

Morbid obesity: a well-established burden on knee prosthesis after total knee arthroplasty

Guoqiang Zhang

Department of Orthopaedics, General Hospital of Chinese People's Liberation Army, Beijing 100853, China

Correspondence to: Guoqiang Zhang. Department of Orthopaedics, General Hospital of Chinese People's Liberation Army, Beijing 100853, China.

Email: gqzhang301@163.com.

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Obesity has become a global issue of public health, and the percentage of obese population has been increasing with the advancement of the society and its quality of life. The world has paid much attention to the health-related problems caused by obesity. The number of obese patients in need of knee replacement procedures is increasing as well. It is estimated that up to 50% of those receiving knee replacements will be obese patients by the year 2030. Obesity influences the outcome of knee arthroplasty in many aspects. Research has revealed that obesity could accelerate the development and progression of knee osteoarthritis, and bring forward the need for joint replacement for as much as 7 years (1).

The status of being obese has been correlated with increased peri-operative complications of knee arthroplasty. A number of publications reported that being obese could lead to poor wound healing, superficial and deep infections, early revisions, acute renal injuries, and cardiac asystole. It has also been reported that obesity will negatively impact the surgical techniques, including prolonging the operation, and malalignment of the prostheses. For all the above-mentioned complications, it is the correction of the limb alignment or mechanical axis that has the significant influence on the loading and thus the loosening of the prostheses in the long term. A deviation of 3 degree from normal mechanical axis is considered to be able to take a long-term detrimental effect on the prostheses. Estes and Krushell have done the research independently to explore whether obesity will negatively influence the correction of the limb alignment. Estes retrospectively reviewed 196 knee arthroplasties, those with a BMI >35 kg/m² has a significantly higher malalignment rate than those with a BMI <35 kg/m². Krushell *et al.* compared the correction of

lower limb axis in 39 cases with a BMI >40 kg/m² and 39 cases with a BMI <30 kg/m², average femorotibial angle is 2.6 degree valgus for obese group, and 5.5 valgus for the control group (P<0.001), indicating that the obese, especially the morbidly obese patients were unable to achieve proper alignment after knee replacement, and thus suffered from long-term loosening of the prostheses (2,3). For those obese patients who did achieve a good mechanical axis, data lacked regarding the long-term outcome of the prostheses, especially the tibial component. Gopalakrishnan *et al.* analyzed the tibial component and the interface performance after using stem extension by biomechanical tests and three-dimensional finite element model, and concluded that tibial stem extension could significantly reduce the stress of the tibial component and the shear force of prosthesis-bone interface, decrease the chance of loosening, and with the increase of the extension length, the distribution of stress is more even (4). The author did a good job by following up a large sample of clinical cases.

The author retrospectively reviewed 5,088 cases of knee replacements with the aseptic loosening of the tibial component as the endpoint (excluding the revision cases due to septic loosening and loosening of other components). The level of obesity was categorized by WHO standard. Standardized imaging evaluation software was used for the measurement of the lower limb and component alignment. After 15 years of follow-up, the author concluded that despite of the achievement of the proper alignment for those with a BMI >35 kg/m², the risk of tibial component aseptic loosening was still significantly higher than those with a BMI <35 kg/m². This conclusion further elucidated that being morbidly obese alone would influence the long-term loosening of the tibial component.

The clinical study is a large sample, mid-to-long term retrospective research undertaken recently, meaning that the surgical techniques and the knee prostheses employed are all up-to-date, which in turn shows the robustness of the study itself. In addition, the adoption of the WHO method of obesity classification and advanced imaging system further enhance the validity of the study.

Still there are a number of limitations about the clinical study. First of all, it is retrospective instead of prospective. The imaging technique used in the study cannot be standardized, which could lead to error. The mean and standard deviation were used for the statistical analysis, and it is possible that the mean of the sample was too ideal, considering the varus and valgus of the knee joint itself. Therefore, outlier should be added to for a better statistical description. And the author did not specify whether the stem extension was used for every surgical patient. Partial use of extension could skew the result. A detailed description of the prostheses used in every case would allow for an objective understanding to the readers.

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Footnote

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