The Journal of Arthroplasty 30 (2015) 1911–1916

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Sports, Physical Activity and Patient-Reported Outcomes After Medial Unicompartmental Knee Arthroplasty in Young Patients

Tilman Walker, MD [a,1], Julia Streit, MD [a,b,1], Tobias Gotterbarm, MD [a], Thomas Bruckner, Dr [c], Christian Merle, MD, MSc [a], Marcus R. Streit, MD, MSc [a]

[a] Clinic of Orthopaedic and Trauma Surgery, University of Heidelberg, Heidelberg, Germany
[b] Department of Trauma and Orthopaedic Surgery, BG Trauma Centre Ludwigshafen, Ludwigshafen, Germany
[c] Institute of Medical Biometry and Informatics, University of Heidelberg, Heidelberg, Germany

ARTICLE INFO

Article history:
Received 17 February 2015
Accepted 15 May 2015

Keywords:
medial UKR
mobile bearing
activity
knee arthroplasty
sport
unicondylar knee arthroplasty

ABSTRACT

One hundred-and-one patients age 60 or younger following medial mobile bearing UKA were reviewed retrospectively with a minimum follow-up of 2 years using the Schulthess activity score, Tegner, UCLA and SF-36 score to assess their level of physical activity and quality of life. Patients showed a rapid recovery and resumption of their activities with a return-to-activity rate of 93%. Most common activities were low impact, whereas high-impact activities showed a significant decrease. Precaution was found to be the main reason for a decrease in the level of activity. The results of this study demonstrate that patients age 60 or younger following medial UKA were able to return to regular physical activities with almost two-thirds of the patients reaching a high activity level (UCLA ≥ 7).

Unicompartmental knee arthroplasty (UKA) is considered to be a highly effective treatment after failure of conservative or joint preserving methods for isolated osteoarthritis in the medial compartment and offers some essential advantages compared to total knee arthroplasty (TKA). The procedure can be performed using a minimal invasive surgical approach with a small incision and limited exposure without dislocation of the patella, leading to less blood loss, a faster recovery and a shorter hospital stay [1]. Both crucial ligaments are preserved, therefore the natural knee kinematics is retained. Thus, patients with UKA tend to achieve a better range of motion and report a more "normal feeling" of the replaced joint [1–13]. Moreover, several trials report a high percentage, up to 20%, of unsure or dissatisfied patients after TKA, most of them with seemingly well-fixed and well-positioned components [14–18].

Excellent long-term results have been reported for the Oxford mobile bearing prosthesis (Biomet UK Limited, Swindon, UK) used in the medial compartment, with survival rates up to 98% after 10 and up to 91% after 20 years [19–22]. Based on these encouraging results the indication for UKA has been extended to younger and more active patients with high expectations concerning their postoperative level of physical activity [23,24]. If such expectations are not met, patients may be dissatisfied with the outcome in spite of a technically successful surgery. There are numerous studies assessing patients' activity levels after TKA [25–28] and UKA [27,29–32]. Nevertheless, none of these studies has addressed the high activity demanded by the group of young patients with high expectations on the function of their replaced knee joint [27,29–31]. Furthermore, there are only few data on the activity level after mobile bearing medial UKA [27,29,31]. Therefore we conducted the present study to assess the return-to-activity rate and to evaluate the physical activities of patients under the age of 60 following UKA in the medial compartment with the Oxford mobile bearing prosthesis. We hypothesized that patients under the age of 60 are able to achieve a high level of activity following medial mobile bearing UKA.

Patients and Methods

The present study comprises a consecutive series of 101 patients (118 knees) age 60 or younger at the time of surgery following minimal invasive Oxford UKA (Biomet UK Limited, Swindon, UK) performed in a multisurgeon series (12 surgeons) between September 2001 and December 2007. Patients were evaluated prospectively and the data were reviewed retrospectively at a minimum of two years postoperatively. If for any reason patients were not able to attend clinical follow up, they were contacted by phone to complete the questionnaire. For patients who had died, information was gathered from relatives and hospital/general practitioners to obtain relevant clinical information. For further data analysis patients were analyzed by gender.

One or more of the authors of this paper have disclosed potential or pertinent conflicts of interest, which may include receipt of payment, either direct or indirect, institutional support, or association with an entity in the biomedical field which may be perceived to have potential conflict of interest with this work. For full disclosure statements refer to http://dx.doi.org/10.1016/j.arth.2015.05.031.

Reprint requests: Marcus R. Streit, MD, MSc, Clinic of Orthopaedic and Trauma Surgery, University of Heidelberg, Schlierbacher Landstrasse 200a, 69118 Heidelberg, Germany.

[1] These authors contributed equally to this work.

http://dx.doi.org/10.1016/j.arth.2015.05.031
0883-5403/

The Oxford Phase III unicompartmental knee prosthesis (Biomet UK Ltd, Swindon, United Kingdom) was used in all patients. In 116 knees the indication for surgery was anteromedial osteoarthritis with severe knee pain after failure of all conservative treatment, two knees were treated for avascular necrosis of the medial femoral condyle. Additionally, in all cases the anterior cruciate ligament (ACL) as well as the collateral ligaments was functionally intact and the varus deformity was fully correctable manually. A previous osteotomy and a flexion deformity >15° were considered as a contraindication whereas patello-femoral osteoarthritis was not considered unless there was deep eburnation and bone grooving. Bodyweight and patients' age were not seen as a contraindication. In all patients a parapatellar approach was used as described by the manufacturer. All components were fixed with cement (Refobacin Bone Cement R; Biomet, Berlin, Germany). Intravenous cefuroxime (1.5 g Zinacef; GlaxoSmith-Kline, London, UK) was administered perioperatively. Anticoagulation consisted of low-molecular weight heparin (enoxaparin) administered subcutaneously the day before surgery and continued for five weeks postoperatively. Full weight-bearing was allowed from the first day postoperatively.

The follow-up regimen and the assessment of data have been described previously [32].The University of California Los Angeles activity scale (UCLA) [33] as well as the Tegner activity score [34] were used to assess patients' physical activity. Preoperative and postoperative physical activities were recorded using the Schulthess Clinic Activity Score [30]. Preoperative UCLA and Tegner Score describe the status right before surgery, whereas the Schulthess Clinic Activity Score describes the status before the appearance of the first restricting symptoms (such as pain, limited range of movement or instability in the knee joint) [30]. The period between first restricting symptoms and the time of surgery varied from a few months to several years. The scores were recorded retrospectively at the time of the last follow-up. The state of general health of the patients was assessed using the SF-36 Health Survey [35]. The SF-36 values of included patients were also compared with those of a matched reference healthy population and with those of a population of patients with osteoarthritis. Both reference populations were recorded by the developers of the SF-36.

The institutional review board approved all procedures (S-065/2011), and the study was conducted in accordance with the Helsinki Declaration of 1975, as revised in 2008.

Statistics

Data were recorded and analyzed using SPSS version 17.0 (SPSS Inc., Chicago, IL) and Graphpad Prism version 5.0 (Graphpad Software, San Diego, CA). The empirical distribution of continuous variables was described using mean and standard deviation. Differences between preoperative and postoperative data were examined with one sample t test and Wilcoxon signed-rank test. In case of categorical variables, count and percentage were calculated, and Pearson's chi-squared test was used to detect differences. For all tests, the significance level was defined at $P \leq 0.05$.

Results

Demographics and Study Group

At final follow-up, 3 patients (3 knees) had died of causes unrelated to their knee surgery without having had revision surgery. Two patients (3 knees) were lost to follow-up, both living abroad. A total of 5 patients had undergone revision surgery. Of those, three had to be excluded from this study because of conversion to TKA. The first patient was revised at 10 months because of persistent pain. The second patient had a bearing exchange for dislocation at 13 months. Although there were no further dislocations, the knee was revised to a TKA at 32 months for persistent pain both at rest and under load. In the third case, revised to TKA at 23 months, the patient reported persistent pain under load and instability of the knee during daily living. In all three cases, the reason for persistent pain could not be identified especially. No revisions were performed for wear or loosening. Due to the high pain level, all three patients did not return to regular physical activity, achieving a mean UCLA score of 2.5 (range 2–3) before revision surgery. The other two patients required an exchange of the mobile bearing. At final follow-up 8 years after surgery, the first patient reported a clicking noise in his knee during normal walking and a feeling of instability for 4 weeks. A CT scan confirmed fracture of the 3 mm mobile bearing and it was exchanged to a 4 mm inlay. This patient did not perform any high impact activities and reached an UCLA score of 5 before revision surgery. The second knee was revised for suspected early infection. Lavage and bearing exchange was performed at two weeks postoperatively. As both patients had an intact prosthesis at final review, they were not excluded from the present study.

Table 1
Patients' Demographics.

Patients (knees)	93 patients/109 knees
Sex	47 female/46 male
Mean age (years)	55 (range: 36–60)
Mean body mass index (kg/m^2)	32 (range: 20–58)
Operated side	34 right/43 left/16 both sides

The remaining 93 patients (109 knees) were available for review at a mean follow-up of 4.4 ± 1.6 years (range: 2.3–8.4 years) after surgery. The mean age at surgery was 55 ± 5 years (range: 36–60 years). Demographic data are shown in Table 1.

Physical Activities and Participation

Altogether 86 of 93 patients (93%) were active in at least one physical activity before the onset of the first restricting symptoms compared to 85 of 93 (91%) patients after surgery. There were 6 patients (7%) who quit their activities entirely after surgery and 5 patients (6%) who began with regular physical activities after surgery. Eighty patients returned to regular physical activity, resulting in a return to activity rate of 93%. Two patients (2%) who were inactive before surgery remained inactive after surgery. In general, patients' recovery was fast. Twenty-five patients (27%) were able to return to regular physical activity within one month after surgery, 52 patients (56%) within 3 months and 72 patients (77%) within 6 months. The remaining 21 patients (23%) required more than 6 months for the resumption of physical activity or remained inactive after surgery.

We could not find a statistically significant difference regarding the number of different physical activities patients took part in before the onset of the first restricting symptoms or after UKA (Fig. 1). Especially high-impact activities such as tennis, soccer, jogging or skiing showed

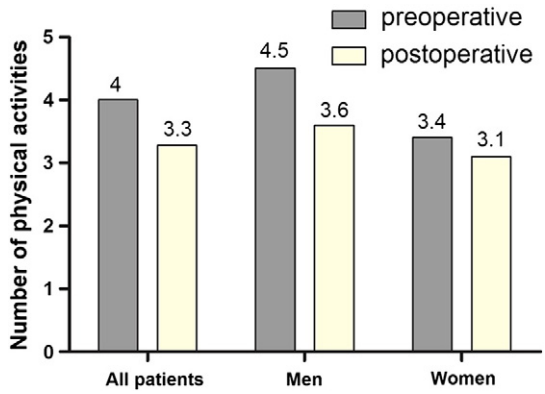

Fig. 1. Number of physical activities. Bar charts showing the number of different physical activities patients were participating before the onset of the first restricting symptoms and after medial OUKA.