

ABSTRACTS BOOK

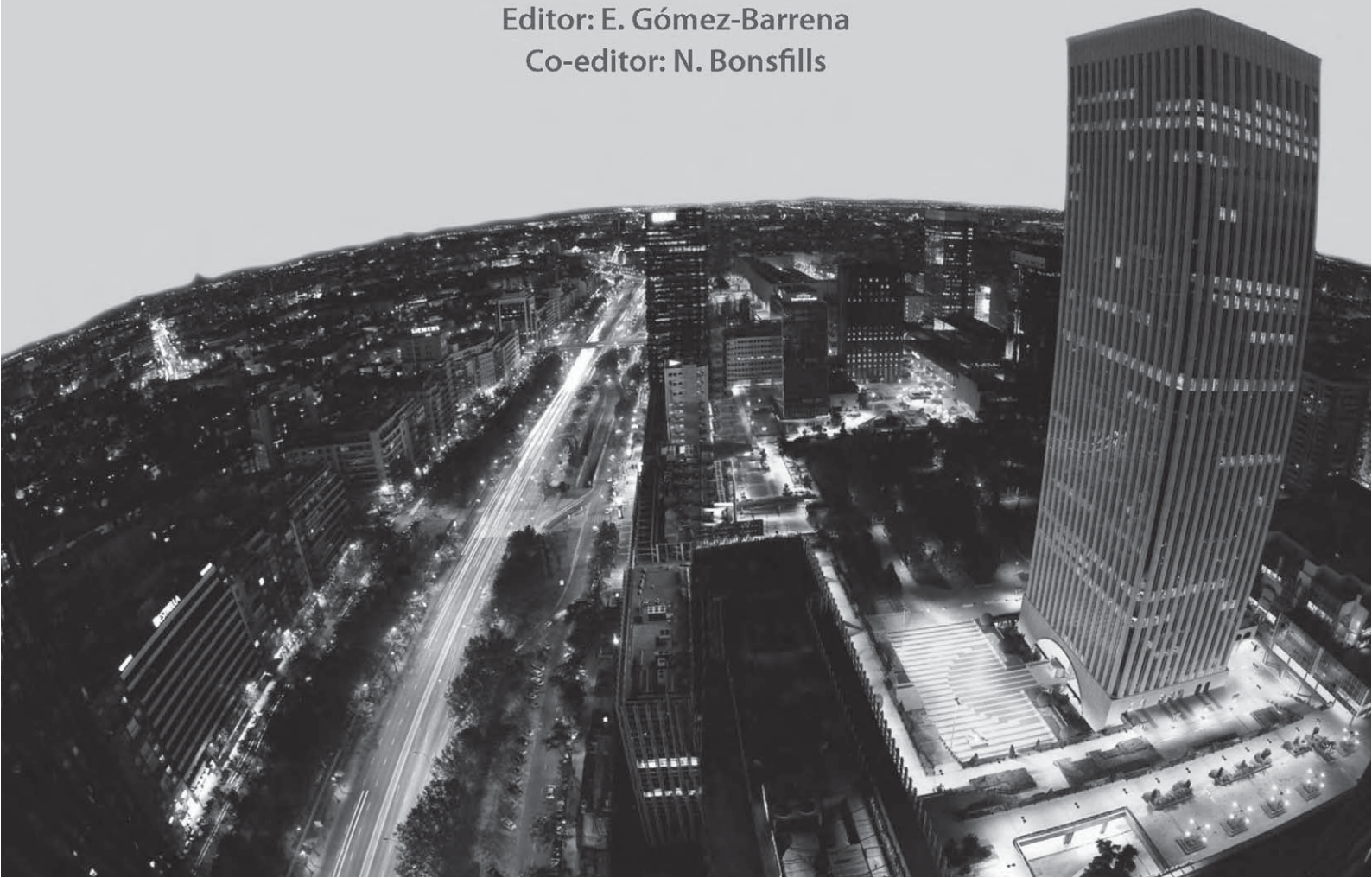
EORS 2008

EUROPEAN ORTHOPAEDIC
RESEARCH SOCIETY



17th ANNUAL MEETING
MADRID
April, 24 - 26

Editor: E. Gómez-Barrena
Co-editor: N. Bonsfills





O-073

FUNCTIONAL COMPENSATION OF THE OSTEOARTHRITIC LEG: DIFFERENCES BETWEEN HIP AND KNEE PATIENTS

Miranda Boonstra*, Maarten De Waal Malefijt*, Wim Schreurs*, Noël Keijsers**, Nico Verdonschot*

* ORL, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands

**Research & Development, Sint Maartenskliniek, Nijmegen, The Netherlands

m.boonstra@orthop.umcn.nl

Introduction

Patients with osteoarthritis (OA) will try to protect their impaired leg. They can either do that by reducing the movement velocity of the leg or by moving asymmetrically and thereby overloading the contralateral leg. In this study, we used the sit-to-stand movement to quantify which strategy OA patients use; reducing the movement velocity (=kinematic) or rising asymmetrically (=kinetic). Also, we were interested if there was a difference in patients with knee OA or hip OA. The first purpose of this study was to assess if there was a difference in asymmetry between knee and hip patients and if a total knee/hip prosthesis would lead to symmetrical loading. The second purpose was to assess the difference in moving velocity between the two groups and the effect of the prosthesis.

Methods

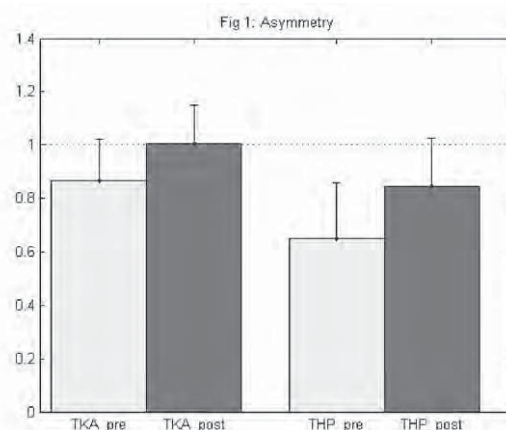
Patients on the waiting list for either total knee arthroplasty (TKA) or total hip arthroplasty (THP) were included in this study. The two patient groups were matched according to age and BMI, which resulted in 11 TKA (age=61.5 (sd=9.3), BMI=28.7 (sd=5.0)) and 10 THP patients (age=57.2 (11.3) and BMI=24.9 (sd=4.2)). The subjects were measured pre-operatively, and 1 year post-operatively. The sit-to-stand movement was performed 10 times, with rest in between, from 90° knee flexion from a chair with adjustable height and without armrests. The subjects had to hold their hands at their waist, and their ankles in a straight line under their knees. The feet were separately placed on two force-plates. The asymmetry (=ASYM) was defined as:

$$ASYM = \frac{Peakforce_tka}{Peakforce_contralateral} \quad (eq\ 1)$$

The movement velocity was quantified as the maximal knee angular extension velocity (VELOCITY_KNEE) and was measured with sets of bi-axial accelerometers and a gyroscope on lower and upper leg¹. The ASYM and VELOCITY_KNEE were averages of the 10 rises. Student t-tests were used to assess differences between the THP and TKA groups and the improvement with the prostheses was assessed with a paired t-test.

Results

Pre-operatively, the ASYM was greater for the THP group than for the TKA group, $p=0.015$. Both groups showed an improvement after 1 year ($p=0.045$ for THP and $p=0.05$ for TKA) and this amount of improvement was not different between the groups ($p=0.58$). This resulted in a still greater ASYM for the THP group as compared to the TKA group, 1 year post-operatively ($p=0.039$), see figure 1. Concerning the VELOCITY_KNEE, there were no significant differences between the THP (pre:mean=99.7, sd=22.3; post:mean=108.6, sd=17.8) and TKA group (pre:mean=86.4, sd=18.3; post:mean=107.0, sd=24.2), both pre-operatively ($p=0.15$) and 1 year post-operatively ($p=0.86$). The THP group showed no significant improvement ($p=0.19$), while the TKA group did improve significantly ($p=0.018$).



Discussion

Hip and knee patients differ in how they perform the sit-to-stand movement. Hip patients rose more asymmetrically, both pre and 1 year post-surgery. Asymmetrical joint loading due to osteoarthritis is a risk factor for evolving contralateral osteoarthritis progression². THP patients do not load their prosthetic leg adequately. We did ask the patients if they were aware of this unloading, but they were surprised that they loaded asymmetrically. The knee patients showed a very symmetrical rising pattern after they received their prosthesis. However, TKA patients tended to rise with a smaller velocity of movement pre-operatively, but they showed a significant improvement in velocity of movement after 1 year.

Conclusion

Hip patients change their movement pattern kinetically, whereas knee patients change it kinematically. After placement of a THP, the asymmetrical loading pattern remains with the risk of evolving contralateral OA. Hence, extra attention on asymmetrical movement should be paid during the rehabilitation period of THP patients.

References

- Boonstra, M.C. et al. *J.Biomech*, 39, 354, 2006.
- Shakoor, N. et al. *Arthritis Rheum*, 46, 3185, 2002.