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ORIGINAL ARTICLE

Evaluation of Postoperative Clinical and Functional Results in Morbidly Obese Individuals Undergoing Primary Total Knee Replacement: A Cross-Sectional Study

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ABSTRACT

Background: Total knee arthroplasty (TKA) is a well-established procedure for treating end-stage knee osteoarthritis (OA), offering significant pain relief and improving the quality of life. However, morbid obesity greater than 40 kg/m², presents unique challenges in surgical outcomes, with potential complications affecting both the procedure and recovery.

Methods: A cross-sectional study was conducted at the Department of Orthopedics, MMC Mardan, from January 2018 to December 2022, involving 236 morbidly obese patients scheduled for primary unilateral. Demographic data, comorbidities, and surgical details were extracted from medical records. Statistical analysis included paired t-tests to compare preoperative and postoperative scores, with significance set at $p < 0.05$.

Results: The mean age of the patients was 59.23 ± 5.66 years. A majority (90.3%) underwent bilateral TKA, with the rest having unilateral procedures. BMI distribution showed 58.9% of patients had a BMI between 38-48 kg/m², 28% had a BMI between 49-50 kg/m², and 13.1% had a BMI greater than 50 kg/m². At the one-year follow-up, significant improvements were observed in pain ($p = 0.031$), joint stability ($p = 0.022$), and ROM ($p = 0.021$). However, no significant improvements were found in functional outcomes, including walking distance ($p = 0.037$), stair climbing ($p = 0.029$), and stair descending ($p = 0.001$).

Conclusion: TKA provides significant clinical benefits, particularly in pain relief, joint stability, and ROM, in morbidly obese patients. However, the lack of substantial functional improvements postoperatively highlights the need for further research on optimizing rehabilitation strategies.

Keywords: Total knee arthroplasty, morbid obesity, clinical outcomes, functional outcomes, American Knee Society Score.

INTRODUCTION

Total knee arthroplasty (TKA) is an expertly perceived and affirmed surgical intervention for people with end-stage knee who have osteoarthritis (OA). It is important in reducing chronic pain, the use of joints, and majorly in enhancing the general quality of life of a patient who has suffered the paralyzing condition of advanced OA[1]. By restoring mobility and alleviation pain by replacing the damaged knee joint with a prosthetic one, TKA has been shown to allow patients to pursue many activities of their daily lives that would have otherwise been impaired due to degeneration of the knee joint. Nevertheless, the procedure has its limitations because of what is considered an influence of certain comorbidity cases like morbid obesity in the effectiveness of the operation. Particularly, a morbidly obese patient is linked to an increased risk of developing complications during the surgery and in the post-surgery period, which may compromise the results of the functional and clinical consequences of TKA[2].

Morbid obesity is usually characterized by a (BMI) of 40 kg/m 2 or above[3]. Moreover, morbidly obese patients tend to have a more rapid OA development because of the overweight they have, as well as contributing to additional pressure on the joint system. Thus, morbidly obese patients are more likely to have TKA earlier in life than their non-obese peers could in search of an escape from the life-altering condition of OA[4]. As an example, some among them point to the possibility of morbidly obese patients recording a functional outcome that is not much lower than that recorded by obesity-free patients. Conversely, the findings of other studies show that the complication rates, including infection, problem healing of wounds, and longer recovery periods, are far higher among morbidly obese people, on the one hand, than the case among non-obese patients.

These problems may interfere with both the functional and clinical outcomes of the surgery, including aspects related to joint stability, mobility, and the amount of pain experienced[5]. Additionally, as much research has been carried out to assess the immediate results of TKA in morbidly obese people, a lot of these research studies have concentrated on only clinical or functional outcomes as compared to individuals. The elements of the long-term success of the surgery on the clinical (pain reduction, joint stability, range of motion reduction) and functional (mobility, performance of the everyday activity) levels have been evaluated seldom and comprehensively, which is highly important to draw the total picture of the surgery success in this group of the patients.

Our research will fill in this gap as we will carefully compare clinical and functional outcomes of morbidly obese patients having had primary TKA. The American Knee Society Score (AKSS) will be one of the primary instruments for measuring clinical outcomes, as it evaluates the degree of pain, joint stability, and range of motion, both before and after surgery[6]. This score will enable us to determine a decrease in the level of pain, the level of functioning of the knee joint, and the overall stability thereof in post-operative conditions quantitatively. Additionally, functional outcomes will be assessed through measures of mobility, including the number of steps the patient can walk, the number of stairs they can climb, and their ability to descend stairs without impairment[7]. These functional scores are necessary to determine how the patient can perform normal activities that are crucial to their independence and quality of life.

To better define patient selection criteria, surgical techniques, and post-operative management strategies, it is crucial to understand how morbid obesity affects the results of TKA. This will help us gain a better perspective into the effects of obesity on the success of TKA by inquiring about the entirety of clinical and functional outcomes of morbidly obese patients. Such knowledge will help in better counseling of patients, better surgical planning, and strategy of rehabilitation efforts to help morbidly obese patients get the best possible care and reap the best final results of an operation[8].

MATERIALS AND METHODS

Study Design: Cross-sectional Study.

Study Settings: The study was conducted at the Department of Orthopedics, MMC Mardan.

Duration of Study: The study spanned from January 2018 to December 2022.

Inclusion Criteria: Patients aged 18 and above with a BMI $\geq$ 40 kg/m², classified as ASA PS classes 1–3, and scheduled for unilateral primary TKA were included. Eligible patients had end-

stage knee osteoarthritis requiring TKA for pain relief and functional improvement.

Exclusion Criteria: Patients with a BMI < 40 kg/m², ASA PS class 4 or higher, prior knee surgery, active or significant joint infections, severe musculoskeletal disorders other than knee osteoarthritis, inability to follow postoperative protocols, or inability to attend follow-ups were excluded. Pregnant women were also excluded due to surgical and anesthesia risks.

METHODS

Data were collected via a thorough review of medical records, extracting demographic details, comorbidities, and surgical information. Clinical and functional outcomes were assessed using the American Knee Society Score (AKSS), evaluating pain, joint stability, and range of motion. Preoperative AKSS scores served as baselines, with postoperative scores collected 3–6 months post-surgery. Data analysis was performed using SPSS version 26.0. Paired t-tests assessed changes in AKSS scores, with an alpha level of 0.05 for statistical significance. Correlations between demographics, comorbidities, and outcomes were explored. The study received IRB approval from MMC Mardan, with informed consent and anonymized data ensuring ethical standards. Limitations included the retrospective design, single-center setting, and short-term follow-up.

RESULT

A total of 236 morbidly obese patients underwent primary total knee arthroplasty (TKA). The average age of the patients was 59.23 ± 5.66 years. A majority of the patients were female (87.71%), while 12.29% were male. Regarding the type of surgery, most patients (90.3%) underwent bilateral TKA, and the remaining 9.7% had unilateral TKA. Table 1

Table 1: Demographics and Surgical Details

Characteristics	Values
Total Patients	236(100%)
Age	59.23.01±5.66
Gender	
Female	207(87.71%)
Male	29(12.29%)
Type of Surgery	
Bilateral TKA	213 (90.3%)
Unilateral TKA	23 (9.7%)
BMI Distribution	
38–48 kg/m²	139 (58.89%)
49–50 kg/m²	66 (28.96%)
>50 kg/m²	31 (13.13%)

The clinical outcomes at the one-year follow-up demonstrated significant improvements in various aspects. The parameters evaluated included pain, joint stability, and range of motion (ROM). Significant improvements were observed in all three parameters, with p-values of 0.031 for pain, 0.022 for joint stability, and 0.021 for ROM, indicating that primary TKA provided notable clinical benefits for morbidly obese patients. Table 2

Table 2: Clinical Outcomes at One-Year Follow-Up (n = 236)

Clinical Parameters	Significant Improvement	P vales
Pain	Yes	0.031
Joint Stability	Yes	0.022
Range of Motion (ROM)	Yes	0.021

In contrast to the clinical outcomes, functional improvements were less pronounced. The functional parameters evaluated included walking distance, stair climbing, and stair descending. No significant improvement was found in walking distance (p = 0.037), stair climbing (p = 0.029), or stair descending (p = 0.001), suggesting that while patients experienced clinical benefits, these did not translate into significant improvements in functional capacity related to mobility. Table 3

Table 3: Functional Outcomes at One-Year Follow-Up (n = 236)

Functional Parameters	Significant Improvement	P vales
Walking Distance	No	0.037
Stair Climbing	No	0.029
Stair Descending	No	0.001

The BMI distribution of the patients was as follows: 58.9% of patients had a BMI between 38 and 48 kg/m², 28% had a BMI between 49 and 50 kg/m², and 13.1% had a BMI greater than 50 kg/m². This distribution highlights the varying degrees of morbid obesity present within the patient cohort, providing a better understanding of how BMI may influence the outcomes of TKA in this population. figure 1

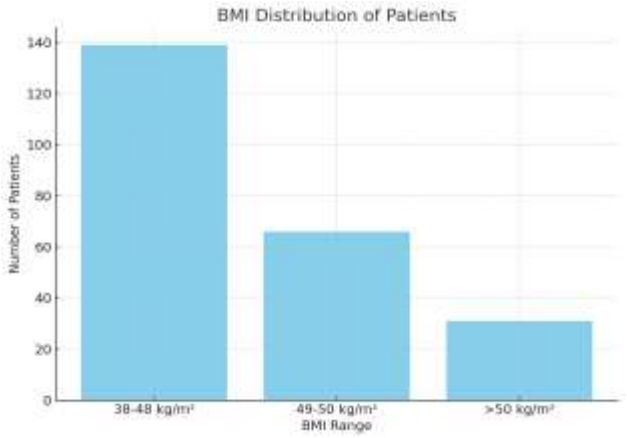

Figure 1: BMI Distribution of Patients (n = 236)

These findings suggest that while primary TKA leads to significant clinical improvements, it does not necessarily result in enhanced functional outcomes in terms of mobility for morbidly obese patients. Further investigation may be needed to optimize functional recovery in this patient population. Table 5

Table 5: Summary of Significant Findings

Outcome	Result
Clinical Status	Significant improvement in pain, joint stability, and range of motion (p < 0.05)
Functional Status	No significant improvements in walking distance, stair climbing, or descending (p > 0.05)

DISCUSSION

The prevalence rate of total knee arthroplasty (TKA) is one of the most effective surgical procedures for patients with end-stage knee osteoarthritis (OA). It is widely known to offer considerable alleviation of pain and, in a great manner, increases the mobility of patients, thus helping them to have a better quality of life[9]. Morbid obesity is normally described as a weight index (BMI) that exceeds 40 kg/m 2, and this condition has highly caused serious doubts as to the success of any surgical operation, including TKA. Since the population in the world is more obese and morbidly obese, the influence of that state on the results of TKA cannot be underestimated and is vital to the development of surgical procedures and patient management[10]. Morbid obesity presents several challenges in orthopedic operations, including total knee arthroplasty (TKA). Along with higher preoperative risks (complications during the use of anesthesia), it also poses specific biomechanical difficulties, metabolic pathologies, and possible impaired postoperative recovery[11].

These concerns mean that it is critical to review whether TKA is an appropriate and effective type of treatment that can be implemented in morbidly obese patients. The justification of TKA in this group of patients should be based on a multidimensional assessment of the risks and benefits that have been described in depth in the literature[12]. On the one hand, knee OA involving

extensive cartilage destruction and joint space width reduction may entail unbearable pain and loss of mobility, which makes surgical operation necessary irrespective of the weight of a patient[13]. Conversely, the morbid obesity effect on the course of the surgery, survival of the prosthetic implant, and general rehabilitating procedure after the operation cannot be overlooked[14]. Historically, there has been a lot of concern regarding the greater risk of complications of morbidly obese patients during TKA. These are the likelihood of wound-healing complications, increment in hospital rates of infections, and a chance of implant failure that have promoted apprehensions and doubtfulness of the effectiveness of TKA in this group[15].

There is inconclusive evidence on the outcomes of TKA in morbidly obese patients. Other researchers claim the clinical efficacy and the implant survival rates of the morbidly obese patients are not largely different than the non-obese patients[17]. Nonetheless, other studies emphasize the increased challenges and decreased functional improvements in morbidly obese human beings after TKA[18]. Although fear of obesity and its complications, such as low prosthetic survivorship, are common, less emphasis has been placed on the long-term effects of obesity that are predicting how obesity affects prosthetic wear and tear and patient outcomes reporting over time[19]. This lack of long-term information emphasizes why it would be so important to gain insight into the long-term effects of TKA in morbidly obese patients in order to ultimately refine clinical management practices and protocols regarding patient care.

The AKSS is a well-established and proven test/tool that assesses pain, joint stability, range of motion (ROM), and functional capacity, resulting in a detailed analysis of the surgery's outcome[20]. The AKSS provides an overall picture of patient recovery by including both clinical and functional evaluations, which is necessary to appreciate how morbid obesity affects postoperative recovery and long-term functional outcomes. The use of both clinical and functional outcomes enables the overall evaluation of the surgery's success and provides valuable information concerning the healing period of morbidly obese patients undergoing TKA[21]. Nevertheless, in addition to the data that can be obtained on the clinical outcomes of TKA using the AKSS, it is also necessary to consider that sociodemographic and comorbid elements can predetermine the success of surgery.

Other factors that influence the outcome of TKA include age, sex, comorbid conditions (e.g., diabetes, cardiovascular diseases), and socioeconomic status. They can have either a direct or indirect impact on the process of surgery, postoperative recovery, and rehabilitation[22]. Therefore, these sociodemographic factors need to be put into consideration when assessing TKA outcomes among morbidly obese people. A comparison of the preoperative and postoperative AKSS scores will determine the level of improvement behind pain alleviation, joint stability, range of movement, and functional improvement after the surgery.

Moreover, the impact of various demographic and surgical factors on total knee arthroplasty (TKA) outcomes will also be studied. The objective is not only to enhance our knowledge of how TKA works in morbidly obese patients but also to optimize the process of clinical decision-making and patient selection criteria in TKA. The potential of this exercise may help in developing more specific and personalized care plans to improve patient outcomes, thereby reducing the likelihood of complications.

Enhancing discussion and joint decision-making may also help increase patient satisfaction and ensure that the selected treatment path is the best fit for individual needs. The final aim of the study is to gain a better understanding of the results of TKA morbidly obese patients t, which will in providing better care to these patients[26]. Finally, the results will be added to the existing knowledge base related to total knee arthroplasty (TKA) in morbidly obese patients. They may be used in the development of more patient-oriented strategies of care.

CONCLUSION

In conclusion, the current literature underlines the clinical performance of total knee arthroplasty (TKA) in morbidly obese patients, especially regarding pain, joint stability, and range of motion. Nevertheless, these clinical outcomes are important; however, there is no evidence of a critical enhancement in functional outcomes, including mobility and the ability to navigate stairs, which suggests the scope of postoperative rehabilitation strategies. The results were used to support the necessity of focusing not only on the clinical outcomes but also on the influence of the sociodemographic factors and comorbidities in the recovery process. As morbid obesity increasingly becomes common, it is essantial to keep examining the long-term impact of obesity on the durability of prostheses as well as patient-reported outcomes in order to improve surgery and provide the best care to these individuals.

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