

Results of total knee arthroplasty

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ABSTRACT

Total knee arthroplasty was applied to 187 knees of 144 patients at Ondokuz Mayıs University School of Medicine and Research Hospital, Clinic of Orthopaedics and Traumatology, between January 2007 and December 2008. Included in this study were 53 knees of 40 patients with adequate follow-up. The mean age was 61.82, (34–91), and the mean follow-up period was 43.95 months. Assessments made based on the knee-scoring system yielded a mean score of 88.09 (75–100). In 39 patients (73.58%), the results obtained were excellent, and in 14 (26.41%) patients, the results were good. The average knee-function score was determined to be 74.62. Assessments made based on the functional knee-scoring system indicated that 17 knees (32.08%) obtained excellent results, 16 knees (30.19%) obtained good results, nine (16.98%) knees obtained intermediate results, and 11 knees (20.75%) obtained poor results.

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1. Introduction

When total knee arthroplasty is done in accordance with the basic principles of orthopaedic surgery, the results can be very promising. Since 1970s, when the modern concept was developed, knee arthroplasty has gained an entirely new dimension. Globally, developments continue to be made in terms of prosthetic designs and surgical techniques.

In the current study, we examine and evaluate total knee arthroplasty cases in a retrospective manner and attempt to attain an outcome similar to that presented in the literature. In addition, other surgical techniques are also mentioned briefly, and degenerative diseases of the knee are investigated from a broader perspective.

2. Materials and methods

Between January 2007 and December 2008, total knee arthroplasty was applied in 187 knees of 144 patients at Ondokuz Mayıs University Hospital in the Department of Orthopaedics and Traumatology. Included in this study were 53 knees of 40 patients with adequate follow-up.

Patients were evaluated according to the criteria of the American Knee Society, and the same criteria were used before and after surgery. The Knee Society score consists of two parts: the Knee Score and the Functional Knee Score. According to this scoring system, scores under 60 are weak, 60-69 are moderate, 70-84 are good and 85-100 are excellent. With the Knee Score system, we used three parameters: pain, range of motion and stability. Flexion contracture and extension defect result in a lower Knee Score. With the Function Score system, we used two parameters: walking distance and climbing up and down the stairs. Using a cane, walker or crutches reduces the Function Score.

Postoperative radiological evaluation was performed according to the radiological assessment criteria for total knee arthroplasty. For the evaluation of component alignment, anterior-posterior and lateral radiographs were checked. The femoral component alignment angle (alpha (α)) is the angle measured between the femoral anatomical axis and trans-femoral axis, which crosses the femoral artery. This angle is normally considered to be 93°. The tibial component align-

ment angle (beta (β)) is the angle measured between the tibial anatomic axis line and trans-tibial line, which passes through the tibial plateau. This angle is normally 90° . The total valgus angle (Ω) represents the total valgus angle of the prosthesis on the anteroposterior X-ray, and it is the difference between α and β angles. The gamma (γ) angles—the angle between the anatomic medullary axis of the femur and the line drawn perpendicular to the base of the prosthesis—reflects femoral component alignment. This angle is normally considered to be 0° . The delta (Δ) angle is used in the evaluation of the tibial component, and it is the angle between the anatomic medullary axis (midmeduller axis) of the tibia and the line drawn parallel to the tibial component. This angle is normally considered to be 90° (Ranawat, 1988; Insall et al., 1993).

3. Results

In our study, 33 patients were female, and seven were male (Fig. 1). Their ages ranged from 34 to 91 (average 61.82 years) at the time of operation. The mean follow-up period was 43.95 months (35–56 months).

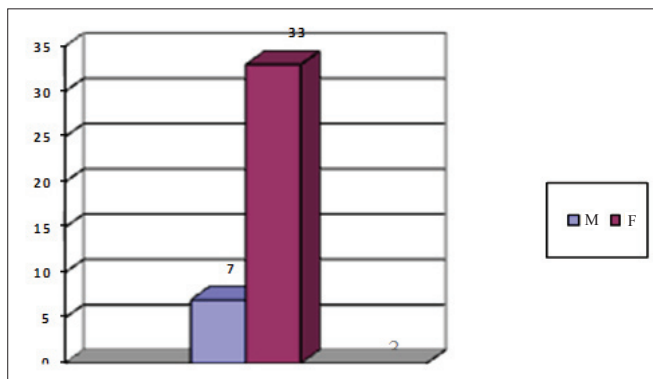
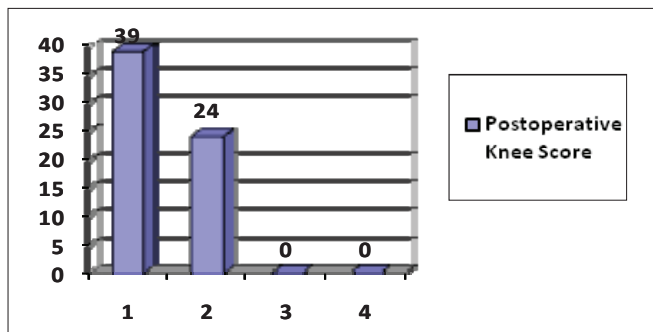


Fig. 1. Gender distribution of patients

While 38 patients were operated for osteoarthritis, two patients were operated for traumatic arthritis. Ten patients underwent a single left-sided arthroplasty, while 17 patients underwent right-sided arthroplasty. Thirteen patients underwent bilateral total knee arthroplasty performed in the same session.

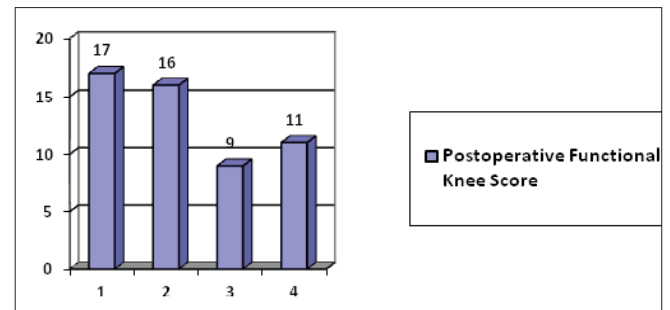
According to knee arthroplasty evaluation criteria, the average Knee Score was found to be 88.09 (75–100). Assessments made based on Knee Scores revealed that 39 (73.58%) individuals obtained excellent results, and 14 (26.41%) individuals obtained good results (Fig. 2).



1. Excellent 2. Good 3. Moderate 4. Weak
Fig. 2. Distribution of patients' Knee Scores.

According to functional evaluation criteria, the average Knee Score was found to be 74.62 (35–100). The scores re-

vealed that 17 (32.08%) individuals obtained excellent results, 16 (30.19%) individuals obtained good results, 9 (16.98%) individuals obtained moderate results and 11 (20.75%) individuals obtained poor results (Fig. 3).



1. Excellent 2. Good 3. Moderate 4. Weak
Fig. 3. Distribution of patients' Functional Knee Scores

After the surgery, the average range of motion of the knee was determined to be 106.22° (90° – 125°), and eight patients were identified as having a postoperative range of motion of less than 90° . There were no cases of residual flexion contracture after the surgery. The survival rate of the prosthesis was 100% during the 43.95 (35–56)-month follow-up period.

Compatibility of components was measured according to the alignment angles of alpha and beta in the frontal plane and femoral gamma and tibial delta in the sagittal plane. The average alpha angle, beta angle, gamma-angle, delta angle and total valgus angle were 95.87° (90.21° – 100.62°), 89.38° (86.43° – 93.35°), 5.09° (1.55° – 11.73°), 88.07° (77.04° – 95.98°) and 6.4° (2.54° – 9.56°), respectively (Table 1).

Table 1. Characteristics of evaluation of the attendants

	Postoperative
Range of Motion	90° – 125°
Average Range of Motion	106.22°
Knee Score	75–100
Average Knee Score	89.09
Knee Function Score	35–100
Average Knee Function Score	74.62
Alpha (α) Angle	90.21° – 100.62°
Beta (β) Angle	86.43° – 93.35°
Gamma (γ) Angle	1.55° – 11.73°
Delta (Δ) Angle	77.04° – 95.98°
Total Valgus Angle(Ω)	2.54° – 9.56°
Flexion Contracture	0°
Average Flexion Contracture	0°

In our study, general anaesthesia was used in 10 (25%) patients, spinoepidural (combined) anaesthesia in three (7.5%) patients and spinal anaesthesia in 27(67.5%) patients. Tourniquets were applied to all patients during the operation.

4. Discussion

Total knee arthroplasty is a successful method of surgical treatment aimed at the relief of pain and limitation in motion due to degenerative disorders. Due to this modern design created in the 1970s, there have been decreases in complications such as infections, early relaxation and metallosis. Today, ap-

proximately 200,000 total knee arthroplasty operations are performed annually in the United States (Guyton, 1998; Akgun et al., 2002). In our study, total knee arthroplasty operations were performed due to traumatic osteoarthritis in two cases and due to primary osteoarthritis in 38 cases.

We have seen an increase in the number of total knee arthroplasty cases due to increases in average life expectancy and improved quality of life. Rand and Trousdale (2003) performed 11,606 total knee arthroplasty operations and evaluated the results in terms of survival of the prosthesis. The survival rates are as follows: 96% after 5 years, 91% after 10 years, 84% after 15 years and 78% after 20 years (Rand and Trousdale, 2003). Moreover, Gill and Joshi (2001) report the results of 1,033 total knee arthroplasty operations. The survival rates of the prosthesis they report are as follows: 95% after 15 years, 89% after 20 years and 83% after 25 years (Archibeck and Richard, 2004). Back et al. (2001) report a 99% survival rate for 369 total knee arthroplasty operations followed for 5 years. In our study, the survival rate was 100% after an average of 44 months in 53 total knee prostheses.

Total knee replacement is generally performed on the elderly, especially for treating primary osteoarthritis, while younger patients are often treated due to secondary osteoarthritis (e.g., rheumatoid and traumatic arthritis). The mean age for total knee replacement in the literature has been reported as 65 (Waters and Bentley, 2003), 66.5 (Barrack et al., 2001), 69 (Ritter et al., 2003), 65.2 (Akgun et al., 2002) and 62.8 (Heal and Blewitt, 2002) years. In our study, the mean age for total knee replacement was 61.82 (34–91), which is similar to the literature.

Adequate range of motion must be ensured after total

knee arthroplasty. At least 90° flexion should be obtained in terms of function (Harvey et al., 1993). According to Archibeck and Richard (2004), more than 15° flexion contracture and/or less than 60° range of joint motion shows stiffness of the joint. Ritter et al., (2003) who has studied postoperative motion in 4,727 total knee arthroplasty cases, decided that the most important factor that determines postoperative joint motion is preoperative range of motion. In our study, we found the mean postoperative range of joint motion to be, on average, 106.22° (90°–135°).

If the deformity is severe—especially greater than 30° varus, valgus and flexion deformities—it is better to cut the anterior cruciate ligament (ACL). In some disorders like rheumatoid arthritis, there is less elasticity in the ligaments, so for these cases, it is better to use ACL-releasing prostheses (Barnes and Sledge, 1993; Moilanen and Freeman, 1995).

In our study, we evaluated 41 ACL-preserving prostheses and 12 ACL-releasing prostheses. For the ACL-preserving prostheses, the average Knee Score was 86.5, and the average Function Score was 76.66. For the ACL-releasing prostheses, the average Knee Score was 88.56, and the average Function Score was 74.02. However, it is unrealistic to compare the results for both types of prostheses because of the inadequate number of ACL-releasing types of prostheses.

As a result of our study, we found Knee Scores to be excellent in 100% of cases and Function Scores to be excellent in 62.27% of cases. These results are similar to those of several previous studies. Therefore, with appropriate patient selection, adequate preoperative preparation and careful surgical techniques, total knee arthroplasty is considered a good treatment option.

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