

Basic Assessment of Neck Spine Injury

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ABSTRACT

This study aims to present a review of the basic assessment of spine and spinal cord injury. This is a review of published articles between 1978 and 2005 on the neck spine and spinal cord injury. We present a summary about the basic principles according to the literatures.

Keywords: Assesment, neck spine, injury

Spinal Assessment

Injury to the neck spine has been a hot topic in the current decade.¹⁻⁵ While the personal and social impact of neck spine injury remains unacceptable, the basic mechanism, assessment and treatment of these patients still as a controversy debate. The prehospital management of the nek spine injury also remains a subject of debate. This debate has confronted many theories of spine injury. Two major theories regarding spinal cord trauma. One theory suggests that initial trauma to the spine is responsible for cord injury with carefull care and treatment maintain minimal risk of further injury. Proponents of this theory have argued prehospital protection of the spine is unnecessary due to insignificance movement forces compared to initial injury.¹⁻⁵ The second theory suggests that energy from the primary insult is significant and any movement of the spine can result in secondary cord injury. The proponents of this view have promoted immobilization as essential to secondary injury prevention. Modern prehospital emergency care has accepted this theory in spine injury. This concept has formed the prehospital care for potential neck spine injury patients. Care and treatment in secondary spine injury prevention with patient immobilization evolved into a routine standard care (Fig. 1).^{1,4-7}

Causes

1. Motor vehicle accidents: 50%.
2. Falls: 20%.
3. Sports: 15%.
4. *Whiplash associated disorder* (WAD).
5. Motor vehicle accidents (40% of cases).

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6. Whiplash in infants can be caused by shaken baby syndrome.

Elderly: the combination of decreased mobility, decrease in speed of protective reflexes, osteoporosis, and osteoarthritis increase the risk of cervical spine fracture.



Figure 1. Creutzfeldt Traction for C-spine fracture

Spinal Injury

More than 5% of patients worsen neurologically at hospital. Protection-priority; detection-secondary Spinal evaluation complicated by head injury. Remove spine board as soon as possible¹⁻³

Examination

1. Exclude other injuries that may be masking severe pain on the spine.
2. Palpate all spinous processes: if pain, make an X-ray.
3. Ask patient to move spine within the limits of pain: Limitation of active range of movement is an indication for X-ray.
4. Inspect motor and sensory function, posture, and gait and carry out full neurological examination

for sensory and motor deficit, reflexes, perineal sensation, and sphincter tone.

5. Look for Horner's syndrome: ptosis, miosis, anhydrosis, enophthalmus; indicates damage to cervical sympathetic ganglia.
6. Torticollis: associated with atlantoaxial dislocation (AAD) or unilateral facet joint dislocation.¹



Figure 2. Atlantoaxis dislocation due to Neck Trauma

Neurologic examination

1. Findings on neurologic examination depend on whether the patient has sustained damage to the spinal cord itself.
2. Reduced sensation in any body area.
3. Reduced power in muscle groups.
4. Long tract signs.
5. Reduced/loss of anal sphincter tone and loss of perineal sensation.

Classification

1. Complete: no motor (Table 1) or sensory (Table 2).
2. Function decrease below injury level.
3. Incomplete:
 - a. Any motor or sensory preservation decrease injury level.
 - b. sacral sparing may be only residual function.

Table 1 Myotome. (ATLS 2010)

Cervical / Thoracic	Lumbosacral
C-5 Shoulder abduction	L-2 Hip flexion
C-6 Wrist Extension	L-3 Knee extension
C-7 Elbow extension	L-4 Ankle dorsiflexion
C-8 Middle finger flexion	L-5 Big toe extension
T-1 Little finger abduction	S-1 Big toe / ankle plantar flexion

Table 2 Dermatome. (ATLS 2010)

Cervical	Thoracic	Lumbosacral
C-5 Deltoid	T-4 Nipple	L-4 Medial Leg
C-6 Thumb	T-8 Xiphoid	L-5 1st/2nd toes
C-7 Middle finger	T-10 Umbilicus	S-1 Lateral foot
C-8 Little finger	T-12 Symphysis	S-4 Perianal

Diagnostic decision

Assuming a history of blunt trauma to the spine: spine fractures, dislocations, and ligamentous injuries with instability are excluded on X-ray or MRI scan.⁶⁻⁹

Classification of WAD

1. Grade I: pain, stiffness, and tenderness only.
2. Grade II: spine complaints + decreased range of movement + point tenderness.
3. Grade III: spine complaints and neurologic signs

Summary of tests

1. Plain X-rays are indicated if the patient has any one of the following: spine pain, tenderness to palpation over the spine, decreased range of movement of the spine, alcohol or drug use, disorientation or lethargy.
2. Flexion extension views (dynamic view): these are useful for excluding instability .
3. Magnetic resonance imaging (MRI): this is considered the 'gold standard' in detecting soft-tissue injury and the spinal cord injury.
4. CT scan and myelography: these imaging modalities are indicated if MRI is not available.

Clinical pearls

1. Spine injury should be suspected in all patients who have head injuries or have spine pain after injury.
2. Specific attention should be given to patient who has deteriorated of consciousness level.
3. Normal X-rays cannot absolutely rule-out fracture.
4. Patients with neurologic deficit associated with spine injury should be consulted to neurosurgery service

Consider consult

1. Consider referral for all patients with a history of neck injury.
2. Objective neurological signs .
3. A history of transient neurological deficit.
4. Present of pre-existing conditions .
5. Significant mechanism of injury in those who are confused after injury.
6. Significant mechanism of injury and excessive spine pain.

7. Neurologic deficit associated with cervical spine injury need urgent neurosurgical consultation.
8. Any suggestion of spine instability urgent neurosurgical consultation.

Management

Treat Airway, breathing and Circulation problems first. Immobilize the patient. Appropriate radiological imaging. Proper Examination and documentation. Definitive treatment.

Goals

1. If damage to the spinal cord is present, immobilize the patient.
2. If the patient is walking and spine fracture is suspected, immobilize until the spine has been cleared.
3. Exclude fractures and dislocations.
4. Reassure patient that WAD is always self-limiting disease.
5. Prevent chronicity of WAD.

Summary of Therapies

Whiplash associated disorder (WAD)

Treatment by grade

1. Grade I: no medications.⁶⁻¹⁰
2. Grade II: if required, prescribe a short period of rest and simple analgesia. Follow-up with advice on self-mobilization exercises.
3. Grade III: as for grade II and reassessment after 6 and 12 weeks. If there is persistent neurologic symptoms, refer for specialist evaluation.

Other treatments

1. After 12 weeks (chronic WAD), referral to a team with experience in WAD treatment is advised.
2. Transcutaneous electrical nerve stimulation (TENS) is a method for chronic pain, but its benefit is still unproven.
3. Remember the association between chronic pain and depression; because can alter the psychological response to pain so psychiatrist treatment is necessary.
4. Surgery is strictly for patients with radiological instability, cervical disc herniation, and nerve root compression.
5. Most other therapeutic interventions currently used have not been scientifically validated.
6. Treatments evaluated in a scientifically manner show no evidence of efficacy.

Spine fracture and dislocation

1. Have to be treated by a spine specialist.
2. Methylprednisolone is administered when there is acute blunt spinal cord injury. After administration of Methylprednisolone, patients

should be immediately referred to neurosurgery service.

3. Treatment depends on instability and neurologic deficit.
4. Treatment options include reduction of fracture and instrumentation, halo body vest and fusion.
5. A systematic review found that in acute whiplash, early-mobilization physical therapy significantly improved symptoms at 4 and 8 weeks compared with immobilization, but found no significant difference in recovery after 12 weeks.
6. A systematic review included three low evidence of clinical trial which found limited evidence that both passive and active interventions seemed to be more effective than no treatment.



Figure 3 Surgery option for Cervical fracture

Summary of evidence

1. Methylprednisolone, if administered within 8h of injury, in a dose of bolus 30mg/kg administered over 15min, with a maintenance of 5.4mg/kg/h infused for 23h, can improve neurologic outcome up to one year postinjury. But this treatment recently no more classified as a standard just an option of treatment.
2. There is evidence that in acute whiplash, early physical therapy significantly improves symptoms at 4 and 8 weeks compared with immobilization
3. Low-quality of clinical trial found limited evidence that both passive and active interventions seemed to be more effective than no treatment.
4. Limited evidence found no significant difference in symptoms in patients with neck radicular pain when comparing surgery with physical therapy in a spine collar after one year.
5. Evidence has suggested that a multimodal treatment approach to whiplash injury in the long-term, provides greater benefit over a longer period than physical treatment alone.

6. Limited evidence has found no significant differences between multimodal treatment and physical therapy alone, for patients with chronic whiplash.

Never

1. Never remove the helmet from the patient unless there are airway problems.
2. Never ask patient with suspected neck spine injury to move the neck until confirmed no neck fracture.
3. Never force passive movement of spine against pain.
4. Never force a patient with ankylosing spondylitis to lie down flat.
5. Never give manipulation therapy unless neck spine injury has been excluded

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