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Sports Activity Following Total Knee Arthroplasty in Patients Older than 60 Years

Hermann O. Mayr, MD PhD [a,1], Maik Reinhold, MD [b], Anke Bernstein, PhD [a], Norbert P. Suedkamp, MD PhD [a], Amelie Stoehr, MD [b]

[a] Department of Orthopaedic and Trauma Surgery, Freiburg University, Germany
[b] OCM Clinic of Orthopaedic and Trauma Surgery, Munich, Germany

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ABSTRACT

In a retrospective study with a population over 65 years, sports activity was conducted 6 years after cruciate retaining (CR) total condylar knee arthroplasty (TKA) with rotating platform (RP). Eighty-one Patients (71.8 ± 5.4 years) were examined at follow-up 6.4 ± 0.9 years postoperative. Sport was practiced 5.3 hours every week in mean. Patients were active in sports 3.5 times per week. Twenty-five percent performed high impact sports, 47% medium impact sports and 52% low impact sports at follow-up. In KOOS sports 60 ± 28 was reached, in WOMAC 12.1 ± 15.1. It can be concluded that in this population 50% of patients were active in medium and low impact sport 6 years after surgery. However, a quarter of patients were also active in high impact sports.

In the modern society sport is an essential part of life to get life quality, health, self-esteem, and social contacts. Just over the age of 50 sports is becoming increasingly important for social integration. One common cause of sports disability is osteoarthritis of the knee. The high expectations of patients to a good functional outcome after TKA are therefore understandable. In recent years a controverse discussion was held on high impact loading activities after TKA. Often physicians and their patients have concerns about sports activities after TKA. These are supported by studies that showed an increased wear and loosening of the artificial joint [1–3]. On the other hand, it is assumed that physical activity in an adjusted degree is reducing the loosening rates of prostheses, or at least has no negative influence [4,5].

It was the objective of the present study to examine sports activity after total knee arthroplasty in impact and frequency as well as possible correlations to the patient-related outcome.

Material and Methods

In a retrospective follow-up clinical study, performed from November 2010 to September 2013, sports activity of 81 patients from an Alpine area was explored. Ninety-seven percent of these patients were sports active during live time. Patients were examined and questioned 6.4 ± 0.9 years after implantation of a total knee arthroplasty.

IRB admittance for the study has been obtained from the ethics committee of Freiburg University authorities November 16th 2010, admission number 346/10.

Included were all consecutive patients (ASA I–III) who received a cemented cruciate retaining total knee arthroplasty with rotating platform (LCS) without resurfacing the patella at the same hospital by the same surgeon between February 2004 and September 2007. Exclusion criteria for participation in this study were the patient's age below 60 and above 80 years, pre-operative arthrofibrosis, status after knee joint fractures, osteotomies, previous knee ligament surgery, functional impairing gonarthritis of the contralateral knee, arthritis of other joints, other joint arthroplasty of the lower extremity or rheumatoid disorders. Patients between the age of 60 and 80 years were selected to control an age related sports activity of a representative retired population. Forty-three female and 38 male patients at the age of 71.8 ± 5.4 years were examined at the follow-up. The average body height was 171.5 cm and the average body mass index was 28.4. Patients had the following comorbidities: 55.6% ($n = 45$) hypertension, 25.9% ($n = 21$), chronic back pain, 17.3% ($n = 14$) treatment after cancer, 9.9% ($n = 8$), diabetes mellitus type I/II, and 7.4% ($n = 6$) pulmonary disease. Index diagnosis was grade IV osteoarthritis (Kellgren/Lawrence) of the knee. Forty-seven patients (58%) were operated on the right knee and 34 patients (42%) on the left side. Thirty-one patients showed a preoperative valgus leg axis between 0.5 and 20° and 50 patients a varus leg axis between 0.5 and 12°. Two patients were lost at the time

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Reprint requests: Hermann O. Mayr, MD PhD, Department of Orthopaedic and Trauma Surgery, Albert Ludwig University of Freiburg, Hugstetter Str. 55, 79106 Freiburg, Germany.
[1] OCM-Clinic of Orthopaedic and Trauma Surgery, Department of Knee Surgery, Steinerstr. 6, 81369 Munich, Germany.

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of follow-up. They had died of non-intervention related reasons. All other patients in this consecutive series were included in the follow-up. Three patients who were not willing to come for examination to the clinic, have been visited by the examiner at home. The following complications occured: one patient suffered from a late infection after 4 years. In this patient irrigation and synovectomy were carried out. The tibial inlay was changed. Two patients suffered from arthrofibrosis with subsequent arthroscopic revision and infection exclusion. An implant loosening was not observed.

Sports activity was evaluated by impact and quantity with a scoring system developed by the work group due to different sports impact levels. The actual scoring system is based on the 2005 Survey of the Knee Society [6,7]: high-impact sports: Alpine skiing, rock climbing, dancing, tennis. Medium-impact sports: hiking, cross country skiing, nordic walking, fitness. Low-impact sports: aqua fit, golf, cycling, swimming. Sports activity 1 year preoperatively and at the time of follow-up was questioned. Sports frequency and duration of sporting activity were documented.

Assessment of patient related outcome was achieved by the Knee injury and Osteoarthritis Outcome Score (KOOS) [8,9]. Functional and subjective outcome was measured by the Western Ontario and McMaster Universities Arthritis Index (WOMAC) [10,11].

At the time of follow-up standard conventional X-rays were obtained in three planes, i.e. posteroanterior with the patient standing on one leg, lateral view and a tangential view of the patella in 45° flexion. It was assessed whether potential signs of loosening were present. Thus, it was examined whether radiolucent lines were present to the femoral or tibial component. The individual zones were documented. For this purpose, the extension of the KSS Knee Society Total Knee Arthroplasty "The Roentgenographic Evaluation and Scoring System" was used [12].

In the study, the LCS knee (DePuy Orthopaedics, Warsaw, IN, USA) was used in the cemented version with a rotating platform. LCS knee is a cruciate retaining TKA with ultra congruent tibial inlay. As surgical approach to the knee the "Mini Midvastus access" was used. The LCS rotating platform knee was implanted in a ligament adapted technique. Releases were carried out to reach a straight leg axis and achieve a balanced extension and flexion gap. Care was taken to tight collateral ligament stability. Patella arthroplasty was not performed in the study.

Statistics

Main outcome variable is the sports activity of patients. It is assumed that patients with a high KOOS Sports achieve an increased level of sports activity compared to patients with a lower score. A KOOS Sports with a mean difference of 30% and a standard deviation of difference 12% is hypothesized. For a total of 73 patients and $\alpha = 0.05$ a power of 0.95 can be obtained. For statistical evaluation of the program SSPS, version 19.0 was used. The following statistical tests were applied. Descriptive statistics and frequencies were used to describe sports activity and Kolmogorov–Smirnov to test for normal distribution. Spearman's rank correlation coefficient was used for non-normally distributed samples to assess relationships between sports activity and outcome scores. Significance level was set at $P < 0.05$.

Results

A total of 74 patients (91.4 %) showed no effusion during clinical examination. Medial laxity was 2.8 ± 0.8 mm and lateral laxity was 2.6 ± 0.7 mm measured in 30° knee flexion. Evaluation of the range of motion of the investigated knee joints showed an average extension/flexion of 2° ± 1.1°/0°/120° ± 9.7°.

Knee Injury and Osteoarthritis Outcome Score (KOOS)

In the category of pain a mean of 90.2 ± 10.2% was reached at the 6 year follow-up. The maximum value of 100% indicates that the patient is always completely painfree. One patient achieved a minimum value of 56% (1.2%) in contrast to 100% of 21 patients (24.9%). In the category symptoms a mean of 86.9 ± 13.1% shows that patients are only slightly limited by symptoms such as swelling, popping in the knee joint, feeling of instability, or flexion and extension deficits. Only one patient (1.2%) achieved the minimum of 60.0%, whereas 16 patients (19.8%) reached the maximum of 100% with regard to function in daily living. In the activities of daily living the study population reached a mean of 91.5 ± 8.6%. This result is very good, in view of the fact that 100% means no limitations in daily life. Only one patient (1.2%) stated the minimum of 60%, whereas 16 patients (19.8%) reached the maximum of 100%.

In the category sports and recreational activities a mean value of 60.3 ± 27.6% was achieved. The minimum of 0% was indicated by two patients (2.5%), whereas the maximum of 100% was scored by eight patients (9.9%). In the KOOS knee survey four questions deal with knee-related quality of life and showed a mean value of 73.9 ± 20.5% (min. 25%, max. 100%) in the present study population.

Western Ontario and McMaster Universities Arthritis Index (WOMAC)

The WOMAC Score is divided into three subscores: pain, stiffness and limitations in activities of daily living. With regard to pain, a mean of 2.7 ± 3.9 out of 50 points was achieved. Only one patient (1.2%) reported 15 points whereas 44 patients (54.3%) had no pain at all. The mean for stiffness was 1.0 ± 1.9 out of 10 points. Only one patient (1.2%) scored 10 points. In contrast, 54 patients reported (66.7%), never to suffer the feeling of stiffness. The subscore for limitations in activities of daily living reached a mean of 8.6 ± 10.8 points. Twenty patients (24.7%) reported no limitations and one patient (1.2%) scored 46 points. Finally, the total score was formed by adding all three subscores, and showed a mean of 12.1 ± 15.1 points ranging from 0 points (20 patients; 24.7%) to 61 points (one patient; 1.2%).

Sports Activity and Activity Level at 6-Year Follow-Up

Ninety-seven percent of the patients practiced sports during lifetime. All examined patients have reported to perform sports 3.5 times on a weekly base. At 1 year preoperative they reported 1.5 times less activity per week. On average 5.3 hours of sport were performed per week by each patient at the 6 year follow-up compared to 3.3 hours 1 year preoperatively. At follow-up a mean 25% of patients were performing high impact sports like dancing, Alpine skiing and tennis whereas 47% performed medium impact sports like mountain hiking and 52% low impact sports like biking and swimming. Detailed specification of sports activity during lifetime, at 1 year preoperative and at follow-up is presented in Table 1.

Table 1
Sports Activity of the Study Population 6 years After TKA in Comparison to 1 Year Preoperative and the Lifetime Sports Activity.

	Lifetime		1 Year Preop		6 Years Postop	
Sports activity	No. of Pat.	%	No. of Pat.	%	No. of Pat.	%
High impact sports						
Alpine skiing	62	77	14	17	20	25
Rock climbing	14	17	2	3	7	9
Dancing	44	54	15	19	37	26
Tennis	23	28	3	6	16	20
Medium impact sports						
Mountain hiking	73	90	22	27	57	70
Cross-counry skiing	48	59	13	16	22	27
Nordic walking	22	27	8	10	25	31
Fitness	30	37	15	18	27	33
Low impact sports						
Water gymnastics	16	20	12	15	21	26
Golf	10	12	4	5	9	11
Biking	79	97	55	68	76	94
Swimming	67	83	56	69	62	76