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Does Early-Period Patient Dissatisfaction Turn Into Satisfaction Over Time After Total Knee Replacement?

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Data Collection B
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Background: Total knee arthroplasty (TKA) is frequently used in the treatment of end-stage gonarthrosis, and the patient satisfaction rate varies. This study aimed to reveal the change in mid-term patient satisfaction results and functional scores of patients with low early postoperative satisfaction scores.


Material/Methods: We included 163 patients who underwent total knee prosthesis between September 2017 and February 2018. Among these patients, early (6 months) and mid-term (24 months) satisfaction and functional results of 34 patients with low satisfaction scores (Likert evaluations 1, 2, and 3) were evaluated. We assessed early-term functional results and satisfaction rates, mid-term analysis of patients who were not satisfied in the early period, and the relationship between functional scores and satisfaction.

Results: The Likert score was 4 or 5 in 124 (80%) of 158 patients, and early dissatisfaction was detected in 34 patients (20%). In the early-period dissatisfied group, satisfaction scores 6 months after surgery were 1.9 ± 1.1 (1-3) and 4.2 ± 1 (3-5) 24 months after surgery. A statistically significant difference was observed between the dissatisfied group's early and mid-term KSS and KS values. A correlation was observed between satisfaction scores and KS and KSS scores ($P < 0.05$).

Conclusions: Patients who do not have mechanical problems with total knee arthroplasty but are not satisfied with the surgery in the early period can be satisfied over time after regular follow-up, appropriate communication and information, and effective rehabilitation.

Keywords: **Arthroplasty, Replacement, Knee • Patient Satisfaction • Osteoarthritis, Knee**

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Background

The number of total knee prosthesis applications has increased as a result of increased life expectancy, comorbid diseases, and obesity [1]. In the United States, the prevalence of total knee replacement was 0.13% in 1980, 0.38% in 1990, 0.80% in 2000, and 1.52% in 2010, and the increase in rates of primary knee arthroplasty was 30.8% in 2010-2011, 19.4% for 2011-2012, 8% for 2012-2013, and 10% for 2013-2014 in Turkey [2,3]. In addition, various studies have evaluated patient satisfaction with this frequently performed surgery [4,5]. Patient satisfaction is affected by many factors, such as postoperative instability or stiffness, radiographic stage of the disease, age, additional diseases such as diabetes, duration of hospital stay, low preoperative clinical scores, and patient expectation [6-9]. Post-surgical recovery and rehabilitation take a long time, and the effect of treatment on the patient's quality of life and consequently on satisfaction changes over time [10]. Therefore, dissatisfaction that may occur due to many factors in the early period can be expected to change satisfaction in the future.

This study assessed changes in mid-term satisfaction and functional scores of patients with low early postoperative satisfaction scores, and to evaluate the correlation between functional outcomes and patient satisfaction that changes over time. This is an important study in terms of preventing surgeons from performing early and excessive total or partial revision surgeries and soft-tissue interventions.

Material and Methods

After ethics committee approval, 163 patients who underwent total knee arthroplasty due to primary gonarthrosis between September 2017 and February 2018 were evaluated in a retrospective cohort study (Figure 1). Informed consent was obtained from the participants involved. Two patients who underwent implant revision within the first 6 months after surgery and 3 patients who refused to participate in the study were excluded. At the end of the sixth month, 158 patients were included in the study to assess patient satisfaction and functional outcome relationships. Functional evaluation of the patients was performed preoperatively, at 6 months after surgery, and at 2 years after surgery using the knee score (knee score = KS) and the Knee Society score (KSS). Patient satisfaction measurements were carried out with Likert analysis in the same periods. In the Likert analysis, patients were asked to score their satisfaction from 1 to 5 (1=not satisfied, 2=somewhat satisfied, 3=satisfied, 4=very satisfied, 5=extremely satisfied). Scores of 3, 4, and 5 were considered "satisfied", while scores of 1 and 2 were considered "not satisfied". The final study group consisted of 34 patients (Likert 1 and 2) with low satisfaction scores at the end of 6 months. A physician who was not part of the

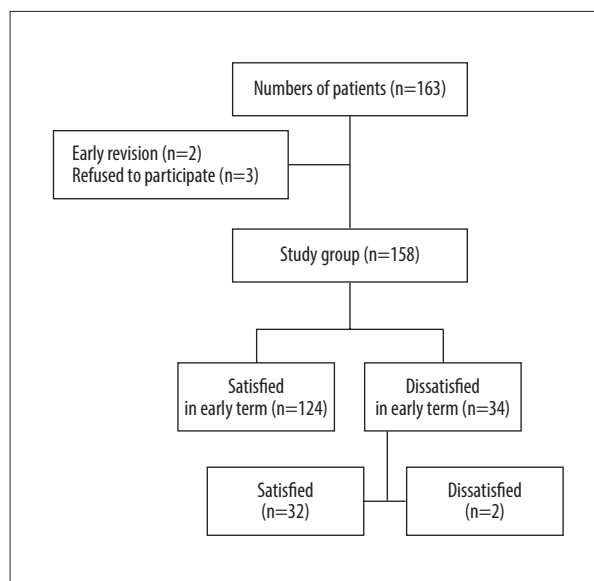


Figure 1. Patient chart.

study and who did not participate in the surgical procedure performed functional evaluation and satisfaction analysis of all patients to achieve a blinded evaluation. The patient group, who was dissatisfied in the early period, was followed up until the end of the second year by applying only knee strengthening, range of motion, and balance exercises after the routine physical therapy rehabilitation. They performed the physical therapy and rehabilitation processes themselves as trained by us. Treatments such as postoperative drug therapy, weight loss, radiofrequency ablation therapy, and acupuncture were not applied. Early 6-month functional results and satisfaction rates, a second-year analysis of patients who were dissatisfied in the 6th month period, and the relationship between functional scores and satisfaction were examined.

Statistical Analysis

The data were analyzed using SPSS 22 (IBM, Armonk, New York, USA). In our analysis, qualitative data were stated as frequency distribution, and quantitative data were stated as mean, minimum, and maximum values. The normal distribution of the data was analyzed using the Kolmogorov-Smirnov test. Early and late-term satisfaction scores, KS, and KSS values were compared using the Mann-Whitney U test. $P < 0.05$ was considered statistically significant.

Results

In the evaluation of patient satisfaction, the Likert score was measured as 3, 4, or 5 in 124 out of 158 patients (80%), and 6th-month dissatisfaction was detected in 34 patients (20%) (Figure 2). The mean age of the study group (n=34) was 68.2

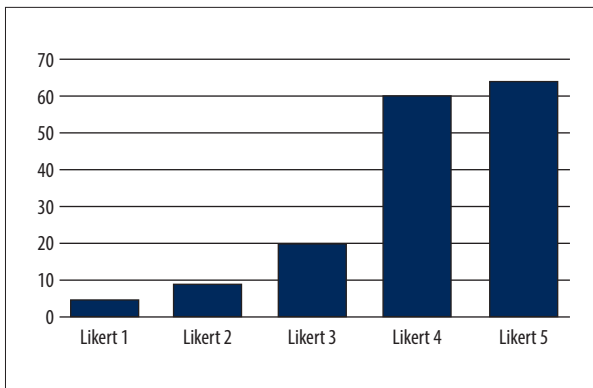


Figure 2. Early-stage patient satisfaction.

years (55-79 years), 27 of the patients were female and 7 of them were male, and 83% of the patients were married (n=28). When we examined the socio-economic characteristics, 50% of patients were retired (n=17), 14% were farmers (n=5), and 35% were housewives (n=12). Sixty-seven percent (n=23) of the patients were primary school graduates, 20% were high school graduates (n=7), and 11% were university graduates (n=4). There was no relationship between the patients' marital status or socio-economic status and their satisfaction.

We observed that 30 patients from this dissatisfied patient group were satisfied when evaluated at the end of the second year. When we evaluated the patient satisfaction results, in the dissatisfied group, satisfaction scores at the end of 6 months postoperatively were 1.9 ± 1.1 (1-3), and 4.2 ± 1 (3-5) 2 years after surgery, and the difference was statistically significant ($P < 0.05$).

In functional evaluation of patients, the knee scores in the dissatisfied group were 45.5 ± 4.8 in the preoperative period, 56 ± 6.8 in the early postoperative period, and 74 ± 7.85 in the postoperative mid-term period. The Knee Society scores were 52.09 ± 10 in the preoperative period, 65.09 ± 7.04 in the 6th-month postoperative period, and 82.91 ± 6.48 in the postoperative second year. A statistically significant difference was observed between the 6th-month and second-year KS and KSS values of the



Figure 3. Range of motion (pre-op).

dissatisfied group (**Table 1**) ($P < 0.05$). A correlation was observed between satisfaction scores and KS and KSS scores ($P < 0.05$).

In 4 (9%) of 34 patients who were dissatisfied in the early period, septic loosening was detected and two-stage revision surgery was performed. After revision surgery, satisfaction scores were 4 in 3 patients and 5 in 1 patient. In 2 (1.2%) patients who were dissatisfied in both the 6th month and second year, persistent knee pain and stiffness were observed.

Illustrative Case

A 66-year-old male patient had knee pain that had persisted for 3 years, increased with activity, and occurred also at night.

Table 1. Satisfaction assessment and clinical results of the dissatisfied group.

	Pre-op (A)	6. Month (B)	24. Month (C)	P	Pairwise comparison		
					A→B	A→C	B→C
KSS	Mean±SD	Mean±SD	Mean±SD	<0.001*	<0.001	<0.001	<0.001
	Median (min./max.)	Median (min./max.)	Median (min./max.)				
Ks	45.5 (29/75)	56 (36/38)	74 (48/88)	<0.001**	<0.001	<0.001	<0.001
Satisfaction	–	3 (1/5)	4 (3/5)	<0.001***	–	–	<0.001

* General Linear Model Anova (Wilk's lambda); Post Hoc Test Bonferroni; ** Friedman Test (Monte Carlo); Post Hoc Test: Dunn's Test; *** Wilcoxon Signed Ranks Test (Monte Carlo). SD – standard deviation; min. – minimum; max. – maximum.



Figure 4. X-ray (pre-op).



Figure 5. Total knee replacement application.



Figure 6. X-ray (post-op 1 day).

After evaluation with physical examination (Figure 3) and X-ray results (Figure 4) and preoperative preparation, total knee arthroplasty was performed (Figures 5, 6). Antibiotic prophylaxis (cefazolin sodium 1 g every 8 h for 24 h), thromboembolic prophylaxis (Enoxaparin sodium 4000 anti-Xa/0.4 mL), and joint range of motion and strengthening exercises were started in the early postoperative period, and the patient was discharged after achieving 90 degrees of flexion and full extension. At the end of the 6th month, the patient had 110 degrees of flexion, no limitation of extension, and normal anteroposterior and mediolateral stability. No pathological changes were observed on direct radiographs (Figure 7). Although there were no pathological findings in the examination of the patient, he stated that pain was frequently present and he was “somewhat satisfied” with his surgery. The patient’s follow-up and routine physical therapy protocol were approved, and no other treatment was applied. After 2 years of follow-up, the patient’s flexion was 115 degrees and extension was normal. He had no pain or tenderness in physical examination, his stability was normal, and no pathological X-ray changes were observed (Figures 8, 9). The patient stated that he was “very satisfied” with his surgery at the end of 2 years.

Discussion

Total knee arthroplasty is a successful treatment method that increases the range of motion, reduces pain, and improves the quality of life in end-stage gonarthrosis [11]. As expected, the primary goal in prosthetic surgery is to have a satisfied patient. Patient satisfaction and factors affecting this satisfaction have been investigated in many studies using patient-specific scoring systems and various analyzes, but there is still no consensus [4,6,12,13]. In addition to evaluating patient satisfaction, one of the important aspects that can cause irreversible decisions is the most appropriate time to evaluate a patient’s satisfaction after total knee replacement. When factors such as postoperative pain control, rehabilitation, soft-tissue healing, ligament balance, component compliance, patient education, and patient expectations are considered, it is obvious that knee replacement treatment is a long-term process [15-18]. Therefore, we can anticipate that patient satisfaction will also change over time, and a process is needed to properly assess it. In this study, it was observed that the satisfaction and functional scores of the patients who were not satisfied with the surgery in the early period increased at the end of the second year.

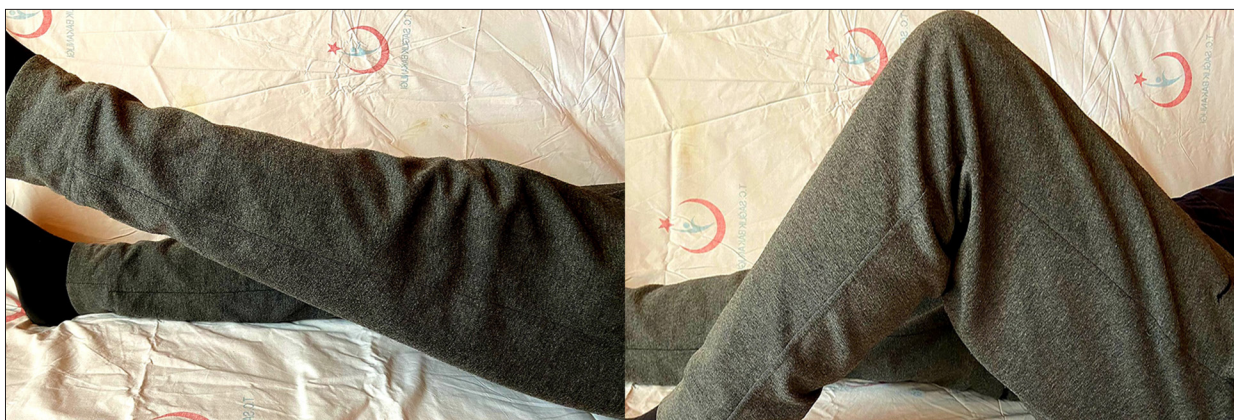


Figure 7. Range of motion (post-op 6 months).

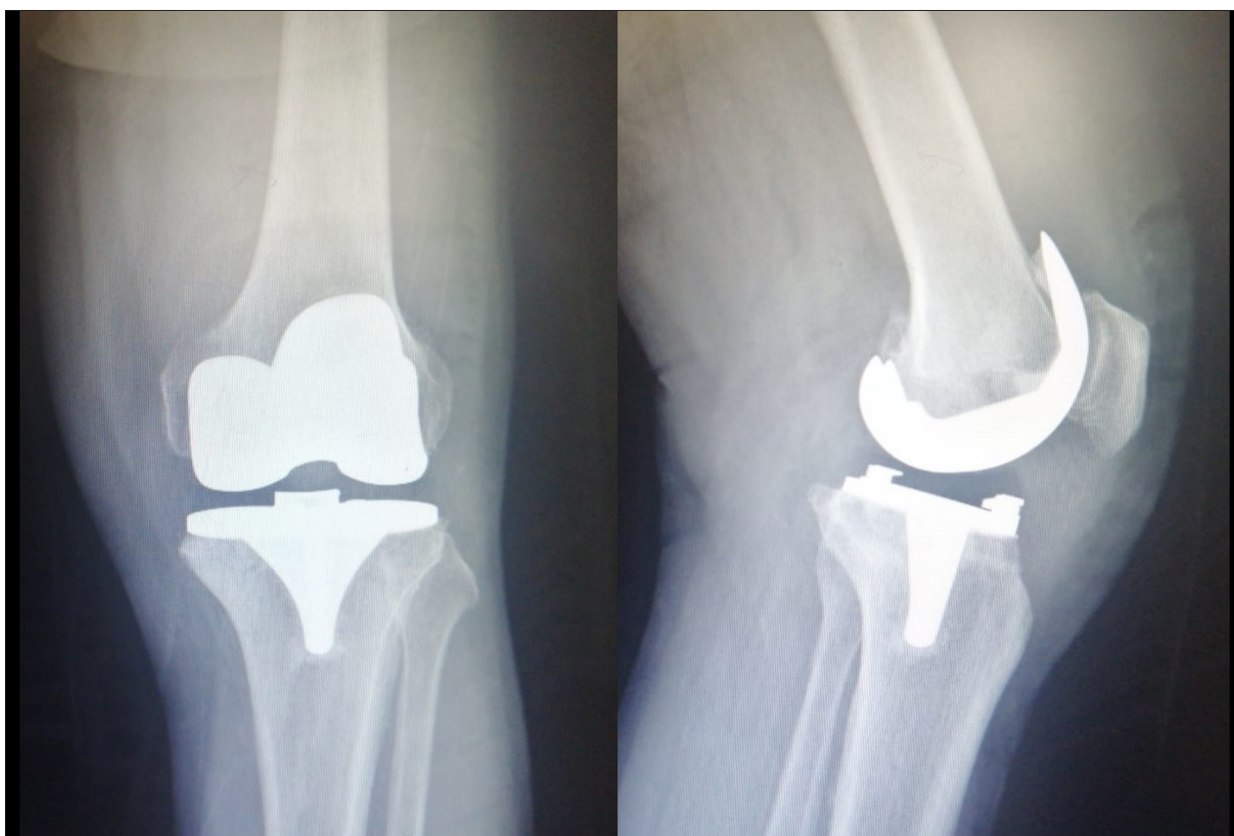


Figure 8. X-ray (post-op 2 years).

In a study conducted by Pivec et al, 287 knees of 281 patients were examined and SF-36 mental and physical assessments were applied at the 6th week, the 3rd month, the 12th month, and annual satisfaction changes were observed [18]. While the physical component results increased over time, the mental component results decreased in the first 3 months and then stabilized after increasing. They stated that researchers should wait at least 1 year before assessing patient satisfaction, and the recovery process continues in the following years. However, since they did not have 6th- and 9th-month

controls, it could not be determined in which period the mental component results started to increase and in which period they peaked. Similarly, we observed in our study that dissatisfaction in the early period turned into satisfaction over time. In the study by Pivec, 3rd-month and annual follow-ups were done, while we performed 6th-month and 2nd-year controls. As in the Pivec study, we could not detect the peak level of satisfaction. We believe that more frequent controls are required to determine the peak time of permanent satisfaction. In a study by Odei Shannak et al, 216 patients who were



Figure 9. Range of motion (post-op 2 years).

not satisfied or were unsure of their satisfaction in the early period were followed for an average of 9.1 years, and 38% of the patients were satisfied in the long term [19]. In agreement with our study, functional scores and patient satisfaction increased over time. When compared with our study, that study had a longer follow-up period. However, in that study, conducted via a telephone questionnaire with a 55% response rate, the proportion of dissatisfied patients was higher.

In contrast to studies showing that patient satisfaction increases over time, some studies revealed the opposite. A study examining changes in patient satisfaction after hip and knee arthroplasty found that the number of patients who were satisfied in the early period but who were dissatisfied in the mid-term was similar to the number of patients who were satisfied in the mid-term and were dissatisfied in the early period [20].

These differences among studies were influenced by differences in the tools used to evaluate satisfaction, the duration of follow-up, the parameters evaluated, and the perspective and expectation of patients and surgeons. While a surgeon prioritizes factors such as knee scores, range of motion, component size, alignment, and rotation, the basic expectation of the patient may be the ability to perform simple activities such as walking, climbing stairs, and getting into and out of a car [21]. It has been shown that preoperative patient expectation is an important factor affecting postoperative satisfaction [18]. There is no consensus in the literature on the effect of various demographic characteristics such as age, gender, body mass index, and the presence of comorbid disease on satisfaction [6,14,22-25]. On the other hand, preoperative patient education, less invasive surgical approaches, proper use of innovations in prosthesis designs, and good postoperative rehabilitation ensure that preoperative expectations are met, thus increasing patient satisfaction after surgery [26].

Our study has some limitations. First, the patients were not evaluated according to their demographic characteristics such as age,

gender, race, socio-economic level, and education level. This is because, in terms of demographics, all patients had similar socio-economic and educational levels, most of the patients were female and there was no racial difference. Second, because the patients were not evaluated at 9, 12, 15, and 18 months, the peak period of increased satisfaction in the dissatisfied patient group was not detected. Third, patients who were satisfied with the surgery in the early period were excluded from the evaluation, so the ratio of patients whose satisfaction decreased in mid-term or whether dissatisfaction occurred later could not be examined.

Conclusions

Patients who do not have mechanical problems with their total knee prosthesis but who are not satisfied with the surgery in the early period can become satisfied over time after regular follow-up, appropriate communication and information, and effective physical rehabilitation. We recommend that early aggressive interventions such as partial or total revisions should be avoided in dissatisfied patients with no apparent instability, component malposition, or evidence of infection. Further studies should be conducted on physical therapy rehabilitation programs, algological treatments, patient education, and treatments that can increase patient compliance when there is early-period patient dissatisfaction.

Ethics Statement

This research has been approved by the Institutional Review Board of the University of Health Sciences, Keçiören Health Practice and Research Center, with approval number 43278876-929.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors, who confirm that the images are original with no duplication and have not been previously published in whole or in part.

References:

- Georgiev T, Angelov AK. Modifiable risk factors in knee osteoarthritis: Treatment implications. *Rheumatol Int.* 2019;39(7):1145-57
- Maradit Kremers H, Larson DR, Crowson CS, et al. Prevalence of total hip and knee replacement in the United States. *J Bone Joint Surg Am.* 2015;97(17):1386-97
- Ceyhan E, Gursoy S, Akkaya M, et al. Toward the Turkish National Registry System: A prevalence study of total knee arthroplasty in Turkey. *J Arthroplasty.* 2016;31(9):1878-84
- Halawi MJ, Jongbloed W, Baron S, et al. Patient dissatisfaction after primary total joint arthroplasty: The patient perspective. *J Arthroplasty.* 2019;34(6):1093-96
- Gunaratne R, Pratt DN, Banda J, et al. Patient dissatisfaction following total knee arthroplasty: A systematic review of the literature. *J Arthroplasty.* 2017;32(12):3854-60
- Dhurve K, Scholes C, El-Tawil S, et al. Multifactorial analysis of dissatisfaction after primary total knee replacement. *Knee.* 2017;24(4):856-62
- Rooks K, Houdek D, Obaid H, Dust W. Primary total knee arthroplasty: Correlation between preoperative radiographic severity of arthritis and postoperative patient satisfaction. *J Knee Surg.* 2021;34(13):1441-45
- 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.* 2017;32(3):767-70
- Tew M, Dowsey MM, Choong A, et al. Co-morbidities and sex differences in long-term quality-of-life outcomes among patients with and without diabetes after total knee replacement: Five-year data from registry study. *J Clin Med.* 2019;9(1):19
- Neuprez A, Neuprez AH, Kaux JF, et al. Total joint replacement improves pain, functional quality of life, and health utilities in patients with late-stage knee and hip osteoarthritis for up to 5 years. *Clin Rheumatol.* 2020;39(3):861-71
- Feng JE, Novikov D, Anoushiravani AA, Schwarzkopf R. Total knee arthroplasty: Improving outcomes with a multidisciplinary approach. *J Multidiscip Healthc.* 2018;11:63-73
- Sesen H, Demirkale I, Karaduman M, et al. Why two-thirds of patients accepted the second session in staged bilateral total knee arthroplasty: A prospective analysis of 111 patients. *Knee Surg Sports Traumatol Arthrosc.* 2015;23(12):3585-90
- Özdemir M, Demirkale I, Şeşen H, et al. Affective temperament does not influence satisfaction after total knee arthroplasty. *Medicine (Baltimore).* 2017;96(19):e6852
- Gibon E, Goodman MJ, Goodman SB. Patient satisfaction after total knee arthroplasty: A realistic or imaginary goal? *Orthop Clin North Am.* 2017;48(4):421-31
- Elmallah RK, Chughtai M, Khlopas A, et al. Pain control in total knee arthroplasty. *J Knee Surg.* 2018;31(6):504-13
- Prvu Bettger J, Green CL, Holmes DN, et al. Effects of virtual exercise rehabilitation in-home therapy compared with traditional care after total knee arthroplasty: VERITAS, a randomized controlled trial. *J Bone Joint Surg Am.* 2020;102(2):101-9
- Verstraete MA, Meere PA, Salvadore G, et al. Contact forces in the tibio-femoral joint from soft tissue tensions: Implications to soft tissue balancing in total knee arthroplasty. *J Biomech.* 2017;58:195-202
- Becker R, Döring C, Denecke A, Brosz M. Expectation, satisfaction and clinical outcome of patients after total knee arthroplasty. *Knee Surg Sports Traumatol Arthrosc.* 2011;19(9):1433-41
- Shannak O, Palan J, Esler C. A regional registry study of 216 patients investigating if patient satisfaction after total knee arthroplasty changes over some time of five to 20years. *Knee.* 2017 Aug;24(4):824-28
- Galea VP, Rojanasopondist P, Connelly JW, et al. Changes in patient satisfaction following total joint arthroplasty. *J Arthroplasty.* 2020;35(1):32-38
- Nakahara H, Okazaki K, Mizu-Uchi H, et al. Correlations between patient satisfaction and ability to perform daily activities after total knee arthroplasty: Why aren't patients satisfied? *J Orthop Sci.* 2015;20(1):87-92
- Anderson JG, Wixson RL, Tsai D, et al. Functional outcome and patient satisfaction in total knee patients over the age of 75. *J Arthroplasty.* 1996;11(7):831-40
- Scott CE, Howie CR, MacDonald D, Biant LC. Predicting dissatisfaction following total knee replacement: A prospective study of 1217 patients. *J Bone Joint Surg Br.* 2010;92(9):1253-58
- Huijbregts HJ, Khan RJ, Fick DP, et al. Prosthetic alignment after total knee replacement is not associated with dissatisfaction or change in Oxford Knee Score: A multivariable regression analysis. *Knee.* 2016;23(3):535-39
- Jacobs CA, Christensen CP, Karthikeyan T. Patient and intraoperative factors influencing satisfaction two to five years after primary total knee arthroplasty. *J Arthroplasty.* 2014;29(8):1576-79
- Greene KA, Harwin SF. Maximizing patient satisfaction and functional results after total knee arthroplasty. *J Knee Surg.* 2011;24(1):19-24