MalleoLoc®

EFFECTIVENESS OF THE MALLEOLOC® ORTHOSIS IN THE REDUCTION OF CHRONIC MECHANICAL ANKLE INSTABILITY

Wenning M[1,2], Gehring D[2] , Gollhofer A[2]

The study presented here examines the effectiveness of the MalleoLoc orthosis in the reduction of chronic mechanical ankle instability (MAI). For this, the innovative 3SAM method (3D arthrometric ankle measurement using MRI), a combination of the high-resolution 3D MRI technique and the mechanical/functional approach of arthrometric measurement, was used to determine 3D joint congruency. Using this method, the goal was to quantify the mechanical component of chronic ankle instability, by measuring the joint congruency area or the cartilage contact area (CCA).

MalleoLoc®
Ankle orthosis

METHODOLOGY

Study design:	controlled quasi-experimental study
Sample:	• control group (= healthy volunteers) n = 25 (16 women, 9 men) • MAI group (= patients with mechanical ankle instability) n = 25 (16 women, 9 men)
Examination method:	3SAM = 3D arthrometric ankle measurement using MRI
Indication:	mechanical ankle instability (MAI)
Test orthosis:	MalleoLoc
Inclusion criteria for control group:	• no previous ankle injuries • mechanically stable during clinical examination
Inclusion criteria for MAI group:	• chronic ankle instability (according to Gribble et al. 2013) • CAIT <24 (Cumberland Ankle Instability Tool) • no acute injury within the 3 months prior to the MRI examination • mechanical instability found during clinical examination
Outcome measurements:	3D joint congruency/cartilage contact area (CCA) (talofibular, talotibial horizontal, talotibial vertical)

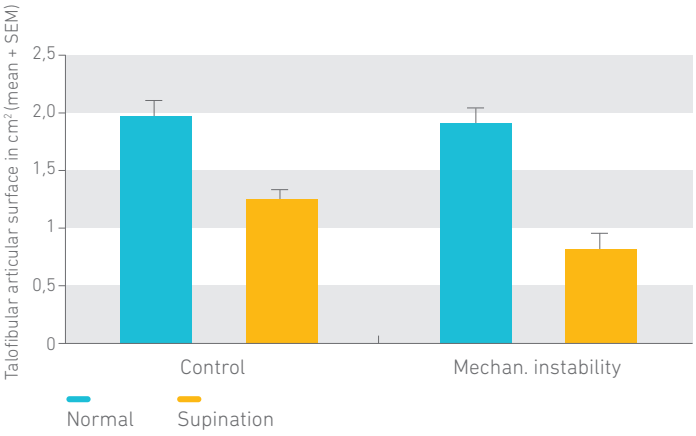
RESULTS

The 3D joint congruency was determined both in the control group and MAI group. The measurements included the "talofibular" contact area as an indicator for lateral osseous stabilization, "talotibial horizontal" as the horizontal weight-bearing area and "talotibial vertical" as an indicator for medial osseous stabilization.

The measurements were carried out in the normal position (neutral zero) and in a functional position (plantar flexion/supination). In the MAI group, the parameters were also determined in the functional position, with the test subjects wearing the MalleoLoc ankle orthosis.

Source:
[1] Department for Orthopedics and Trauma Surgery, Freiburg University Hospital
[2] Institute of Sport and Sport Science at Freiburg University

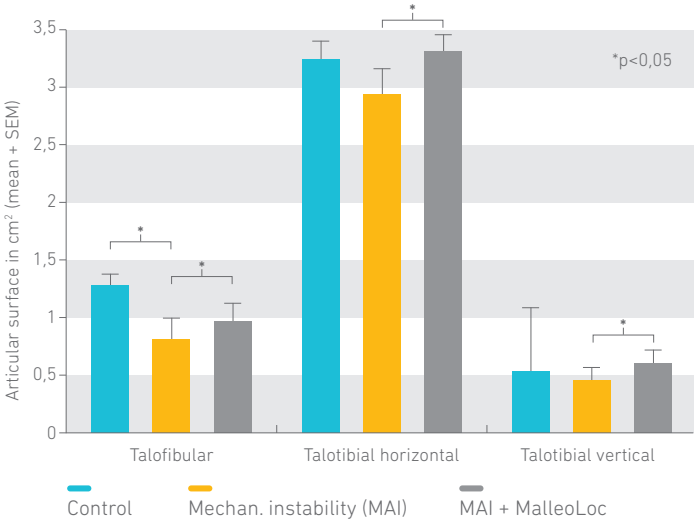
Comparison of joint congruency in the normal and functional positions



There is a reduction in joint congruency in the functional position, both in healthy subjects and patients with mechanical ankle instability.

Patients with mechanical instability lose more of the articular surface in the functional position compared with the healthy control group.

Impact of an orthosis on joint congruency



In a functional position, joint congruency is reduced in patients with chronic mechanical ankle instability.

The MalleoLoc significantly improves joint congruency.

Image: MRI scan of the articular surfaces (talofibular, talotibial vertical and talotibial horizontal) with orthosis; ventral view of the right foot in a functional position

Assessment of the ankle orthosis by the subjects examined

Parameter	Control	MAI
Stability	7,2	8
Comfort	5,2	5

Very poor (0) — Very good (10)

The MalleoLoc provides significant stabilization to healthy subjects as well as patients

Acknowledgment
M. Wenning was supported as a fellow in the Berta-Ottenstein Program for Clinician Scientists at Freiburg University's Faculty of Medicine.

MalleoLoc®

FUNCTIONING OF THE ANKLE ORTHOSIS DURING SIMULATED INVERSION OF THE UPPER ANKLE JOINT

Gehring D., Lohrer H., Nauck T., Wißler S., Gollhofer A.
Department of Sport and Sport Science, University of Freiburg

The most common injury in sport is ligament injuries affecting the upper ankle joint, which make up 25% to 40% of all traumas. In addition to physiotherapy and tape bandages, supports and orthoses are used for acute treatment and later on in the rehabilitation phase. The use and benefits of these aids have been demonstrated and confirmed many times over. The aim of this investigation was to evaluate the function of the MalleoLoc ankle orthosis during a simulated ankle inversion, taking into account a dynamic injury scenario.

METHODOLOGY

Sample:	n = 17 men, age: 25.7 ± 4.4 years
Test orthoses:	MalleoLoc ankle orthosis (Bauerfeind AG)
Measurement systems:	3D kinematics (Vicon MX), electromyography
Test method:	17 test subjects were asked to walk at a normal speed over a trapdoor with and without the orthosis on their foot. The test was repeated with and without anticipation of the trapdoor's behavior (opening or closing). Muscle activity was measured during the inversion phase and a comparison of the response of the peroneus muscle under all conditions was performed.
Inclusion criteria:	Active men who play sport aged between 18–35 years with unilateral chronic ankle instability (FAAM-G score (2) < 95%)

MalleoLoc®
Orthosis for the stabilization of the ankle

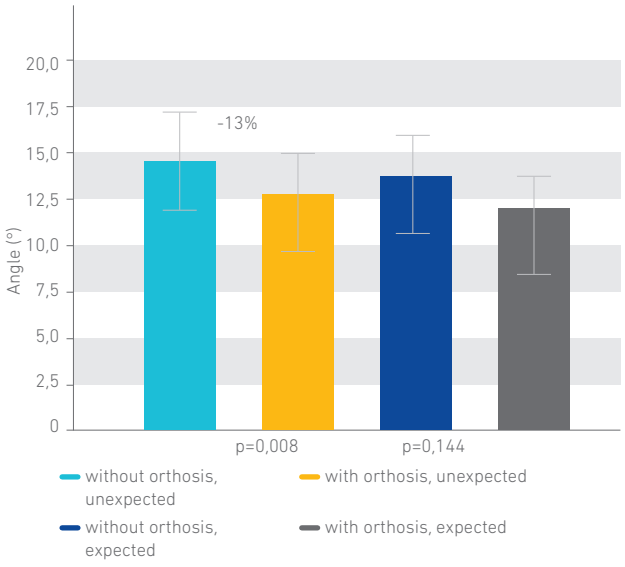
Source:
Gehring D, Wissler S, Lohrer H, Nauck T, Gollhofer A;
Expecting ankle tilts and wearing an ankle brace influence joint control in an imitated ankle sprain mechanism during walking;
Gait Posture. 2014 Mar;39(3):894-8. doi: 10.1016/j.gaitpost.2013.11.016. Epub 2013 Dec 4

RESULTS

The results show that a reduction in the maximum joint inversion and the inversion speed was achieved with the orthosis. A reduction in maximum joint inversion was observed in all tests. However, the degree of inversion was much smaller when test subjects did not anticipate the trapdoor's behavior (Picture 1). Picture 2 shows a reduction in the maximum speed of joint inversion. It was much greater when subjects did not anticipate the trapdoor's behavior. In the simulation of the sprain movement, the orthosis did not affect plantar flexion while walking.

→ **MalleoLoc stabilizes the ankle and significantly reduces the risk of damaging supination movements**
→ **MalleoLoc enables a normal movement process while walking**

Maximum inversion angle



Maximum speed of inversion