Spinal Trauma

**Grossly categorized into** –

- Acute injury
  - E.g. Sprain/strain, contusion
- Chronic injury
  - E.g. Cumulative traumatic disorder

**Important Anatomical Structures at each Vertebral Level**

- Vertebra
- Spinal cord
- Spinal nerve roots/spinal nerves
- Blood vessels
- Intervertebral disc (pain-sensitive)
- Facet joints (pain-sensitive)
- Ligaments
- Muscles

**Common Spinal Injuries**

**Cervical region**

- Sprain/strain
- Disc herniation
- Fracture
- Spinal stenosis/cord compression
- Wryneck
- Whiplash injury
Common Spinal Injuries

**Thoracic region**
- Sprain/strain
- Compression fracture
- Direct contusion

**Lumbar region**
- Sprain/strain
- Burst fracture
- Prolapsed intervertebral disc (PID)
- Spondylolisthesis
- Spinal stenosis/cord compression

Common Spinal Injuries

**Sacral and Coccygeal region**
- Fracture
- Direct contusion
- Fall accident

General Principle of Rehabilitation for Spinal Trauma Patients

- To prevent further damage.
- To decrease spinal related pain.
- To improve strength, flexibility, lifting capacity and cardiopulmonary function.
- To minimize spinal related disability.
- To normalize activities of daily living.
- To assist in return to work and vocational activities.
General Principles of Physiotherapy Assessment on Spinal Trauma Patients

- To take a complete history.
- To perform a thorough physical examination based on the history.
- To establish a diagnosis.
- To rule out any “Red Flags” (Factors that may indicate serious underlying pathology - fever, bladder and bowel dysfunction, unexplained weight loss, cancer history, fracture, significant trauma).

History Taking

- Symptom onset: Acute or insidious (nature of injury)?
- Symptom duration: Acute or chronic?
- Pain location.
- Pain quality and character: Sharp? Dull?, Radiating? Stabbing?

History Taking

- Aggravating and alleviating factors: Mechanical or non-mechanical in nature?
- Functional impairment.
- Prior treatment.
- Worker’s compensation claim.
- Past medical history

Physical Examination

- Inspection: Posture, deformity, signs of inflammation, gait.
- Range of motion in different planes.
- Neurologic examination – sensation (dermatome), muscle power (myotome), reflexes.
- Nerve root tension signs (e.g. PNF, SLR, PNB tests)
- Palpation
Physical Examination

- Special tests –
  1. to delineate between upper motor neuron lesion and lower motor neuron lesion (e.g. Hoffmann sign, clonus test, Babinski sign)
  2. to rule out cauda equina syndrome (e.g. bladder and bowel incontinence, saddle anaesthesia)
  3. to highlight the contribution of psychological and/or socioeconomic factors (e.g. Waddell’s signs)
- To check one joint above and one joint below (and any other associated injury).
- Look for any abnormalities in X-ray, CT, MRI and laboratory test results.

Role of Physiotherapy in the Rehabilitation of Patient with Spinal Trauma

- Pain control.
- Instruction in proper exercise technique.
- Advancement of the level of therapy based on the patient’s symptoms.
- Postural correction and gait re-education.
- Providing supervision, motivation and goal-setting during a therapy program.
- Assisting the patient with creation of an individual home exercise program.

Rehabilitation of Spinal Trauma

Operative

Vs

Non-operative

Operative
Common Spinal Operative Procedures Encountered by Physiotherapists

**Three Major Indications for Spinal Operation**
- Decompression
- Stabilization
- Realignment

Physiotherapy Rehabilitation for Post Operative Spinal Trauma Patients
- Check vital signs
- Chest physiotherapy – chest complications
- Ankle and toe exercise – DVT
- Maintenance to unaffected limbs
- Pain control if indicated
- Check neurology
- Application of orthotic device as indicated (e.g. Philadelphia brace, TLSO, Knight brace)
- Bed mobility and transfer training – e.g. log roll turn

Physiotherapy Rehabilitation for Post Operative Spinal Trauma Patients – Cont’d
- Isometric postural muscle control upon pain subsided and wound stable
- Mobilization/endurance training
- Walking exercise +/- walking aids
- Postural education
- Home advice

Non-operative
Physiotherapy Rehabilitation for Non-operative Spinal Injury Patients – 1

- **Pain relief** –
  1. Heat and cold (e.g. hot pad, ice therapy)
  2. Electrotherapy (e.g. TENS, IFT, infrared, shortwave diathermy, ultrasound)

Physiotherapy Rehabilitation for Non-operative Spinal Injury Patients – 2

- **Mobilization and strengthening** –
  1. Intermittent traction (INT/IPT)
  2. Spinal mobilization/manipulation (manual technique)
  3. Spinal exercises (e.g. McKenzie exercise, Williams exercise, spinal stabilization exercise)
  4. Hydrotherapy

Physiotherapy Rehabilitation for Non-operative Spinal Injury Patients – 3

- **Home exercise program**
- **Postural re-education**
- **Joint protection advice**
- **Functional capacity evaluation**
- **Work rehabilitation**
- **Ergonomics and manual handling operation advice**

Functional Capacity Evaluation (FCE)

**Purpose of FCE** –

- Functional Capacity Evaluation (FCE) is commonly used to determine the physical work abilities of individuals who have sustained musculoskeletal injury.
- An important purpose of work-related assessments is to ensure an appropriate match between the injured worker’s abilities and work requirements.
- The test protocol is constructed with reference to various available FCE test systems, which have been commonly used by the physiotherapists in different settings.
Work Rehabilitation

**Definition and Purpose** –
- Work rehabilitation is interdisciplinary and uses conditioning tasks that are graded for progressive improvement of the injured worker’s *biomechanical, neuromuscular, cardiovascular, metabolic and psychological function* by using a series of real or simulated work activities.
- Work rehabilitation provides a transition between acute care and return-to-work and addresses the issues of productivity, safety, physical tolerance and behaviour.
- Work rehabilitation is a highly structured, goal-oriented, individualized treatment program designed to maximize ability to return-to-work.

Chronic Pain Program

**Definition of Chronic Pain** –
- Chronic pain involves interrelated biologic, sensory, psychological, behavioural and environmental factors.
- Chronic pain is persistent and does not respond to conventional medical treatment.

**Context of a Chronic Pain Program** –
- Treatment of chronic pain requires a biosocial model that helps the patient to improve function without necessarily diminishing or curing the pain.

Neck and Back Class

- A kind of intervention to handle individuals presented with chronic or recurrent neck and back problems.
- Consists of a brief therapy that uses a health education method to empower participants through a procedure of assessment, education and skill development.
- Usually implemented in a class/group form in order to enhance positive interactions among participants.
- Evaluation is usually made on the extent of improvement on the participant’s quality of life (e.g. SF-36)

Spinal Cord Injury (SCI)

**Common terminology** –
- *Tetraplegia* refers to the impairment resulting from damage to neural elements within the cervical spinal canal.
- *Paraplegia* refers to the impairment resulting from damage to neural elements within the thoracic, lumbar or sacral spinal canal.
**Physiotherapy Rehabilitation for Spinal Cord Injury (SCI) Patients**

**Key assessment for SCI patient** –
- To identify the key muscles that are tested in determining the motor level of the lesion (Motor charting)
- To identify the key point for each sensory dermatome that is tested in determining the sensory level of lesion (Sensory charting)
- To identify level of functional independence and physical capabilities

**Objectives of rehabilitation** –
- To prevent movement of unstable spine causing further cord damage.
- To minimize spasticity
- To prevent damage to skin and joints.
- To maintain posture and circulation.
- To train up safe and effective transfer technique within the capacity of the patient.
- To maximize self care and locomotion capability.

**Means and Methods** –
- Positioning
- Assisted active/Passive mobilization
- Weight bearing exercise (e.g. tilt-table standing, electric standing wheelchair)
- Bed mobility/Transfer training
- Gait training with assistive devices as indicated (for paraplegic only)
- Functional electrical stimulation (FES)
- Liaise with other disciplines to enhance self care and prescription of appropriate means of locomotion (e.g. wheelchair prescription)

**Conclusion**
- Spinal trauma is a multi-facet clinical problem that demands sound knowledge and skillful handling from health care workers right from the acute phase to the recovery phase in order to achieve the best possible outcome.
Thank You