



## Standard Treatment Workflow

# SPINAL INJURY

## ICD-S14.109A

### DEFINITION

- **Injury to any of the following**
  - Vertebral Column and it's adnexae (disc, ligaments, facets etc)
  - Spinal cord (Partial/ Complete)
  - Cauda Equina and nerve roots
- **Acute <3 weeks**
- **Subacute 3 weeks - 3 months**
- **Chronic >3 months**

### WHEN TO SUSPECT

- Always rule out spine injury in patients with poly-trauma, especially if unconscious
- Ascertain pain in the neck, back or limbs
- Rapid sensorimotor examination- ability to move fingers, hands, elbows, shoulders, hips, knees, ankles, toes
- Priapism (in unconscious/unresponsive)

### CLINICAL PRESENTATION

#### SYMPTOMS:

- Pain (neck or back)
- Inability to move the limbs
- Numbness
- Breathing difficulty
- Inability to void and defecate

#### Local-

- Deformity (swelling, gibbus)
- Bruising
- Open wound over spine
- Tenderness over spine

#### SIGNS:

#### Systemic-

- Bradycardia with hypotension
- Sensorimotor deficit in arms, legs
- Labored breathing
- Priapism

### PRIMARY CARE

#### GOALS

- Identify/suspect
- Immobilise
- Refer to higher center

### SECONDARY CARE

#### GOALS

- Where General/Orthopaedic surgeon or Neuro surgeon (trained in spine) available
- Imaging: X ray/ CT SCAN
- Determine neurological status
- Develop treatment plan

### TERTIARY CARE

#### GOALS

- Imaging: x-ray/CT SCAN/MRI
- Surgery/ Conservative management
- Rehabilitation

### MANAGEMENT

- ATLS protocol (Airway-breathing-circulation-disability-exposure)
- Intubate/ventilate with C spine control
- IV Line Ringer Lactate; collect blood for grouping and cross matching; catheterise
- Log roll and inspect neck and back for bruise, deformity, tenderness
- Immobilise with ambulance man's collar/philadelphia collar/spine board/sand bags
- Manage pain with morphine/pethidine or unless contraindicated
- Transfer to higher centre

### MANAGEMENT

- Secondary survey as per ATLS protocol
- Conscious/ unconscious
- Log roll and examine cervical, thoracic, lumbar, sacral spine
- Detailed neurological examination (Frankel scale) and document (Appendix I)
- Associated injuries
- Imaging (appropriate X rays, CT whole spine scans/MRI if available)
- TLICS/SLIC scoring (Appendix II/ III) –
  - surgery: indicated/doubtful – refer;
  - conservative: brace
- MPSS in selected cases (Appendix IV)
- Apply collar/skull traction/halo vest, brace or spine board to transfer

### MANAGEMENT

- Detailed neurological evaluation (ASIA scale)
- Imaging (X Ray, CT, MRI)
- Classify spinal injury and score
- TLICS/SLIC <4 conservative management; >5 surgery; 4-case based
- MPSS as indicated
- DVT prophylaxis as indicated (Appendix V)
- Surgery as indicated (decompression/stabilisation)
- Conservative care-skull traction, halo vest, SOMI brace, TLSO brace
- Rehabilitation

### APPENDIX I: FRANKEL SCALE

- Grade A: Complete neurological injury - No motor or sensory function detected below level of lesion
- Grade B: Preserved sensation only - No motor function detected below level of lesion, some sensory function below level of lesion preserved
- Grade C: Preserved motor, nonfunctional - Some voluntary motor function preserved below level of lesion but too weak to serve any useful purpose
- Grade D: Preserved motor, Functionally useful voluntary motor function below level of injury
- Grade E: Normal motor function - Normal motor and sensory function below level of lesion, abnormal reflexes may persist

### APPENDIX II: TLICS SCORE

Table 1

#### The TLICS with its subcategories and scoring

| Injury Category                                 | Point Value |
|---|-------------|
| <b>Injury Morphology</b>                        |             |
| Compression fracture                            | 1           |
| Burst fracture                                  | 2           |
| Translation or rotation                         | 3           |
| Distraction                                     | 4           |
| <b>PLC Status posterior ligamentous complex</b> |             |
| Intact  | 0           |
| Injury suspected or indeterminate               | 2           |
| Injured   | 3           |
| <b>Neurological Status</b>                      |             |
| Intact  | 0           |
| Nerve root involvement                          | 2           |
| Spinal cord or conus medullaris injury          | 3           |
| Incomplete cord injury                          | 3           |
| Complete cord injury                            | 2           |
| Cauda equina syndrome                           | 3           |
| Non operative                                   | <4          |
| Equivocal                                       | 4           |
| Operative                                       | >4          |

### APPENDIX III: SLIC SCORE

| Characteristics                                   | Points |
|---|--------|
| <b>Injury Morphology</b>                          |        |
| No abnormality                                    | 0      |
| Compression fracture                              | 1      |
| Burst fracture                                    | 2      |
| Distraction                                       | 3      |
| Translation/rotation                              | 4      |
| <b>Integrity of the disco-ligamentous complex</b> |        |
| Intact  | 0      |
| Indeterminate                                     | 1      |
| Disrupted   | 2      |
| <b>Neurological Status</b>                        |        |
| Intact  | 0      |
| Nerve root injury                                 | 1      |
| Complete cord injury                              | 2      |
| Incomplete cord injury                            | 3      |
| Persistent cord compression                       | +1     |
| Non operative                                     | <4     |
| Equivocal   | 4      |
| Operative   | >4     |

### APPENDIX IV: MPSS GUIDELINES (MODERATE EVIDENCE AND WEAK RECOMMENDATION)

- Methyl Prednisolone Sodium Succinate: 30mg/kg bolus and 5.4mg/Kg/hr x 23 hours
- **Role of MPSS:**
  - May consider but be aware of the complications of high dose of steroids
  - Acute spinal cord injury less than 8 hours, incomplete neurology: consider
  - Acute spinal cord injury more than 8 hours, incomplete/complete cord injury neurology : no role
  - Acute spinal cord injury less than 8 hours, complete neurology: no role
  - Acute spinal cord injury with thoracic/abdominal visceral injury: contraindicated

### APPENDIX V: DVT PROPHYLAXIS

- All neurologically compromised (non-ambulatory) patients within 72 hours must receive DVT prophylaxis.
- Subcutaneous LMW Heparin/ fixed low dose unfractionated heparin
- No adjusted dose unfractionated heparin
- Duration 8-12 weeks depending on risk factors

### ANCILLARY PROCEDURES

|   |   |   |  |   |
|---|---|---|--|---|
| • Goal MAP $\geq$ 85 mmHg for blunt/incomplete penetrating injury | • Goal MAP $\geq$ 65 mmHg for complete penetrating injury | • Nor-epinephrine IV infusion (0.1- 0.5 mcg/kg/min) | • Early neurosurgical decompression of acute spinal cord compression (< 72 hours) is recommended | • Consider early tracheostomy (< 7 days) in high cervical injury (C1-C5) patients |
|---|---|---|--|---|

### ABBREVIATIONS

**ATLS** : Advanced Trauma Life Support  
**CT** : Computed Tomography  
**DVT** : Deep Vein Thrombosis  
**LMW** : Low Molecular Weight Heparin  
**MAP** : Mean Arterial Pressure

**MRI** : Magnetic Resonance Imaging  
**SLIC** : Subaxial Injury Classification  
**SOMI** : Sternal Occipital Mandibular Immobilizer  
**TLICS** : Thoracolumbar Injury Classification and Severity  
**TLSO** : Thoracic-Lumbar-Sacral Orthosis

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### KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES

This STW has been prepared by national experts of India with feasibility considerations for various levels of healthcare system in the country. These broad guidelines are advisory, and are based on expert opinions and available scientific evidence. There may be variations in the management of an individual patient based on his/her specific condition, as decided by the treating physician. There will be no indemnity for direct or indirect consequences. Kindly visit the website of ICMR for more information: ([icmr.gov.in](http://icmr.gov.in)) for more information. ©Indian Council of Medical Research, Ministry of Health & Family Welfare, Government of India.