



Short and mid-term clinical and radiological results in ligament-cutting total knee arthroplasty

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Abstract

Aim: In our study, it was aimed to present our retrospective clinical and radiological short and medium-term results in patients who underwent total knee prosthesis and compare them with the literature.

Materials and Methods: 74 knees of 55 patients who were followed-up regularly from 114 patients who underwent primary ligament-cutting cementitious total knee prosthesis between January 2015 and 2020 in the Department of Orthopedics and Traumatology of our clinic were included in this study. Our study is a retrospective study, and our patients were evaluated clinically according to the American Knee Society scoring system before and after surgery, while they were evaluated radiologically according to the Total Knee Replacement Radiological Evaluation Criteria. Analyses were performed with IBM SPSS 25.0 program and $p < 0.05$ values were considered statistically significant.

Results: Nine (16.3%) of the patients who underwent a total knee prosthesis with ligament-cutting were male and 46 (83.7%) were female, and their ages were between 51 and 88 (mean, 66.7). Follow-up periods were between 2-60 months, with an average of 22.9 months. The number of patients who underwent unilateral knee prosthesis was 36, and the number of patients who underwent bilateral total knee prosthesis in the same session was 19. In the evaluation made according to the Knee Society Knee Prosthesis Evaluation Criteria, the knee score of the patients was 40 on average between 22 and 60 before the operation, while the average knee score was 85 between 40 and 96 after the operation. The functional knee score was between 20 and 56 preoperatively, with an average of 40; It was found to be 85 on average between 20 and 100 after surgery. Revision surgeries were performed on septic ground in one patient and loosening findings on aseptic ground in one patient.

Conclusion: In our study, it was stated that the total knee prosthesis that cuts the ligament has satisfactory results in terms of functionality and satisfaction if it is applied to the appropriate patient within the appropriate indication.

ARTICLE INFO

Keywords:

Arthroplasty
Ligament cutters
Knee society score
Infection

Received: Sep 17, 2021

Accepted: Jan 01, 2022

Available Online: May XX, 2022

DOI:

[10.5455/annalsmedres.2021.09.549](https://doi.org/10.5455/annalsmedres.2021.09.549)



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Introduction

Total knee arthroplasty is a successful and cost-effective method that is frequently applied today in patients for whom many treatments such as lifestyle recommendations, weight loss, drug treatments, physical therapy, intra-articular injections, arthroscopic debridement and osteotomies are insufficient in knee osteoarthritis. Knee osteoarthritis is the main indication for total knee arthroplasty.

The idea of giving movement to the knee joint and relieving pain started with resection arthroplasty in the historical process, many and a wide range of materials have been

put forward to provide the anatomical joint, and with the advancement of both design and surgical technique, a wide application area has been created and will continue to be formed.

In our study, it was aimed to evaluate the short and mid-term clinical and radiological results of cases with ligament-cutting total knee prosthesis applied in our clinic and to compare them with the literature.

Materials and Methods

In this study, 74 knees of 55 patients who were followed-up regularly from 114 patients who underwent primary ligament-cutting cemented total knee prosthesis between January 2015 and January 2020 in the Department of Orthopedics and Traumatology of İnönü University Turgut

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Özal Medical Center were included. This study was approved by the Inonu University Health Sciences Noninvasive Clinical Research Ethics Committee (No: 2020/497).

Nine of the patients were male and 46 were female, and their ages ranged from 51 to 88. The mean age was 66.7 years. The follow-up period ranged from 2 to 60 months, with a mean of 22.9 months. All patients were operated for primary gonarthrosis. The number of patients who underwent unilateral knee prosthesis was 36, and the number of patients who underwent bilateral total knee prosthesis in the same session was 19.

We applied a cemented total knee prosthesis that cuts ligaments to all our patients. We did not perform patellar component replacement in any of our patients.

The knee and function scores of the Knee Society were used in the preoperative and postoperative periods in the clinical evaluation of the patients. Knee Society Arthroplasty Roentgenographic Evaluation Form was used in the radiological evaluation.

Surgical technique

Considering the characteristics of the patient, general anesthesia, spinal, epidural or spinoepidural anesthesia forms were administered to the patients by the anesthesiologist. Sterile tourniquet or pneumatic tourniquet was used in our patients. Medial parapatellar arthrotomy was performed using a midline skin incision in the surgical incision. The surgical time ranged from 45 to 75 minutes for each knee. Aspiration drains were used in all patients. The drains were used and pulled for a maximum of 2 days depending on their return. For the medical prophylaxis of deep vein thrombosis, low molecular weight heparin was used for up to 30 days postoperatively in all patients. Antiembolic stockings were used for mechanical prophylaxis after removal of aspirative drains.

Statistical analysis

Data were given as median (minimum-maximum), mean (standard deviation) and number (percentage). Conformity to the normal distribution was done using the Shapiro-Wilk test. Mann-Whitney U test, independent samples t test, dependent samples t test, Wilcoxon Paired Two Sample Test, Marginal Homogeneity Test were used in statistical analysis, where appropriate. A p value of < 0.05 was considered statistically significant. IBM SPSS Statistics 25.0 program was used in the analysis.

Results

In the evaluation made according to the Knee Society Knee Prosthesis Evaluation Criteria, the average knee score was 40 between 22 and 60 before the operation, while the average knee score was 85 between 40 and 96 after the operation. In the evaluation based on this scoring; excellent results were obtained in 39 (52.7%), good 24 (32.4%) knees, moderate (9.5%), and poor (5.4%) knees.

In the evaluation made according to the functional knee score; His preoperative score was between 20 and 56, with an average of 40; it was found to be between 20 and 100 post-operatively, with an average of 85. In the evaluation

Table 1. Evaluation characteristics of the cases

Characteristic	Minimum	Maximum	Mean
Preoperative extension	-20°	5°	-5°
Postoperative Extension	-5°	0°	0°
Preoperative Flexion	60°	100°	90°
Postoperative Flexion	85°	125°	100°
Preoperative Knee Score	22	60	40
Postoperative Knee Score	40	96	8
Preoperative Functional Score	20	56	40
Postoperative Functional Score	20	100	85
Preoperative Alignment	20° Varus	5° Valgus	7° Varus
Postoperative Alignment	6° Varus	8° Valgus	2° Valgus
Preoperative Flexion Contracture	0°	0°	0°
Postoperative Flexion Contracture	0°	0°	0°
Alpha Angle	81°	99°	91°
Beta Angle	82°	98°	90°
Gamma Angle	0,4°	16°	6,25°
Theta Angle	82°	99°	89°
Total Valgus Angle	-16°	12°	-0,5°

based on this scoring, 42 (56.8%) of the knees had excellent, 18 (24.3%) good, 7 (9.5%) moderate and 7 (9.5%) poor results. has been done.

The range of motion of the subjects included in our study; preoperative extension While the average is (-2.5) degrees between (-25) and (5) degrees; It was measured as 0 degrees on average between (-5)-0 degrees postoperatively. Preoperative flexion was between 60 and 100 degrees and an average of 90 degrees; it was measured as an average of 100 degrees between 85 and 125 degrees postoperatively. In this context, $p < 0.05$ was found both on the basis of flexion and extension, and a significant difference was detected in the postoperative range of motion of the joint. The joint range of motion of all our patients increased after surgery.

Preoperative and postoperative flexion contractures were not detected in our patients.

The radiological evaluation of our ligament-cutting total knee prosthesis applications was made according to the Total Knee Prosthesis Radiological Evaluation criteria. An average of 7° varus (5° valgus - 20° varus) was determined in the preoperative period, and an average of 2° valgus (6° varus - 8° valgus) alignments was achieved in the postoperative period. Compatibility of the components; Alpha and beta alignment angles in the frontal plane and sagittal femoral (gamma) and sagittal tibial (theta) angles in the sagittal plane were measured. Average alpha angle was 91° (81°- 99°), beta angle was 90° (82°- 98°), gamma angle was 6.25° (0.4°-16°), theta angle was 89° (82°- 99°) (Table 1).

No lysis was observed in either the femoral or tibial components in any of our cases.

When prosthesis survival was evaluated, prosthesis survival was found to be 85.7% at the end of a mean follow-up

of 20 months (2-60 months).

An intraoperative tourniquet was applied to all of our patients. The mean amount of transfusion was calculated as 0.07 units of erythrocyte suspension.

Discussion

Total knee arthroplasty and total hip arthroplasty are the most common joint replacement procedures. Especially since the results of total knee arthroplasty are not as clear as those of total hip arthroplasty, the results should be evaluated with extreme care [1]. In our study, in this sense, the results were examined with great care and meticulousness, both by radiological measurements and clinical scoring.

In a meta-analysis study including nineteen studies by Shan et al. five-year satisfaction rates was reported as 75% [2]. In our study, the rate of our patients who were evaluated as excellent-good in our knee and functional scoring was determined as 80%, and our results were evaluated in accordance with the literature. In addition, it can be observed that some patients with good knee scores in scoring systems are not satisfied with the result, and it may be difficult to distinguish between excellent and excellent results [3, 4]. As a matter of fact, in our study, while the postoperative knee scores were higher in seven of our patients, the function scores were found to be lower.

In a national and multi-centre study by Parvizi et al. poor outcomes were noted in 661 young patients (mean age 54). Residual pain was found in 33% of these patients, swelling in 33%, complaints of noise during joint movements in 33%, and stiffness in the joint in 40% [5]. In another study conducted on 136 patients under the age of 60, the satisfaction rate was found to be only 68% [6]. This should limit the indications for total knee replacement in young and active patients. In our study, the mean age of the patients was 66.7, and total knee arthroplasty was tried to be applied to the population aged 60 and over as much as possible.

According to Jianga et al. not using a tourniquet in total knee arthroplasty applications resulted in faster recovery of the extensor mechanism, but no significant difference could be detected in the long term [7]. Guler et al. found a significant difference in function in the first six months following total knee replacement versus using tourniquet, but no difference in one year [8]. This can be explained by the decrease in quadriceps muscle volume and the strength associated with the use of a tourniquet [8, 9]. Patellar eversion, which is frequently criticized, appears to have no effect on medium and long-term functional outcomes [10]. In our study, a tourniquet was applied to all our patients and it was observed that it had no effect in terms of functional results.

The superiority of one implant type over the other is controversial [11]. There is no significant difference between various implant types (posterior ligament severing/non-cutting, stable/mobile, etc.) in terms of joint range of motion and quality of life [12, 13].

In a recent randomized controlled study in terms of implant fixation, no significant difference was found between cemented and cementless implants, except for the CSR

knee score at postoperative two years, and in long-term patient satisfaction and quality of life [14].

Many studies have shown that quality of life improves after total knee arthroplasty, no matter which postoperative rehabilitation protocol is used. Based on studies, it is impossible to objectively evaluate the contribution of rehabilitation to this finding [15]. In our study, our patients were mobilized on the 2nd postoperative day at the latest after drain removal and were referred to rehabilitation programs in different centers. Although many different protocols were applied, no significant functional difference was detected.

Lawrie et al, in a study conducted by him, the actual cost of cemented and uncemented total knee arthroplasty procedures was compared and it was determined that cemented total knee prosthesis (TKP) was more costly, and it was concluded that the cost alone should not be an obstacle to the use of cemented TKP [16].

Optimal positioning of total knee replacement components improves stress distribution across the bearing surface of the implant. Generally, the goal is to create a neutral mechanical axis after arthroplasty so that weight-bearing forces pass through the center of the femoral head through the center of the knee joint and then through the center of the ankle joint. Adjustment increases the load on a portion of the implant, increases polyethylene wear and the risk of osteolysis and loosening [17]. Mechanical axis alignment is not the only factor for long-term prosthesis survival [18]. Component malrotation, especially internal rotation, is associated with post-TKP pain [19]. It has been detected in 50% of patients with pain 1 year after TKP [20].

Although anterior pain reduction was achieved after TKP with tricompartmental arthroplasties, difficult-to-treat patellar complications occurred [21, 22]. A recent meta-analysis of randomized controlled trials revealed no difference between patella resurfacing and outcomes other than resurfacing, including knee pain [23]. However, refurbished patients required less additional surgery [23]. Indications for patella resurfacing are currently center- or surgeon-dependent and are politically based in some countries, particularly if total joint replacement centers over three-part arthroplasty are defined. In our study, patients were preop for patellar surface change. Intraop after x-ray evaluation. It was decided that the surface change was not performed except for the patients who did not have severe arthritic changes in the patella. Cauterized desensitization was applied to all of our patients with or without surface replacement. In the postoperative follow-up, no significant difference was found in the patients in terms of anterior knee pain.

There has been great debate about the effect of gender on TKP results due to the anatomical variability associated with sex [24, 25]. The distal femur tends to be narrower for any anteroposterior dimension in females²⁶ and a female-specific system has been released (GenderSolutions™, Zimmer Inc. Warsaw, IN, USA. However, there are greater differences in femur size between races than between sexes, complicating the situation [27, 28]. Studies have failed to show any benefit with gender-specific implants, and the use of implants for the “wrong” gender has

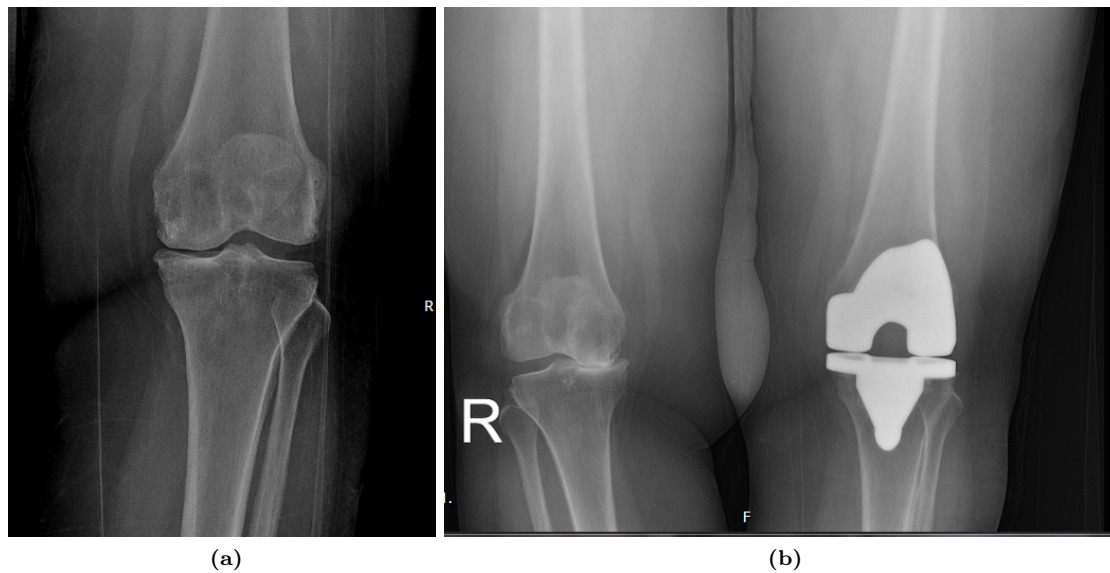


Figure 1. Preoperative anteroposterior and lateral Radiographs of the patient

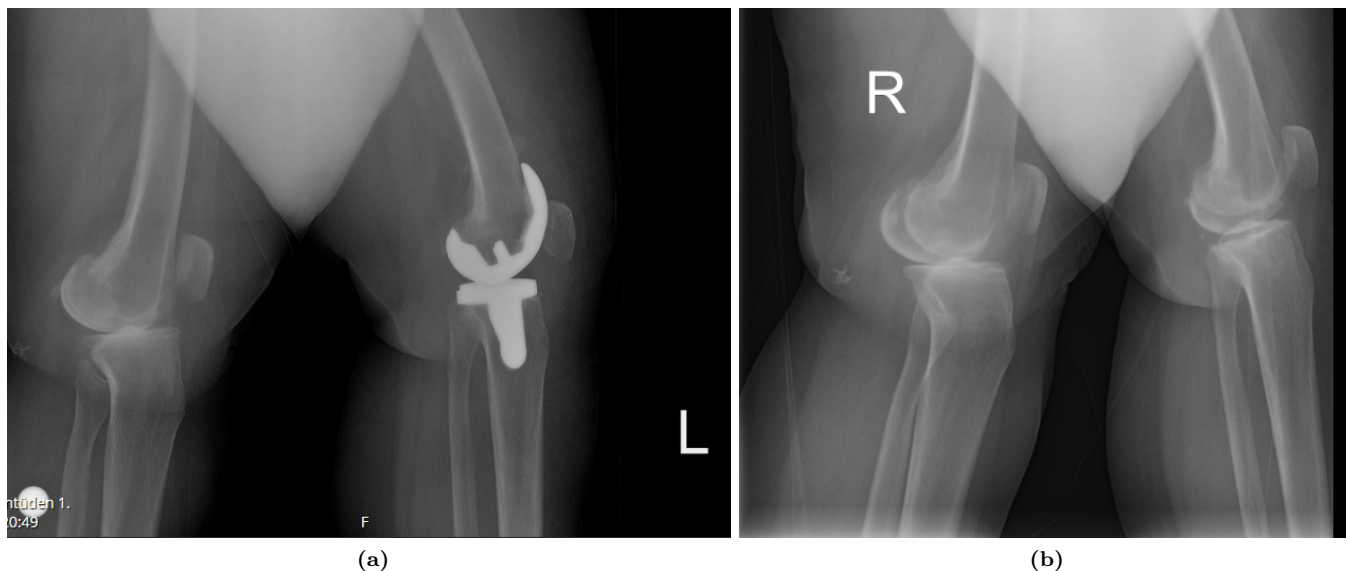


Figure 2. Postoperative anterioroposterior and lateral Radiographs of patient

led to court cases [29]. Currently, many manufacturers offer narrow femoral component designs without gender-specific nomenclature. In our study, the same type of implant was used in all our patients, regardless of gender. Tibial and femoral component sizes were observed to be smaller in our female patients, and no significant difference was found in terms of component compatibility.

Conclusion

As a result of our total knee prosthesis that cuts the ligament, 85.1% excellent and good knee score, 74.8% excellent and good functional score were obtained. These results were found to be compatible with the results of many studies.

We think that total knee arthroplasty, which cuts ligaments in patients with advanced knee osteoarthritis that cannot even meet their basic needs, is a very successful

and open surgery especially in the elderly population in terms of reconnecting the patient to life and providing a better quality of life.

Ethical approval

This study was approved by the Inonu University Health Sciences Noninvasive Clinical Research Ethics Committee (No: 2020/497).

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