without active pushing. Using modern analyses of brain imaging in stroke patients, several recent papers have specified which brain structures are involved in verticality perception and lateropulsion. These new findings, mainly obtained with studies of stroke patients, contribute to a better understanding of internal models of verticality with vestibular and somaesthetic graviception synthesised in the postero-lateral thalamus, and predict an improvement of balance by recalibrating verticality representation. Interestingly, this approach brings arguments supporting the relevance of traditional techniques used in clinical practice to attenuate lateropulsion, and points out new tracks for rehabilitation. This argues for a more systematic measurement of verticality perception in stroke patients showing postural disorders.

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Gait stability in paretic patients and its association with tone and strength of the lower limbs

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Keywords: Gait; Stability; Risk of falling; Neurology

Objective.– To explore the gait stability and the association between this parameter and lower limbs disabilities, in neurologically impaired patients.

Patients and methods.– Sixty-one paretic patients following a central nervous system pathology with gait limitations and twenty healthy adults were included. They were asked to walk during 30 seconds wearing an accelerometer set at the lower trunk. The local dynamic stability (LDS), a parameter derived from deterministic chaos theory that may predict fall risk, was calculated [1]. Moreover, the paretic patients underwent a tone and strength examination of the lower extremities.

Results.– Paretic patients walked with a lower frequency (8%, P < 0.05) and were more unstable (13%, P < 0.05) than the control group. The traumatic brain injured patients showed the highest instability whereas the spinal cord injured patients were the most stable. Significant fair to moderate correlations (r: 0.31–0.43, P < 0.05) between the gait data and the tonus were observed. The strength was correlated fairly (r: −0.26, P < 0.05), only with the antero-posterior stability index. A higher stability was obtained when the paretic patients had a more normal muscular tone and stronger muscles.

Discussion.– Despite the significant correlation, the force of the association was rather low between the tone/strength and the stability parameters (r < 0.50). However, hypertonia and reduced strength were not the only impairments that the patients exhibited and that could influence negatively gait stability. Because it is well known that falls are frequent in these patients, our results can be interpreted as new evidence that LDS is a relevant index for global gait stability and risk of falling. An efficient prevention should be based on early parameters that could warn practitioners of the imminence of future falls before they occur.

The use of the accelerometry enables to calculate these parameters and it is an easy method to perform with a minimal constraint to the patient.

Reference


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Complex movements induced by multiple vibrations after stroke: The stepping-in-place example

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Background.– Stroke patients have sensorimotor impairments that interfere in achieving functional tasks such as walking. Tendon vibrations induce an illusion of movement in the direction of stretching of the vibrated muscle and a motor response in the vibrated muscle or its antagonist. It could therefore be possible to induce complex stepping-in-place illusions and movements by applying vibrations appropriately.

Objective.– To determine whether the application of a vibration pattern which produces gait-like sensory activity can induce gait-like movements, among stroke patients, without any voluntary command. Material: Seven stroke patients (walking speed: 0.2 to 0.9 m/s, mean = 0.56 m/s) attended two experimental sessions. Vibrations were applied for one minute by twelve vibrators placed on the flexor and extensor muscles of the lower limbs. The subject was standing using a body weight support system. Vibrations were applied in a gait-like pattern organized in cycles of 1 or 2 seconds. Kinematic data were recorded using a motion capture NDI Certus system. The amplitude...