

# Total knee arthroplasty in morbid obese, early outcomes

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## Abstract

### Introduction

Obesity has been linked to the development of osteoarthritis of the knee, also it may lead to poor outcomes after any surgery. Total knee arthroplasty in morbidly obese patients carries a high risk of complications such as; delayed wound healing, wound dehiscence, infection, and remote mechanical failure. This study aims to evaluate short term follow up of total knee arthroplasty in Egyptian morbidly obese patients

### Patients and methods

Short term follow-up was done on 86 patients who were morbidly obese with BMI more than 40 and underwent TKA in a period from February 2016 till April 2019.

All patients with severe end-stage knee osteoarthritis and with BMI > 40 were done in AIN SHAMS University hospitals by the same surgical team who were the authors of this work.

Time of operative procedure, hospital stay, wound dehiscence in the early postoperative period, superficial & deep wound infection, and occurrence of cardiopulmonary complications (DVT & pulmonary embolism), were the main items that were studied in this work.

### Results

In this study the mean operative time was 84 , and the mean hospital stay was 4 days. wound dehiscence occurred in only one patient (1.1%), superficial infection occurred in 5 patients (5.8%), while deep infection occurred in only one patient. At the last follow up the average total knee society score was 88.2 compared to preoperative score which was 33.4. While average functional score at the last, follow-up was 72.7 compared to an average total preoperative functional score which was 22.7

### Conclusion

According to this short term follow up research, the results of total knee arthroplasty in morbidly obese patients in the Egyptian population is good, and the result can be improved by adequate preparation, optimum perioperative situation, and presence of an expert surgical team. Indeed, long term follow-up in a larger number of patients is needed for the detection of complications and possible mechanical loosening.

### Keywords

Total knee arthroplasty, Morbid obesity, wound dehiscence.

## Introduction

Total knee arthroplasty is a successful gold standard treatment for end-stage knee osteoarthritis. [1]

Obesity has been linked to the development of osteoarthritis of the knee, also it may lead to poor outcomes after any surgery. [2,3]

Obesity is widely recognized as a cause of multiple medical comorbidities and considered as a risk factor for the pathogenesis and progression of knee osteoarthritis. [6&7]

There is evidence that the mean body mass index (BMI) of patients who undergo TKA surgery is rising due to the increased incidence of obesity in the world

population. [8]

According to the World Health Organization (WHO) Guidelines; the body mass index for an individual is their weight in kilograms divided by their height in meters squared. Obesity is defined as a BMI > 30 kg/m and morbid obesity as a BMI > 40 kg/m. [4&9]

Total knee arthroplasty in morbidly obese patients carries a high risk of complications such as; delayed wound healing, wound dehiscence, infection, and remote mechanical failure. [5]

In Egypt, most of the patients presenting for total knee arthroplasty are obese and morbidly obese, but we don't have enough data about them.

This study aims to evaluate short term follow up of total knee arthroplasty in Egyptian morbidly obese patients.

**Patient and methods**

Short term follow-up was done on 86 patients who were morbidly obese with BMI more than 40 and underwent TKA in a period from February 2016 till April 2019.

All patients with severe end-stage knee osteoarthritis and with BMI > 40 were done in AIN SHAMS University hospitals by the same surgical team who were the authors of this work.

Patients with BMI < 40, those with rheumatoid arthritis, and patients with cardiopulmonary, hepatic, and renal problems were excluded.

The admission for all patients was one day before surgery, while the discharge occurred after fulfilling certain criteria which were good general condition, dry wound (fig.1), full weight-bearing.



**Fig. 1:** dry wound before discharge.

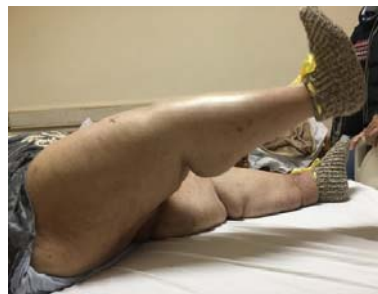
Local clinical evaluation for overall alignment, stability, walking ability, and both sagittal and coronal deformities was done for all patients preoperatively (fig. 2,3,4).



**Fig.2:** local examination for walking ability & deformities.



**Fig.3:** Local examination for preoperative ROM.



**Fig.4:** local examination for extensor mechanism integrity.

Varus deformity plus or minus flexion deformities of variable degrees was founded in the obese patients in this study (fig. 5), none of the patients were in valgus deformity.



**Fig. 5:** varus malalignment in morbidly obese patients.

Although most of the patients in this study had big and short thighs, the tourniquet was applied in all patients after good padding over plaster strips that were reflected upwards to make use of most of the skin of the thigh (fig.6,7).



**Fig.6:** tourniquet preparation.



**Fig.7:** tourniquet application.

The prosthesis in all cases was a primary NEXGEN (Zimmer Biomet, Warsaw, Indiana, USA) fixed-bearing prosthesis with a tibial stem (fig.8).



**Fig.8:** fixed bearing Nexgen prosthesis with a tibial stem.

The idea behind using a tibial stem is to absorb some of the load exerted by the overweight on the articular surface. [17]

Tranexamic acid was used in all cases, 2 grams at the time of induction then one gram every 8 hours for 24 hours only postoperative.

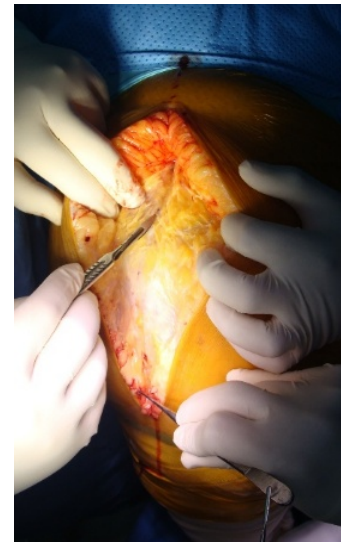
A medial parapatellar approach was used for all cases, using generous incision for careful soft tissue retraction around the knee.

Medial ligament release was done in all patients carefully and in a staged manner according to gap balancing issues to prevent injury of this critical attenuated structure in obese patients.

As regard patellar management, patelloplasty was used in all cases with no need for patellar resurfacing.

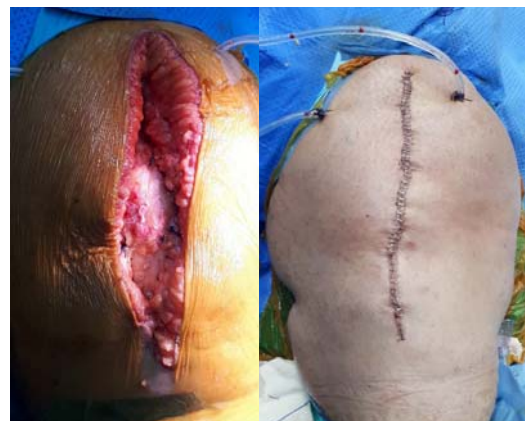
Simultaneous cementation for both tibial and femoral components was done in all cases, Jet lavage used in all cases to improve cementation[18&19]

For better wound management and to decrease the incidence of wound dehiscence, the skin was incised using generous incision with a large flap without undermining the lateral flap. (fig. 9)



**Fig.9:** Skin incision using the large flap.

Wound closure was done carefully in layers starting with an extensor mechanism then closing the skin flap in two layers without tensioning the skin (fig. 10).



**Fig.10:** Final wound closure.

The anticoagulation protocol was used in all patients, using a prophylactic dose of Clexane 12 hours before surgery and continued 12 after surgery and continued for 35 days postoperative.

Clinical evaluation for all patients was done according to the knee society scoring system (clinical and functional), immediate postoperative, 1 month after surgery, and then every 3 months for 2 years.

Radiological evaluation was done immediately postoperative, 3 months postoperative, after 6 months then every 6 months for 3 years (fig.11,12).

Time of operative procedure, hospital stay, wound dehiscence in the early postoperative period, superficial & deep wound infection, and occurrence of cardiopulmonary complications (DVT & pulmonary embolism), were the main items that were studied in this work.



**Fig.11:** immediate postoperative ppx.



**Fig.12:** 3-month postoperative.

## Results

Mean total operative time was 84 minutes, ranging from 70 minutes up to 160 minutes, while the mean tourniquet time was 51 ranging from 45 up to 130 minutes.

Eight patients (9.3%) experienced a prolonged operative time (160 min.) with corresponding tourniquet time (130. Min.) and thus was due to knee morphology itself which lead to increase closure time in 5 patients, while in 3 patients the cause was due to difficulties in flexion & extension gap balancing.

The mean hospital stay was 4 days ranging from 3 to 7 days.

Three patients (3.4%) experienced wound problems in the first month after the operation, in the form of, gaping, and delaying in stitch removal, all of them man-

aged with daily dressing and a steristrips application, and finally, they became good after stitch removal.

Only one patient (1.1%) developed wound dehiscence, and skin necrosis during follow up which was managed by excision of the necrotic part plus secondary sutures (fig.13).



**Fig13:** skin necrosis excision + 2ry sutures.

Five patients (5.8%) developed an early superficial infection which was treated by antibiotics only, while one patient (1.1%) developed a deep infection which was managed by debridement and plastic insert exchange and the patient was good.

Despite using the anticoagulation protocol, DVT occurred in three patients (3.4%), one of them does not follow the protocol of post-operative anticoagulation and all were treated using a therapeutic dose of the Clexane with no subsequent complications.

At the last follow-up, the average total knee society score was 88.2 (Ranging from 73–95) compared to an average total preoperative knee society score which was 33.4 (ranging from 22–51).

While functional score, at last, follow-up, the average score was 72.7 (Ranging from 53–95) compared to an average total preoperative functional score which was 22.7 (ranging from 12–45).

As regards postoperative knee society clinical score, there were 24 cases (27.9%) knees had excellent results (80 to 100 points), 62 cases (72.1%) had good results (70 to 79 points), No knees had fair results (range 60 to 69 points) or poor results (<60 points)

As regards postoperative functional score, there were 25 cases (29.1%) knees had excellent results (80 to 100 points), 52 cases (60.6%) had good results (70 to 79 points), 6 cases (6.9) had fair results (range 60 to 69 points) and 3 cases (3.4) also had poor results (<60 points).

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## Discussion

Most of the patients undergoing TKA nowadays are obese and are liable for many complications. [10] In this study, we assessed the effect of obesity on TKA in the Egyptian population.

Nunez, et al[13] reported that TKA in obese patients associated with long operative time, due to the difficulty of the approach, bone cuts, implant orientation, and wound closure. While Luis M, et al,[11] stated that there is no difference in the operative time or hospital stay in obese and nonobese patients supposing that the operation performed by a highly specialized team and within optimum circumstances.

The current study agrees with Luis M. et al, the operative time does not increase in obese patients, also the hospital stay does not increase supposing that there are no other medical comorbidities.

In a systematic review by Raju et al,[15] superficial infection seems to be more statistically significant in morbidly obese patients.

Wound dehiscence, superficial infection according to Raju et al, was the most ridiculous complications in the early postoperative period, maybe due to thin skin, hyperglycemia and insulin resistance associated with obesity may increase leukocyte infiltration, also may be due to poor oxygenation of adipose tissue, increased wound tension and underlying endocrine disorders. [16]

Awareness of these problems and early management associated with good results, adequate wound healing without progression to deep infection and may not affect the TKA. [15]

In our study five patients (5.8%) developed a superficial infection which was treated early and promptly by wound care and antibiotic, all patients experienced good results without further complications throughout follow-up.

Only one patient (1.1%) developed a deep infection, debridement, and plastic insert exchange was done 6 weeks post-operative which was enough to control the infection.

As regards DVT, Raju et al, stated that there is no statistical difference between obese and non-obese patients.

Three patients in this study developed DVT mostly due to non-compliance of the patients and all were treated successfully by a therapeutic dose of anticoagulation without subsequent complications.

Michele R. et al,[14] stated that using BMI more than 40 kg/m<sup>2</sup> is not likely to be a perfect single predictor for postoperative complications after primary TKA

Also, they stated that multiple comorbidities associated with morbid obesity are responsible for the post-operative complications, not morbid obesity alone.

Stickless B, et al,[12] also, concluded that obesity does not influence the clinical outcome and complication rates at five years following TKR.

This study excluded all patients with a comorbid condition like hepatic, renal, and cardiopulmonary problems from the research, and finally coincides with Michele R. et al, and Stickless B, et al that morbid obesity alone is not the risk factor of perioperative complications.

Despite complications, Mark. et al[5] stated that the overall postoperative knee society score was improved in obese patients. However, there was a difference between obese and nonobese patients.

In this study, both postoperative clinical and functional knee society score was improved in relation to preoperative scores as Mark., et al stated.

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## Conclusion

According to this short term follow up research, the results of total knee arthroplasty in morbidly obese patients in the Egyptian population is good, and the result can be improved by adequate preparation, optimum perioperative situation, and presence of an expert surgical team.

Indeed, long term follow-up in a larger number of patients is needed for the detection of complications and possible mechanical loosening.

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## References

1. Stanislas Gunst, Michel-Henri Fessy. The effect of obesity on mechanical failure after total knee arthroplasty *Ann Transl Med* 2015;3(20):310 DOI: 10.3978/j.issn.2305-5839.2015.10.37
2. Sturmer T, Gunther KP, Brenner H. Obesity, overweight and patterns of osteoarthritis. *J Clin Epidemiol* 2000;53:307-13.
3. M. M. Dowsey, D. Liew, J. D. Stoney, P. F. Choong The impact of pre-operative obesity on weight change and outcome in total knee replacement *J Bone Joint Surg [Br]* 2010;92-B:513-20. doi:10.1302/0301-620X.92B4. 23174 \$2.00
4. Spicer DD, Pomeroy DL, Badenhausen WE, et al. Body mass index as a predictor of outcome in total knee replacement. *Int Orthop* 2001;25:246-9.
5. Mark J. McElroy, Robert Pivec, Kimona Issa, Steven F. Harwin, Michael A. Mont, The Effects of Obesity and Morbid Obesity on

- Outcomes in TKA, *J Knee Surg* 2013;26:83–88.
6. Jiang L, Tian W, Wang Y, Rong J, Bao C, Liu Y, Zhao Y, Wang (2012) Body mass index and susceptibility to knee osteoarthritis: a systematic review and meta-analysis. *Joint Bone Spine* 79(3):291–297
  7. Richmond SA, Fukuchi RK, Ezzat A, Schneider K, Schneider G, Emery CA (2013) Are joint injury, sport activity, physical activity, obesity, or occupational activities predictors for osteoarthritis? A systematic review. *J Orthop Sports Phys Ther* 43(8):515–524
  8. Yeung E, Jackson M, Sexton S, Walter W, Zicat B, Walter W. The effect of obesity on the outcome of hip and knee arthroplasty. *International Orthopaedics (SICOT)* (2011) 35:929–934 DOI 10.1007/s00264-010-1051-3.
  9. Collins RA, Walmsley PJ, Amin AK, Brenkel IJ, Clayton RA (2012) Does obesity influence clinical outcome at nine years following total knee replacement? *J Bone Joint Surg Br* 94(10):1351–1355.
  10. Hai bo Si, Yi Zeng, Bin Shen, Jing Yang, Zong ke Zhou, Peng de Kang, Fu xing Pei (2014) The influence of body mass index on the outcomes of primary total knee arthroplasty. *Knee Surgery, Sports Traumatology, Arthroscopy* DOI 10.1007/s00167-014-3301-1
  11. Luis M. Lozano, Monserrat Tio, J. Rios, Gerard Sanchez, Etayo, Dragos Popescu, Sergi Sastre, Misericordia Basora (2014) Severe and morbid obesity (BMI > 35 kg/m<sup>2</sup>) does not increase surgical time and length of hospital stay in total knee arthroplasty *Knee Surgery Sports Traumatology Arthroscopy* DOI 10.1007/s00167-014-3002-9
  12. Stückless B, Phillips L, Brox WT, Owens B, Lanzer W. Defining the relationship between obesity and total joint arthroplasty. *OBESITY RESEARCH* 2001. doi:10.1038
  13. Nunez M, Lozano L, Nunez E, Segur JM, Sastre S (2011) Factors influencing health-related quality of life after TKA in patients who are obese. *Clin Orthop Relat Res* 469(4):1148–1153. DOI 10.1007/s11999-010-1671-3
  14. Michele R. D'Apuzzo MD, Wendy M. Novicoff Ph.D., James A. Browne MD (2014) Morbid Obesity Independently Impacts Complications, Mortality, and Resource Use After TKA. *Clin Orthop Relat Res* DOI 10.1007/s11999-014 3668-9
  15. Raju Vaishya, Vipul Vijay, David Wamae, Amit Kumar Agarwal. Is Total Knee Replacement Justified in the Morbidly Obese? A Systematic Review *Cureus* 8(9): e804. DOI 10.7759/cureus.804
  16. Anthony J. Samson, Graham E. Mercer and David G. Campbell, Total knee replacement in the morbidly obese: a literature review, *ANZ J Surg* 80 (2010) DOI: 10.1111/j.1445-2197.2010.05396.x
  17. Parratte, S, Ollivier, M, Lunebourg, A, Verdier, N, and Argenson, JN (2017). Do Stemmed tibial components in total knee arthroplasty improve outcomes in patients with obesity?. *Clin Orthop Relat Res.* 475, 137-45. DOI: 10.1007/s11999-016-4791-6.
  18. Sherif Mostafa Abdeldayem, MD (Ortho), Zeiad M. Zakaria, MD (Ortho), Radwan G. Metwaly, MD (Ortho) and Mohamed A. Eid, MD (Ortho). Jet lavage in primary total knee arthroplasty: a comparative study. *Current Orthopaedic Practice* March/April 2018 DOI: 10.1097/BCO.0000000000000597
  19. Sherif M. Abdeldayem, MD (Ortho) and Mohamed A.M. Eid, MD (Ortho). Correlation of cementation technique with bone stock preservation in total knee arthroplasty. *Current Orthopaedic Practice* JANUARY/FEBRUARY 2018 DOI: 10.1097/BCO.0000000000000569.