

PRELIMINARY RESULTS OF TOTAL KNEE ARTHROPLASTY: TASHKENT MEDICAL ACADEMY EXPERIENCE

M.Yu. Karimov, S.B. Madrakhimov
Tashkent Medical Academy

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Abstract

Objective: to evaluate the short-term results of 82 patients who underwent primary total knee replacement (TKR), with an average follow-up period of 16 months.

Material and methods: A prospective study was conducted in a multidisciplinary clinic of the Tashkent Medical Academy (Tashkent, Uzbekistan) and the Wiltse Memorial Hospital (Suwon, Republic of Korea). The sample consisted of 82 patients (54 women and 28 men) who underwent TKR from November 2018 to January 2020, with a total of 82 knee joints. The age of the patients ranged from 52 to 87 years (average age 61 years). The diagnosis of knee osteoarthritis of the 3rd – 4th degree (Kellgren and Lawrence) was confirmed in all patients. Several types of cement fixation implants were used (GruppoBioimpianti, DePuy, Corentec, Stryker, Zimmer). The Hospital for Special Surgery (HSS) scale, the volume of movements, and the visual analog pain scale (VAS) were used as criteria for functional evaluation.

Results: The average duration of hospitalization was 11 days. The average volume of movements was 100.6° at the end of the observation period. The knee joint in all patients demonstrated adequate stability. All the patients returned to their former daily activities. 43 patients out of 52 patients in the 12-month postoperative period were satisfied with the outcome of the operation. During the study, there were no cases of postoperative mortality, periprosthetic infection and revision intervention.

Conclusion: up to date, during clinical observation of patients with osteoarthritis of the knee joint who underwent primary TKR, the results were found satisfactory.

INTRODUCTION

Osteoarthritis (OA) of the knee joint is one of the leading causes of disability among adults over 65 years old [1]. Patients with OA experience significant pain and functional deficiency during normal daily activities, which leads to a loss of productivity and a deterioration in the quality of life [2,3]. Although many conservative treatments are available for the treatment of mild to moderate OA, the terminal stage of knee joint OA is best treated with total knee replacement (TKR) [4]. From 2005 to 2030, the number of TKR procedures is projected to grow exponentially by 601%, reaching an estimated 3.48 million procedures per year 3. In addition, TKR is already one of the most frequently performed inpatient surgical procedures in Western countries [5,6].

Satisfactory results obtained after performing TKR are widely described in the literature, both in terms of pain relief and in terms of maintaining these results over a long-term follow-up period [7-11]. The success of the surgical procedure depends on many factors: a correct diagnosis, comorbid pathology of the patient, a sense of understanding of the patient's responsibility for the upcoming operation, thorough preoperative preparation. The qualification of a knee joint replacement surgeon, the state of soft tissue balance, the

correct selection of the type of endoprosthesis, the readiness of the operating unit, the quality of instruments and many other factors also play a significant role.

This paper describes the functional results of patients who underwent TKR. The aim of this study was to evaluate the short-term outcomes of 82 patients who underwent primary TKR, with an average follow-up period of 16 months.

MATERIAL AND METHODS

In the period from November 2018 to January 2020 in the Department of Orthopedics of the Multidisciplinary Clinic of the Tashkent Medical Academy and the Wiltse Memorial Hospital (Suwon, Republic of Korea). 82 patients (54 women and 28 men) with a diagnosis of "Osteoarthritis (osteoarthritis, deforming osteoarthritis) of the knee joint of 3-4 degrees" underwent 82 primary unilateral TKR. The age of the subjects ranged from 52 years to 87 years (average age 61.0 years). The duration of follow-up was on average 16 months (from 4 months to 25 months). The patients were re-examined 3 months after the operation.

Surgical procedure. All operations were performed with standard medial parapatellar access.

Bone cuts of the femur were made perpendicular to the mechanical axis using an intramedullary guide. The proximal part of the tibia was also sawn perpendicular to the mechanical axis of the tibia using extramedullary guides. Patellar arthroplasty was solved by the condition, thickness of the patella and the presence of anterior pain syndrome in the knee joint and was performed in 27 cases. Spinal anesthesia was applied to all patients. The wounds were sewn in layers in a state of knee flexion. The tourniquet was not used in 12 cases. The same postoperative protocol was applied to all patients. Patients were discharged home after adequate pain control and demonstration of functional capabilities.

Prevention of thromboembolism was achieved by general measures: compression ligation of the lower extremities, elevated position of the lower extremities, activation of the patient with partial load for 2-3 postoperative days, after ultrasound duplex examination of the vessels of the lower extremity.

The protocol used was the Hospital for Special Surgery (HSS) Knee Osteoarthritis Protocol, as well as a Visual Analog Scale (VAS) of Pain, and the determination of the volume of knee joint movements, which were evaluated in the six-month postoperative period. Patients' satisfaction with the outcome of the operation was surveyed in the 12-month postoperative period.

There are six variables in the HSS protocol: pain, function, range of motion, muscle strength, flexion strain, and instability. Points were deducted if crutches or a cane were used, loss of active knee extension was observed, or varus and valgus instability was observed. The maximum score was 100 points, the results were classified as follows: 85 points or more were considered excellent; 70-84-good; 60-69-satisfactory; and 60 or less-unsatisfactory. Pain levels for VAS were measured on a numerical rating scale of 0-10, where 0 is the absence of pain, and 10 is "unbearable pain that can be imagined."

Statistical analysis. Statistical analysis consisted of two methods. During the analysis, the Wilcoxon test was used to determine whether there were any significant differences in HSS scores from the beginning to the end of the operation. To find out whether there is any significant difference in the delta (absolute and relative) of the HSS score between subgroups depending on age, the Mann-Whitney criterion was applied. Nonparametric methods were used, since the HSS estimate did not represent a normal distribution (Gaussian distribution). The criterion for determining the significance was the level of 5%. Statistical analy-

sis was carried out using the Microsoft Excel® 2013 statistical system software.

RESULTS

Table 1. Characteristics of numerical variables

Indicator	Number of patients, n	Mean	SD	Mediana	Min	Max
Years	82	61,0	7,8	61	52	87
Follow-up period (months)	82	16,0	4,4	16	4	25

Note: SD is the standard deviation.

Table 2 shows the mean, standard deviation (SD), median, minimum and maximum for HSS scores before and after surgery, the corresponding absolute changes (delta) and relative changes (delta %), as well as the corresponding descriptive levels (P values) of the Wilcoxon test. The absolute change in the HSS score from the preoperative to the postoperative period was determined by the formula: Delta HSS = (postoperative HSS score – preoperative HSS score). The relative change (%) of the HSS score from the beginning to the end of the operation was: relative delta HSS (%) = (postoperative HSS score – preoperative HSS score) / preoperative HSS score x 100. In this study, we observed a significant increase in the average HSS score after surgery - 27.6 points (P = 0.0001), which corresponded to an average of 51.4% (P = 0.0001)

Table 2. Analysis of postoperative HSS score

HSS Score	Number of patients, n	Mean	SD	Mediana	Min	Max	P value
Preop score	82	58,4	10,3	60	31	80	
Postop score	82	86,0	5,1	87	73	92	
Delta HSS (score)	82	27,6	2,1*	28	9	58	0,0001
Relative delta HSS (%)	82	51,4	4,3*	46,8	10,8	176,3	0,0001

Note: SD is the standard deviation, * is the standard error

For all patients, the average value of VAS was 1.8 points (SD ± 3.3).

Seven patients reported pain when climbing/descending stairs, 12 patients reported periodic pain in the lower leg, 10 patients reported discomfort when walking more than 100 meters. At six-month follow-up, the average volume of movements was: extension 2° (range from 0° to 6°) flexion 100.6° (range from 90° to 115°). It is also worth noting that during the follow-up period (an average of 16 months), no cases of

postoperative mortality, periprosthetic infection and revision intervention were registered.

12 months after the operation, patients (n=52) were asked about satisfaction with the results of the operation. In addition, there were questions about the positive changes in the use of walking aids and walking distance. (Table 3)

Patient satisfaction at 12 months after surgery

Satisfied	43
Walking aids, clinical improvement	29
Walking distance, clinical improvement	36
Not satisfied	9

DISCUSSION

In our study, the number of women prevailed over men, which is consistent with the idea that osteoarthritis mainly affects women, and they are at much greater risk of having a need for TKR12–16. For example, in the UK from 2002 to 2018, a total of 57% of primary TKR were performed in women, which is slightly less compared to our figures (65.8%). In addition, the patients in our study were much younger (61 years versus 70 years).17 Perhaps the reason lies in the demographic indicators and life expectancy of the population of Uzbekistan, where the percentage of elderly people over 64 years old is 4.7%, which is 3.5 times less compared to the same United Kingdom (16.5%) [18].

HSS scores were used in a blind manner in which an orthopedic surgeon with a doctor-ate in orthopedics evaluated the scale before surgery and six months after surgery. The experience of the evaluator and the routine use of the HSS scoring system were fundamentally important for the validity of the study 19,20. The HSS scale after surgery in our study showed an average of 86 points. In comparison with the literature data, we noted that our results of the HSS scale were similar, with a difference only in the time of the study [21].

The average indicators of pain syndrome in the form of VAS (1.8 points (SD ± 2.3)) and the volume of movements: extension of 2° (range from 0° to 6°), flexion of 100.6° (range from 90° to 115°) were similar to the data in literature22,23. Considering that these results were obtained six months after the operation, it can be assumed that the indicators improved with long-term follow-up, since according to studies, the plateau of the volume of movements is reached in the 12-month period after the operation [24].

Our research and methodology have some limitations. First of all, the number of patients is relatively small due to the smaller flow of patients with knee os-

teoarthritis who can afford to purchase implants (the lack of a unified insurance system). Also, elderly patients, as a rule, do not always trust new methods and it is inconvenient for them to come to hospitals for repeated follow-up visits, which makes it difficult to recruit a large number of patients with high potential for long-term studies. Secondly, there was no control group with an alternative surgical intervention.

Due to the peculiarities of the socio-economic conditions of our region, a number of factors negatively affect the outcome of surgical intervention. The patient population has a completely different profile in terms of age, morphology, severity of the disease and lifestyle, unlike those in developed countries. Also, the prevalence of severe deformities, poor bone quality and concomitant rheumatoid diseases increase surgical difficulties and reduce the chances of success and service life of primary TKR25.On the other hand, given the wear resistance of modern implants and the limited level of activity of most patients, it is logical to assume the long-term service of the primary TKR.

CONCLUSION

Despite the above, the total knee replacement performed by our team demonstrated satisfactory short-term results based on the clinical indicators of patients with osteoarthritis of the knee joint and excellent results in relation to revision interventions. Further studies with a large cohort and subsequent long-term follow-up are needed to evaluate and improve the use of TKR in end-stage knee osteoarthritis. Also, in the future, it is necessary to raise the issue of creating a single joint register or large institutional databases. Since it is difficult to foresee the volume and workload of revision arthroplasty, which we are likely to face in the near future.

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