

Feasibility and applications of the Deschamps multi-segment foot model in 3D gait analysis to evaluate foot kinetics in ankle and foot pathologies

by Naaim Alexandre | Paul André Deleu | Chèze Laurence | Univ Lyon, Université Claude Bernard Lyon 1, IFSTTAR, LBMC UMR_T9406, F69622, Lyon, France | Univ Lyon, Université Claude Bernard Lyon 1, IFSTTAR, LBMC UMR_T9406, F69622, Lyon, France | Univ Lyon, Université Claude Bernard Lyon 1, IFSTTAR, LBMC UMR_T9406, F69622, Lyon, France

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In daily practice, methods of assessment in patients suffering from foot and pathologies are observation, anamnesis, clinical assessment, medical imaging and in rare cases 3D gait analysis (3DGA). 3DGA is the state of the art for measuring lower limb joint kinematics and kinetics. However, assessing kinetics for the foot joints remains challenging and few studies integrate kinetic pressure map's measurement. The aim of this study was to demonstrate the feasibility of patient kinetics evaluation using 3DGA with a multi-segment foot model.

Ten asymptomatic participants performed a gait analysis using an 8-camera system combined with a force-platform and a pressure map to obtain a normative data base. To illustrate impairments that could be assessed, a patient with ankle osteoarthritis undergoing a total ankle replacement associated with a subtalar joint arthrodesis performed a pre-op and post-op 3DGA. The model proposed by Deschamps et al. 2017 for the foot was used. The net moments and power obtained for all foot joints were plotted on figure 1 for asymptomatic population and this patient.

The patient can develop post-op similar ankle power than asymptomatic subjects but presents compensation in the Chopart's joint rising the power generated above asymptomatic level. This compensation might be due to the subtalar arthrodesis and could later results in arthrosis in the Chopart's joint.

The model proposed allows to assess different impairments of the foot kinetics and could help to better understand degenerative mechanisms in foot and ankle pathologies. During the congress, typical foot deformities will be presented with additional patients.