

ESTIMATING QUALITATIVE PARAMETERS FOR ASSESSMENT OF BODY BALANCE IN A SIMULATED AMBULATORY SETTING

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ABSTRACT

Stroke often results in impaired balance which is a major cause of locomotor disability and may decrease the performance of many activities of daily living. Patients who suffered a stroke are trained to recover adequate control over their movements with the objective to optimize their daily-life functional performance. Continuous daily-life monitoring of balance control of stroke survivors in an ambulatory setting, is essential for optimal guidance of rehabilitation therapy by medical professionals and coaching of the patient.

Schepers et al. [1] developed instrumented force shoes (IFS) for the ambulatory assessment of the ground reaction force and the estimation of the position of centre of mass. They demonstrated the evaluation of dynamic balance control in stroke patients. However, for the assessment of body balance, foot placement (i.e. relative foot position), is a crucial variable. The IFS does not provide information about relative foot positions. In order to estimate the relative foot position, the Xsens (Enschede, the Netherlands) MVN Biomech measurement system will be used [2], which contains 17 inertial magnetic measurement units. Position information of all sensors will be estimated with Xsens' software, MVN studio Pro.

The purpose of this study is to demonstrate in stroke patients, the relation between qualitative parameters of body balance [3], while measuring in a simulated ambulatory setting using on-body measurement systems, and the results of a generally accepted clinical balance assessment.

A total of twenty stroke subjects will be included in a clinical study which is approved by the local medical ethical committee. Subjects will perform tasks in a simulated ambulatory setting; daily-life tasks: sitting, moving an object over a table, rising up, walking to another room, opening a door and returning an item from the other room. During the experiment, movements will be evaluated using the IFS and MVN Biomech system and afterwards qualitative parameters will be calculated and compared with the results of the clinical balance assessment (e.g. Berg Balance Scale [4]).

Although the IFS and the MVN Biomech system need to be redesigned to make them applicable for measurements during daily-life, it is expected that the combination of both systems allows to assess qualitative parameters of balance control in stroke patients in an ambulatory setting.

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