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CORR Insights®: Do Stemmed Tibial Components in Total Knee Arthroplasty Improve Outcomes in Patients With Obesity?

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Where Are We Now?

Obesity has been recognized as an epidemic, with approximately 35% of the US population classified as obese. Obesity is also considered a major factor in the increasing need for TKA [5]. Patients

who are obese and have undergone TKAs have been associated with an increased incidence of complications including cardiopulmonary events [7, 13], wound healing difficulties [16], infection [6], thromboembolic disease [14], and prosthetic loosening resulting in inferior survivorship [1]. Patients with obesity often have multiple medical comorbidities such as diabetes mellitus, cardiopulmonary disease, and malnutrition that can negatively impact the results after TKA.

Bariatric surgery has been employed extensively during the last decade to facilitate weight loss [3]. Werner and colleagues [15] evaluated three large patient cohorts categorized as nonobese, morbidly obese who had not received bariatric surgery, and morbidly obese who underwent bariatric surgery prior to TKA. The authors found a reduced rate of both major and minor complications in the

bariatric cohort when compared to the morbidly obese cohort who did not undergo bariatric surgery. It is difficult to infer a direct relationship between obesity and outcomes secondary to undergoing bariatric surgery due to the lack of a matched cohort controlling for many of the coexisting comorbidities. Others have noted either no difference or worse outcomes including higher reoperation and revision rates in patients that underwent bariatric surgery prior to TKA [8, 10, 12]. One explanation for inferior outcomes in the bariatric patient population undergoing TKA is the presence of concomitant malnutrition in this patient population [11]. Many remain in a catabolic state for 2 years following bariatric surgical procedures [4].

Currently, many of the problems associated with performing TKA on a patient with obesity have been identified, but detailed research studies on how to reduce complications and improve outcomes in this patient cohort are lacking.

Previous reports [1, 2] have documented the association of obesity and

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tibial component loosening and suggest consideration of a tibial stem extension to enhance long term fixation [1]. The current report found improved clinical scores and less pain in patients with obesity (BMI > 30kg/m²) by using a tibial component with a 100 mm stem extension (10 mm diameter) compared to using a standard tibial component.

Where Do We Need To Go?

Debate exists regarding preoperative measures to reduce complications and improve TKA survivorship in this patient population. Is there a predetermined BMI above which TKA should be withheld until the patient's body weight is reduced? Will preoperative bariatric surgery improve TKA outcomes?

As previously stated, many of the problems associated with performing TKA in patients with obesity have been identified, but detailed research studies on how to reduce complications and improve outcomes in this patient cohort are lacking.

The issue of additional tibial fixation to improve TKA outcomes in patients with obesity is only one of many treatment modalities which need evaluated to reduce complications and improve survivorship of obese patients requiring TKA. The addition of a stem

increases the surface area of fixation, theoretically lessening high eccentric loads. However, other factors affecting fixation must be considered including tibial tray size and bone quality. This report demonstrated females with osteopenia exhibited inferior pain and functional scores.

How Do We Get There?

To improve pain relief, function, and complication rates for patients with obesity who undergo TKA, numerous additional investigations are merited. The best medicine is always preventative medicine. Better national educational programs are necessary to advise the public on the many adverse health conditions associated with morbid obesity, as well as the proper diet and regular exercise regimens to prevent obesity. While several reports [1, 5–7, 13, 14, 16] document inferior functional capacity and a higher incidence of revision TKA in patients with obesity, more prospectively randomized analyses are necessary to determine if there is a BMI above which it is unwise to perform TKA. There is limited detailed information available providing information on what potential adverse health effects occur in subjects with morbid obesity and advanced knee arthritis who do not receive a TKA. This information is

needed to better determine risk versus benefit ratios in patients with morbid obesity who also have advanced knee arthritis. There is controversy as to what best represents a patient with obesity when comparing BMI and body fat percentage [9]. Percentage of body fat may be a better representation of obesity because it is a more accurate measurement of adipose tissue than BMI.

More studies are needed to better understand how and which medical comorbidities affect risk in patients with obesity. Many of these patients who experience inferior functional results and higher complication rates often have multiple associated medical comorbidities. Which ones are the main causal conditions that lead to lesser results or do they act in combination? Which comorbid medical conditions mandate correction or improvement before TKA is pursued? Studies involving large numbers of obese patients with detailed multivariate statistical analyses are needed to answer these questions. Creation of multispecialty care centers specializing in research and management of the various comorbid conditions associated with obesity could provide this badly needed information to improve outcomes of these individuals.

Lastly, a substantial need exists to lessen the wound complications and the subsequent higher infection risks

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associated with TKA in patients with morbid obesity. Randomized studies on variations in wound closure method, speed of knee mobilization, and the use of vacuum-assisted wound therapy devices are required to prevent these complications.

References

1. Abdel MP, Bonadurer GF, Jennings MT, Hanssen AD. Increased aseptic tibial failures in patients with a BMI ≥ 35 and well-aligned total knee arthroplasties. *J Arthroplasty*. 2015;30:2181–2184.
2. Berend ME, Ritter MA, Meding JB, Faris PM, Keating EM, Redelman R, Faris GW, Davis KE. Tibial component failure mechanisms in total knee arthroplasty. *Clin Orthop Relat Res*. 2004;428:26–34.
3. Buchwald H, Avidor Y, Braunwald E, Jensen MD, Pories W, Fahrbach K, Schoelles K. Bariatric surgery: A systematic review and meta-analysis. *JAMA*. 2004;292:1724–1737.
4. Dalcanciale L, Oliveira CP, Faintuch J, Nogueira MA, Rondó P, Lima VM, Mendonça S, Pajecki D, Mancini M, Carrilho FJ.. Long-term nutritional outcome after gastric bypass. *Obes Surg*. 2010;20:181–187.
5. Derman PB, Fabricant PD, David G. The role of overweight and obesity in relation to the more rapid growth of total knee arthroplasty volume compared with total hip arthroplasty volume. *J Bone Joint Surg Am*. 2014;96:922–928.
6. Dowsey MM, Choong PFM. Obese diabetic patients are at substantial risk for deep infection after primary TKA. *Clin Orthop Relat Res*. 2009;467:1577–1581.
7. Friedman RJ, Hess S, Berkowitz SD, Homering M. Complication rates after hip or knee arthroplasty in morbidly obese patients. *Clin Orthop Relat Res*. 2013;471:3358–3366.
8. Inacio MCS, Paxton EW, Fisher D, Li RA, Barber TC, Singh JA. Bariatric surgery prior to total joint arthroplasty may not provide dramatic improvements in post-arthroplasty surgical outcomes. *J Arthroplasty*. 2014;29:1359–1364.
9. Ledford CK, Ruberte Thiele RA, Appleton JS, et al. Percent body fat more associated with perioperative risks after total joint arthroplasty than body mass index. *J Arthroplasty*. 2014;29(9 Suppl):150–154.
10. Martin JR, Watts CD, Taunton MJ. Bariatric surgery does not improve outcomes in patients undergoing primary total knee arthroplasty. *Bone Joint J*. 2015;97-B:1501–1505.
11. Peterson LA, Cheskin LJ, Furtado M, Papas K, Schweitzer MA, Magnuson TH, Steele KE. Malnutrition in bariatric surgery candidates: Multiple micronutrient deficiencies prior to surgery. *Obes Surg*. 2016;26:833–838.
12. Severson EP, Singh JA, Browne JA, Trousdale RT, Sarr MG, Lewallen DG. Total knee arthroplasty in morbidly obese patients treated with bariatric surgery: A comparative study. *J Arthroplasty*. 2012;27:1696–1700.
13. Thornqvist C, Gislason GH, Køber L, Jensen PF, Torp-Pedersen C, Andersson C. Body mass index and risk of perioperative cardiovascular adverse events and mortality in 34,744 Danish patients undergoing hip or knee replacement. *Acta Orthop*. 2014;85:456–462.
14. Wallace G, Judge A, Prieto-Alhambra D, de Vries F, Arden NK, Cooper C. The effect of body mass index on the risk of post-operative complications during the 6 months following total hip replacement or total knee replacement surgery. *Osteoarthritis Cartil*. 2014;22:918–927.
15. Werner BC, Kurkis GM, Gwathmey FW, Browne JA. Bariatric surgery prior to total knee arthroplasty is associated with fewer postoperative complications. *J Arthroplasty*. 2015;30 (9 Suppl):81–85.
16. Winiarsky R, Barth P, Lotke P. Total knee arthroplasty in morbidly obese patients. *J Bone Joint Surg Am*. 1998;80:1770–1774.