Objective.—Evaluation of clinical, radiological, and functional benefits of brace treatment in patients aged over 70 years.

Patients and methods.—Retrospective study on 30 patients over 70 years we have treated, with a follow of one year after the beginning of the brace. All patients had impaired spinal posture. They received a thoracolumbar or lumbar polyethylene bivalve brace carried the day for 6 months and on demand thereafter.

We lead a clinical, radiological and functional (EVA and quality of life) evaluation.

Results.—We found little decrease in Cobb angle of scoliosis (~5° on average). The occipital axis is normalized, from a 20 mm heel on average, it rises to 8 mm with the brace (55% correction). In the sagittal plane, improves lordosis averaged 10°, 8° of kyphosis, and C7 plumb line moves back to its normal position of 15 mm. Clinically the arrow of C7 going from 98 mm to 63 mm. Orthopedic treatment lowers four points on the VAS (52% improvement) and 55% across St. Antoine. QUEBEC scores and HAD are reduced by 25% and 10%.

At one year, all patients still wear the brace on average 6 hours per day, their index of subjective satisfaction is around 75% on pain, and 70% of the posture.

Discussion.—The brace makes a correction in the sagittal and frontal plane. It has undeniably an analgesic effect, which allows an improved quality of life. It is an effective adjunct to functional treatment and an alternative for non-indication or contra-indication for surgery. We prescribe it combined with rehabilitation treatment, which seems essential.

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How repetitive trunk movements affect estimates of local stability? A pilot study
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Keywords: Stability; Trunk; Kinematics

Objectives.—Stability refers to the ability to offset an external perturbation. However the spine stability can also refer to the ability of the motor system to reliably perform in a variety of task constraints. Recent studies [1,2] have estimated this dynamic stability using non-linear approaches with the maximum Lyapunov exponent (λmax) during limited repetitive movements only in the sagittal plane. The goal was to test λmax in simple and complex tasks involving the trunk and determine the number of repetitions needed in order to provide useful and ecologic tools to assess LBP patients.

Materials and methods.—Ten healthy volunteers performed 100 trunk movements at fixed pace in flexion, twist and both movements. Markers (LED) were attached to the trunk at the level of T6 (2) and S1 (1). LED movements were recorded with an active 3D movement registration system (Optotrak®) consisting of a 3 × 3 camera array. λmax describing responses to extremely small perturbations was calculated from the trunk kinematics to estimate the local dynamic stability of the system.

Results.—The preliminary results of multiple comparisons showed that the 30 repetitions were not different from each other, limiting the role of fatigue and of the length of data series for interpretation. The rotation tasks seemed to be, in first approximation, more stable than the others (flexion and complex tasks). Moreover it seemed that variability of movement between pelvis and thorax was lower than variability of either segment.

Conclusion.—Repetitive motion analysis is suitable for trunk stability analysis using limited repetitions. This study provides insight into the use of λmax in trunk local stability. Comparing type of movement, it seems that we have better options to control segments relative to each other than to control segments in space.

References

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CO22-003-e
Radiological parameters of sagittal plane in children with cerebral palsy walking or wandering
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Keywords: Cerebral palsy; Children; Radiological parameters

The population of cerebral palsy (CP) walking or wandering has often an abnormal profile clinically unlike same age’s adolescents without neuro-motor dysfunction. So we wanted in this work to realize a radiological assessment of the static data in the spine-pelvis-thigh complex in children with CP and made a comparison with an asymptomatic population.

The population of CP is made up 119 children and the asymptomatic population up 652 children. The radiographs of the sagittal plane, in large format (30cm × 90 cm) are realized in a comfortable position, knees and hips in maximal extension. Analyses were performed using the Optispine® software to measure radiological parameters of the whole spine-pelvis-thigh. Comparing the two populations, we found no difference in the shape parameter (pelvic incidence), for against a significant difference was demonstrated on the maximum Lyapunov exponent (λmax) during limited repetitive movements only in the sagittal plane. The goal was to test λmax in simple and complex tasks involving the trunk and determine the number of repetitions needed in order to provide useful and ecologic tools to assess LBP patients.

Materials and methods.—Ten healthy volunteers performed 100 trunk movements at fixed pace in flexion, twist and both movements. Markers (LED) were attached to the trunk at the level of T6 (2) and S1 (1). LED movements were recorded with an active 3D movement registration system (Optotrak®) consisting of a 3 × 3 camera array. λmax describing responses to extremely small perturbations was calculated from the trunk kinematics to estimate the local dynamic stability of the system.

Results.—The preliminary results of multiple comparisons showed that the 30 repetitions were not different from each other, limiting the role of fatigue and of the length of data series for interpretation. The rotation tasks seemed to be, in first approximation, more stable than the others (flexion and complex tasks). Moreover it seemed that variability of movement between pelvis and thorax was lower than variability of either segment.

Conclusion.—Repetitive motion analysis is suitable for trunk stability analysis using limited repetitions. This study provides insight into the use of λmax in trunk local stability. Comparing type of movement, it seems that we have better options to control segments relative to each other than to control segments in space.

References

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Linear analysis of postural data in idiopathic scoliosis
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Keywords: Posturology, Idiopathic scoliosis, Fourier

Introduction and purpose.—Idiopathic scoliosis (IS) is a common disorder. Its prevalence is variable according to the authors (20 to 30/1000) [1]. In the IS, spinal deformations in the three anatomical planes lead to a modification of the characteristics of regulation of the balance [2]. Posturography is a useful tool for assessing the balance of a subject. However, the frequency analysis of the oscillations based on the model of fast Fourier transforms (FFT) is still delicate. We propose a method to better read the FFT.

Further reading
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Keywords: Idiopathic scoliosis; Cephalic repositioning; Cervical Proprioception

Introduction. – The Fourier transform that we have calculated can decompose the signal into a Fourier series consisting of about ten oscillations on the domain (0.08 Hz; 0.5 Hz). The predominant ones are around 0.1 Hz.

Discussion. – This method is used to improve the definition and usually delicate interpretation of FFT. Under the experimental conditions in place, we bring to light the existence of frequency peaks which are well individualized and at around 0.1 Hz. These peaks seem to correspond to the spinal disturbance caused by the wearing of corsets and thus to the absence of postural adjustment of this zone when the IS subject is placed under the conditions of instability.

References


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CO22-006-e

Cephalic stabilization and idiopathic scoliosis


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Keywords: Idiopathic scoliosis; Cephalic repositioning; Cervical Proprioception

Introduction. – In idiopathic scoliosis (IS), increase of osteopontin tissue expression [1] due to a defect of melatonin signaling could explain the various oculomotor, vestibular and proprioceptive anomalies. These anomalies can disturb postural control including cephalic stabilization control. Cephalic stabilization is influenced by vestibular, visual, oculomotor, proprioceptive and cervical information and used as a reference to vertical gravity.

Objective. – To evaluate the cephalic stabilization in IS, with a validated test: Cephalic Repositioning Test (CRT).

Methods and Materials. – In this prospective study, we evaluate, in a IS population with an angle Cobb ≥ 15°, cephalic repositioning ability with CRT on a target, eyes closed, after ten right rotation and ten left rotations. Quantitative and qualitative statistical analysis is performed.

Results. – Thirteen IS subjects (age 13.5 ± 2.36) were evaluated. Forty percent have a pathological right and left CRT (> 6°). 76.9% have at least one pathological CRT and 61.1% have a pathological left CRT. Higher right lateralization was found significantly after repositioning. Abnormal left CRT is associated with a high angle Cobb lumbar (P < 0.05), and more significant with left convexity lumbar scoliosis (P < 0.05).

Discussion and conclusion. – These preliminary results show a disturbance of CRT and indirectly proprioceptive cervical control in IS. Requires further evaluation with a larger number of IS and matched a control group. In this disease, the test standardization is the detection and guidance to a specific rehabilitation: oculo-cervical reprogramming according to Revel’s [2] protocol.

References


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Laterality and idiopathic scoliosis

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Keywords: Idiopathic scoliosis; Laterality; Melatonin; Posture; Interhemispheric interaction

Introduction. – Several authors found a significant relation between handedness and asymmetry of trunk. The laterality is partially in relation with interhemispheric interaction. It is permitted by interhemispheric commissura, particularly the corpus callosum. Arguments evoke relation between abnormalities of the interhemispheric interaction and scoliosis: 1) the HGPS; rare human syndrome, associates scoliosis with dysfunction of commissural neurons; 2) significant decrease of the volume of the corpus callosum in the idiopathic scoliosis (IS).

Objective. – Evaluate the interhemispheric interaction in IS, by studying eyes-hand-foot laterality.

Methods and materials. – Prospective case-control study, estimating by eye-hand-foot laterality with specific tests, to SI ≥ 15°. The score allows classifying each laterality in right or left dominance. When the three dominances are isilateral, the laterality is homogeneous; in the opposite, it’s a cross-dominance.

Results. – Two groups were estimated: 38 AIS, and 26 controls. AIS present more cross-dominance than controls: 69% vs 30% (P = 0.003). Cross-dominance eye-hand is most frequent (eye-hand 65,4%; foot-hand 11,5%; mixed dominance 23,1%). These observations show disturbance of the interhemispheric interaction.

Discussion and conclusion. – Results are independent from the scoliotic deformation, because dominance install before seven years. The cross-dominance eye-hand favors direct retino-geniculo-cortical pathway, to save time of interhemispheric transfer during eyes-hand activities. This preferential use of some visual pathways can be secondary of the defect of melatonin signal transduction in ISA. This defect induces increase of osteopontin’s tissular expression. Osteopontin, coupled with the CD44 receptor, which can inhibit, in the optic chiasm, the growth of visual axons in some directions. The sub-use of the crossed retino-tecto-cortical pathway, which contributes to the cervico-cerebro visual stabilization, could perturb the postural downward control. The incapacity of proprioceptive compensation, especially cerebral, could explain the abnormal muscular adaptation of trunk, and consequently spine deformity. These results can generate new therapeutic orientations.

Further reading


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Intradiscal pressure change induced by a lumbar orthosis


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Keywords: Lumbar orthosis; Intradiscal pressure; Finite element; Low back pain

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