

Biomechanical Principles of Common Orthotic Treatment Concepts for Gait Problems in Cerebral Palsy - A Critical Consideration

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Introduction: The goal of an orthotic treatment in cerebral palsy (CP) is approaching physiological gait. An ankle foot orthosis (AFO) prepares the foot for initial contact, enables stability and supports the push off. It should perform a positive effect on therapy and must not lock residual physiological motion. A detailed consideration of existing AFO types shall indicate whether requirements can be met.

Participants and Methods: The effect of common AFO is evaluated. Considering criteria of adjustable alignment, pivot point, range of motion and spring force, solid AFO (SAFO), dynamic AFO (DAFO), floor reaction AFO (FRAFO), posterior leaf spring AFO (PLS AFO) and hinged AFO (HAFO) are compared.

Results: The alignment of most AFO cannot be adjusted. In HAFO this is possible depending on the joint type used. In PLS AFO, FRAFO and DAFO a defined pivot point is missing, while in HAFO it can be placed on the ankle joint. All orthoses lock plantar flexion. Range of motion is possible for certain joint types in HAFO. In PLS AFO, FRAFO and DAFO the spring force can be regulated during producing.

Conclusion: Due to an appropriate orthosis, approaching physiological gait and improving energy consumption of CP patients are possible. Common AFO don't fulfil all necessary requirements because basic adjustment possibilities are missing. The required spring force depends on gait type of the patient. The correct alignment of the orthosis using biomechanical principles is essential. The resulting demand is: Both dynamic and static AFO should be produced with an adjustable ankle joint.