Summary of selected results

The effect of valgus braces on medial compartment load of the knee joint – in vivo load measurements in three subjects

Kutzner, I.[1]; Küther, S.[1]; Heinlein, B.[2]; Dymke, J.[1]; Bender, A.[1]; Halder, A,[3]; Bergmann, G.[1]

In: Journal of Biomechanics, 44 (2011), p. 1354-1360.

Abstract

Osteoarthritis is the most commonly occurring joint disease with the associated symptoms of pain and loss of mobility. In addition to surgery, various standard conservative treatment methods are used, such as lateral shoe wedges, forearm crutches, weight loss and OA orthoses to reduce the axial tibial force. Prior to this study, no direct measurement of the medial contact force had been performed in order to substantiate the medial relief effect.

The study compared 2 hard-frame orthoses with a monocentric joint. The study examined former patients with medial osteoarthritis of the knee in everyday situations, such as walking and climbing stairs. The relief effect was determined using a special endoprosthesis that recorded the forces that occurred. The aim of the study was to investigate the relief effect on the medial compartment. The study is presented below in extracts.

The results demonstrate that relief of the medial compartment is achieved with both orthoses.
However, in this comparison, the MOS Genu achieves significantly better results.

Methodology

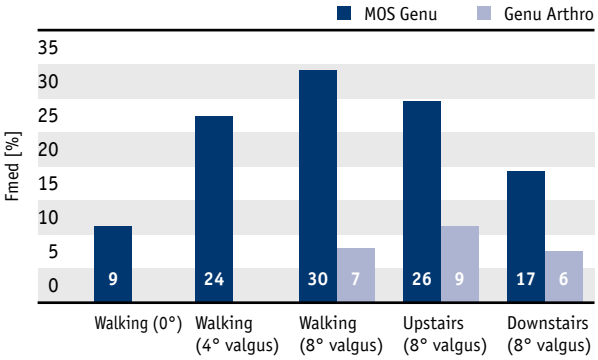
Test subjects:	Number: 3			
	Age [in years]	64	71	60
	Weight [kg]	103	96	96
	Height [cm]	177	175	175
	Time, post-operative [months]	23	12	6
	Mechanical axial angle	3° varus	4° varus	1° varus

Test orthoses:	MOS Genu (Bauerfeind AG); Genu Arthro (Otto Bock Health Care GmbH)
Data analysis:	Variance analysis with significance level of 5%
Test method:	· 3 activities with (x) repetitions: Walking (30), going upstairs (5), going downstairs (5)
	· Endoprosthesis with sensors for cable-free force/moment measurement
Inclusion criteria:	· Endoprosthesis following osteoarthritis in the medial compartment
	· No pain

[1] Julius Wolff Institute, Charité – Universitätsmedizin Berlin, Augustenberger Platz 1, 13353 Berlin, Germany.
[2] ZHAW Zurich University of Applied Science, Biomechanical Engineering, Winterthur, Switzerland.
[3] Hellmuth-Ulrici-Kliniken, Klinik für Endoprothetik, Sommerfeld, Germany.

Results (selection)

Reduction of the medial, axial forces

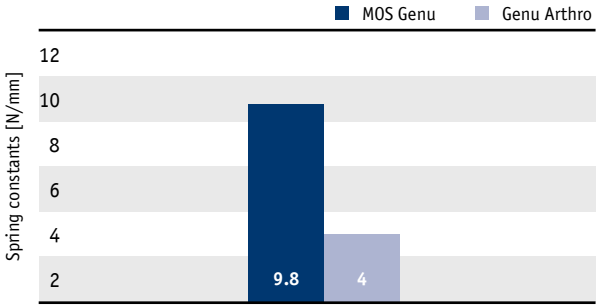


Significant reduction in the medial, axial forces through use of the MOS Genu.

By wearing the MOS Genu, a reduction in force of 9% is possible even in the neutral position (0°), while the relief achieved with an 8° valgus adjustment is 30% (compared to 7%).

Stiffness test

[Measurement with 100 N load]



MOS Genu demonstrates a stiffness that is 2.5 times higher with a medial load system.

With the same adjustment, higher valgus forces can be transmitted.

Discussion

The test method examines the effect of OA orthoses during activities with which an average patient is confronted in everyday life.

The measurements demonstrate that the forces on the medial compartment can be significantly reduced with an OA orthosis. Even with a 4° valgus adjustment, the system provides significant relief. It should also be noted that MOS Genu, depending on the specific loading situation and the valgus adjustment, can produce a level of relief which is up to 4 times greater. These clear differences between the two orthoses can be attributed to a number of factors, including the greater stiffness of the MOS Genu.

In terms of everyday use, this can mean a crucial reduction in pain for the patient, together with greater ease of typical movements, such as walking or climbing stairs.