



# Spinal Injury

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## Spinal Injury

Spinal injuries in children are extremely uncommon.

Children may present with full movement and sensation of all four limbs; however, they may have a vertebral fracture and, if handled incorrectly, the spinal cord may be damaged and the results could be devastating.

If you suspect a spinal injury, take all measures to protect the spine, remembering to do no harm in the combative child, and call the Neurosurgical registrar for injuries in the cervical spine and the orthopaedic registrar for thoracic or lumbar spine injuries.

In general, spinal injuries should be suspected in any patient who has been involved in:

- A road traffic accident
- A fall or jump from a height
- An accident resulting in impact or crush injuries
- An accident resulting in multiple trauma
- An accident resulting in the patient losing consciousness and if:
  - Following injury, the patient complains of back or neck pain and appears to be guarding their back or neck
  - The patient complains of any sensory changes or loss such as numbness or tingling
  - History of altered sensation, weakness or other signs of spinal injury
  - The patient is unable to pass urine
  - There is pre-existing pathology
  - Remember spinal shock - at the acute stage there may be total, flaccid paralysis of all skeletal muscle and loss of all spinal reflexes below the level of the lesion. It may last from several hours to several weeks depending on the severity.

## Imaging

**Refer to RCR Guidance on Imaging in Paediatric Trauma.**

- **A Paediatric Musculoskeletal Radiologist is required for interpreting these scans.** It is not the role of the Spinal Consultant to exclude all aspects of the radiological images.
- Imaging the whole spine is essential usually with MRI of the whole spine particularly in the young child.
- Areas of concern may then require localised CT.
- In reduced consciousness, CT of the whole cervical spine (to T4) is mandated.
- The ETC/APLS protocols should be followed in major trauma.
- Soft tissue swelling must not be overlooked.
- CT of identified fractures is required.
- Young children may present without obvious bony injury of vertebrae; SCIWORA (SCI without radiological abnormality, though significant damage may be seen on MRI). A high index of suspicion is needed re disco-ligamentous injuries.

The exact timing of performing imaging has to be reviewed as access to the patient is poor in the scanner and careful assessment of clinical condition is needed. Younger children will require sedation or anaesthesia for imaging.

## **Cervical spine**

Cervical Spine Injury (CSI) in children is very rare and becomes increasingly rare the younger the child.

The cervical spine attains its adult form from the age of about 8 years, and so CSI in children aged over 8 years tend to be in the adult pattern, i.e. mainly of the lower cervical vertebrae (C5-C7).

However, in children of 7 years and under, involvement of the atlas and axis with injuries is more common. These injuries are normally characterised by distraction of the osseous ring rather than compression or comminution seen in older children and adults. Fractures at one level should prompt a search for fractures elsewhere in the whole spinal column. The high-level cervical fractures are often fatal at the scene, so they may be under-represented in the hospital patient. Relative bradycardia for age and measured blood pressure might be a clue to upper cervical spinal cord injury.

Spinal Cord Injury without Radiological Abnormality (SCIWORA) is more common in children than adults. It is defined as objective signs of myelopathy as a result of trauma with no evidence of fracture or ligamentous instability on plain spine radiographs and tomography. There can be a delay of up to four days between the insult and developing the myelopathy. It is therefore recommended that neurologically normal children with a history of transient neurological symptoms should also be taken seriously.

The mainstay of treatment is immobilisation, and MRI can provide prognostic information.

## **Thoracic and Lumbar Spine**

Thoracic and lumbar spine injuries in children are rare. The majority of injuries occur in the growth plates within the bones and at the thoracolumbar junction because of its increased mobility.

NICE Guidance 41, Spinal Injury: Assessment and Initial Management recommends that X-ray is the imaging modality of choice in children with a suspected thoracolumbar (T1 – L3) spinal column injury without neurological injury. A CT scan should be performed if the X-ray is abnormal or there is still a clinical suspicion of spinal injury. If an injury is identified, then the rest of the spinal column should be imaged.

Their pathomorphology, healing process and prognosis differs from those in adults, and is beyond the scope of this document.

The goals of initial management are to minimise further injury and resulting neurological deficit as for head injury.

Patients with an identified thoracic or lumbar spine injury on imaging should be kept on bed rest until a plan has been made by the spinal team.

### **Ongoing management**

The continuing management of cervical spinal injuries will be directed by the Neurosurgical team with input from the Spinal team for thoracic and lumbar spine injuries.

The Spinal Cord Injury Centre at Southport Hospital should be contacted in the event of a spinal cord injury within the first 24 hours.

The SCI Centre encourages rapid referral, as soon as spinal cord injury is identified. Consultant to on-call doctor referral to the Centre is required for all new trauma cases. To contact the SCI Centre during office hours telephone 01704 704333, outside office hours, use telephone number 01704 704345 or the main hospital switch board on telephone number 01704 547471. All referrals **must also** be made via the NHS National Spinal Cord Injury Database <https://nww.mdsas.nhs.uk/spinal/>

A detailed assessment of neurological functional should be documented on an ASIA chart which is available on Neurosurgery and Neurology.

# The Management of Traumatic Spinal Cord Injury

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## Background and justification

Acute Spinal Cord Injury (SCI) due to traumatic or vascular damage, resulting in neurological deficit is a rare but devastating injury. Spinal cord compromise can result in immediate or insidious onset of neurological symptoms. Appropriate urgent management from the time of diagnosis has been shown to reduce complications and improve outcomes.

## Inclusions:

All patients (adults and children) with traumatic spinal cord injury resulting in complete or incomplete para- or tetraplegia.

## Standards for Practice

1. All hospitals receiving patients with SCI must have a named linked Spinal Cord Injury Centre and named linked Specialised Spinal Surgery Centre (SSSC) which offers 24 hour consultant spinal surgeon availability. SCI Centres should provide 24 hour advice and support to the Major Trauma Network (MTN).
2. All hospitals within a MTN should have an agreed, common protocol for protecting the neck and spine and exclude injury in line with BOAST-2 (Spinal Clearance in the Trauma Patient (2015)).
3. Centres receiving patients with SCI require 24-hour access to CT and MRI. Initial trauma CT scanning must be followed by whole spine MRI scanning once safe.
4. Daily generalised neurological review should be recorded as part of the routine ward round or multidisciplinary assessment.
5. Full detailed neurological examination should be recorded on an ISNCSCI chart, within 2 hours of admission, in keeping with the International Standards for Neurological Classification in Spinal Cord Injury (ISNCSCI).<sup>\*</sup> This should also occur weekly as well as before and after major interventions and/or surgical procedures.
6. ISNCSCI charts should be completed by clinicians trained in their use.
7. Protocols for skin care, gastric, bowel and bladder care, neuroprotection, joint protection and therapy requirements must be agreed with the linked SCI Centre and follow national guidance.
8. For patients requiring surgery, protocols for anaesthesia and spinal stabilisation must follow national guidance.
9. All major trauma and SSSCs should have dedicated link nurse and therapy arrangements to provide specialised care until transfer to SCI centre.
10. All patients with SCI in England must be submitted to the National Spinal Cord Injuries Database<sup>\*\*</sup> within 24 hours of diagnosis. An agreed management plan between admitting unit and SCI centre must be formulated and recorded in the medical notes within 72 hours of diagnosis.
11. Transfer to a SCI Centre should take place within 24 hours, unless it is in the patient's best interest to remain locally. Regionally agreed support / liaison arrangements need to be in place in the event of a delay.
12. Appropriate psychological support should be provided for patients, family and carers.

<sup>\*</sup> ISNCSCI chart (replaces ASIA chart) <https://asia-spinalinjury.org/international-standards-neurological-classification-sci-isncsci-worksheet/>

<sup>\*\*</sup> National Spinal Cord Injuries Database: <https://www.nscisb.nhs.uk>