SPINAL CORD INJURY

The Prehospital Care Library
La Bibliothèque de Soins Préhospitaliers

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