss prior to a TJA should be elucidated (e.g., less risk of infection and need for revision).
- Agree—Establish goals that are specific, measurable, attainable, relevant, and time-based (SMART)[44]. Reasonable expectations should be set as patients often assume they need to lose more weight than is realistic[45]. Self-monitoring of diet, exercise, and weight is important to reinforce positive behavioral changes[46]. Patients can self-monitor by using paper forms or mobile applications (apps), depending on their preference[47].
- Assist—Identify and resolve barriers to achieving weight loss[48]. Using a problem-solving method with patients to discern the underlying causes of, and contributors to, their weight problem can help to facilitate weight loss[40]. For patients who want to lose weight prior to TJA, pain may substantially interfere with their ability to engage in exercise. Setting realistic, gradual goals that are mutually agreed on by the patient is important. Assist with identifying low-impact aerobic exercises accessible to the patient to minimize pain. For some patients, recommendations to break up or decrease sedentary activity may be a more suitable place to begin increasing activity levels. Focusing primarily on dietary changes to facilitate weight loss may be a more acceptable approach for patients with substantial pain, although the importance of any physical activity should be emphasized.
- Arrange—Assess the patient's progress and refer to more intensive and specialized treatment as necessary. Referral options include dietitians, hospital-based

programs, psychologists trained in behavioral medicine, and evidenced-based commercial weight loss programs[49]. In adults with obesity, evidence supports the effectiveness of multiple visits (2 to 12 visits, which include a 60-minute initial visit followed by 20 to 45-minute visits) for medical nutrition therapy by a nutritional specialist (a registered dietitian nutritionist or equivalent)[49]. Compelling evidence supports improved weight (−0.5 to −9.0 kg), BMI (−0.2 to −7.8 kg/m^2), waist circumference (−2.0 to −14 cm), fasting blood glucose (−5.2 to −9.5 mg/dL), total cholesterol (−4.3 to −59 mg/dL), low-density lipoprotein (−15 to −47 mg/dL), high-density lipoprotein (+2.0 to +11 mg/dL), and triglycerides (−12 to −60 mg/dL)[49]. Independent of whether a patient receives treatment referrals, physicians should follow up with patients to provide ongoing support and positive reinforcement for progress, even if the patient falls short of meeting goals. Follow-up is critical to identifying whether a patient who is struggling could benefit from additional treatment[40].

While tertiary-care centers often have established weight loss programs that patients can be referred to, a community-based orthopaedic surgeon may not have such accessible resources. Independent dieticians and behavioral counselors, however, are likely available within the community, and establishment of a relationship for ease of patient referrals should be sought. Evidenced-based community weight loss programs are also widely available and focus on dieting, exercise, and behavioral change. Examples of such organizations are the Take Off Pounds Sensibly Club (TOPS) and the Young Men's Christian Association (YMCA) Diabetes Prevention Program[50].

Pharmacotherapy

The U.S. Food and Drug Administration (FDA) has approved 5 medications for the long-term treatment of obesity in adults with a BMI of ≥30 kg/m^2, or ≥27 kg/m^2 with an associated comorbidity such as hyperlipidemia, hypertension, or diabetes mellitus[36,51]. The approved drugs include lorcaserin, orlistat, phentermine-topiramate extended release (ER), liraglutide, and naltrexone-bupropion ER (Table III)[36,51,52]. Weight loss with available agents has been reported to range from 5% to 15% of body weight, depending on the medication and population studied[36,51,52]. One meta-analysis found all medications to be effective at achieving at least 5% weight loss by 52 weeks compared with placebo (Table IV)[51]. Other than orlistat, which is a pancreatic lipase inhibitor, medications for obesity are centrally acting agents that decrease appetite or increase satiety (Table III)[36,52].

Intragastric Balloons

Intragastric balloons (IBGs) represent newer approaches to weight loss used either independently or together with other pharmacologic or surgical treatments. There are 3 IBGs currently approved for patients with a BMI of 30 to 40 kg/m^2 who have had failure of less invasive lifestyle and pharmacologic treatments[53]. These devices may result in 10% to 15% weight loss by means of reducing the stomach's potential volume, leading to early satiety[53]. Although current endoscopically implanted gastric ballooning options achieve less overall weight loss than surgical methods, they are generally safer and perhaps more cost-effective[54].

Two endoscopically placed devices were approved by the FDA in 2015 for a treatment duration of 6 months[55]. The Orbera Intragastric Balloon System (Apollo Endosurgery) is a single fluid-filled balloon that achieved an average 26.9% more weight loss than control groups at 12 months after implantation in 1 meta-analysis[56]. The most common side effects were pain and nausea, with rare complications including ulceration, gastric perforation, and device migration[56]. The ReShape Integrated Dual Balloon System (ReShape Medical) contains dual fluid-filled balloons and has been reported to achieve a 15.4% weight loss at 6 months in a study of 60 patients, with a similar side-effect profile as the Orbera[57].

In 2016, the FDA approved the first swallowable intragastric balloon system, the Obalon (Obalon Therapeutics)[53]. The Obalon is uniquely inserted without anesthesia by swallowing a capsule containing the deflated balloon[53]. Endoscopic removal of the device is required after 6 months. One pilot study reported a 5.8% weight loss when using the Obalon in combination with diet and exercise[58]. Side effects were minimal and included abdominal cramping and nausea[58].

Bariatric Surgery

Bariatric surgery has become a safe and attractive option for patients with morbid obesity refractory to less invasive interventions. Minimally invasive laparoscopic techniques are available with low mortality rates that currently compare with other routine laparoscopic procedures[59-61]. Current guidelines suggest that candidates for bariatric surgery are patients with a BMI of ≥40 kg/m^2 or patients with a BMI between 35 and 39.9 kg/m^2 with an obesity-related comorbidity[62]. Information regarding bariatric insurance coverage for patients can be found at obesitycoverage.com. The Centers for Medicare & Medicaid Services, for example, covers patients under 65 years of age who meet the aforementioned criteria in addition to having further documentation of participation in a supervised weight loss program, a psychological evaluation, and exclusion of other conditions known to cause obesity (e.g., adrenal, pituitary, and thyroid disorders)[63].

Roux-en-Y gastric bypass is a malabsorptive procedure that achieves the greatest overall weight loss[64,65]. Risks include vitamin and mineral deficiencies, protein calorie malnutrition, hernia, anastomotic leakage, and gastric perforation[65-67]. Nutritional deficiencies after gastric bypass are a concern and may result in hypoalbuminemia, peripheral neuropathy (folate), Wernicke encephalopathy (thiamine), anemia (iron), and metabolic bone disease (vitamin D)[66,68]. Continuous nutritional monitoring and supplementation long after the index procedure is required for patients who have gastric bypass[68].

TABLE III Approved Pharmaceutical Agents for the Long-Term Treatment of Obesity*

Medication	DEA Schedule	Mechanism	Administration	Titration	Common Adverse Effects	Contraindications
Liraglutide	No	GLP-1 agonist with central appetite lowering effects	Injectable	Weekly titration over 5 weeks to target dose	Nausea, hypoglycemia, diarrhea, constipation, vomiting, and headache	Medullary thyroid carcinoma, MEN2 syndrome, and pregnancy
Naltrexone-bupropion ER	No	POMC activation and mesolimbic reward system activity	Oral, with food	Weekly titration over 4 weeks to target dose	Nausea, constipation, headache, vomiting, dizziness, insomnia, dry mouth, and diarrhea	Uncontrolled hypertension, seizure disorder, bulimia, chronic opioid use, bipolar disease, concomitant use of bupropion products, MAOI inhibitor use, and pregnancy
Lorcaserin	Schedule IV	Selective serotonin agonist	Oral	No	Headache, hypoglycemia, dizziness, fatigue, nausea, dry mouth, constipation, and cough	Use of drugs associated with valvular heart disease and pregnancy
Phentermine-topiramate ER	Schedule IV	Norepinephrine and GABA agonist	Oral	Titration after 2 weeks	Paresthesia, dizziness, dysgeusia, insomnia, constipation, and dry mouth	Glaucoma, hyperthyroidism, MAOI inhibitor use, and pregnancy
Orlistat	No	Pancreatic lipase inhibitor	Oral, with food	No	Oily spotting, flatus with discharge, fecal urgency, fatty or oily stool, increased defecation, and fecal incontinence	Chronic malabsorption syndrome, cholestasis, and pregnancy

*DEA = U.S. Drug Enforcement Administration, GLP-1 =glucagon-like peptide-1, MEN2 = multiple endocrine neoplasia type 2, ER = extended release, POMC = pro-opiomelanocortin, MAOI = monoamine oxidase inhibitor, and GABA = gamma-aminobutyric acid.

Adjustable gastric banding and sleeve gastrectomy are restrictive procedures without the risks of malabsorption and nutrient deficiencies. Gastric banding has the lowest mortality risk, although it achieves less weight loss than the other options. Risks of gastric banding include band erosion or slippage, esophageal dilation, and dysphagia[69]. Sleeve gastrectomy is associated with weight loss intermediate between gastric bypass and gastric banding, although some studies have found results comparable with those for gastric bypass[70]. Postoperative complications include leakage, stricture, and gastroesophageal reflux[71].

TABLE IV Weight Reduction Efficacy and Discontinuation of Therapy Due to Adverse Events Among Approved Medications for Long-Term Obesity Treatment*

Pharmaceutical Agent	Weight Loss of ≥5% Versus Placebo†	Discontinuation of Therapy Due to Adverse Events†
Orlistat	2.69 (2.36 to 3.07)	1.84 (1.55 to 2.18)
Lorcaserin	3.09 (2.49 to 3.83)	1.40 (0.96 to 2.03)
Naltrexone-bupropion	3.90 (2.91 to 5.22)	2.60 (2.15 to 3.14)
Liraglutide	5.09 (4.07 to 6.37)	2.82 (2.10 to 3.77)
Phentermine-topiramate	9.10 (7.68 to 10.78)	2.32 (1.86 to 2.89)

*Data from: Khera et al.[51]. †The values are given as the odds ratio, with the 95% confidence interval in parentheses.

TABLE V Comparison of the Different Types of Bariatric Surgery*

Bariatric Surgery	Change in Mean BMI *(kg/m²)* at 1 Yr (95% CI)	Complication Rate *(%)* (95% CI)	Mortality Rate *(%)* (95% CI)
Gastric bypass	−14.53 (−16.82 to −12.25)	21.00 (12.00 to 33.00)	0.08 (0.01 to 0.30)
Gastric banding	−10.48 (−13.70 to −7.25)	13.00 (5.20 to 26.00)	0.11 (0.01 to 0.50)
Sleeve gastrectomy	−16.20 (−24.45 to −7.95)	13.00 (0.70 to 44.00)	0.50 (0.01 to 3.88)

*Data from: Chang et al.[64]. CI = confidence interval.

Chang et al. analyzed 37 randomized controlled trials from 2003 to 2012 and found that, at 1 year, gastric bypass reduced BMI by a mean of 14.5 kg/m^2; adjustable gastric banding, by a mean of 10.5 kg/m^2; and sleeve gastrectomy, by a mean of 16.2 kg/m^2 (Table V)[64]. The choice of procedure can also have implications not only for weight loss but also for the resolution of obesity-related comorbidities. For example, the remission rates of diabetes in patients who have bariatric surgery appears to be higher for those who undergo gastric bypass (52%) and sleeve gastrectomy (63%) than for those managed with gastric banding (20%)[72].

For patients with morbid obesity, bariatric surgery is the most effective option when lifestyle and pharmaceutical interventions have failed. McLawhorn et al., in a study comparing the quality-adjusted life-years and cost-effectiveness ratio differences for patients with morbid obesity undergoing TKA and those who had bariatric surgery prior to TKA, found that bariatric surgery was a cost-effective option for improving outcomes[73].

The literature is conflicting with regard to the demonstration of improved outcomes in patients who receive bariatric surgery prior to TJA. A database study that included 2,636 patients managed with bariatric surgery who underwent TJA showed improved preoperative comorbidities and reduced perioperative complications compared with patients with morbid obesity who were not managed with bariatric surgery; however, there was no improvement in revision rates[74]. In contrast, Inacio et al. performed a retrospective cohort study and found similar profiles for perioperative complications after TJA between patients who underwent bariatric surgery and candidates for bariatric surgery who did not undergo the procedure[75]. Another retrospective study failed to demonstrate improved rates of PJI or revision surgery in patients who underwent bariatric surgery prior to TKA compared with those with a similarly elevated BMI who did not undergo bariatric surgery[76]. Interestingly, these authors found an increased risk of reoperation for stiffness in the bariatric surgery group (HR = 2.5)[76]. The lack of consistently improved TJA outcomes after bariatric surgery may be explained by untreated malnutrition[77]. Little information is currently available to determine functional outcomes in patients managed with TJA after bariatric surgery.

Malnutrition in Obesity

Rates of malnutrition may paradoxically be increased in patients with obesity[78,79]. After adjusting for other factors contributing to hypoalbuminemia, such as nephrotic syndrome and liver disease, Mosli and Mosli found a fourfold increase in the likelihood of hypoalbuminemia in patients with obesity and a nearly sevenfold increase in the likelihood of hypoalbuminemia in patients with morbid obesity compared with subjects who were not overweight[78]. In a large database study comparing the different classes of patients with obesity who were undergoing THA and had malnutrition, defined as a preoperative albumin level of <3.5 g/dL, increased rates of malnutrition were found in patients with a BMI of ≥40 kg/m^2 (5.7%) and between 35 and 40 kg/m^2 (4.9%) compared with those with a BMI of <30 kg/m^2 (3.6%)[79]. Hypoalbuminemia is an independent risk factor for major complications, wound complications, blood transfusions, extended hospital stay, and the need for reoperation[79]. Other studies have emphasized the increased complications observed in patients with hypoalbuminemia undergoing TJA, which include wound infection, pneumonia, extended length of stay, readmission, and increased mortality[80,81]. This information highlights the importance of preoperative nutritional evaluation and optimization in patients with obesity.

Overview

Optimizing the weight of a patient prior to TJA is an effective strategy to minimize infection, increase implant survivorship, and reduce health-care costs. A committee from the American Association of Hip and Knee Surgeons performed a literature review to determine recommendations for BMI thresholds in patients with obesity undergoing TJA[82]. The group determined that a substantial increase in perioperative complications occurs in patients with a BMI of ≥40 kg/m^2, and they strongly recommended consideration for reduction and optimization of weight to minimize comorbidities such as diabetes and malnutrition prior to TKA[82]. They were unable to establish a consensus with TKA, but similarly recommended weight reduction prior to surgery in patients with morbid obesity[82]. On the basis of these recommendations and of our own review of the literature, we similarly recommend serious consideration for weight reduction, with the goal for a patient with morbid obesity being a BMI of <40 kg/m^2 before TJA is scheduled. Patients with a BMI between 30 and 40 kg/m^2 may undergo TJA with an understanding that they are at increased risk for complications.

There are numerous options for weight reduction, each with their respective risks and benefits, available to patients with obesity seeking to undergo TJA. Prospective randomized clinical trials that can further quantify the benefit of weight reduction prior to TJA, such as the Surgical Weight-Loss to Improve Functional Status Trajectories Following Total Knee Arthroplasty (SWIFT) trial, are under way. ■

Michael J. Chen, MD[1]
Subhrojyoti Bhowmick, MBBS, MD[1]
Lucille Beseler, MS, RDN, LDN, CDE[2]
Kristin L. Schneider, PhD[3]
Scott I. Kahan, MD, MPH[4]
John M. Morton, MD[1]
Stuart B. Goodman, MD, PhD[1]
Derek F. Amanatullah, MD, PhD[1]

[1]Departments of Orthopaedic Surgery (M.J.C., S.B., S.B.G., and D.F.A.) and Surgery (J.M.M.), Stanford University Medical Center, Stanford, California

[2]Family Nutrition Center of South Florida, Coconut Creek, Florida

[3]Department of Psychology, Rosalind Franklin University of Medicine and Science, North Chicago, Illinois

[4]National Center for Weight and Wellness, Washington, DC

E-mail address for D.F. Amanatullah: dfa@stanford.edu

ORCID iD for M.J. Chen: 0000-0003-2951-8295
ORCID iD for S. Bhowmick: 0000-0003-2599-7532
ORCID iD for L. Beseler: 0000-0002-8882-587X
ORCID iD for K.L. Schneider: 0000-0002-7445-5118
ORCID iD for S.I. Kahan: 0000-0002-3080-0661
ORCID iD for J.M. Morton: 0000-0002-9542-1283
ORCID iD for S.B. Goodman: 0000-0002-1919-3717
ORCID iD for D.F. Amanatullah: 0000-0002-6203-5853

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