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CASE REPORT

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Effectiveness of Tailored Exercise Protocol on Functional Independence in Post Laminectomy Induced Paraparesis – A Case Study

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Abstract

The compression and decompression junction are a potential site for spinal cord distortion. Cord compression could result from the changed cerebrospinal fluid flow dynamics. Para paresis will occur due to direct trauma sustained during surgery or postoperative hematomas and there is 16% of secondary disease, because of non-traumatic injuries and 84% of spinal cord injury are due to trauma and 2 to 5 times the individuals will die prematurely due to spinal cord injury. Case report of a patient, having D8-L1 wedge compression fracture undergone surgical laminectomy, for which specific exercise protocol designed to improve muscle strength, activities of daily living and reduce clonus. post-operatively patient complained of weakness in bilateral lower limb, and he was dependent on others for his daily life activities, so our aim was to make the patient independent and he should be able to transfer from bed to wheelchair and reduce clonus. Tailored protocol was designed for patient's functional independence by bed mobility, transfer skills, muscle strengthening by using different scales, and he was trained five sessions in a week for three months. After implementing the exercise program like strengthening exercises for bilateral upper limbs, bed mobility training, stretching of bilateral lower limb muscles for clonus and transfer skills using tailored protocol for twelve weeks there was improvement in all parameters.

Keywords: Paraplegia; Functional independence; Tailored exercise

Introduction

Laminectomy

Laminectomy is one of the most popular treatments used to decompress the narrowed Spinal cord by a variety of disorders, including degenerative stenosis, fractures, primary and secondary spinal tumors, abscesses, and deformities.[1] The compression and decompression junction

are potential site for spinal cord distortion. Cord compression could be a result of changed cerebrospinal fluid flow dynamics. Paraparesis is one of the complication of laminectomy. It may be caused by direct trauma sustained during surgery or postoperative hematomas.[2]

Clinical presentation of laminectomy

Foraminal and extraforaminal lumbar stenosis-radiculopathy, central stenosis, which causes pain, tingling, or cramps in the extremity lateral recess. Patients with central stenosis experience more symptoms when standing and walking and the pain is typically relieved by slouching or leaning forward.[3]

Methodology

The patient was 38 years old male by profession farmer, presented with paraparesis who was admitted at tertiary care centre. Patient reported with the history of laminectomy through D8-L1 for wedge compression fracture before six months from the time of reporting to physiotherapy. At the time of baseline assessment on observation patient was mesomorphic, wheel chair bound with abdomino - thoracic breathing and atrophy of lower limb muscles with an attitude of limb: ankle in slight plantar flexion and hip externally rotated. On examination the vitals were as follows, temperature was normal, pulse rate-85 beats per minute, respiratory rate-18 breaths per minute, blood pressure was 130/80 mm hg and Mini mental status examination was 30. All the deep tendon reflexes for upper limb were 2+ and for lower limb 4+ and there was no limb length discrepancy. Post operatively he felt weakness in both of his lower limbs and even noticed shaking of ankles. He also complained of weakness in bilateral lower limbs and further no control over bladder, he was bedridden for two months and was totally dependent for his daily living activities (ADLs). Patient was unable to walk with walker, for the preceding two months. Physical examination revealed severe bilateral ankle clonus with impaired sensation in lower limbs and sensation was normal in the upper limbs. The assessment included collection of demographic data, muscle strength of upper and lower limb assessed using Manual Muscle Testing (MMT), functional activities assessed by Barthel index, clonus assessed through spastic reflexes scores. (SCATS).

He had total score of ten on the modified Barthel index, for MMT grade of one for the bilateral lower limb muscles and three for bilateral upper limb muscles and SCATS score was three at baseline. Post evaluation exercises were designed specific to the symptoms and planned. The following exercises were progressively implemented Week wise for a period of three months. Initially patient was positioned in supine position for bilateral upper limb strengthening and weight cuff of half kg was tied at the wrist joint level and resistance was increased based on the patient's capacity.[4] Bed mobility training was initiated by the patient positioned in supine lying with the momentum of upper limb with the assistance of therapist. Bed mobility skills were taught to the patient: how to go for, side lying, prone, returning from prone to supine or side lying, long sitting in the bed.[5–9] For clonus stretching exercises were given for bilateral lower limb muscles.[10] After completing upper limb strengthening and bed mobility training wheel chair transfers training was started viz…folding the wheel chair and unfolding, educated how to overcome obstacles and ramps, ascending inclines, descending inclines and passing through doors etc. Wheelchair skills included activities of daily living according to his needs. Wheelchair should be angulated 45 degrees to the edge of the bed and wheels should be locked, by using his bed mobility skills he transferred himself from bed to the wheelchair by using his upper limb strength.[11]

Tailored Protocol

Three months after the training programme is completed, a post evaluation was conducted. The results shown improvement of a sixty-three on modified Barthel index, grade of two for the bilateral lower limb muscles, grade four for the bilateral upper limb muscles on a manual muscle testing and score of two on the SCATS for clonus.[12,13] As per the study done by Gruner et al, MMT improved because of strength training where there was a increase in muscle bulk is one of the finding in this case which indirectly motivated the patient to improve on the modified barthel index by performing his ADL'S better compared to baseline. The unusual finding in this case was reduction of clonus from severe to moderate on SCATS score as stretching was incorporated, further long term implementation of stretching in cases would be recommended to know the effects over clonus during long term follow up.

Conclusion

In Post laminectomy cases it is necessary to screen for sensory and motor impairment. Modified tailored protocol has shown improvement in functional scale to reduce clonus and to improve muscle power.

Limitations

Patient followed up only for three months, if functional electrical stimulation, hydrotherapy and advanced physiotherapy management would have been included further for still better outcome.

Weeks	Strength training	Bed mobility	Wheelchair training	Treatment for clonus
Week 1 - week 4	Upper limb strength training with 1 kg weight cuff 10 repetitions of 1 set every 5 days in a week.	10-15 minutes of bed mobility training every 5 days in a week.	For Wheel chair training muscle preparation was done.	Lower limb hamstring and quadriceps muscle stretching- 5 repetitions of 1 set and each stretch was held for 10 seconds.
Week 5 - week 8	Upper limb strength training with 1 kg weight cuff 10 repetitions of 2 set every 5 days in a week.	15-20 minutes of bed mobility training every 5 days in a week.	The Wheelchair training was started when patient achieves upper limb muscle grade 4. Basic transfer skills were trained for patient. Patient is trained to shift to wheelchair with minimal support after the 6th week of rehabilitation training.	Lower limb hamstring and quadriceps muscle stretching- 10 repetitions of 1 set and each stretch was held for 10 seconds.
Week 9 - week 12	Upper limb strength training with 2 kg weight cuff 10 repetitions of 3 set ever y 5 days in a week.	20-25 minutes of bed mobility training every 5 days in a week.	Patient is trained to shift to wheelchair without any assistance after the 10th week of rehabilitation training.	Lower limb hamstring and quadriceps muscle stretching- 15 repetitions of 1 set each stretch was held for 10 seconds.

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