

**About the necessity of a dorsal stop in KAFOs for patients with paralyses and weak plantar flexors****Background:**

Most patients with paralyses – caused by e.g. spina bifida, post-polio syndrome or spinal cord injuries – develop pathological gait patterns. Too weak or prolonged plantar flexors lead to additional instability while walking and standing. The goal of an orthotic fitting is to restore or even refine these gait patterns. A Knee-ankle-foot orthosis (KAFO) can change an unstable or deformed knee for the better. To ensure a most effective KAFO, it should be produced with a dorsal stop.

**Aim:**

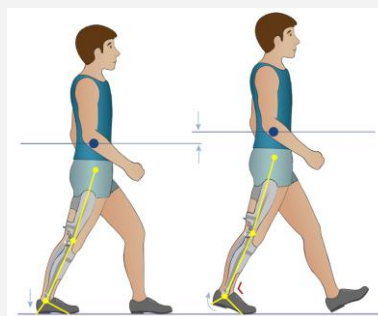
The goal of this observation is to call attention to the effects of too weak plantar flexors on gait pattern and to the necessity of a dorsal stop.

**Method:**

Biomechanics and gait patterns of healthy patients and patients with paralyses have been considered. Step length, stride characteristics, security and balance in standing and walking of patients wearing no KAFOs, KAFOs without and KAFOs with dorsal stop are evaluated.

**Results:**

A static, stable balance is based on a physiological state. Then, standing upright is possible without external help. The unstable ankle balance in patients with too weak plantar flexors leads to an increased insecurity while standing. Standing safely upright is only possible with external help. While walking, step length is apparently decreased and contralateral knee flexion increased. The heel remains on the floor and body's centre of gravity is too low. Same results are on KAFOs without dorsal stop (fig.).

**Discussion & Conclusion:**

Too weak or prolonged plantar flexors are responsible for the forefoot lever remaining inactive. An active forefoot lever ensures the safety necessary while standing. A dynamic forefoot lever ensures heel-lifting from floor in time, resulting in a balanced step length. Therefore, KAFOs should always be produced with ankle joints with adjustable dorsal stops or otherwise the securing effect of the orthotic knee joint is lost. Correct dorsal stop position can be checked by pressing the KAFO with foot piece into the designated shoe and putting the orthosis shell into dorsal stop position. Line of gravity should pass through the middle of the femoral shell and ventrally ahead of the ankle joint. Now, the KAFO should stand unassisted. If the patient is standing in his KAFO, stable balance efficacy can be visualised by slightly leaning the body's centre of gravity forwards and backwards. A correctly adjusted dorsal stop is absolutely necessary for all orthoses for patients with paralyses and weak plantar flexors to provide safety while standing and improve gait pattern.

**References:**

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 Mulroy SJ et al. *Prosthetics and Orthotics International.* 2010; 34(3): 277–292