and frequency of movements created at the knees and hips were analyzed in the trials where responses to vibration were the best, as determined by visual analysis of joint movements.

Preliminary results.– Repeated and alternated movements of flexion and extension at the knees and hips were measured in response to the applied vibrations. The period of the cycles of the induced movements was equivalent to that of vibration cycles of 1 and 2 seconds for 81 and 92% respectively of cycles recorded. The amplitude of motion ranged from 0.4 to 7.9° at the knee and from 0.2 to 4.4° in paretic hip.

Discussion.– The application of a complex pattern of vibration can trigger, in hemiparetic subjects, rhythmic movements of small amplitude in the absence of voluntary command. It could provide a means of early rehabilitation training for different populations. These results should be compared with those obtained in healthy subjects.

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Lower limb coordination patterns during gait in hemiparesis – study in a cohort of 41 patients

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Keywords: Hemiparesis; Gait; Inter-segmental coordination; Continuous Relative Phase; Gait velocity; Hyperactivity; Soft tissue retraction; Botulinum toxin

Introduction.– Paresis, muscle overactivity and soft tissue contracture are the three main mechanisms responsible for gait disturbance in hemiparesis. In the rehabilitation management of hemiparetic patients, clinicians may try to determine the responsibility of each mechanism and to quantify the impact of treatment on movement organization and gait efficiency. Inter-segmental coordination analysis, using measurement of the Continuous Relative Phase (CRP) in the sagittal plane, may assist in reaching these objectives [1–3].

Methods.– A cohort of 41 patients with chronic hemiparesis and a group of 20 healthy subjects were analyzed [1–3]. The CRP between lower limb segments was quantified during gait at spontaneous and maximal velocity.

Results and discussion.– The amount of dephasing between lower limb segments, in each phase of the gait cycle, sheds light on the coordination pattern. Relevant parameters of the inter-segmental CRP (ie. RMS, peaks, mean, standard deviation, first derivative) may reveal specific information such as the predominance of neurological or orthopedic factors in the kinematic deficits, the impact of various conditions of gait rehabilitation, or treatment-related benefits. This analysis, complementary to routine clinical examination, may also disclose specific motor deficits in the paretic lower limb [1–3] and compensatory strategies at work in the non-paretic lower limb [1–3].

Conclusion.– These findings may encourage rehabilitation clinicians to carefully study coordination patterns, which may help optimize treatments to lessen gait impairment in spastic paresis.

References

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Spatiotemporal gait characteristics of hemiplegic patients

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Keywords: Gait speed; Hemiplegia; Asymmetry; Spatiotemporal parameters

Introduction.– The measurement of spontaneous walking speed is the usual descriptor of the gait performance of the hemiplegic. The maximum walking speed, and the parameters of temporal and spatial symmetry also seems interesting to characterize the gait of the hemiplegic. The objective was to study the spatio-temporal asymmetries of the gait with respect to the lateralization of hemiplegia, and to determine the parameters best correlated with motor impairment and function, at spontaneous and maximum walking speed.

Patients and methods.– Thirty-two stroke hemiparetic subjects (50 ± 14 years, 53% of left hemiplegia) conducted a standardized assessment of gait with a Locometer, at spontaneous speed (VS) and maximum speed (VM). The motor level assessed by the motor sub-score of the lower limb Fugl-Meyer (FMf) is 22.3 ± 7.4 of 34. The functional level assessed with the FIM is 106.8 ± 21 of 126. An index of temporal asymmetry (or IAT, obtained from time to single-leg support right and left) and spatial asymmetry (or IAS, obtained from the step length left and right) were calculated.

Results.– A high temporal asymmetry is always at the expense of hemiplegic side, while a high spatial asymmetry is divided equally between healthy and injured side. The correlation coefficient is high and significant (P < 0.001) between the score FMf and the IAT at VS and VM (−0.68 for both), the VM (0.66) and the VS (0.65). The correlation coefficient remains significant but with low value between the score FMf and IAS expressed in absolute value (−0.38 with P = 0.03 at VS and −0.46 with P = 0.008 at VM). The correlation coefficient is high and significant (P < 0.01) between the MIF and the IAS expressed in absolute value at VM (−0.72) and VS (−0.62), the IAT at VM (−0.53) and VS (−0.51), the VM (0.53) and VS (0.49).

Discussion.– The IAT appears to be the most interesting parameter because of its validity and its qualitative aspect. Conducting an assessment at maximum speed seems to improve the validity of gait parameters compared to the spontaneous speed.

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Efficacy of long term physical therapy on walking activity in chronic stroke: Interim analysis

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Keywords: Stroke; Hemiplegia; Physical therapy; Gait; Walking activity

Objectives.– The aim of this multi-center, randomized controlled study is to assess the efficacy of continuing physical therapy twice a week during 8 weeks at the chronic phase of post-stroke hemiplegia (six months to two years post-stroke) as compared to an 8 weeks break of the physical therapy.

Methods.– multicenter (CHU de Saint-Étienne, Angers, Nancy, Bordeaux), randomized, parallel, single-blind study. Included patients were first ever stroke at a chronic stage (6 months to 2 years), living at home and able to walk with or without assistive technologies. The therapeutic group followed an 8 weeks program of gait-oriented physical therapy, whereas the control group stopped the physical therapy during 8 weeks. The main outcome measure was the walking activity as assessed during 3 days (excluding the days with physical therapy) by a magnetometer-based step counter. These measures were performed before and after the therapeutic program.