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 < 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.

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 sensory 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

