Promoting ‘Force to use it’ Strategies of the Hemiplegic Limbs of a Patient with Severely Impaired Motor Control Following Stroke: A Case Report

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Background
Patients with severely impaired motor control as a result of stroke are often limited in their ability to use their paretic limbs. A number of studies have shown that forced-use or constraint induced training promotes recovery of function for patients with mild hemiparesis (Taub et al., 1991; (1)) but no less has been reported for patients with pronounced weakness (Frey et al., 2006) (2). We have found it possible to use inflatible air splints and positioning systems to design functional activities and exercises to suit the stage of motor recovery of this stroke. This enables patients with severe hemiparesis to carry out training within and outside formal therapy sessions autonomously. Behnke’s (1991) (11) suggested in the 1970’s the use of inflatible air splints and rockering devices for active training, but limited research has been carried out. These training set-ups can be organised to promote the quality and quantity of functional movements of the hemiparetic limbs while preventing detrimental compensatory movements. This paper presents a case report to illustrate how inflatible air splints and supportive positioning can be used to promote autonomous practice and ‘force to use it’ strategies. The training of rehabilitation of a patient with severely impaired motor control following stroke.

Subject
72-year-old woman who suffered a stroke 1 year previously. She has no patient physiotherapy, speech therapy and occupational therapy in the home-setting, once weekly.

Pathology
Left cerebrovascular insult (25.01.05), with right upper and lower limb hemiparesis, right sided neglect, apraxia and global aphasia.

Impairments
Muscle Performance: Right-sided hemiparesis. Weakness and difficulty recruiting muscles selectively in the right upper and lower limbs. Trunk weakness also presents.

Flexibility: Range of motion: Decreased dorsiflexion and finger extension due to tightness in the gastrocnemius and long finger flexors.

Motor Function: Slowness in all functional mobility; poor reciprocal limb movements in gait; excessive dependence on gait, balance and control of gait, asymmetrical body alignment. Patient ambulates safely in the home, can dress herself independently, limited in skills for household chores. Patient require assistance on stairs and for gait outside the home setting.

Participation: Patient is dependent on others for all social activities. Cannot participate in a household, and cannot walk in a safe manner in a device outside of her home; use of the right upper limb sufficient to hold a glass of water and drink with assistance.

Environmental Factors: Patient is cooperative and motivated, has a supportive sister that helps with ambulation on stairs, applying hip protector and ankle support.

Methods
Improvements occurred in motor recovery, reaching and grasping, standing balance, and gait at both discharge and 9 months post-stroke, evidenced by improved scores on the Chedoke McMaster Stroke Assessment (impairments), Tinetti Balance and Mobility Scale, the 3 Minute Walk Test (Olsson) and the Berg Balance Test.

Results
Aim: To increase motivation to train
To provide challenge in motor planning and execution
To give patients the opportunity to train autonomously
To train within and outside formal therapy sessions.

Conditions:
- Static and autonomous
- Integration of the hemiplegic limbs in unilateral and bimanual movements
- Practice of selective movements after removal of tools
- Administration of a home program
- Continuous and variable intervention based on the patients performance and goals

Requirements:
- Focus on efficacy and efficiency of motor abilities in part task (Practice)
- Includes stretching and strength training
- Reappraisal of 10–15 times with no set routine (Practice)
- Includes variability of rhythm, speed, coordination, task, change of inflatible air splints and tools, especially in a stationary environment

Conclusion
Although the prognosis for patients with extended severe motor impairments following stroke is generally poor, this case study showed that some patients are able to improve their motor control and function. The patient presented in this case study received an intervention that promoted autonomous practice and ‘force to use it’ strategies in addition to traditional therapeutic approaches. The use of inflatible air splints, rockering devices and other environmental adaptations reinforced the use of the hemiplegic limbs and provided a means for autonomous practice outside of formal therapy sessions. This may have strongly contributed to the improvements this patient achieved.

The careful set-up used in our interventions helped to minimise detrimental movements during therapeutic activities, promoted strengthening of hemiplegic muscles, helped to maintain muscle flexibility, and promoted sensory stimulation of the hemiplegic extremities through weight-bearing and limb-loading. In addition, the use of inflatible air splints, rockering devices and other environmental adaptations reinforced the use of the hemiplegic limbs and provided a means for autonomous practice outside of formal therapy sessions. This may have strongly contributed to the improvements this patient achieved.

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