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Resistance walking in multiple sclerosis: A case report

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Abstract
A 25 years old male diagnosed with Multiple Sclerosis was referred to physiotherapy department for treatment with symptoms of altered sensations and bilateral lower limb muscle weakness. On physiotherapy assessment we found that lower limbs had grade 2 strength on MMT and difficulty in walking in addition to above mention symptoms. Physiotherapy treatment was started with bed mobility and active assisted exercises which progressed to strengthening exercises. When the patient was able to walk without assistance, resistance walking had begun with 0.5 kilogram progressed till 2 kilograms weight cuffs tied over the ankle joints. Post 1 month resistance walking intervention patient showed significant improvement in the gait and was able to carry out his activities of daily living independently.

Keywords: multiple sclerosis, resistance walking

Introduction: Background

Multiple sclerosis is a chronic inflammatory, demyelinating disease of the Central Nervous System, generally affects the young adults between the age of 20 to 40, and thus it is referred as 'great crippler of young adults.' It is widely accepted that MS is an autoimmune disease, induced by viral infections, particularly herpes viruses (I, II and VI) and clamydial pneumonia agents [1]. It alters the conduction in the motor and sensory nerve pathways resulting from an autoimmune attack on components of the central nervous system (CNS). It attacks the myelin sheath & the disruption of the myelin sheath produces active demyelination, slowing neural transmission and causing nerves to fatigue rapidly and other neurologic symptoms such as muscle weakness and paralysis, spasticity, ataxia, postural and gait abnormalities, diplopia and nystagmus. Muscle weakness, paralysis and fatigue contribute to reduced daily activity in persons with MS. The long term inactivity further compromises muscle function, walking ability, and thus physical fitness. The vicious cycle of decreased activity contributes to increased disability, and reduced quality of life [2].

Medical management of MS is directed at the overall disease process and its specific symptoms. A variety of drugs are used to alleviate such as spasticity, weakness, fatigue, visual, sensory symptoms and pain [1]. The rehabilitation techniques are directed at the spasticity, muscle weakness, fatigue, balance and postural alterations and gait abnormalities. Various strategies are included to improve the strength, endurance, reduction of spasticity, functional limitations [3]. One of them is resistance exercises, which was used in this case in the form of resistance walking to improve the gait in Multiple Sclerosis patient.

Case description

A 25 years old male patient came to Pravara Medical Hospital with complains of intermittent fever, weakness and reduced sensations over bilateral lower limbs. The patient was examined and admitted in the hospital and further investigations were done. On radiological examination, MRI of brain and spinal cord showed symmetrical hyperintensities involving bilateral periventricular, peritrigonal white mater and callosal septal interface with hyperintensity along dorsal cervical cord from C2 to C7 level. The findings were suggestive of Demyelinating disease most likely Multiple sclerosis. Immediately medical treatment was started and he was referred to Physiotherapy department for rehabilitation. The patient was thoroughly examined at Physiotherapy department and on assessment we found the sensations, deep tendon reflexes, coordination, muscle power of the lower limbs (grade 2 on MMT) and posture was affected. Patient had difficulty to balance without support in sitting & standing and he was not able to walk. The upper limb muscle power was grade 4 on MMT, the deep tendon reflexes and sensations were intact. Physiotherapy treatment had started which involved bed mobility, trunk control exercises, strengthening exercises in supine position for lower limb. After one month of physiotherapy treatment reassessment was done and we found out that patient had improved strength in his lower limbs and trunk control. Thus we started with balance training in sitting and standing. Then gait training was incorporated in the treatment, initially the patient was walking with the walker under supervision of the Physiotherapist. Later, parallel bar training was started where the patient was walking with the help of side bars but with reduced step length (40cm) and stride length (69cm) and reduced speed. After a week resistance walking was initiated in parallel bars. The resistance walking was performed by tying 0.5 kilogram weight cuff at the ankle joints and patient was asked to walk for 10 minutes which then progressed to 1 kilogram weight for 20 minutes duration and after 10 days the resistance was progressed to 2 kilograms which continued for next 20 days. After one month of resistance walking the result of this study showed that there

was significant improvement in the muscle power (Grade 4+ on MMT) of lower limbs and the gait parameters such as step length (60cm) and stride length (80cm) were improved significantly and the patient was able to walk independently. He was able to perform all his activities of daily living by himself.

Fig 1: Showing patient walking in parallel bars with weight tied at ankle joints

Fig 2: Showing patient walking with weight tied at ankle joints

Discussion

The one month resistance walking training is effective in improving muscle power of lower limb muscles and hence the gait in Multiple sclerosis patient. Studies have found resistance training to be associated with improved ambulation and decreased fatigue in MS patients. Strength training is known to promote neural adaptations such as improved motor unit activation and synchronization of firing rates, which may deteriorate with periods of inactivity. Neural adaptations gained through physical activity may have favourable functional outcomes in MS subjects, depending on lesion and location. Moreover, improving strength in muscle capable of adaption to overload stimuli may also help maintain or improve overall fitness and functional ability including ambulatory status [4].

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