

might generalize VV measurement after stroke, which requires analyzing VV clinimetric properties.

Objectives.– To analyze the reproducibility of the VV, and to determine the minimum number of trials required to reach a robust final result, comparatively in stroke patients and control subjects.

Materials and methods.– Twenty patients with a first and unique hemispheric stroke (61.9 ± 12 years; 10 left-10 right-sided; 2.6 ± 3 months since stroke), matched to 20 control subjects (54.4 ± 6 years) were recruited from a neuro-rehabilitation unit.

The VV was assessed in a darkened room, subjects being seated, with head and trunk maintained upright. Subjects verbally indicated how to reset a luminous line presented on a computer screen to their subjective visual vertical. VV was measured twice, 5 days apart, with 10 trials performed each time. An average (orientation) and a standard deviation (uncertainty) were calculated. The minimum number of trials was the lowest number of consecutive trials leading to a final result similar (not significantly different) to that obtained with 10 trials, both for orientation and uncertainty. Non-parametric statistics were used for analyses.

Results.– The mean VV orientations were $-3.7 \pm 0.8^\circ$ vs. $-0.1 \pm 0.8^\circ$ ($P < 0.01$), and the mean VV uncertainty were $1.4 \pm 0.1^\circ$ vs. $0.8 \pm 0.1^\circ$ ($P < 0.01$), in stroke patients and control subjects, respectively. The test-retest reliability was high in patients for the orientation ($r = 0.79$; $P = 0.001$); acceptable for the uncertainty ($r = 0.64$; $P = 0.002$), and modest in control subjects due to very small variations in data ($r = 0.45$; $P = 0.06$). The minimum number of trials required to reach a stable and robust final result was 6 in controls as in stroke patients, both for VV orientation and uncertainty.

Conclusion.– VV orientation and uncertainty are reliable clinical criteria for assessing the sense of verticality in stroke patients, provided results are averaged on at least six trials.

<http://dx.doi.org/10.1016/j.rehab.2012.07.264>

CO25-003-e

Determination of force platform parameters during sit to stand movement in elderly: A preliminary study

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Keywords: Ageing; Force platform

Communication of *Société de biomécanique*.

<http://dx.doi.org/10.1016/j.rehab.2012.07.265>

CO25-004-e

Effect on postural control of spastic equinovarus foot treatment with botulinum toxin in stroke patients: Randomized, controlled, multicenter trial

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Keywords: Botulinum toxin; Spasticity; Postural control; Dual task

Objective.– To study the effects on postural control of the treatment with botulinum toxin in lower limb muscles in stroke patients.

Method.– Multicenter, randomized, active treatment versus placebo, double-blind study. Inclusion criteria: Hemiplegia over a year after a stroke with spasticity of leg muscles and equinovarus. Clinical evaluation and instrumental at 4 to 6 weeks after injection on clinical examination and evaluation of postural

control. Assessment on an AMTI force plate of the center of pressure sway area for 30 seconds in three conditions: eyes open, eyes open in a dual task condition, eyes closed. The dual task consisted of a postural control task combined with an arithmetic task.

Results.– Forty patients were enrolled and randomized into two groups, one treated with botulinum toxin ($n = 19$) and the other with placebo ($n = 21$). The sway area before treatment was not significantly different between the two groups. The sway area of the center of pressure eyes open increased in placebo group ($+2.48 \text{ cm}^2$; sd 11.11) and decreased in the treated group (-1.74 , SD 8.30) after injection but the difference was not significant ($P = 0.735$). The main effect was found in dual task with a significant decrease ($P = 0.005$) of the sway area in the treated group (-3.11 ; sd 6.92) compared with the placebo group ($+0.27$, sd 3.57).

Discussion.– Treatment of spasticity by botulinum toxin injection in the lower limb muscles in hemiplegic stroke patient changes postural control in this study with a significant decrease of the sway area in the treated group compared with the placebo group. The assessment of postural control in dual task seems to be an interesting test and sensitive to these effects.

<http://dx.doi.org/10.1016/j.rehab.2012.07.266>

CO25-005-e

Simulating the effect of upper-body inertia on human balance recovery

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Keywords: Balance; Fall Simulation

Communication by *Société de biomécanique*.

<http://dx.doi.org/10.1016/j.rehab.2012.07.267>

CO25-006-e

Hemiparetics use more their proximal muscles for controlling the upright stance than healthy subjects do

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Keywords: Posture; Balance; Posturography; Hemiparesis; Asymmetry; Hip; Ankle; Center of pressure

Objectives.– Upright stance maintenance in humans is achieved by complementary and different mechanisms. For instance, when feet are positioned side by side, the resultant center of pressure (CPRes) are displaced along the antero-posterior (AP) axis are achieved through pressure variations mechanisms occurring around the ankle joints whereas, along the medio-lateral (ML) axis, the main mechanisms is the body-weight distribution which mainly involves the hip joint [1].

The posturographic analysis of hemiparetic patients shows, along the AP axis, a forward shift of the mean plantar CP positions under the paretic leg and a backward shift under the non-paretic leg [2]. This gap, which favors the use of a loading-unloading for controlling the AP CPRes displacements, could be enhanced in hemiparetic patients.

Methods.– Posturographic measurements of 41 hemiparetic patients (first CVA, 16 and 25 with stroke on the left and right sides, respectively) were recorded with the instruction to stand still upright. Forty-one healthy