

# Rehabilitating A 44-Year-Old Chronically Traumatized Parapalegic Woman: A Case Study

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## ABSTRACT

Spinal cord injury (SCI) resulting from trauma imposes major and permanent life changes on the predominantly young male population who receive these injuries. Paralysis of the muscle below the level of injury can lead to limited and altered mobility, self-care and ability to participate in valued social activities. In addition to the musculoskeletal system, many other body systems are also impaired. The psychosocial impact of the SCI can be just as great as the physical impact. Rehabilitation is an important element toward achieving a fulfilling and active life after an SCI. Physical therapist play a key role in rehabilitation process. A detailed neurological assessment of a patient was done and the severity of the injury was graded according to ASIA impairment scale. A systematic treatment plan was made and altered according to the patient's recovery and needs.

**Keywords:** Spinal cord injury, Rehabilitation, Physical therapist, ASIA impairment scale.

## INTRODUCTION

A dangerous medical disease known as spinal cord injury (SCI) can lead to functional, psychological, and social disorders. As a result, people with SCI have serious limitations in a number of areas of their lives. Improvement of functional level, reduction of secondary morbidity, and improvement of health-related quality of life are the objectives of rehabilitation and various treatment modalities for SCI. In people with SCI, both acute and chronic secondary medical problems are frequent. However, the functional independence and quality of life of patients are further significantly impacted, particularly by chronic problems. Thus, controlling chronic secondary problems in people with SCI, increasing survival, promoting community involvement, and enhancing health-related quality of life all depend on prevention, early diagnosis, and treatment. Spinal cord injury is a catastrophic neurological and pathological state that results in a loss or impaired muscle function, sensory loss and autonomic dysfunctions. Spinal cord injury (SCI) is a low incidence, high cost injury that have tremendous change in individual's life by affecting their physical, psychosocial and socioeconomic perspectives. Accordingly, the ongoing decade has been entitled as the decade of the spine to put stress on the importance of SCI and other spinal disorders<sup>1</sup>. Clinical studies have implied that acute SCI is a two step process involves primary and secondary causes. Primary injury of the spine cord refers to the initial mechanical damage due to the physical trauma to the cord and surrounding structures. Direct compression and damage to the neural elements and blood vessels by fractured and displaced bone fragments transpire after physical trauma. The primary injury initiates secondary mechanism. The secondary mechanism implicate a cascade of bio mechanical and cellular

processes, electrolytes abnormalities, vascular ischemia, oedema, post traumatic inflammatory reaction, apoptosis and another processes<sup>2</sup>. The epidemiological characteristics of traumatic spinal cord injury differs for Asia from other countries. A study was conducted after searching from different published articles between 1980 to 2011. Data were used from 39 reports from the published articles showing the incidence rates ranged from 12 to 61 per million, age ranging from 26 to 56 years old, occurring more in men than women. Falls and road traffic accidents being the major causes for SCI, with mixed neurological levels and extent of injury<sup>3</sup>. The most standard method for classifying a spinal cord injury is American spinal Injury Association's (ASIA) standard neurological classification of spinal cord Injury. The conversion rates of ASIA impairment scale are dramatically high for Tetraplegia less for High paraplegia (T1-T9) and lesser for low paraplegia (T10-T12)<sup>4</sup>.

The goals of rehabilitation approaches for spinal cord injury are to improve functional and independence level, secondary morbidity, enhance healthy quality of life. Patients with spinal cord injury have various acute and long-term secondary medical complications. Some of which AutonomicDysreflexia, Spastic hypertonia, Cardiovascular impairment, Pulmonary impairments, Bowel and Bladder issues, pressure sores, Heterotopic (ectopic) ossification, Osteoporosis and Skeletal fractures<sup>5</sup>. Assessment of patients with spinal cord injury requires a comprehensive patient history, systematized neurological examination and radiographs of the spinal cord. Managing the complications for SCI, is key to address all facets of patient's injury experience<sup>6</sup>.

## CASE STUDY

### Demographic Data

**Name** – \*\*\*\*\*

**Age** – 44 yrs.

**Gender** – Female

**Occupation** – Housewife

**Address** – Subharti Guest House

**Chief Complaint** – Patients complains of inability to move both the lower limbs or ambulate.

### History-

- **History of present illness** – Patient had an incident of fall from around 20ft. height 6-years back in September 2017 soon after the injury pt. was conscious but was unable to feel or move her B/L LL and was taken to the Yashoda super speciality hospital in Ghaziabad where she was operated having metallic implant and pedicular fixation screws passing through T11 and L1 vertebral body.
- **Past History** – Spinal Cord Injury, after a fall from height in 2017.
- **Medical History** – H/O sepsis with fatty liver (grade 2)
- H/O Physiotherapy in Yashoda Hospital Rehab Centre soon after the injury till 2018.
- **Personal History** –
- Sleeping pattern Altered
- Diet- Mixed Indian diet
- Appetite-Normal
- Bowel and Bladder-Normal
- **Family History** – No relevant History

- **Socioeconomic History** – Upper Middle Class
- **Psychological Impact** – Depressed

**Observation** –

- MOA-Wheelchair Dependent
- Body Built-Endomorphic
- Breathing pattern-Thoraco-abdominal breathing
- AOL-Legs are externally rotated

**Palpation** –

- Tenderness- Absent
- Edema- Absent

**Examination** –

- **Higher Mental Function Examination**

- Level of Consciousness-Alert
- Language-Normal
- Fluency-Fluent
- Comprehension-Preserved
- Attention-Preserved
- Memory-Preserved
- Emotional Status- Calm

- **Sensory Assessment**

- Superficial-
  - Pain – Grade 0
  - Touch – Grade 0
  - Temp. – Grade 0
- Deep-
  - Proprioception – Grade
  - Kinesthesia – Grade 0
- Higher cortical Sensation-
  - Texture – Grade 0
  - Two point Discrimination – Grade 0
  - Stereognosis – Grade 0

**Motor Examination**

Muscle Girth -

Area	Right	Left
Thigh	49 cm	49 cm
Calf	36 cm	36 cm

**Range of Motion** –

- Passive- Not affected
- Active- Not present

## Muscle Tone –

- Flaccid in bilateral legs and foot

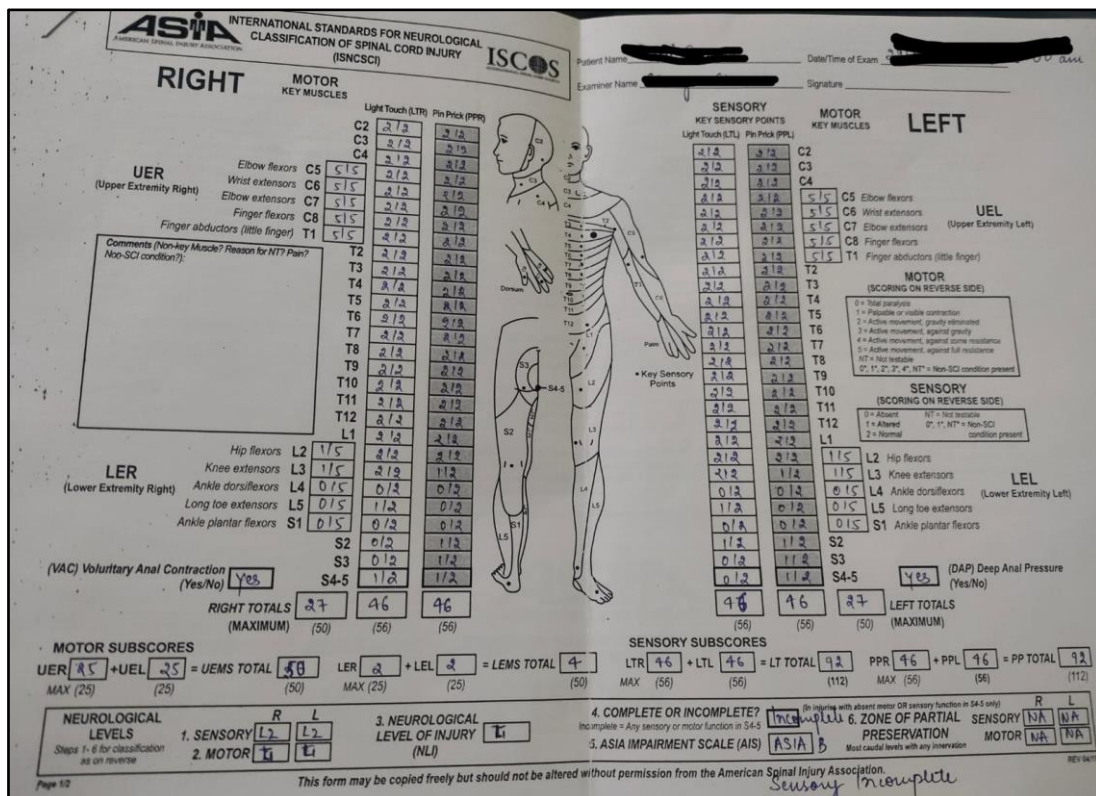
## Reflex –

- Knee jerk- Grade 0
- Ankle jerk-Grade 0

## Manual Muscle Testing-

HIP	Right	Left
Flexion	1/5	1/5
Extension	1/5	1/5
Abduction	2/5	2/5
Internal Rotation	1/5	1/5
External Rotation	1/5	1/5
KNEE	Right	Left
Flexion	1/5	1/5
Extension	1/5	1/5
ANKLE	Right	Left
Plantarflexion	0	0
Dorsiflexion	0	0

## ASIA Scale:



**ASIA INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY (ISNCSCI)**

Patient Name: [REDACTED] Date/Time of Exam: [REDACTED]  
 Examiner Name: [REDACTED] Signature: [REDACTED]

**RIGHT MOTOR KEY MUSCLES**

C2	2/2	2/2
C3	2/2	2/2
C4	2/2	2/2
C5	1/5	2/2
C6	1/5	2/2
C7	1/5	2/2
C8	1/5	2/2
T1	1/5	2/2
T2	2/2	2/2
T3	2/2	2/2
T4	2/2	2/2
T5	2/2	2/2
T6	2/2	2/2
T7	2/2	2/2
T8	2/2	2/2
T9	2/2	2/2
T10	2/2	2/2
T11	2/2	2/2
T12	2/2	2/2
L1	2/2	2/2
L2	1/5	2/2
L3	1/5	2/2
L4	0/5	0/2
L5	0/5	0/2
S1	0/5	0/2
S2	0/2	1/2
S3	0/2	1/2
S4-5	1/2	1/2

**RIGHT TOTALS (MAXIMUM)** LTR: 27, LTL: 46, PPR: 46

**RIGHT MOTOR SUBSCORES**  
 UER: 25 + UEL: 25 = UEMS TOTAL: 50  
 LER: 2 + LEL: 2 = LEMS TOTAL: 4

**LEFT MOTOR KEY MUSCLES**

C2	2/2	2/2
C3	2/2	2/2
C4	2/2	2/2
C5	1/5	2/2
C6	1/5	2/2
C7	1/5	2/2
C8	1/5	2/2
T1	1/5	2/2
T2	2/2	2/2
T3	2/2	2/2
T4	2/2	2/2
T5	2/2	2/2
T6	2/2	2/2
T7	2/2	2/2
T8	2/2	2/2
T9	2/2	2/2
T10	2/2	2/2
T11	2/2	2/2
T12	2/2	2/2
L1	2/2	2/2
L2	1/5	2/2
L3	1/5	2/2
L4	0/5	0/2
L5	0/5	0/2
S1	0/5	0/2
S2	1/2	1/2
S3	1/2	1/2
S4-5	1/2	1/2

**LEFT TOTALS (MAXIMUM)** LTR: 46, LTL: 46, PPR: 46

**LEFT MOTOR SUBSCORES**  
 UEL: 25 + UER: 25 = UEMS TOTAL: 50  
 LEL: 2 + LER: 2 = LEMS TOTAL: 4

**SENSORY KEY SENSORY POINTS**

C2	2/2	2/2
C3	2/2	2/2
C4	2/2	2/2
C5	2/2	2/2
C6	2/2	2/2
C7	2/2	2/2
C8	2/2	2/2
T1	2/2	2/2
T2	2/2	2/2
T3	2/2	2/2
T4	2/2	2/2
T5	2/2	2/2
T6	2/2	2/2
T7	2/2	2/2
T8	2/2	2/2
T9	2/2	2/2
T10	2/2	2/2
T11	2/2	2/2
T12	2/2	2/2
L1	2/2	2/2
L2	2/2	2/2
L3	2/2	2/2
L4	2/2	2/2
L5	2/2	2/2
S1	2/2	2/2
S2	2/2	2/2
S3	2/2	2/2
S4-5	2/2	2/2

**SENSORY SUBSCORES**  
 LTR: 46 + LTL: 46 = LT TOTAL: 92  
 PPR: 46 + PPL: 46 = PP TOTAL: 92

**NEUROLOGICAL LEVELS**  
 1. SENSORY: R L2, L2  
 2. MOTOR: R L2, L2  
 3. NEUROLOGICAL LEVEL OF INJURY (NLI): L2

**4. COMPLETE OR INCOMPLETE?** Incomplete  
**5. ASIA IMPAIRMENT SCALE (AIS):** ASIA B  
**6. ZONE OF PARTIAL PRESERVATION:** Sensory incomplete

**COMMENTS:** (Non-key Muscle? Reason for NT? Pain? Non-SCI condition?)

**NEUROLOGICAL LEVELS** (Steps 1-6 for classification as on reverse)

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Figure 1: ASIA impairment Scale of the patient

## PHYSIOTHERAPY MANAGEMENT

- Tilt table exercises.
- **PNF:** Hold relax and contract relax methods, initially performed passively and slowly progressed to active assisted and then actively achieved by the patient.
- **NDT:** Task based approaches.
- **BWS** and a treadmill: Started with 5 minutes of activity and then progressed up to 15 minutes.
- **MAT Exercises:**
  1. Neck circumduction -10 reps\*2sets
  2. Neck isometrics- 5reps\*2sets
  3. Rotation from one side to another with weights 7reps\*2sets
  4. Forward bending in long sitting-5reps\*2sets
  5. Backward bending in long sitting-5reps\*2sets
  6. Arm flexion-extension in long sitting with weights-5reps\*2sets
  7. Arm flexion with side rotation with weights-5reps\*2sets
  8. Transition from side lying to sitting on edge of bed-5reps\*2sets
  9. Arm flexion-extension with weights on edge of bed-5reps\*2sets
  10. Trunk rotation with weights-5reps\*2sets
  11. Transition from side lying to sitting on edge of bed.
  12. Supported forward bending and sitting up at edge of bed without support
  13. Bridging- 10reps\*3 sets
  14. Bridging with weight cuffs in hand- 5reps\*3sets
  15. Sit-ups – 20reps\*4 sets
  16. Sit ups with weight cuff on upper limb- 5reps\*3sets
  17. Prone Extension: 10reps\*3set
    - a. On neck
    - b. On elbow
    - c. Only hand
  18. Prone to quadruped- Bending down to unlock hips before pushing up to quadruped- 5reps\*3sets
  19. Supported quadruped to partial sitting. 5reps\*3sets
  20. Kneeling with swiss ball- 5reps\*2sets
  21. Isometric contraction for lower back- 10reps\*3sets
  22. Parallel Bar Exercises- 15reps\*2sets
    - a. Forward Bending and Backward Bending
    - b. Forward stepping and Backward stepping
    - c. Sideways Stepping





## DISCUSSION

A multitude of publications, comprehensive analyses, and clinical practice guidelines have compiled the data supporting various physiotherapy approaches for individuals with spinal cord injuries. This case study attempts to clarify how successful treatment with surgery and physical therapy can be provided to a patient who has suffered a serious spinal cord injury. The achievement of independent mobility is the most important objective for patients who are paraplegics, total or incomplete, during the chronic phase. Functional goals can be established quickly following a TSCI, and patients can use multidisciplinary care to work toward reaching their objectives.

An extensive and lengthy rehabilitation program is necessary for the treatment of patients with chronic TSCI. In order to reduce the death rate from complications, effective issue prevention and care are essential. An at-home exercise regimen, together with weight-bearing mat exercises and orthoses for mobility, should be part of the rehab protocol According to Akkurt et al. (2017), short-term arm aerobic training can help patients with SCI improve their capacity for exercise. According to McMillan et al. (2021), individuals may need longer rehabilitation programs in order to fully benefit from aerobic exercise training. In order to maximize training outcomes, patients ought to receive suitable warm-up and cool-down exercises, according to a 2016 study by Bongers et al. Randomized Controlled Trials haven't produced enough data to conclude that one locomotor training method is superior to another for improving walking capacity in SCI patients. It is necessary to look at specific questions regarding the optimal kind of locomotor training for enhancing walking function in SCI patients.

## CONCLUSION

This case study concludes that the patient's ability to do activities of daily life was improved by appropriate physical therapy interventions and exercises. Once the patient's overall strength has improved significantly, we intend to transition them from using a walker to a crutch.

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## AUTHORSHIP STATEMENT

Aishwarya Rai and Jasmine Anandabai designed the treatment protocol. Aishwarya Rai counselled the patient and recruited her for the treatment. Somya Sharma helped in the treatment sessions by being a valuable member of the team. Aishwarya Rai and Somya Sharma prepared the manuscript for publication. No research funding was applied for the study. The manuscript was revised by all authors and approved for the final document.

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