SPINAL CORD INJURY

Spinal cord injury is neurological dysfunction due to traumatic damage to the spinal cord, often accompanied by unstable vertebral injury.

ED priorities:

- **Prevent secondary injury**
- **Maintain cord perfusion**
- **Avoid hypoxia and hypotension**
- **Do not worsen instability**

Most neurological damage after arrival is iatrogenic or physiological, not mechanical.

MECHANISMS THAT SHOULD TRIGGER IMMEDIATE IMMOBILISATION

- [ ] High speed MVC / moto collision
- [ ] Fall from height
- [ ] Direct axial load (diving, collapse)
- [ ] Blunt trauma with altered mental status
- [ ] Polytrauma with unknown history

RECOGNITION

Neurological Red Flags

- Limb weakness or paralysis
- Sensory loss or altered sensation
- Paresthesia
- Loss of anal tone
- Urinary retention

Autonomic / Systemic Clues

- Neurogenic shock:
  - Hypotension with bradycardia
  - Warm peripheries
- Priapism (late / severe)

Neurogenic shock is a diagnosis of exclusion — rule out bleeding first.

PATHOPHYSIOLOGY

Primary Injury

- Mechanical damage → irreversible

Secondary Injury

- Hypotension → cord ischaemia
- Hypoxia → neuronal death
- Cord oedema → worsens compression

Mean arterial pressure (MAP), not SBP, determines cord perfusion

HEMODYNAMIC TARGETS

- SBP ≥90 mmHg (minimum)
- MAP ≥85 mmHg (ideal first 5–7 days if feasible)
- SpO_2 ≥94%
- Avoid hypoglycaemia, fever, anaemia
- Aim for SBP ≥90–100 if MAP monitoring not available

DRUG MANAGEMENT

A OXYGEN / AIRWAY

- Rarly oxygen
- Low threshold for intubation if:
  - High cervical injury
  - Reduced respiratory effort
  - Deteriorating GCS

B FLUIDS

- **Cautious crystalloids**
- Small boluses (250–500 mL)
- Avoid overload (respiratory failure risk)

C VASOPRESSORS (KEY IN NEUROGENIC SHOCK)

Preferred

- Noradrenaline (supports MAP without reflex tachycardia)

Alternatives

- Dopamine (if no alternative)
- Adrenaline (titrate carefully)

Goal: restore perfusion, not “normalise” BP numbers

D STEROIDS

- NOT recommended routinely
- No proven functional benefit
- Increased infection, GI bleeding

Steroids cause harm more often than benefit in SCI.

E PAIN / SEDATION

- Treat pain carefully
- Avoid excessive sedation masking neuro exam
- Use opioids judiciously

IMAGING STRATEGY

Preferred

- CT spine (whole spine if possible)

If CT unavailable

- Targeted X rays (cervical + suspected level)

Normal imaging does NOT exclude SCI (e.g. SCIWORA)

WHAT TO AVOID (COMMON CAUSES OF DETERIORATION)

- Excess movement / repeated log rolling
- Hypotension (“permissive hypotension” is NOT acceptable)
- Hypoxia
- Routine steroids
- Delayed referral

CHECKLIST
SPINAL CORD INJURY

PRIMARY SURVEY WITH SPINE PROTECTION

Airway
- [ ] Inline cervical stabilisation at all times
- [ ] Prepare for early intubation if high cervical injury

Breathing
- [ ] Oxygen (target SpO_2 ≥94%)
- [ ] Assess chest expansion and respiratory effort

Circulation
- [ ] Control external bleeding
- [ ] IV access ×2
- [ ] Monitor BP and HR
- [ ] SBP ≥90 mmHg (minimum)

Disability
- [ ] GCS
- [ ] Full neurological screen (if possible)

Exposure
- [ ] Undress fully with spinal protection
- [ ] Prevent hypothermia

IMMOBILISATION
- [ ] Rigid cervical collar
- [ ] Blocks + straps
- [ ] Move patient **only if necessary**
- [ ] Log roll only with full team control

NEUROLOGICAL ASSESSMENT (DOCUMENT CLEARLY)
- [ ] Motor function (all limbs)
- [ ] Sensory level
- [ ] Rectal tone (if feasible)
- [ ] Identify approximate level of injury
- [ ] Repeat assessment after interventions

IDENTIFY NEUROGENIC SHOCK
- [ ] Hypotension with bradycardia
- [ ] Warm peripheries
- [ ] No evidence of haemorrhage
- [ ] Exclude bleeding before diagnosis

HEMODYNAMIC MANAGEMENT
- [ ] Oxygen
- [ ] Cautious IV fluids
- [ ] Vasopressors if hypotensive:
  - [ ] Noradrenaline preferred
  - [ ] Dopamine / adrenaline if no alternative
- [ ] Target MAP ≥85 mmHg if feasible

URINARY & SUPPORTIVE CARE
- [ ] Early urinary catheter (monitor output)
- [ ] Strict I/O chart
- [ ] Pressure area care

IMAGING
- [ ] CT spine if available
- [ ] X ray if CT unavailable
- [ ] Do not delay stabilisation for imaging

WHAT TO AVOID
- [ ] Steroids
- [ ] Excess movement
- [ ] Hypotension or hypoxia
- [ ] Over sedation masking exam

EARLY REFERRAL / DISPOSITION
- [ ] Early referral to spine/neurosurgical centre
- [ ] ICU/HDU if high cervical or unstable
- [ ] Document:
  - Time of injury
  - Neurological findings
  - Hemodynamics
  - Interventions given