CLASSIFICATION OF GAIT PATTERN IN STROKE PATIENTS TO OPTIMISE ORTHOTIC TREATMENT AND INTERDISCIPLINARY COMMUNICATION

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Main topics: Analysis of gait and motor disorders, outcomes after clinical intervention, rehabilitation, orthotics.

INTRODUCTION and AIM

The goal of an orthotic treatment of stroke patients is the best possible approach towards physiological gait. In order for the intervention to work in the best way, the orthopaedic technician has to consider the individual biomechanic situation of the patient. With the N.A.P. Gait Classification, patients viewed laterally can be divided into gait types (GTs) with hyperextended and hyperflexed knee [1]. For both GTs, different requirements have to be met by an orthosis (AFO) [2]. The following examination deals with the influence of a dynamic adjustable AFO on the joint kinematics of both GTs.

PATIENTS/MATERIALS and METHODS

8 patients with prior stroke were treated with an adjustable AFO. According to the N.A.P. Gait Classification GT 1a (hyperextension, inversion; n=5) and GT 2a (hyperflexion, inversion; n=3) can be identified. The AFOs for both GTs have a high ventral shell, a long partially flexible foot piece and an adjustable ankle joint with a very strong ventral spring. Additionally, GT 1a has a very strong and GT 2a a medium dorsal spring. Then AFOs are tuned. All patients performed a gait analysis with standardised footwear. Per patient, three gait cycles of the affected side were filmed each with and without AFO. The angle movements of hip (HA), knee (KA), ankle (AA), tibia inclination (TI) and heel contact (HC) were recorded. In mid stance (12 to 31% of the gait cycle), both GTs were tested separately with a Wilcoxon rank-sum test for differences between the conditions “with AFO” and “without AFO”.

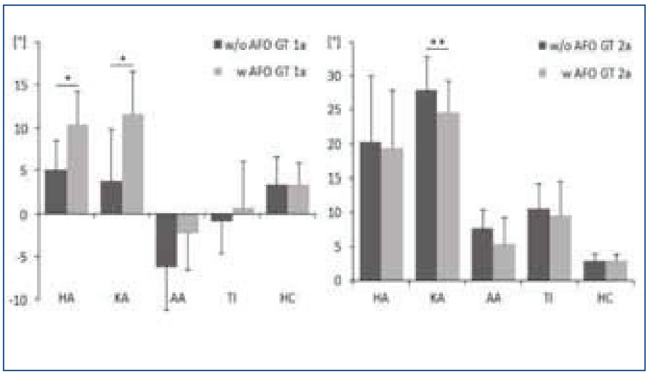

Figure 1: Joint angle [°] in mid stance with AFO and without AFO at a) GT 1a hyperextension and b) GT 2a hyperflexion. Valid is * p=0.05 and ** p=0.01

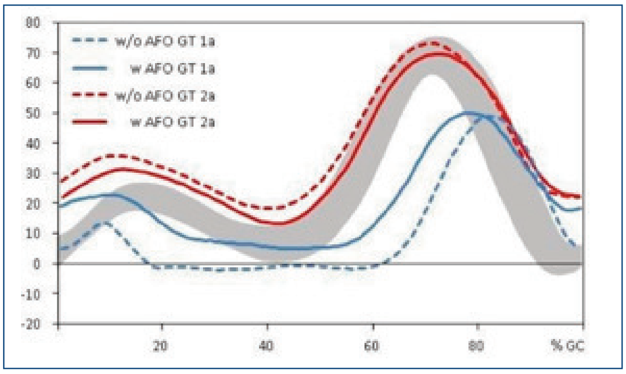

Figure 2: Movements of knee angle [°] at GT 1a hyperextension (blue), GT 2a hyperflexion (red), each with and without AFO as well as physiological gait (gray).

RESULTS

Patients with GT 1a (fig. 1a) show a significantly higher HA (p=0.041) and KA (p=0.039) when walking “with AFO”. In mid stance the KA of GT 2a (fig. 1b) is significantly lower (p=0.002) during gait “with AFO”, than when walking “without AFO”.

DISCUSSION and CONCLUSIONS

The AFOs adjusted to the patient’s individual gait lead to an increase of the KA in mid stance at GT 1a and to a decrease at GT 2a. Therefore, the variable resistance of the used springs has a decisive influence on the gait at lateral level [3]. The KA of both GTs bring the patient closer to a physiological gait (fig. 2). The N.A.P. Gait Classification is the optimal method to identify the gait type fast and unambiguously during the orthotic treatment of stroke patients. With more subjects, differences in the other angle movements could be proved.

REFERENCES

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