



# Evaluation of quality of life of female patients after bilateral total knee arthroplasty

## *İki taraflı total diz protezi uygulanan kadın hastalarda yaşam kalitesinin değerlendirilmesi*

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**Amaç:** Total diz protezi uygulanan kadın hastaların ameliyat sonrası yaşam kaliteleri değerlendirildi.

**Çalışma planı:** Çalışmaya primer osteoartrit tanısıyla iki taraflı total diz protezi ameliyatı uygulanan 50 kadın hasta (ort. yaş 67; dağılım 52-84) alındı. Tüm hastalara ameliyat öncesinde ve ameliyat sonrasında üç kez (6. hafta, 3. ay, 6. ay) olmak üzere Yaşam Kalitesi Ölçeği Kısa Form (SF-36) ve Diz Derneği (Knee Society) Klinik Değerlendirme Sistemi (DDKDS) uygulandı. Ameliyat öncesinde tüm hastalara, uygulanacak cerrahi işlem ve rehabilitasyon programı konusunda yeterli bilgilendirme yapılmasına özen gösterildi.

**Sonuçlar:** Her iki ölçeğin tüm altgruplarında, cerrahi öncesi ve cerrahi sonrası ilk (6. hafta) ve son (6. ay) değerlendirme puanları arasında düzelme lehine anlamlı farklılık gözlemlendi ( $p<0.05$ ). SF-36 alt ölçekleri içinde yalnızca fiziksel fonksiyon alt ölçeği puanında altıncı haftadan sonraki değişiklikler anlamlı bulundu ( $p<0.05$ ); diğer alt ölçeklerin altıncı haftadan sonra gösterdiği düzelme anlamlı düzeyde değildi. DDKDS ölçeğinde ise altıncı haftadan sonra anlamlı değişim gösteren ağrı skoru idi; fonksiyon skorunda düzelme anlamlı bulunmadı.

**Çıkarımlar:** Total diz protezi uygulanan kadın hastaların ameliyat sonrası altı hafta içinde yaşam kalitelerinde anlamlı düzelme olmaktadır. Daha sonraki dönemde, SF-36 alt ölçekleri içinde yalnızca fiziksel fonksiyon alt ölçeğinde, DDKDS'nin ise ağrı alt ölçeğinde anlamlı düzelmelerin sürdüğü görülmektedir.

**Anahtar sözcükler:** Artroplasti, replasman, diz; sağlık durumu göstergeleri; osteoartrit, diz/cerrahi; yaşam kalitesi; anket.

**Objectives:** We evaluated the quality of life of female patients following total knee arthroplasty.

**Methods:** The study included 50 women (mean age 67 years; range 52 to 84 years) who underwent bilateral total knee arthroplasty for primary osteoarthritis of the knee. All the patients were administered the Medical Outcomes Study Short Form-36 (SF-36) and the Knee Society Clinical Rating System (KSCRS) preoperatively and at six weeks, three and six months postoperatively. Particular attention was given to provide patients with sufficient information on surgery and postoperative rehabilitation program.

**Results:** Compared to preoperative scores, all the subscales of both instruments showed significant improvement at six weeks and six months ( $p<0.05$ ). After six weeks, however, only SF-36 physical function scores continued to improve significantly till the final assessment ( $p<0.05$ ), whereas the other subscales reflected only maintenance of improvement. Conversely, a consistent significant improvement after six weeks was seen in the pain score of the KSCRS, while the function score representing only maintenance of improvement.

**Conclusion:** Significant improvement is achieved in the quality of life of female patients within six weeks after total knee arthroplasty. It appears that, beyond six weeks, this improvement continues to be significant only in the physical function score of the SF-36 and pain score of the KSCRS.

**Key words:** Arthroplasty, replacement, knee; health status indicators; osteoarthritis, knee/surgery; quality of life; questionnaires.

Knee osteoarthritis (OA) is a disease of elderly population that leads to pain and disability due to degeneration of the knee joint. OA usually affects both knees and disturbs the quality of life of women more than men.<sup>[1,2]</sup> Most common presenting symptom is pain. Deformity and loss of range of motion may develop and even activities of daily life may be hindered by pain as the disease progresses.<sup>[3]</sup> In advanced stages of the disease pain becomes unrelenting and may disturb sleep. This physical incapacity may affect the psychological health and social functions.<sup>[4]</sup>

In the management of OA, total knee arthroplasty (TKA) stands as a reliable method that quickly restores the functional capacity of patients that are irresponsive to conservative treatment. Goals of TKA are to relieve pain, restore function through increasing mobility and correction of any deformity if present, which consequently help to improve the quality of life of the patient both psychologically and physically.

Incidences of degenerative diseases are increased as the ratio of elderly gets higher in the population due to increase of expected life time.<sup>[5]</sup> Treatment of these diseases loads a heavy burden on the health budget. Outcomes of any treatment should be evaluated by such measures that are reliable and sensitive to changes to confirm the cost-effectiveness.

Studies on arthroplasty have conventionally focused on physical measures such as range of motion, morbidity, mortality, surgical complications and prosthesis survival. However these outcomes are believed to be insufficient or may not assess the subjective perception of the benefits by the patient.<sup>[6,7]</sup> Therefore self-answered questionnaires that assess quality of life have been used in the recent studies. The term of quality of life is a broad description that involves the response of the individual to the physical, psychological and social effects of the disease during daily activities.<sup>[7]</sup> Any benefit offered by a treatment can be determined by a valid and reliable disease-specific or general measure for quality of life.<sup>[8]</sup> Disease-specific measures are recommended to reveal the effects of treatment as they are theoretically expected to be more sensitive than general measures.<sup>[9]</sup> General measures of quality of life provide a complementary view to osteoarthritic patients who usually have multiple accompanying diseases by their ability to better document side effects and complications of the treatment that are not directly related to disease

process.<sup>[10]</sup> Thus combination of general and disease-specific measures are recommended to take advantages of both methods.<sup>[11,12]</sup>

In this study we aimed to evaluate the effects of bilateral TKA on quality of life of female patients. We have used Knee Society Clinical Rating System (KSCRS) described by Insall et al in 1989 as the disease-specific measure<sup>[13]</sup> and Quality of Life Short Form-36 (SF-36) test as the general measure.<sup>[14]</sup>

## Patients and method

Study included 50 female patients (mean age 67; range 52-84) that underwent bilateral TKA for bilateral primary osteoarthritis in our institute between 2004 and 2006. Study group consisted of 29 (58%) married and 21 (42%) single females. Preoperative general information form, SF-36 and KSCRS were administered by psychologist and physiotherapist. SF-36 and KSCRS was readministered during follow-up examination at 6 weeks, 3 months and 6 months. Patients were informed about the study during the interview before administration of the tests and patients that consented were included in the study. Patients that denied being involved were excluded from the study. Expectations of the patients assessed during the personal interview were considered to be reasonable, as all patients expected to be free of pain and be able to independently perform daily activities.

## Surgery

Bilateral TKAs were performed to all patients by the same surgeon. Following combined epidural and spinal anesthesia both knees were concomitantly prepared and draped in supine position. Skin was incised at the midline and joint was accessed through paramedian incision. Both femoral and tibial components were fixed using bone cement. All patients received prophylaxis for deep vein thrombosis and infection. No surgery related complication was observed.

## Rehabilitation

Passive knee flexion and extension by CPM machine was started at the first or second postoperative day. First day rehabilitation program included ankle dorsiflexion-plantar flexion, isometric exercises for quadriceps muscle, straight leg raising; active flexion and extension of knee as tolerated and isometric and active exercises for hip muscles. In the second postoperative day patients sit at the side of the bed and performed active knee flexion and extension exercises; learned how to sit and rise from

the bed and mobilized with a walker. Stair climbing was performed at the fifth day and patients were discharged at the sixth postoperative day.

### Outcome Measures

*Quality of Life Short Form 36 (SF-36):* is a self-assessment test that includes 36 items which measures in 8 dimensions. These are physical function, social function, role limitations due to physical problems, role limitations due to emotional problems, mental health, energy/vitality, and general health and pain perception. Subscales assigns a score between 0 to 100, where '0' represents poor health status and '100' represents good health status.

*Physical Function:* Low scores of this subscale indicate difficulty during all physical activities including self-cleaning and clothing whereas high scores indicate performing strenuous activities with no limitation.

*Role Limitation - Physical:* Low scores of this subscale indicate presence of problem at job or during daily activities due to disturbances in physical health, whereas high scores indicate no problem at job or during daily activities.

*Social Function:* Low scores of this subscale indicate frequent and abnormal interruptions during routine social activities due to physical and emotional problems, whereas high scores indicate all social activities are performed with no interruption due to physical and emotional problems.

*Pain:* Low scores of pain subscale indicate severe and limiting pain whereas high scores indicate no limitation due to pain.

*Mental Health:* Low scores of this subscale indicate persistent emotions of anger or depression whereas high scores indicate a calm, relaxed and happy mood.

*Role Limitation -Emotional:* Low scores of this subscale indicate presence of problem at job or during daily activities due to disturbances in emotional status, whereas high scores indicate no problem at job or during daily activities.

*Vitality:* Low scores of this subscale indicate persistent feelings of tiredness or exhaustion, whereas high scores indicate lively and energetic feelings.

*General perception of health:* Low scores of this subscale indicate that patient perceives health status

as bad and believes that it will get worse, whereas high scores indicate that patient perceives health status as excellent.<sup>[14]</sup>

*Knee Society Clinical Rating System:* It consists of two parts: a knee score for knee joint and a functional score that assess walking and stair climbing ability of the patient. This dual rating system avoids erroneous low scores due to problems not related to knee such as aging or weakness.<sup>[13]</sup> Pain, stability and range of motion are also assessed and deductions are made for flexion contracture, hyperextension and malalignment. In this system, a painless knee having normal alignment and 125 degrees range of motion with minimal anteroposterior and mediolateral instability scores 100 point. For the functional score walking distance and stair climbing is evaluated. If patient uses a walking aid (crutches, walker), 10 points are deducted. Highest score may be 100 points which indicates that patient can walk with no limitation and climb stairs easily.

### Statistical Analysis

Repetitive variance analysis was used for statistical analysis and  $p < 0.05$  was set as significance level. Data were processed by Windows SPSS 15.0 software.

### Results

Eighteen patients (36%) were ignorant, 21 patients (42%) were primary school graduates, 4 patients (8%) were secondary school graduates and 7 patients (14%) were university graduates. None of the patients were able to perform sports activity. At the time of operation, 38 patients (76%) had at least one accompanying chronic systemic disease (diabetes mellitus, hypertension etc); remaining 12 patients (24%) had no other disease. No surgery related complication was observed in our patient group.

Variance analysis for repeated measurements was used to determine any significant change for the scores of KSCRS and all SF-36 subscales (physical function, physical role limitation, pain, general health, vitality, social function, emotional role limitation and mental health) before the surgery and 6 weeks, 3 months and 6 months after the surgery. Results are summarized in Table 1 and Table 2.

Functional and knee scores of KSCRS before and after surgery (6 week, 3 months and 6 months) showed

**Table 1.** Statistical Analysis of the results of Knee Society subscales (analysis of variance for repeated measurements)

	Preoperative		Postoperative		Wilks lambda	F	p
		1.5 weeks	3rd month	6th month			
Pain	7.0±10.9	30.1±10.7	37.6±7.1	43.9±6.3	0.090	222.374	<b>0.00</b>
Function	36.4±18.7	56.0±13.6	76.3±13.6	93.9±13.5	0.081	176.6	<b>0.00</b>

significant differences ( $p < 0.05$ ). Significance measurement by Tukey test revealed significant difference between the first scores and the last score ( $q = 8.13$ ), however no such a difference was observed between the second and third or third and fourth scores.

Similar to KSCRS all subscales of SF-36 test before and after surgery (6 week, 3 months and 6 months) showed significant differences. ( $p < 0.05$ ). Comparison of all scores by Tukey test showed that significant differences between all scores were observed to persist only in physical function subscale. These results indicate that patients had persistent improvement in physical function during the postoperative follow-up period. Other subscales of SF-36 test before and after surgery (6 week, 3 months and 6 months) showed significant differences, however no such a difference was observed between the second (6 week) and third (3 months) or third and fourth scores. These results indicate that the dimension measured by each subscale showed significant improvement at the postoperative sixth week and these improvements persisted until the sixth month.

### Discussion

All patients showed significant increase in SF-36 scores after the postoperative 6 weeks. Literature review by Etygen et al in 2004 has shown that most of the improvement occurs between 3rd and 6th months.<sup>[15]</sup> Improvement of our patients in a relatively short period of 6 weeks may be due to meticulous preope-

rative interview about the surgery to keep the expectations at a reasonable level and to favor active participation of the patient to the rehabilitation process and early restoration of functions together result in positive effect on patients quality of life as emphasized in some studies.<sup>[15,16]</sup>

In our study we found that all subscales of SF-36 except physical function showed significant differences between the preoperative measurements and the follow-up measurements at 6th week and 6th month, but no significant change was observed between the 6th week and subsequent measurements. This suggests that maximal regain of physical functions requires at least 6 months. Scores achieved at the 6th month are comparable to those of normal population<sup>[17]</sup>, thus further improvement by time is not anticipated. Studies with longer follow-up period have demonstrated that these scores are maintained up to 5 years.<sup>[18]</sup>

This significant difference between the preoperative score and the postoperative 6th month score of SF-36 physical function subscale was also observed to increase constantly during the subsequent follow-up measurements. It is known that most sensitive subscale of SF-36 test is the physical function subscale.<sup>[19]</sup> Interestingly, knee-specific KSCRS did not show any significant change after 6 weeks. Lingard et al have previously reported that functional score of KSCRS was less sensitive compared to SF-36 for patients af-

**Table 2.** Results of statistical analysis for SF-36 subscales (variance analysis for repeated measurements)

	Preoperative		Postoperative		Wilks lambda	F	p
		6 weeks	3rd month	6th month			
Physical Function	16.1±15.0	63.8±24.1	83.2±15.7	93.5±9.9	0.049	304.73	<b>0.00</b>
Physical role	10.0±28.1	61.1±42.7	82.8±26.6	91.9±17.1	0.129	105.47	<b>0.00</b>
General Health	35.8±27.4	63.7±20.2	80.6±16.5	89.2±14.4	0.24	47.25	<b>0.00</b>
Vitality	37.0±25.3	70.4±20.5	80.2±17.5	87.7±12.8	0.263	44.0	<b>0.00</b>
Social Function	34.6±30.5	69.9±21.5	88.8±15.0	93.4±11.7	0.202	61.81	<b>0.00</b>
Emotional Role	28.0±44.3	74.1±39.6	88.3±24.4	95.5±12.4	0.289	38.5	<b>0.00</b>
Mental Health	46.8±25.6	74.5±21.9	82.8±19.4	89.3±18.4	0.295	37.4	<b>0.00</b>
Pain	15.8±20.4	62.5±21.6	75.4±15.0	87.1±12.6	0.092	154.09	<b>0.00</b>

ter TKA.<sup>[20]</sup> This might be explained as functional score of KSCRS questions only the knee joint and a few simple activities of daily life which inevitably remain insensitive to changes above a certain level. Yet, functional score of KSCRS includes questions regarding two-blocks of walking and stair climbing whereas physical function subscale of SF-36 questions difficult activities such as lifting heavy objects, pulling a table and climbing multiple stair climbing which involves not only knee joint alone, but all joints of the body. Therefore after 6 weeks functional score of KSCRS was insensitive to improvements provided by TKA.

Knee score of KSCRS showed significant differences between preoperative and postoperative scores and also between the individual postoperative scores. However postoperative scores (6 week, 3 months and 6 months) pain subscale of SF-36 did not show a significant change. This may be explained by the fact that SF-36 includes few questions that broadly evaluates pain and its effect on quality of life with no concern on the intensity of pain. On the other side knee score of KSCRS has been specifically designed for TKA, which assess the intensity of the pain in addition to presence of pain. Therefore knee score of KSCRS is more sensitive to changes in pain following compared to TKA. Similarly, Lingard et al. have found that knee score of KSCRS was poorly correlated to body pain subscale of SF-36 among patients that underwent TKA.<sup>[20]</sup> Taking results of both scales into consideration, although pain was consistently reduced even after 6 weeks as represented by knee scores of KSCRS, intensity of pain might have fallen under a critical level that would influence the patients' quality of life, thus incapable of making a change in pain scores of SF-36 test.

One of the limitations of the study is inclusion of only female patients who underwent bilateral TKA by a single surgeon. As it is known, knee OA is more common in females, their quality of life is more severely affected and amount of improvement following surgery is lower in females.<sup>[2,15]</sup> Thus it may be suggested that females are potentially a difficult group of patients. Besides, results of a surgical procedure may show significant differences depending on the surgeon or the hospital. Thus a group of patients from a single surgeon or hospital may not be ideal for generalization of the results. However, studies including

multiple surgeons or multinational studies have yielded results similar to single-surgeon studies.<sup>[20,21]</sup>

As for conclusion, TKA is a successful procedure to improve patients' quality of life through reducing the pain and restoring functional capacity provided that a comprehensive consultation tailored to patients' educational level is provided before the operation. Evaluation of the benefits of any treatment should include a general measure for health-related quality of life to assess the effects of treatment on patients' quality of life and provide a complementary picture of patients' condition. Thus studies on health related quality of life should use both general and disease or site-specific measures in order to reveal exact and complete benefits offered to the patient.

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