CO06-006-e
The role of upper extremity strength and trunk control on performance-based manual wheelchair propulsion tests in individuals with a spinal cord injury
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Background The association between upper extremity (U/E) and trunk strength as well as seated postural stability with wheelchair propulsion performance has not been evaluated. Consequently, it remains unknown to what extent U/E and trunk strength and seated postural stability contribute to manual wheelchair propulsion performance. Gaining additional knowledge with regards to these modifiable contributors may provide guidance to rehabilitation professionals, particularly to physiotherapists, for selecting and prioritizing therapeutic interventions aiming to improve manual wheelchair performance, aside from those focusing on developing optimal propulsion techniques.

Objective To quantify the association between performance-based manual wheelchair propulsion tests (i.e., 20-m propulsion test, slalom test, and 6-min propulsion test), trunk and U/E strength as well as seated reaching capability to establish which trunk and U/E strength or seated reaching capability measures best predict performance on timed manual wheelchair propulsion tests completed at discharge from inpatient rehabilitation by individuals with a spinal cord injury (SCI).

Methods Fifteen individuals with a SCI performed the 20-meter, slalom and 6-minute wheelchair propulsion tests within 72 hours prior to discharge from comprehensive inpatient SCI rehabilitation. Trunk and U/E strength along with seated reaching capability with unilateral hand support were also measured. The relationships between the wheelchair propulsion tests and the other variables were assessed using bi-variate correlation and multiple linear regression analyses.

Results The 20-meter propulsion—maximum velocity, slalom and 6-minute propulsion tests were moderately or strongly correlated with anterior and lateral inclination trunk strength, seated anterior reaching distance and the majority of shoulder, elbow and handgrip strength measures. Shoulder adductor strength-weakest side explained 53% of the variance on the 20-meter propulsion test—maximum velocity. Shoulder adductor strength-strongest side and forward seated reaching distance explained 71% of the variance on the slalom test. Handgrip strength explained 52% of the variance on the 6-minute propulsion test.

Conclusions U/E strength, especially of the shoulder adductors and handgrip, and forward seated reaching capability may be important determinants and predictors of performance during manual wheelchair propulsion tests. Specific rehabilitation interventions targeting these modifiable personal characteristics during rehabilitation may enhance manual wheelchair propulsion ability.

Keywords Muscle strength; Physiotherapy; Postural balance; Spinal cord injury; Manual wheelchairs
Disclosure of interest The authors have not supplied their declaration of conflict of interest.

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CO06-007-e
Effect of wheelchair tires types and weight on wheelchair propulsion
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Background The number of manual wheelchair users in USA was estimated to 2.7 M individuals. Excessive loads to upper extremity joints are now a growing concern, causing possible loss of independence and increased healthcare cost. Consequently, there is a strong interest in clinical practice to reduce the mechanical effort to propel a wheelchair. The manual wheelchair tires being the interface between the wheelchair itself and the surface, their physical properties then become variables of great importance for which clinicians have few relevant data on to guide their interventions.

Objective To determine the impact wheelchair propulsion of tire type, tire profile, wheelchair load, wheelchair type, tire pressure, and their interactions.

Method To achieve our goal, we measured the distance traveled when a standardized push was applied by a mechanical propelling system for 2 wheelchair types (rigid frame and foldable), 3 urethane solid tire types with different profiles and 2 pneumatic tire types with different profiles at 100% and 75% of the manufacturer’s recommended pressure. This was done for all possible wheelchair configurations at 48.0, 75.4, 98.2 and 123.1 kg of mass added to the wheelchair.

Results On average, solid tires ran 39% less distance (p < 0.001), regardless of any other parameter. This effect remains clearly pronounced at all masses, although the relative impact increases with mass (31% at 48 kg and 41% at 123.1 kg, [p < 0.0001]). Secondly, the foldable wheelchair showed up to 32% less rolling distance (p < 0.001) at lower added mass than the rigid frame wheelchair. This advantage is negligible at 98.2 kg and 123.1 kg. Finally, tire pressure and tire profile were shown to be, at best, of higher order effects.

Discussion Wheelchair users and clinicians have two options to reduce efforts related to wheelchair propulsion, by opting for pneumatic tires and/or rigid frame wheelchairs. Impact of those two parameters is less important for heavier wheelchair users.

Keywords Wheelchair; Tire type; Propulsion
Disclosure of interest The authors have not supplied their declaration of conflict of interest.

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The SCI Community Survey: Highlights related to met or unmet needs for services after return in community living
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Background and objectives The SCI Community Survey is the largest consumer survey of its type ever undertaken in Canada (n = 1549 participants including 412 with a non-traumatic lesion).
The primary aim was to identify the most salient needs for services after returning to community living. Method Thirteen domains were identified as relevant for the Survey, including home accessibility, personal services, transportation, healthcare and job training. Results Data showed that expressed needs for services are higher in participants with traumatic lesion compared to non-traumatic lesion (ex.: technical aids and equipment, 93% vs. 82% short-distance transportation, 87% vs. 77%, housing accessibility 86% vs. 71) suggesting more incapacities in people with traumatic lesion. The percentage of participants with met needs (to a great extent or completely) exceeded 70% for needs related to transportation, housing accessibility, technical aids and equipment, general health care and personal services. However, less than 50% of participants considered needs related to emotional counselling, recreation and leisure, income support as fulfilled. These proportions do not differ between people with traumatic or non-traumatic lesion. Several environmental factors hindered the participants’ capacity to fulfill their needs for services, particularly the availability, the cost and the process to get the services and, to some instances, the lack of SCI knowledge of healthcare providers. Discussion The survey results allowed a better knowledge of met/unmet needs for services in people with spinal cord injury in Canada and the identification of potential improvement in healthcare service delivery in order to decrease the impact of incapacities after returning to community living. Disclosure of interest The authors have not supplied their declaration of conflict of interest. Further reading Noreau L, Noonan VK, Cobb J, Leblond J, Dumont FS. The spinal cord injury community survey: a national and comprehensive study to portrait the life of Canadians with a spinal cord injury. Topics in Spinal Cord Injury Rehabilitation 2014;20(4):249–264 http://dx.doi.org/10.1016/j.rehab.2015.07.058

Posters

P018-e Is thermo-algesic loss of sensibility the cause of neuropathic arthropathy? J. Schemoul *, G. Rode (Prof), A. Basch (Dr), F. Cotton (Prof) CHU, Nogent-Sur-Marne, France *Corresponding author. Adresse e-mail: julien.schemoul@chuyon.fr (J. Schemoul)

Introduction Neuropathic arthropathy of the shoulder is a rare condition and its physiopathology is unclear. It frequently leads to the discovering of syringomyelia, which is one of the most frequent etiology. The physiopathology would be based on loss of sensibility. Our case is original because it concerns a patient with only a thermo-algesic deficit but without any anesthesia of the shoulder.

Observation The patient is quadraplegic C7 by C6-C7 luxation because of a car accident which occurred in 1986. In 2013, he started complaining about stiffness of the left shoulder, which began progressively without initial trauma. X-rays and clinical examination made us diagnose shoulder arthropsis and capsulitis. The stiffness progressively got worse in spite of appropriate physical therapy and glucocorticoid intra-articular infiltration. Neurological examination showed sensibility loss, more pronounced on the left side, which deteriorated in 2013. At the same time, a medullar MRI had shown unknown left postero-lateral C4-C5 syringomyelia. The stiffness progressively worsens so we asked for a CT-Scan. It showed a neurogenic arthropathy of the shoulder.

Discussion The OAN physiopathology is unclear, there are two hypotheses: the neuro-traumatic diagnosis and the neuro-vascular diagnosis. Both are probably linked and have a common beginning: a sensibility loss. The new thing in this case is the maintaining of the tactile sensibility of the shoulder, whereas there is an evident loss of thermo-algesic sensibility. This is probably because of a selective compression of certain nerve fibre by the syringomyelia.

Keywords Neuropathic arthropathy; Syringomyelia; Physiopathology; Thermoalgesic; Quadraplegic; MRI; Stiffness

Disclosure of interest The authors have not supplied their declaration of conflict of interest.

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P020-e High intensity body weight support treadmill training induces long-term walking performance improvement without spasticity increase after chronic incomplete spinal cord injury S. Mateo a, L. Arsenault, L. Delporte b, A. Deleage b, T. Garnier b, M.O. Girard b, Y. Rossetti (Prof) c,d, S. Ciancia (Dr) c,d, J. Luaut (Prof) c,d a Hospices civils de Lyon, service de médecine physique et de réadaptation, hôpital Henry-Gabrielle, mouvement et handicap et université Lyon 1, Inserm U1028, CNRS UMR5292, Lyon Neuroscience Research Center, ImpAct Team, CRIS, EA 647, laboratoire P3M, Saint-Genis-Laval, France b Hospices Civils de Lyon, service de médecine physique et de réadaptation, hôpital Henry-Gabrielle, Mouvement et Handicap Université de Lyon, université Lyon 1, Inserm U1028, CNRS UMR5292, Lyon Neuroscience Research Center, ImpAct Team, 69676 Lyon, France c,d Hospices Civils de Lyon, hôpital Henry-Gabrielle, Mouvement et Handicap, 69000 Lyon, France *Corresponding author. E-mail address: sebastien.mateo@chuyon.fr (S. Mateo)

Body Weight Support Treadmill Training (BWSTT) has shown walking improvement after incomplete spinal cord injury (SCI) but its effect on spasticity remains unaddressed. The aim of this study was to assess the BWSTT effects on both walking performance and spasticity of patients suffering from incomplete SCI. Material Two patients were included: a tetraplegic female (S1) and a paraplegic male (S2) with incomplete chronic SCI (AIS D) respectively 30 and 45 years old. The program consisted in 20 BWSTT sessions of one hour, scheduled 5 days a week lasting 4 weeks. Two pre-tests 4 weeks apart were performed in order to establish a baseline before the BWSTT. We assessed the intervention effects with two post-tests, performed immediately after BWSTT and nine months later. Measures consisted in kinematic gait recording, six Minutes Walking Test (6MWT) and spasticity assessment using the Ashworth Modified Scale.

Results Motor performances were stable during baseline. Immediately after BWSTT, gait speed increased respectively for S1 and S2 by 25% and 33% (from 0.61 to 0.80 m s⁻¹ and 0.64 to 0.79 m s⁻¹). Similarly, 6MWT distance increased from 198 to 337 m (S1) and 270 to 353 m (S2). Nine months after BWSTT, gait speed further improved by 21% and 5% (0.98 ms⁻¹–S1) et 5% (0.83 ms⁻¹–S2). Participants walked 600 m (S1) and 445 m (S2) during the 6MWT. Angular kinematic evidenced a shift toward normalization particularly altering knee and ankle joints on both patients. Spasticity remained unchanged after BWSTT.

Discussion Classical rehabilitation results in walking performance stability at chronic stage. In two participants with chronic incomplete SCI, BWSTT demonstrated an additional improvement of both gait performance and quality without spasticity increase.