

Oral presentation

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A new protocol for complete 3D kinematics analysis of the ankle foot complex in stroke patients

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Introduction

Most widespread clinical gait analysis protocols for lower limb kinematics provide information about the ankle motion only in the sagittal plane. Behavior of the foot in the coronal plane during gait is usually determined just through the measure of the foot angle of progression. In the clinical practice most of the patients, particularly with upper motor disease, present a complex deformity of the foot in the three anatomical planes, most frequently in equinus, varus, supinated foot. Adequate kinematic analysis requires full consideration of the 3D ankle-foot complex position and motion on the basis of appropriate biomechanical conventions. The aim of the present work is to test the efficacy of current kinematic protocols for gait analysis in the measurement of 3D motion in stroke patients with foot deformities before and after surgery.

Methods

Ten stroke patients with equinus-varus foot deformity were analysed. Patients were evaluated by means of a clinical examination including: leg and foot alignment, range of motion, spasticity, strength and selectivity, and observational gait analysis of foot during gait. Patients were assessed by means of the Vicon system (8 TVC) during gait using Total 3D Gait protocol (T3DG) [1]. Five subjects were assessed over the same gait cycles by means of Plug in Gait protocol (PIG) [2] sharing common markers. Five

subjects were evaluated before and after surgery for foot deformities.

Results

Data obtained in the ten patients with the T3DG protocol provided a complete 3D measure of the deformity consistent with clinical measure of alignment and of range of motion. In the five patients evaluated during the same gait cycle by means of the two protocols, it was evident the added value of the T3DG protocol in providing information on the coronal and transverse planes. Data on operated patients provide evidence of changes induced by surgery. Figure 1.

Conclusion

Total 3 D Gait protocol, based on anatomical references and on the ISB convention [3] for the biomechanical reconstruction of movement, provides reliable 3D kinematics data of the ankle foot complex during gait, consistent with clinical findings. This offers greater support to clinicians in patients with severe foot deformities, such as stroke patients, for which the instrumental analysis is relevant for dynamic deformity measure, clinical decision making and outcome assessment, particularly after surgery.

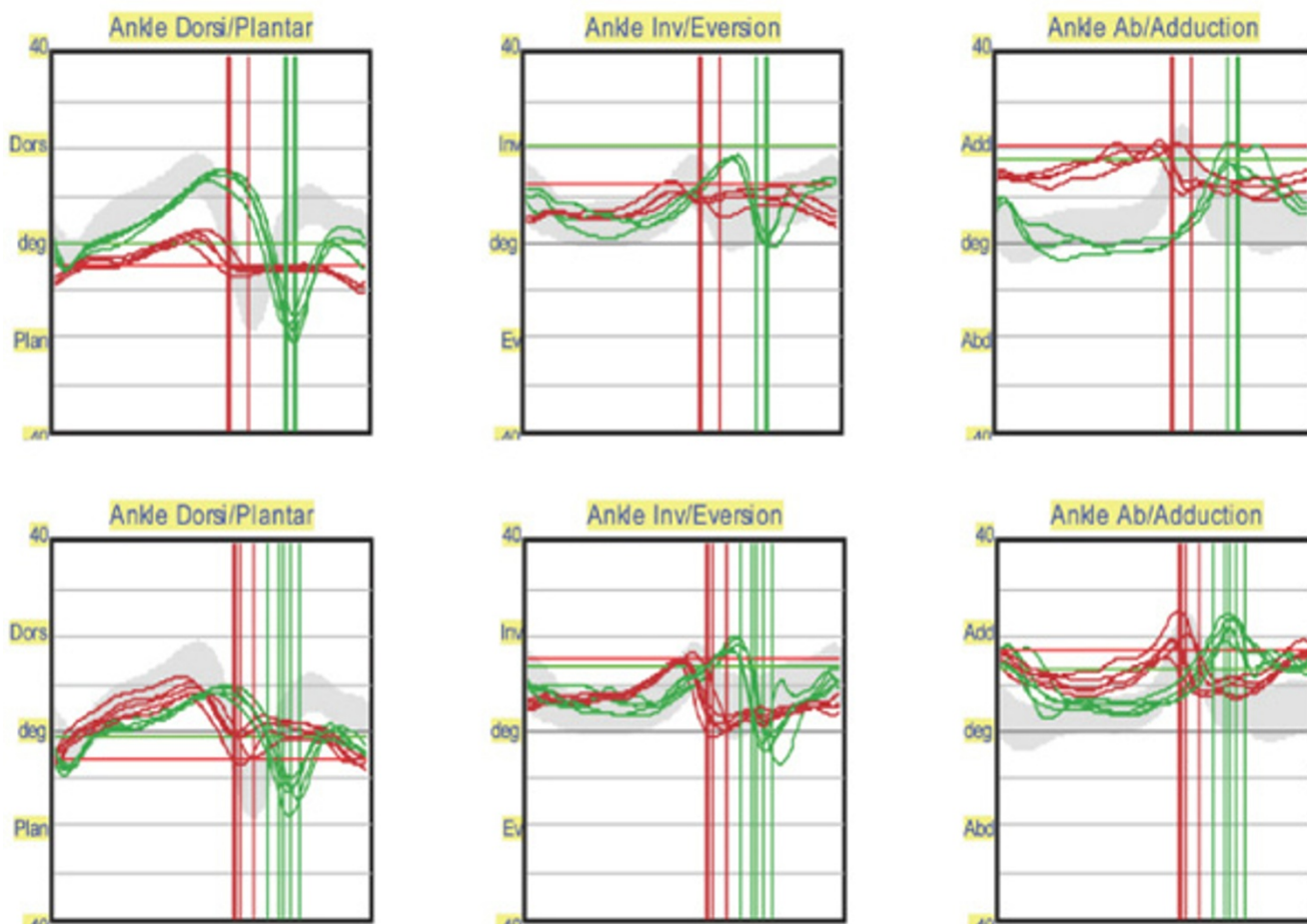


Figure 1
Ankle-foot complex rotations before (top row) and after (bottom) surgery.

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