Special Issue:
24th Annual Meeting of ESMAC 2015 Abstracts
Aims and Scope. *Gait & Posture* is a vehicle for the publication of up-to-date basic and clinical research on all aspects of locomotion and balance. The topics covered include: Techniques for the measurement of gait and posture, and the standardization of results presentation; Studies of normal and pathological gait; Treatment of gait and postural abnormalities; Biomechanical and theoretical approaches to gait and posture; Mathematical models of joint and muscle mechanics; Neurological and musculoskeletal function in gait and posture; The evolution of upright posture and bipedal locomotion; Adaptations of carrying loads, walking on uneven surfaces, climbing stairs etc; Spinal biomechanics only if they are directly related to gait and/or posture and are of general interest to our readers; The effect of aging and development on gait and posture; Psychological and cultural aspects of gait; Patient education.

Journal Supplements: Inquiries regarding supplements should be sent to Reinbert van der Fluit, Elsevier BV, Radarweg 29, Amsterdam 1043 NX, The Netherlands; phone: (+31) 20485 2931; fax: (+31) 20485 2940; e-mail: r.f.vanderfluit@elsevier.com

© 2015 Elsevier B.V. All rights reserved.
This journal and the individual contributions contained in it are protected under copyright, and the following terms and conditions apply to their use in addition to the terms of any Creative Commons or other user license that has been applied by the publisher to an individual article:

Photocopying
Single photocopies of single articles may be made for personal use as allowed by national copyright laws. Permission is not required for photocopying of articles published under the CC BY license nor for photocopying for non-commercial purposes in accordance with any other user license applied by the publisher. Permission of the publisher and payment of a fee is required for all other photocopying, including multiple or systematic copying, copying for advertising or promotional purposes, resale, and all forms of document delivery. Special rates are available for educational institutions that wish to make photocopies for non-profit educational classroom use.

For information on how to seek permission visit www.elsevier.com/permissions or call: (+44) 1865 843830 (UK) / (+1) 215 239 3804 (USA).

Derivative Works
Users may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions or companies. Other than for articles published under the CC BY license, permission of the publisher is required for resale or distribution outside the subscribing institution or company.

For any subscribed articles or articles published under a CC BY-NC-ND license, permission of the publisher is required for all other derivative works, including compilations and translations.

Electronic Storage or Usage
Permission of the Publisher is required to store or use electronically any material contained in this journal, including any article or part of an article (please consult www.elsevier.com/permissions).

Except as outlined above, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the Publisher.

Notice
No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug dosages should be made.

Although all advertising material is expected to conform to ethical (medical) standards, inclusion in this publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer.

St. Louis: Elsevier Customer Service Department, 3251 Riverport Lane, Maryland Heights, MO 63043, USA; phone: (800) 6542452 [toll free within the USA]; (+1)(314) 4478871 [outside the USA]; fax: (+1) (314) 4478029; e-mail: JournalsCustomerService-usa@elsevier.com

Printed by Henry Ling Ltd, The Dorset Press, Dorchester, UK
The sole angle or ankle dorsiflexion did not show any significant correlation.

**Discussion:** In agreement with the literature [1], patients with fixed knee contractures do not improve crouch gait by AFO, they rather require surgical interventions. Further, improvement of crouch cannot be expected with good plantarflexor strength and external foot progression, the latter reduces the moment arm of the foot with respect to the knee extension axis. The type of foot contact (heel, excessive toe, or flatfoot) as well as passive and active ankle dorsiflexion during walking did not have any predictive value. Therefore the classification of crouch gait based on foot contact and ankle dorsiflexion [2] is not relevant for the indication of the AFO’s used in this study to improve crouch gait.

**References**


http://dx.doi.org/10.1016/j.gaitpost.2015.06.145

**Session PS16 Orthotics**

*Spatistic hemiparetic gait pattern after over 6 month period of using carbon-fibre anterior leaf spring AFO? Flaws and advantages*

M. Alvela*, M. Bergmann, Ü. Kruus, M.-L. Ööpik, K. Englas, P. Eelmäe

Haapsalu Neurological Rehabilitation Centre, Centre of Excellence in Health Promotion and Rehabilitation, Haapsalu, Estonia

**Research question:** The aim of the study is to find out the main problems in gait pattern of children who have used carbon-fibre anterior leaf spring AFOs for more than six months.

**Introduction:** Clinical gait analysis (CGA) is an important component of evidence based medicine and rehabilitation. Proper physiotherapeutic evaluation combined with data gathered during 3D CGA can be used for goal setting and evaluation of the efficiency of physiotherapeutic interventions and higher quality of rehabilitation services. The 3D CGA can be used as an objective evaluation tool for finding the right orthotics for gait pattern correction. The use of carbon-fibre anterior leaf spring orthotics to cure drop foot in hemiparetic children has been a growing trend over the past years [1].

**Materials and methods:** 3D CGA was conducted on five right side hemiparetic children mean age 10.4 ± 3.4 (±SD) years. All the patients had been using the carbon-fibre anterior leaf spring AFO for more than six months. The reason for wearing orthotics was on all occasions drop foot and incorrect prepositioning of the foot in swing phase. During the study, all patients used the orthotics with their usual footwear. Motion in sagittal plane was analysed and compared with barefoot trials. 3D Vicon Gait Analysis System and two AMTI platforms were used to capture the data. Markers were placed according to Davis model. Physiotherapeutic assessment was carried out prior to the gait analysis. For interpretation 2 good trials with orthotics and footwear and barefoot were selected to compare the sagittal plane movement of ankle, knee and hip shown in degrees ±5D.

**Results:** The angles were looked at in sagittal plane during initial contact (IC), midstance (30% of gait cycle) and during late swing. IC occurred with ankle dorsiflexion barefoot –13 ± 5.1, with orthotics 0.1 ± 6.1. The knee flexion angle was 10.7 ± 8.5 and 8.7 ± 5.7 accordingly and hip flexion barefoot 34.4 ± 5.6 and with orthotics 32.2 ± 14. During midstance the ankle angle barefoot was 6.6 ± 1.7 and with orthotics 4.4 ± 4.6. Knee flexion angle was 7.4 ± 2.7 and 9.9 ± 21.7 accordingly and hip angles 11.4 ± 4.7 barefoot and 12.9 ± 9.9 with orthotics. During late swing the ankle angle barefoot was –15 ± 4.2, with orthotics 1.5 ± 4.9. Knee angles showed 8.9 ± 7.5 and 9.0 ± 5.4 accordingly and hip angles barefoot 33.6 ± 5.2 and with orthotics 32.3 ± 11.7. In addition the orthotics was seldom incorrectly used – wrong size, loose fitting, incorrect footwear and absence of insoles.

**Discussion:** Gait pattern improved with orthotics mostly regarding ankle join motion, especially in IC. During mid stance all three joints showed variable results in improvement. During late swing the knee extension was insufficient, which also resulted in poor ankle angle. In conclusion – proper gait training is necessary to avoid habitual patterns like knee flexion in late swing which appeared in all five patents. In addition guidance for proper use of orthotics is necessary.

**Reference**


http://dx.doi.org/10.1016/j.gaitpost.2015.06.146

**Session PS16 Orthotics**

*The contribution of a rigid and a spring-hinged Ankle Foot Orthosis to ankle work in children with cerebral palsy*

Y. Kerkum*, J. van den Noort, A. Buizer, M.-A. Brehm, J. Becher, J. Harlaar

Rehabilitation Medicine, VU University Medical Center, MOVE Research Institute Amsterdam, Amsterdam, Netherlands

**Research question:** To evaluate the effects of a rigid and spring-hinged Ankle Foot Orthosis on ankle power and work in children with CP.

**Introduction:** Gait of children with cerebral palsy (CP) is often hampered by excessive knee flexion in stance. To counteract the knee flexion, rigid ventral shell Ankle Foot Orthoses (AFOs) are often prescribed. Although this AFO generally improves knee joint kinematics and kinetistics, it obstructs ankle range of motion and push-off power. A more spring-like AFO can store and release energy, which may enhance push-off power by taking over ankle work [1].

**Materials and methods:** 15 children with spastic CP (11 boys, 1072 years, GMFCS level I–III), all walking with excessive knee flexion, were prescribed with an AFO with integrated hinge (Neuro Swing®, Fior & Gentz). The hinge was set into three stiffness configurations: rigid (3.8 Nm/deg), stiff (1.6N/m/deg), and flexible (0.7 Nm/deg). The AFO mechanical properties were measured using BRUCE [2]. A 3D-gait analysis was performed for each AFO. We assessed peak ankle power generation (A2) and ankle work (Wankle) over the whole gait cycle (GC) and during push-off (PO). Using the data from the BRUCE measurements, AFO contributions to ankle work (Wankle) were calculated. Generalized Estimation Equations (GEE) were used to analyze the effects of different conditions on the outcome measures.

**Results:** Peak ankle push-off power and ankle work were reduced by the rigid configuration, compared to the stiff and flexible configurations. Also the contribution of the rigid configuration to ankle work was smaller compared to the other two configurations. No differences were found between the stiff and flexible configuration, except for negative ankle work (see Table 1; Fig. 1).

**Discussion:** Spring-like AFOs seem to have beneficial effects on ankle push-off power and ankle work compared to a rigid AFO. Further research should investigate whether these effects are reflected