

20.12 Posterior walkers for postural support during walking in spastic diplegia

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Introduction: Knowledge of how patients with spastic diplegic cerebral palsy (SDCP) use Kaye walkers to off-load their lower limbs may be important when considering intervention. In this study we measured the differences in the vertical ground reaction force (GRF), net joint moments and lower limb joint angles between patients walking independently and those using a Kaye walker.

Methods: Kinematic and kinetic data were analysed retrospectively from 42 SDCP patients, 22 who were Kaye walker dependent (group A), and 20 who were independent walkers (group B). The student t-test (95% confidence) was used to examine differences in loading, joint angles, walking velocity and joint moments in single support in both groups.

Results: Mean GRF in single support was 64.67% (36–90%) of body weight in group A and 94.4% (77.8–94.4%) in group B. Group A had significantly greater flexion at all joints than group B ($p \leq 0.001$). Patients that used Kaye walkers had significantly greater knee extensor moments but significantly lower ankle plantarflexor and hip abductor moments than the independent group.

Discussion and Conclusion: In spite of significant off-loading, patients with SDCP who use Kaye walkers have greater knee extensor moments than those walking independently. It may be that increasing reliance on the knee extensors is responsible for the transition from independent to assisted walking in this group.

20.13 Tongue position and postural control. Double blind random study in 360 post-puberal subjects

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Introduction: Is the position of the tongue capable of affecting the posture of the subject? In order to answer this question a double blind random study has been carried out, on 360 post-puberal subjects (the age spans between 14 and 24 for males and 12 to 24 for females), with stabilometric, baropodometric and clinical examinations.

Methods: 360 teenagers have been randomly divided in two groups and have undergone a postural clinical examination (scoliomeric), with normalized stabilometry, with baropodometry: Group A (180 teenagers): examination performed in natural conditions and, subsequently, with the positioning of the tip of the tongue on the retroincisive spot of the palate. Group B (180 teenagers): Examination performed in natural conditions, and subsequently, with administration of a placebo.

Results: The double blind randomized research, has shown a statistically very meaningful correlation between the position of the tongue and posture, evident with normalized stabilometry, with baropodometry and with the clinical examination.

Discussion and Conclusion: This data seems to mark an important relation between lingual functions – particularly deglutition – and postural control. Furthermore, it seems to confirm the hypothesis according to which the retroincisive spot of the palate could be considered as receptor of the tonic postural system.

20.14 Modulation of pre-landing lower limb muscle responses in basketball players with bilateral multiple ankle sprains

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Introduction: Modulation of pre-landing muscle activities in the lower leg by mental set and by motor skill has been documented. This study set out to examine whether pre-landing muscle responses

and the associated impact force on landing were changes as a result of bilateral multiple ankle sprains in man

Method: Pre-landing EMG responses in 4 lower limb muscles were recorded with the associated impact force on landing, while 20 healthy and 19 injured male basketball players performed self-initiated drops from a height of 30 cm with their eyes open.

Results: demonstrated that the tibialis anterior muscle in injured players were activated earlier than that of healthy players with respect to the moment of landing (about –132 ms and –85 ms, respectively), and the tensor fascia latae muscle was activated later (about –140 ms and –171 ms, respectively). Greater co-contraction indexes between the dorsiflexor and plantarflexor in the left ankle ($p < 0.05$), and a higher impact force in both legs on landing ($p < 0.05$) were also observed in the injured players. Furthermore, the magnitude of impact force on landing was correlated with EMG co-contraction indexes in both groups, and negatively correlated with the response latency in tensor fascia latae of the injured players.

Discussion and Conclusions: These finding demonstrate that modulation of muscle response latencies occurred in both injured (ankle) and non-injured (hip) joints of basketball players with bilateral ankle sprains, who may therefore adopt a different pre-landing motor strategy for the absorption of impact force on landing.

20.15 A sensory substitution equipment for rehabilitation of patients with endoprosthesis implants for lower limbs

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Introduction: The most used technologies for sensory substitution are based on electrotactile and vibrotactile actuators [1,2]. The equipment we have developed uses vibrotactile sensory-substitution, this equipment was designed for rehabilitation of patients with endoprosthesis implants for lower limb. We hypothesized that an artificial external sensorial restitution during rehabilitation may lead to optimal results.

Material and Methods: The equipment [3] we have developed contains two insoles, each one instrumented with two force sensing resistors one positioned under the heel and the other under the metatarsals. The core of the central unit is a PIC16F84 (Microchip). The equipment is worn by the patients, each couple of actuators is positioned near the joint (Knee or hip) in order to stimulate the external mechanical receptors. A dedicated experimental protocol was designed to test the equipment during recovery after hip prosthesis.

Results and Discussion: The preclinical tuning has terminated and the equipment showed to be suitable for the clinical application. The use of external receptors (by means of the SSE) could improve the recovery process (static and dynamic). We will use the gait analysis to obtain a quantitative measure of all of clinical parameters during the rehabilitation care.

References

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