

Role of BMI, Patient's psychological status and Implant type on Patient's Satisfaction after Total Knee Arthroplasty (TKA)

Raed Wagokh
Ashraf Fowzat Omor
Laith Al Tarawnah
Nizar Al Berihi
Moayad Mousa Abu Qa'oud

Jordanian Royal Medical Services, Orthopaedics Department

Corresponding author:

Dr. Moayad Abu Qa'oud
 Jordanian Royal Medical Services, Orthopaedics Department
 Phone number: +962776595032
 Email: Moayadabuqaoud@gmail.com

Received: February 2021; Accepted: March 2021; Published: April 1, 2021.

Citation: Ahmed Mohamed Kahlout et al. Role of BMI, Patient's psychological status and Implant type on Patient's Satisfaction after Total Knee Arthroplasty (TKA). World Family Medicine. 2021; 19(4): 132-136

DOI: 10.5742/MEWFM.2021.94040

Abstract

Background: Patients undergoing TKA are constantly increasing and some of them are not satisfied with the outcome of surgery. There are many factors that may predispose to dissatisfaction in those patients. We studied whether patient's psychological status, implant type or BMI had predicted poor outcome after TKA at the JRMS.

Methods: We performed our study on 189 TKA in 158 patients to assess the effect of the above-mentioned factors and their relation to the patient's satisfaction at 1 year after surgery. Two surgeons independently applied the Likert's satisfaction Score system, however, all surgeries were performed by one surgeon. Outcomes generally included postoperative pain, dissatisfaction, or loss of function of the patients.

Results: Overall, we found the satisfaction rate to be 81% in this study. We elaborated a noticeable difference between those who are satisfied and who are dissatisfied after having a look at the Likert satisfaction scoring system. Dissatisfied patients had a higher risk of anxiety, depression, less range of motion, more pain, and a lower life quality. The developed prediction tool consists of 5 simple but robust questions. The sensitivity of prediction satisfaction tool was 94% with a positive-predictive value of 89%.

Conclusions: We found that a poor preoperative psychological status of a patient, higher BMI, greater than 40, might affect the post-operative satisfaction of a TKA. We also came to the conclusion of a satisfaction rate of 81% of all the TKA patients at the JRMS with the preoperative psychological factor being the most significant factor affecting the rate of post TKA satisfaction based on the used questionnaire with no significant effect of implant type.

Key words: BMI, psychological status, implant type, Total Knee Arthroplasty TKA

Abbreviations:

TKA: Total Knee Arthroplasty, JRMS: Jordanian Royal Medical Services, PS: PCL Sacrificing

Introduction

TKA is one of the most successful procedures in orthopedics that significantly improves patient's lives when it comes to pain, range of motion and function. Despite the high success rate and the significant improvement TKA imposes, almost 1 in 5 patients still feel dissatisfied at different times after surgery (1). We believe as reported in the literature, knee satisfaction after TKA is a complicated issue as it can't be measured objectively and has many controllable and uncontrollable risk factors (2,3). In addition to those factors, dissatisfied patients carry an extra burden on the health system especially when as per some institutions' policy, a reimbursement for the unsatisfied patient might be implemented (4).

It is also well known in the literature that satisfaction rate for many patients might not be reflected by the commonly used knee scoring systems (5,6). Many studies report that preoperative factors still have a role in predicting the TKA surgery outcome (7,8), which is a significant point in our study to assess the preoperative status of the patients' psychological status which seems to be of significant effect and therefore requires more attention (9,10,11,12). In addition to the well-known risk factors for many physical and psychological issues, obesity contributes to knee dissatisfaction as shown by many authors (13).

The aim of this study is to analyze the preoperative psychological status, BMI and implant type and their effects on the patient's satisfaction post TKA at the Jordanian Royal Medical Services.

Methods and Materials

Ethical committee approval was obtained to study the enrolled patients regarding the post-operative satisfaction rate at the JRMS. We conducted and analyzed 158 patients' data, who had 189 TKA surgeries between May 2015 till June 2018 at the Arthroplasty clinic at the JRMS. We collected data 1 year after the last enrolled patients underwent their surgeries in June, 2019. All procedures were selected on the basis of being performed by one surgeon, the senior author, and all were cemented PS knees from 3 different companies, (Anthem, Smith and Nephew, Memphis, Tennessee), (Triathlon, Stryker, Kalamazoo, MI) and (NexGen, Zimmer-Biomet, Warsaw, Indiana).

The Likert satisfaction score questionnaire was handed to those who consented to be involved in this study.

Surgical Technique

A table plate was used for holding the leg intraoperatively; we applied the tourniquet for all cases but it was only used upon cementing. We used minimally invasive anterior knee skin incision of about 14 cm, median parapatellar approach for all patients. We utilized the gap balancing technique to address the knee alignment accurately and closed all knees in a water sealed closure and used intra-

articular tranexamic acid with no drains for all patients. Patients who are ASA score 3 and above and/or have one medical condition were cleared for surgery at least 1 week before surgery by a dedicated medical team to the arthroplasty patients.

Data Collection and Analysis

We started collecting patient's data at the arthroplasty clinic at the JRMS; patients' demographics can be seen in Table 1. We went through both the medical and surgical patients' charts which included a psychological assessment as well which was analyzed against the patient's satisfaction as seen in Table 2. Many studies showed no difference of patient outcomes between 1 year and 2 years postoperatively (14). Patients were interviewed preoperatively to assess their psychological status and 1 year postoperatively to measure their satisfaction using the Likert's Knee Satisfaction Score. Patients who answered 1, 2 or 3 were considered dissatisfied and those who scored 4 or 5 were considered satisfied. A psychological analysis was performed preoperatively by a professional psychologist and gave the conclusion of the psychological status of every individual as psychologically impaired with a diagnosis according to the ICD 10 classification system of psychiatric disorders. Those who have no significant psychological illnesses were considered psychologically stable. SPSS version 27 version was utilized to analyze these numbers and figures.

Results

189 TKA patients were assessed preoperatively and at 1 year postoperatively. The mean follow up was 16 months ranging between 11 and 19 months. Follow up of 11 months and more was considered a full year. Revision rate in our sample was 4.5% (8 patients) of whom 2 had an acute infection and 1 had a chronic infection and needed 2 stage arthroplasties. The other 5 patients were revised for different reasons, yet those patients were not excluded and were given the same questionnaire as the other sample patients. Overall, 81.1% of our patients were satisfied 1 year after their surgery. The factors we studied here were the preoperative psychological status, BMI and implant type, see Tables 2-4. Age and 2 years follow up didn't show a statistical significance, though, they had statistical differences, but didn't show any clinical impact on the satisfied patients. Psychological status carries the most significant effect on the patients' satisfaction after TKA ($P \leq 0.004$), followed by the patient's BMI ($P \leq 0.005$). We found that implant type doesn't hold any risk of dissatisfaction independently ($P \leq 0.008$). Patients with BMI higher than 40 had the highest risk of dissatisfaction with up to 3 folds of dissatisfaction higher than those with BMI 25-30 (95% CI, 1.9-5.6). Other variables such as the surgeon's factor was excluded as one surgeon with more than 7 years of experience performed all the procedures.

Table 1: Summary of Demographics of patients

N	158 patients (189 TKAs)
Mean age	67.4 years (58-81)
Mean BMI	33.7 kg/m ² (21-47)
Female/Male	93/ 65
ASA	3
Implants	74(S&N)/68(Zimmer)/47(Stryker)

Table 2: Summary of Psychological illnesses vs Satisfaction

Mood disorders	Likert satisfaction score average	P Value
Mood disorders	2.9	0.002*
Anxiety	3.3	0.07
PTSD	3.6	0.04
Eating disorders	3.1	0.06
Substance abuse	3.2	0.02
Other disorders	3.6	0.055
Psychologically stable	4.1	0.045

*Numbers in bold indicate statistical significance

Table 3. Summary of BMI effect on satisfaction

BMI	Satisfaction score average	P value
25-30	4.4	0.004*
31-35	4.2	0.06
36-40	3.5	0.045
>40	3.1	0.007

*Numbers in bold indicate statistical significance

Table 4. Summary of effect of implant type

	Triathlon	Anthem	NexGen
Satisfaction	3.96	4.11	4.14
P Value	0.005*	0.06	0.05

*Numbers in bold indicate statistical significance

Discussion

There are two different methods for assessing the success of a TKA. The first is by measuring the functional and pain scoring systems and assessing the complications of a TKA such as aseptic loosening or the need for a revision surgery due to technical or mechanical issues. The other way is to evaluate the patients' satisfaction toward their TKA surgery. We feel that patient's satisfaction is of great importance in addition to physician assessment, x ray findings or any functional assessment or other scoring systems. It is well known that there are many factors that predispose to knee satisfaction, such as patients' expectations, preoperative ROM, inflammatory arthritis, age and other variables (15). Implant type does not seem to be a risk factor as shown in many studies (16,17,18), even though some studies suggested that CR/CS knees showed better results as they have more anatomical designs in comparison to the PS designs and consequently might improve satisfaction thereafter (19,20). Some authors would argue that the surgeon factor is a contributing factor to satisfaction (21), but we couldn't assess that as all of the procedures were performed by one surgeon. We looked for satisfaction at the 1 year follow up because earlier than 12 months post op many patients reported surgery pain that might be improving (22).

81% of our project's patients reported satisfaction 1 year after their surgery, which is consistent with many other studies in the literature (1,23), still, there are cultural variations across the globe (24). Until now, there have been no clear set of strict indications of performing TKA (25), even though, the decision seems easier when a patient presents with a deformity or severe, disabling pain with advanced osteoarthritis, which is not the same scenario in patients with mild OA, in which the decision to go for surgical management seems more challenging. In our study, we investigated the effect of preoperative psychological factor which showed a significant effect on the post-operative satisfaction which is consistent with what Ali A, et al (10) concluded about the role of anxiety and depression in leading to higher dissatisfaction rate. Even though the revision rate is not significantly high, reaching 2.5-3% in the Swedish knee registry, the dissatisfaction rate is still high reaching up to 19% (2,26,27) in our research, which is the reason why surgeons and researchers have been looking thoroughly into this specific subject more and more during the last 10-15 years. Satisfaction rates are shown to be significantly higher in many series in the Total Hip Replacement (THR) groups of patients (26,28).

In summary, dissatisfaction rate of the TKR patients group lies between 7-25%. We might be able to warn certain patients with higher risk factors, of the possibility of not being happy with their surgery and anticipate the prognosis of their level of satisfaction and in many instances treat the factor or factors predisposing to dissatisfaction post operatively.

Conclusion

We found that a poor preoperative psychological status of a patient, higher BMI, greater than 40, might affect the post-operative satisfaction of a TKA. We also came to the conclusion of a satisfaction rate of 81% of all the TKA patients at the JRMS with the preoperative psychological factor being the most significant factor affecting the rate of post TKA satisfaction with no significant effect of the implant type.

We think further analysis and studies should be done to evaluate the high confounding and causative factors affecting satisfaction after TKA which are crucial to improve the percentage of satisfaction to a higher level of this very successful surgical intervention.

References

1. Bourne RB, Chesworth BM, Davis AM, Mahomed NN, Charron KD. Patient satisfaction after total knee arthroplasty: who is satisfied and who is not? *Clin OrthopRelat Res*. 2010;468(1):57–63.
2. Bourne RB, Chesworth B, Davis A, Mahomed N, Charron K (2010). Comparing patient outcomes after THA and TKA: is there a difference? *Clin OrthopRelat Res* 468(2):542–546. doi:10.1007/s11999-009-1046-9
3. Bullens PH, van Loon CJ, deWaal Malefijt MC, Laan RF, Veth RP (2001). Patient satisfaction after total knee arthroplasty: a comparison between subjective and objective outcome assessments. *J Arthroplasty* 16(6):740–747. doi:10.1054/arth.2001.23922
4. Graham B, Green A, James M, Katz J, Swiontkowski M. Measuring Patient Satisfaction in Orthopaedic Surgery. *J Bone Joint Surg Am* 97(1): 80-84, 2015
5. Bullens PH, van Loon CJ, deWaal Malefijt MC, Laan RF, Veth RP (2001). Patient satisfaction after total knee arthroplasty: a comparison between subjective and objective outcome assessments. *J Arthroplasty* 16(6):740–747. doi:10.1054/arth.2001.23922
6. Brokelman RB, van Loon CJ, Rijnberg WJ (2003). Patient versus surgeon satisfaction after total hip arthroplasty. *J Bone Joint Surg Br* 85(4):495–498
7. Cushnaghan J, Bennett J, Reading I, Croft P, Byng P, Cox K, Dieppe P, Coggon D, Cooper C (2009). Long-term outcome following total knee arthroplasty: a controlled longitudinal study. *Ann Rheum Dis* 68(5):642–647. doi:10.1136/ard.2008.093229
8. Nilsson AK, Toksvig-Larsen S, Roos EM (2009). Knee arthroplasty: are patients' expectations fulfilled? A prospective study of pain and function in 102 patients with 5-year follow-up. *Acta Orthop* 80(1):55–61
9. Schulze A, Scharf HP. Satisfaction after Total Knee Arthroplasty. Comparison of 1990-1999 with 2000-2012. *Orthopade* 42(10): 858-865, 2013
10. Ali A, Lindstrand A, Sundberg M, Flivik G. Preoperative Anxiety and Depression Correlate with Dissatisfaction after Total Knee Arthroplasty: A Prospective Longitudinal Cohort Study of 186 Patients, with 4-Year Follow-Up. *J Arthroplasty* 32(3): 767-770, 2017

11. Kahlenberg CA, Nwachukwu BU, McLawhorn AS, Cross MB, Cornell CN, Padgett DE. Patient Satisfaction after Total Knee Replacement: A Systematic Review. *HSS J* 14(2): 192-201, 2018
12. Bierke S, Häner M, Karpinski K, Hees T, Petersen W. Midterm Effect of Mental Factors on Pain, Function, and Patient Satisfaction 5 Years after Uncomplicated Total Knee Arthroplasty. *J Arthroplasty* 35(1): 105-111, 2020
13. Abdel MP, Bonadurer GF 3rd, Jennings MT, Hanssen AD. Increased aseptic tibial failures in patients with a BMI \geq 35 and well-aligned total knee arthroplasties. *J Arthroplasty*. 2015 Dec;30(12):2181-4. Epub 2015 Jul 2.
14. Ramkumar PN, Navarro SM, Haeberle HS, Ng M, Piuzzi NS, Spindler KP. No Difference in Outcomes 12 and 24 Months after Lower Extremity Total Joint Arthroplasty: A Systematic Review and Meta-Analysis. *J Arthroplasty* 33(7): 2322-2329, 2018
15. Schulze A, Scharf HP. Satisfaction after Total Knee Arthroplasty. Comparison of 1990-1999 with 2000-2012. *Orthopade* 42(10): 858-865, 2013
16. Bercik MJ, Joshi A, Parvizi J. Posterior Cruciate-Retaining Versus Posterior-Stabilized Total Knee Arthroplasty: A Meta-Analysis. *J Arthroplasty* 28(3): 439-444, 2013
17. Bourne RB, Chesworth BM, Davis AM, Mahomed NN, Charron KDJ. Patient Satisfaction after Total Knee Arthroplasty: Who Is Satisfied and Who Is Not? *Clin OrthopRelat Res* 468(1):57-63, 2010
18. Meneghini RM, Deckard ER, Ishmael MK, Ziemba-Davis M. A Dual-Pivot Pattern Simulating Native Knee Kinematics Optimizes Functional Outcomes after Total Knee Arthroplasty. *J Arthroplasty* 32(10): 3009-3015, 2017
19. Banks SA, Hodge WA. 2003. Hap Paul Award Paper of the International Society for Technology in Arthroplasty. Design and Activity Dependence of Kinematics in Fixed and Mobile-Bearing Knee Arthroplasties. *J Arthroplasty* 19(7): 809-816, 2004
20. Hoshino Y, Tashman S. Internal Tibial Rotation During in Vivo, Dynamic Activity Induces Greater Sliding of Tibio-Femoral Joint Contact on the Medial Compartment. *Knee Surg Sports TraumatolArthrosc* 20(7): 1268-1275, 2012
21. Menendez ME, Chen NC, Mudgal CS, Jupiter JB, Ring D. Physician Empathy as a Driver of Hand Surgery Patient Satisfaction. *J Hand Surg Am* 40(9): 1860-1865. e1862, 2015
22. Pynsent PB, Adams DJ, Disney SP. The Oxford hip and knee outcome questionnaires for arthroplasty. [Erratum appears in *J Bone Joint Surg Br*. 2005;87:1166]. *J Bone Joint Surg Br*. 2005;87:241-248
23. Noble PC, Conditt M a, Cook KF, Mathis KB. The John Insall Award: Patient expectations affect satisfaction with total knee arthroplasty. *Clin OrthopRelat Res*. 364 2006 Nov;452(452):35-43.
24. Diener E, M. Suh Eunkook, Smith H, Liang S. National differences in reported subjective well-being: Why do they occur? *Soc Indic Res*. 1995;34:7-32.
25. Cross WW, Saleh KJ, Wilt TJ, Kane RL. Agreement about indications for total knee arthroplasty. *Clin OrthopRelat Res*. 2006 May;446(446):34-9.
26. Hamilton D, Henderson GR, Gaston P, Macdonald D, Howie C, Simpson AH (2012). Comparative outcomes of total hip and knee arthroplasty: a prospective cohort study. *Postgrad Med J* 88(1045):627-631. doi:10.1136/postgradmedj-2011-130715
27. Scott CE, Howie CR, MacDonald D, Biant LC (2010). Predicting dissatisfaction following total knee replacement: a prospective study of 1217 patients. *J Bone Joint Surg Br* 92(9):1253-1258
28. Scott CE, Bugler KE, Clement ND, MacDonald D, Howie CR, Biant LC (2012). Patient expectations of arthroplasty of the hip and knee. *J Bone Joint Surg Br* 94(7):974-981. doi:10.1302/0301-620x.94b7.28219
29. Kahlenberg CA, Lyman S, Joseph AD, Chiu Y 299 F, Padgett DE. Comparison of Patient-Reported Outcomes Based on Implant Brand in Total Knee Arthroplasty: A Prospective Cohort Study. *Bone Joint J* 101-B(7_Supple_C): 48-54, 2019