WHAT IS THE INFLUENCE OF AN ANKLE-FOOT ORTHOSIS (AFO) ON THE SPATIO-TEMPORAL GAIT PARAMETERS AND FUNCTIONAL BALANCE IN STROKE PATIENTS?

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Introduction

Stroke
- Third leading cause of death
- Affects many aspect of life
- Patients have an altered gait pattern related to a number of factors: muscular weakness, altered coordination, altered motor programming, abnormal synergy patterns, and abnormal reflexes.

Walking, ambulation or locomotion
- One of the most common and important activity that we do during the day
- Individual need to move safe and efficient from one place to another
- For healthy people, this is automatic
- For stroke patients, a safe and adequate gait pattern is a challenge!

Why this research?
- Stroke patients have difficulties with gait and balance
- In the rehabilitation Department of ZOL (Ziekenhuis Oost-Limburg) in Lanaken, very early in the rehabilitation process, an ankle-foot orthosis (AFO) is prescribed if needed to assist in dorsi-flexion. During the weekly ankle-foot orthosis consultations, the orthoses of both in- and out-patients are adjusted according the individual needs, to promote an adequate and effective gait pattern with and without an assistive device.
- Aim of the health care professionals in Rehabilitation Department ZOL in Lanaken: To evaluate the gait pattern more objectively (with and without individualized orthoses)

Methods

Participants
- Fifteen patients were included for this study

Inclusion criteria
- Diagnosis of hemi-paresis caused by a Cerebro-Vascular Accident
- Chronic phase (> three months post-stroke)
- Patients can walk safely with and without an AFO
- Patients can understand simple instructions
- Familiar with wearing an AFO (Y-tec) since at least one month

Exclusion criteria
- Bilateral assistive devices needed for walking
- History of orthopedic problems (related to lower extremities) that would interfere with gait performance

Apparatus
- For this study, two different types of AFOs were used:
  - Maramed: Prefabricated AFO
    - Available in different sizes
    - Material: polypropylene
    - Positioned in a neutral dorsiflexed position
  - Y-tec:
    - Individualized AFO (V!GO)
    - Material: carbon + polypropylene
    - Additional strap to fixate the foot in the AFO

Research design
- Each patient was tested on three days within three weeks

Day 1
- Familiarization with the Maramed AFO and standardized sport shoes
- Collection of descriptive outcome measures
- Demonstration and practice of each experimental test

Day 2
- Patients were tested in three different randomized conditions
  - Condition 1 (without AFO)
  - Condition 2 (Maramed)
  - Condition 3 (Y-tec)
  - GAITRite® measurement:
    - An instrumented walkway embedded with sensors which are activated when the patient walks across the carpet
    - Used to detect spatio-temporal parameters
    - Coefficient of repeatability for walk length: 0.97, step length: 0.88, step length symmetry: 0.98, stride length: 0.96, single support time: 0.96, and a decrease in double support time
  - Three functional balance tests:
    - Timed Up and Go test (TUG)
    - Step Test (ST)
    - Four Square Step Test (FSST)

Day 3
- Patients were again tested on the GAITRite® and walked the Six-Minute-Walk Test (6MWT), within the three different conditions.