Session 809 - Posture: Aging, Injury, and Disease

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809.05 / KK2 - The video head impulse test predicts the ability to reweight vestibular information during stance in patients with vestibular disorders

📅 November 16, 2016, 1:00 PM - 5:00 PM 📍 Halls B-H

Presenter at Poster
Wed, Nov. 16, 2016, 1:00 PM - 2:00 PM

Session Type
Poster

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Disclosures

J. Van Kordelaar: None. **J.H. Pasma:** None. **M. Cenciarini:** None. **C. Maurer:** None.

Abstract

INTRODUCTION: During stance, vestibular information is used and weighted based on its reliability. Vestibular deficits affect the reliability of vestibular information and therefore affect the ability to reweight vestibular information during stance. Vestibular information during stance mainly consists of frequencies up to 5 Hz. However, vestibular-ocular reflex (VOR) tests designed to detect vestibular deficits mainly operate in restricted frequency ranges such as 0.002 - 0.004 Hz for the caloric test, 0.1 - 1 Hz for the rotational chair test and 1 - 6 Hz for the head impulse test. In this study we investigated how these three VOR tests are related to the ability to reweight vestibular information under different sensory disturbance conditions in patients with vestibular disorders. METHODS: 11 Patients (5 female) with vestibular disorders (mean ± SD age: 59.3 ± 9.9 years) were included. All patients underwent VOR examination using videonystagmography during bilateral cold caloric test, the rotational chair test at horizontal harmonic oscillations of the chair at 0.4 Hz and the head impulse test. In addition, balance control experiments were conducted using continuous support surface rotations (SS) which followed a pseudo-random ternary sequence (PRTS). Patients stood with their eyes closed during two SS conditions: 1) 0.5 degrees peak-to-peak amplitude and 2) 1.0 degrees peak-to-peak amplitude. System identification and parameter estimation were used to estimate balance control model parameters, including the vestibular weight W_v which indicates how much patients relied on vestibular information in each condition. Spearman correlation coefficients were calculated to establish the relation between VOR tests (caloric test, rotational chair test and head impulse test) and the difference in the vestibular weight (W_{v_diff}) between 0.5 and 1.0 degrees peak-to-peak amplitude. RESULTS: Only the head impulse test was significantly related to W_{v_diff} (ρ = -0.67, p = 0.033), indicating that patients who showed more asymmetric ocular responses to left and right head impulses showed less sensory reweighting between SS conditions during balance control. DISCUSSION: Our results suggest that out of the three VOR tests included in this study the video head impulse test is most predictive of a reduced ability to reweight vestibular information during stance in patients with vestibular disorders. The video head impulse test mainly operates in the 1-6 Hz frequency range, which is comparable to the frequency range of joint torque and body sway oscillations and could therefore explain this high association.