

Use of new posturographic parameters for the differentiation between various clinical groups

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Introduction

Posturography is a non-invasive diagnostic technique used to objectively assess human postural stability and postural responses. The technique includes the investigation of visual, somatosensory, motor and central nervous processes and their effect on stability. Analysis of postural signals that can provide comparison and differentiation between different types of problems may be highly useful for the clinician.

Objectives

To apply signal-processing methods to formulate new postural parameters, which would help in differentiating between different clinical groups.

Methods

Ninety-four subjects were measured using the Tetrax device (Sunlight Medical Ltd., Tel Aviv, Israel): twenty-nine (n=29) healthy subjects (OH, 75±6 yr) and 65 subjects suffering from balance problems (SCK, 75±12 yr). The SCK group was subdivided to 3 clinical groups: Cerebro-Vascular Accident (CVA) (n=11), Deconditioning (DEC) (n=35) and Total Hip Replacement (THR) (n=19). Raw data was collected and parameters in the time domain and in the frequency domain were extracted. In addition structural parameters based on the center of pressure (COP) plot were calculated.

Results

Most of the investigated parameters, among them COP area, Weight Distribution index (WDI), Anterior-Posterior sway, and Median Frequency of Sway, showed significant differentiation between sick elderly subjects and age-matched healthy elderly subjects (p<0.05).

A significant higher median frequency was found in the DEC group in comparison to the CVA group (p<0.05) and to the THR group (p<0.05). This is expected, since postural tremor of deconditioned patients due to muscle weakness may raise sway frequency in comparison to the CVA and THR groups.

A significant higher WDI was found in the CVA group and in the THR group in comparison to the DEC group (p<0.05). The uneven weight distribution in CVA and THR patients can be explained by the fact that they usually suffer from paralysis or other orthopedic problem.

Conclusions

The new posturographic parameters calculated in this study have the potential to differentiate between different pathologies. The sensitivity of these parameters may serve as a valuable tool in monitoring the effects of therapeutic interventions and rehabilitation.

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