



The Results of Posterior Cruciate Ligament Sparing Type Total Knee Arthroplasty in Elderly Patients

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ABSTRACT

Purpose: The main purpose of this study was to report the 12 to 36 months' results of posterior cruciate ligament sparing type total knee arthroplasty in elderly patients.

Methods: A retrospective evaluation was made of a total of 75 patients with advanced stage tibio - femoral arthrosis with the pain of a degree that would limit daily activities, and which had not responded to conservative treatment, and who then underwent total knee arthroplasty between April 2013 and May 2015.

Results: The mean age of the patients was 71.7 years, and the mean follow-up time was 21 months (range, 12- 36 month). Body Mass Index (BMI) was calculated as $>30 \text{ kg/m}^2$ in 15 (20%) patients, $25\text{-}30 \text{ kg/m}^2$ in 41 (54,6%), and $20\text{-}25 \text{ kg/m}^2$ in 19 (25,3%) patients. The mean operating time was 61.06 min (range, 50-90 min). Preoperatively, the knees of all the patients were evaluated as varus. The angles shown in the AP radiographs for placement of the components were determined as alpha angle mean 96.2° (range, $89^\circ\text{-}103^\circ$), beta angle mean 88.7° ($80^\circ\text{-}92^\circ$). Preoperative and postoperative mean knee and functional scores of the knees, according to the KSS was evaluated at 28.6° , 40.1° , 79.6° , and 78.1° respectively. The mean range of movement at the last follow-up was 96° (85-120).

Conclusion: In conclusion, the results of this study showed good results were obtained with total knee arthroplasty in the treatment of knee arthrosis occurring at an advanced age, although an increase in postoperative complications was determined with increased BMI, which is consistent with other studies in the literature.

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1. Introduction:

In the treatment of degenerative knee arthrosis, total knee arthroplasty (TKA) is a method which is successfully used both for the eradication of pain and for the correction of functional status when it is observed in both compartments of the knee in elderly, sedentary patients.

Factors affecting postoperative success and functions include patient age and weight, preoperative activity level, concomitant joint involvements and diseases and preoperative range of movement and alignment together with the surgeon's experience (Morra et al., 2008). The risk of systemic complications increases with age. Infection, local

wound site problems, and patellofemoral problems have been reported to be observed more often in obese patients with a high body mass index (Scott et al., 2012; Flegal et al., 2012; Bray, 1987; Winiarsky et al., 1998).

Another factor increasing complication rates is diabetes, and thus, in the same way, wound site problems, infection and deep vein thrombosis have been reported at higher rates in diabetic patients compared to the normal population (Amin et al., 2006; Stern & Insall, 1990; Andriacchi & Hurwitz, 1997).

Although the postoperative range of movement (ROM) has been reported in the literature as mean

100°-115°, one of the most important factors determining postoperative ROM is the preoperative ROM (Morra et al., 2008).

Despite all the precautions taken preoperatively during the operation and developments in prosthesis design, some patients satisfaction with the outcome isn't good as expected (Lewis et al., 2014; Turpie et al., 2009; Eriksson et al., 2008). The aim of this study was to compare the results of the knee arthroplasty applied with posterior cruciate ligament sparing type prosthesis, which is considered to provide a good level of satisfaction, with the previous literature.

2. Material and Method:

A retrospective evaluation was made of a total of 75 patients with advanced stage tibio-femoral arthrosis with the pain of a degree that would limit daily activities and which had not responded to conservative treatment and then who underwent total knee arthroplasty between April 2013 and May 2015.

The patients were 40 females and 35 males with a mean age of 71.7 years (range, 58 - 84 years). The right knee was affected in 25 patients, the left in 30 and same-session bilateral TKA was applied to 20 patients.

All the patients were operated on by two surgeons (MG or AA) using a cemented posterior cruciate ligament sparing prosthesis (P/S Protech). Under general anaesthesia in 24 patients and spinal anaesthesia in 51 patients, a medial parapatellar approach was used with a longitudinal midline skin incision. The femur bone cut was made using an intramedullary guide at 3° external rotations and 7° valgus according to the posterior condylar axis.

The tibia bone cut was made using an extramedullary guide. Checking was made with trial prostheses then the component was fixed with cement (Surgical Simplex P; Stryker). A hemovac drain was placed in all patients and removed after 48 hours. As deep vein thrombosis prophylaxis, low molecular weight heparin was administered at 6 hours postoperatively and continued for 20 days.

The tourniquet duration, preoperative and postoperative haemoglobin values, amount of bleeding, and the number of blood transfusion units if used, were recorded. Clinical evaluations were made using the Knee Society Score (KSS).

KSS is an outcome scoring system comprising two subgroups of knee and function scores. Knee score rates the joint itself and the function score rates the ability of the patient to walk and climb stairs.

Both components are scored out of a maximum of 100 points. The specific parameters assessed by the knee score component are a pain (50 points), the range of movement (25 points) and stability (25 points),

with deductions for flexion contracture, extensor lag, and malalignment. The function score component addresses the walking distance (50 points) and the ability to climb stairs (50 points), with deductions for any walking aids used (Tan et al., 2014).

Radiological evaluation was made according to the Knee Arthroplasty Radiological Evaluation form using preoperative and postoperative standing anteroposterior and lateral knee radiographs (table 1).

Table 1: *Radiological results postoperatively*

AP radiographs	
Mean femoral angle (range)(α)	96.2(89-103)
Mean tibial angle (range)(β)	88.6 (83-94)
Mean total valgus angle	7.4 (0-12)

Complications including infection, deep-vein thrombosis, and peri-operative mortality were also noted. A wound infection is considered deep if it is not resolved with oral antibiotics and requires debridement or revision. Perioperative mortality was defined as a death during the peri-operation period or within three months of the operation.

Statistical analysis was done using Microsoft Excel 2010. The Student's t-test was used to evaluate the difference between the preoperative and postoperative periods. A value of $p < 0.05$ was accepted as statistically significant.

3. Results:

3.1. Clinical Results

The mean follow-up period of the patients was 21 months (range, 12- 36).

Body Mass Index was calculated as >30 in 15 (20%) patients, 25-30 in 41 (54,6%) and 20-25 in 19(25,3%) patients. The mean operating time was 61.06 mins (range, 50-90 mins). The amount of blood collected in the hemovac drain during the operation and postoperatively was mean 502.66 cc (range, 400-750 cc). Blood transfusion applied postoperatively was mean 1.29 units (range, 1-2 units).

3.2. Radiological Results

Preoperatively, the knees of all the patients were evaluated as varus. A change from preoperative varus deformity of mean 17.1° to postoperative 7.4° valgus was determined ($p < 0.05$). The angles shown in the AP radiographs for placement of the components were determined as alpha angle mean 96.2° (range, 89°-103°), beta angle mean 88.7° (80°-92°).

Preoperative and postoperative mean knee and functional scores of the knees according to the KSS was evaluated at 28.6, 40.1, 79.6 and 78.1 respectively (table 2) ($p < 0.05$). The mean range of movement at the last follow-up was 96° (85-120)

Table 2: *Clinical results*

Knee score	society	Pre-op'	Post op' at the last follow-up	p-value
Mean	knee	28.6 (9-49)	79.5 (55-100)	<0.05
Mean function score (range)				
Mean function score (range)		40.7 (15-65)	78.1 (50-90)	<0.05

3.3. Complications

In a 77-year old female patient, a femoral supracondylar fracture developed, which was treated with plate osteosynthesis. In 4 patients, superficial infection developed in the postoperative first week. *Staphylococcus aureus* was determined in their cultures and treatment was applied with 1st generation cephalosporin for 3 weeks. All of these patients had a BMI greater than 30.

4. Discussion

Total Knee Arthroplasty restores functional knee movements by relieving pain and removing the limited movement caused by degenerative arthrosis. When stable and sufficient range of movement is obtained in the knee, patient satisfaction is high (Turpie et al., 2009).

As a result of a high range of movement obtained, the patient is able to ascend and descend stairs more comfortably. Scott et al reported that the ability to perform this activity increased postoperative patient satisfaction by a significant degree (Eriksson et al., 2008). In the current study, at the final postoperative follow-up examination the mean range of movement was 96° and patient satisfaction was high.

It has been reported that obesity prevalence reaches a peak in the 6th and 7th decades of life. These age groups are also the groups to which arthroplasty is most often applied (Insall et al., 1989). According to the World Health Organization (WHO) criteria, patients with BMI <25 kg/m² are accepted as normal weight. Those with a BMI of 25.0-29.9 kg/m² are defined as overweight and BMI of >30 kg/m² as obese (Scott et al., 2012). As subcutaneous tissue is thicker in obese patients, there are difficulties reaching the bone tissue to be cut during the operation (Flegal et al., 2012).

During the postoperative period, there may be an earlier component failure and revision due to the extra weight of the components. In addition, the frequency of wound site problems and infection increases (Bray, 1987). In a study of 257 TKA in obese patients, it was reported that patellofemoral problems occurred in 182 patients after mean postoperative 4 years (Winiarsky et al., 1998). In the current study, 4 patients (16%) were in the obese group. Postoperative supracondylar femur fracture

and superficial and deep infections developed in this group of obese patients. When cases of revision due to aseptic loosening are examined in the literature, the most common reasons are seen because of obesity and varus malalignment. When there is varus malalignment, loosening is caused by excessive loading on the medial of the tibial component (Lewis et al., 2014). In the current case series, postoperative valgus alignment of 7.4° was obtained. No aseptic loosening was determined in any patient.

Deep vein thrombosis (DVT) occurs in 0.9% of patients following total knee arthroplasty. Pulmonary embolism requiring hospitalization has been reported to occur in 0.3% of patients (Amin et al., 2006).

Various methods of prophylaxis are used to avoid these serious complications. Pharmacological prophylaxis is the primary of these methods. Warfarin is known to be an important anticoagulant agent, but careful monitorization is needed during use. Low molecular weight heparin is another option, which does not require close monitorization but must be used by the parenteral route in the same way as Warfarin. However, compared to other groups, a non-significant increase in bleeding has been reported (Stern & Insall, 1990; Andriacchi & Hurwitz, 1997).

In the current series, mean 540cc postoperative bleeding was determined. No DVT was determined in any patient.

In a study by Tan et al, the results of TKA performed by surgeons only dealing with knee surgery were reported to be better than those of general orthopaedic surgeons and surgical indications were placed at lower scores. According to this, the preoperative KSS knee and function scores were 38.2, and 48.4 respectively in patients operated on by surgeons specializing in knee surgery, whereas the scores of the patients operated on by general orthopaedic surgeons were 41.2, and 50.1 respectively (p<0.001) (Morra et al., 2008).

In the current study, the KSS knee and function scores were determined as 28.6 and 40.1 preoperatively and at the last follow-up postoperatively the knee scores were 79.6 and the function scores were 78.1.

In a study of TKA applied to 204 patients, Papakostidou et al., reported that significant improvements were obtained in the VAS and KSS scores compared to the preoperative values. A mean 8.7 indicates improvement on the preoperative VAS score was reported at postoperative 12 months. The KSS knee score improved from preoperative 40.9 to 89.3 at 12 months postoperatively and the function score from 34.4 to 68.6 (Papakostidou et al., 2012).

There were some limitations to this study, although greater number of patients and a longer follow-up the period would have strengthened the

study, but the mean follow-up period of 21 months was deemed a sufficient period. The number of patients was low as the evaluation was made only of varus knees with a single type of prosthesis applied by 2 surgeons. In addition, it was attempted to strengthen the study by reducing to a minimum the differences between surgeons seen in multicentre studies. That the study did not compare different makes and models of knee prosthesis could be said to be a limitation of the study. However, in the belief that better results were obtained from makes and models with which the surgeons were familiar, no change was made to the most frequently used make of the prosthesis and the study was planned to present the results of a model with good results.

In conclusion, the results of this study showed that extremely good results were obtained with total knee arthroplasty in the treatment of knee arthrosis occurring at an advanced age, although an increase in postoperative complications was determined with increased BMI, which is consistent with other studies in the literature.

5. Disclosure

No conflict of interest was declared by the authors.

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