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Case Report

REHABILITATION OF A QUADRIPERETIC PATIENT: A SINGLE CASE STUDY

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ABSTRACT

Background: Physical activity and exercise following a spinal cord injury is a central part of the rehabilitation programme for everyone with a spinal cord injury. However, the level and extent of the injury as well as how much time has passed since the injury is of even greater importance. Patients should be mobilised as soon as medically possible after a spinal cord injury.
In the present study, during the active rehabilitation phase, emphasises of treatment was on maximising functional independence (transfers, self-care including- bathing, toileting, dressing); and later on emphasis was on general fitness, co-ordination and balance.
Outcomes: Level of functional independence was improved i.e. the patient was able to transfer from bed to chair; he was able to stand and walk with the help of walker. He was able to do his self-care, i.e. bathing, toileting, dressing, eating, which was not possible earlier.
KEYWORDS: Cervical spinal cord injury, Quadriparesis, Rehabilitation.

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INTRODUCTION

The spinal cord is the long cylindrical lowest part of central nervous system. It occupies upper two-thirds of vertebral canal. It gives rise to 31 pairs of spinal nerves. Spinal cord extends from upper border of atlas vertebra to the lower border of first lumbar or second lumbar in an adult. Superiorly it continues with the medulla oblongata, inferiorly it terminates as conus medullaris. It is surrounded by three meninges. Outer most Dura mater, middle arachnoids mater and innermost is the pia mater. Spinal cord presents cervical enlargement for supply of upper limb muscles. This extends from C4 to T2 spinal segments with maximum diameter at the level of C6 segment. Another enlargement is the lumbar enlargement for supply of muscles of lower limb. [1]

Spinal injuries can be classified on the basis of mechanism of injury. These are flexion, compression, hyper extension and flexion distraction. Spinal cord injuries typically divided into two broad functional categories: quadriplegia and paraplegia. Quadriplegia refers to complete paralysis of all four extremities and trunk, including respiratory muscles, and results from lesions of the cervical cord [2]. Spinal cord injury is a low incidence, high cost disability requiring tremendous change in an individual's lifestyle. This type of injury mostly occurs from

indirect forces produced by movement of the head and trunk and less often from direct injury to a vertebra. A fall from height is the commonest mode of sustaining a spinal injury in developing countries. Other modes may be road traffic accidents, sport injuries.[3]

The treatment of spinal cord injuries can be done in the three phases. Emergency care, definitive care and rehabilitation. Emergency care will be done at the site of the accident and in the emergency department. Definitive care depends upon the stability of spine. And rehabilitation protocol will make the individual independent. [4]

REHABILITATION

Management of the patient with SCI is a complex and challenging task in which continuity of care is critical to achieving the overall goals of rehabilitation. Frequent and open communication among team members, patient, family and care givers is vital to maintaining an organised and highly individualized approach to both rehabilitation and reintegration of the patient into the community. [2]

Rehabilitation has been defined by the World Health Organisation as a progressive, dynamic, goal-oriented and often time –limited process, which enables an individual with impairment to identify and reach his/her optimal mental, physical, cognitive and social function level.

Rehabilitation after spinal cord injuries seeks the fullest possible physical and psychological readjustment of the injured person to his permanent disability with a view to restoring his will to live and working capacity.

GOALS OF THE REHABILITATION [4]

1. Rehabilitation continues with planning for discharge back to community and finally reintegration into the former or new roles and activities within the community.

2. Family and peers have an important role throughout the rehabilitation process and must be initiated and integrated into this process planning.

The initial treatment is passive stretching, e.g. stretching muscles, mobilising joints and to normalise the muscle tone. This is followed by an active training programme that incorporates individual training for the purpose of improving aerobic fitness, muscle strength, co-ordination and balance. Both the spinal cord injury patient and the Physiotherapists managing his or her rehabilitation must know how to avoid and prevent complications during training. Physiotherapists must also be fully aware of the possibilities available to spinal cord injury patients so as to be able to help the patient to improve his or her health and physical fitness. Consequently, it is vital to acquire new knowledge on how these individuals can best train, not just for the purpose of improving aerobic fitness and muscle strength, but also to learn how to do “old activities with new muscles.”

During the active rehabilitation phase, the emphasis of treatment is on maximizing functional independence. Initially this includes basic skills such as bed mobility, transfers and wheelchair mobility skills. As the patient progresses, these interventions are expanded to include skills necessary for work, home, and community re-entry. Rehabilitation programme emphasises on neuromuscular facilitation/ spasticity, independence level, and to A.D.L's. [5]

CASE DESCRIPTION

A 44 year old male patient presented to physiotherapy department of college of Physiotherapy, Adesh University, Bathinda with complaint of inability of standing and walking since 3 years. There was a history of fall that led to spinal cord injury 3 years ago. MRI finding were consistent with Spinal Cord Compression injury at C5-C6, C6-C7 level. The patient underwent surgery after 3 days of injury. After surgery, he had not taken any Physiotherapy treatment and was totally dependent on his family members for his all A.D.L's.

ON OBSERVATION

Mode of ambulation: wheelchair

Body built : Mesomorphic

Attitude of limb :

Upper limb: Left Hand and wrist: flexion at PIP and DIP joint of index and middle finger

Lower limb: Hip joint – externally rotated (B/L)

Knee joint – flexed (Right - 10p left - 4p)

Feet – inverted and plantar flexed (B/L)

MUSCLE TONE

Upper limb (left): Grade 1 (According to Ashworth's scale)

Lower limb (Right & left): Grade 2 (According to Ashworth's scale)

REFLEXES

	RIGHT	LEFT
Knee	Exaggerated	Exaggerated
Ankle	Exaggerated	Exaggerated

SENSORY EXAMINATION: Intact

MOTOR EXAMINATION: ROM was measured with goniometer in supine lying. The active pain free ranges available were as follows:

ROM	RIGHT	LEFT
Hip flexion	0º-40º	0º
Knee flexion	10º-100º	4º-100º
Shoulder flexion	0º-180º	0º-120º
Shoulder abduction	0º-170º	0º-110º
Elbow flexion	0º-110º	0º-110º

MUSCLE STRENGTH: Muscle testing was performed and scoring was based on Manual Muscle Testing. [6]

	RIGHT	LEFT
Upper Limb	Grade 4	Grade 3
Lower Limb		
Hip flexors	Grade 2	Grade 2
Abductors	Grade 2	Grade 2
Knee flexors	Grade 3	Grade 3
Dorsiflexors	Grade 3	Grade 3

FINDINGS: Physiotherapy evaluation revealed decrease functional mobility such as ambulatory status such as transfers, bathing, eating, dressing standing, walking, gripping with left hand, weight transfers in sitting, decrease muscle strength, decrease ROM.

ROM	RIGHT	LEFT
Knee flexion (in supine)	8º-100º	2º-112º
Hip flexion	0º-40º	0º-10º

PLAN OF CARE DESIGN: The rehabilitation program focuses on Functional independence, ROM, flexibility, strength, endurance, proprioception, gait training and fitness of patient.

PHYSIOTHERAPY PROTOCOL

GOALS

To achieve the functional level of independence.

To make patient ambulatory with or without assistance.

To normalise the muscle tone

To improve muscle strength.

To increase range of motion.

DAY 1 TO DAY 5

Cryotherapy for 5 minutes to decrease the muscle tone.

Active assisted ROM exercises of both upper limb and lower limb (10 repetitions)

Stretching of hamstrings, quadriceps, calf muscles, adductors, (3 repetitions with 30 second hold)

Stretching of muscles of hand (intrinsic muscles).

Sustained stretch in prone lying with weight of 2 kg on each ankle [Fig. 1].

Transfer techniques (lying to side lying, side lying to sitting, sitting to wheel chair, wheel chair to bed.)

Foot correction with pillow placement in supine lying.

Fig. 1: Sustained stretch in prone lying.

DAY 6 TO DAY 10

Cryotherapy, active ROM exercises, stretching is continued.

Strengthening exercises of quadriceps, calf muscles, hip flexors, and abdominals.

Bridging.

Gripping exercises of hand.

Self-made splint for extension of PIP and DIP joints [Fig. 2 (a), Fig. 2 (b)].

Fig. 2(a) Ventral view

Fig. 2(b) Dorsal view

REASSESSMENT

SUBJECTIVE

He was able to extend his fingers of left side which was not possible earlier.

Able to extend his left knee fully.

Mat exercises (side rolling, side rolling to prone lying, prone on elbow, prone on hand)

Weight transferring in sitting.

Self-made splint for right leg was given to prevent further deformity.

OBJECTIVE

ROM	RIGHT	LEFT
Knee flexion (in supine)	8^{o}-100^{o}	2^{o}-112^{o}
Hip flexion	0^{o}-40^{o}	0^{o}-10^{o}

DAY 11- DAY 15

Standing with support

Mat exercises (prone on elbow, prone on hand, quadripud, kneel sitting).

Weight transferring during mat exercises.

Swiss Ball exercises, with patient sitting on chair [pushing away the ball with both feet, to improve the strength.

Balancing exercises with Swiss ball were started for balancing [jogging, weight shifting].

Tilt table (for 10 minutes) (Fig. 3).

Sustained stretch was given after the treatment.

Fig .3: Prone on tilt table.

DAY 16- DAY 20

Active ROM exercises of both upper and lower limb.

Stretching continued

Strengthening continued with weight bands of half kg.

Bridging on one leg.

Sit to stand (on chair).

Swiss ball exercises were continued [progression in jogging and weight shifting by placing hands across chest, trunk rotation, knee extension, forward and backward bending].

Reach out activities were started on Swiss ball.

Standing with support of walker.

Weight transfer through one leg standing.

Mat exercises were continued.

Weight shifting in quadriped position and one leg raising in this position to strengthen the multifedus muscle and for balancing.

Balance exercises in kneel sitting.

Co-ordination exercises of both upper and lower limb.

Tilt table in prone lying.

Walking started with support of walker (Fig. 4)

Foot exercises [plantar and dorsiflexion].

Dynamic quads with PRE programme.

	RIGHT	LEFT
1 RM	1 kg	1kg
10 RM	0.5 kg	0.5kg

Fig. 4: walking with walker.

REASSESMENT

SUBJECTIVE

He was able to touch his heel to ground while walking, which was not possible earlier.

Grip strength becomes fair.

Patients started doing his self -care such as toileting, dressing, brushing by himself.

OBJECTIVE

ROM	RIGHT	LEFT
Knee flexion	8°-104°	0°-114°
Hip flexion	0°-40°	0°-30°
Shoulder flexion	0°-180°	0°-136°
Shoulder abduction	0°-174°	0°-130°

OUTCOMES

After the session of 20 days programme,

Patient is able to do his activities of daily living such as self care (eating, dressing, toileting, bathing) by himself.

He was able to stand from sitting.

He was able to walk with the help of walker.

Conflicts of interest: None

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