Updated review

Clearing Cervical Spine Injury in the Unconscious or Obtunded Adult

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Introduction

Approximately 500–600 people sustain traumatic spine injuries each year in the UK. 55% of all spinal fractures occur in the cervical region.

“Clearing” the cervical spine involves the exclusion of injuries to both the bones and soft tissues of the neck (C1 to T1). In many patients, this is possible following careful clinical examination. However, in unconscious or obtunded patients, clearing the C-spine by clinical examination alone is not possible and imaging is required.

As prolonged use of collars is known to cause complications, C-spine clearance should therefore be an immediate priority in all trauma patients.

When assessing the C-spine, it should be noted that around 10% of patients with a C-spine fracture have other, noncontiguous vertebral fractures. Therefore, the entire spine should always be investigated. If one fracture is identified a careful look for a second fracture is mandatory.

WHAT GUIDANCE CURRENTLY EXISTS?

The Canadian C-spine rule and the NEXUS criteria are the most commonly used methods of clearing C-spine injuries, but neither of these detail how to clear the C-spine in obtunded or
unconscious patients. However, there are many other good resources providing guidance on C-spine clearance in patients with GCS scores <13. Some of the most comprehensive ones include:

i) Vienna C-spine protocol for critically injured patients (VCS) 

ii) Alfred Spinal Clearance Management Protocol 

iii) National Institute for Health and Clinical Excellence (NICE) Clinical Guideline 176 

iv) Diagnostic Imaging Pathways Group (DIP) - Cervical Spine Injury Guidance 

v) Eastern Association for the Surgery of Trauma (EAST) Management Guidelines for Identification of Cervical Spine Injuries Following Trauma 

Others exist (Click to see table)

**HOW DO THESE GUIDELINES DIFFER?**

The majority of guidelines agree that CT is the best choice in assessment for C-spine injury in obtunded or comatose patients and that MRI can be used as a supplementary assessment if available. Some older guidelines suggest that 3-view cervical “trauma series” should be used first, but more recent guidelines do not include this assessment, as it has been shown that they provide no additional information than that derived from CT. Concerns have been raised over radiation exposure in CT scans compared to plain films. However, levels of exposure in CT of the head or C-spine are far less than with CT scans of the abdomen.

Research suggests that there is no evidence that MRI should be used as a stand-alone assessment. This is well known to visualise bone poorly. There are still questions as to the risk/benefit ratio of MRI if CT is normal and it has been suggested that MRI is unnecessary if cervical CT and motor function assessment are both normal. Nevertheless, MRI can identify ‘soft tissue’ injuries otherwise missed on CT and may enable any subsequent imaging to be targeted at areas of soft tissue injury which accompany fractures.

**SCOPE OF THIS GUIDANCE**

This summary guidance applies to patients who:

1. Have a GCS of ≤13
2. Are 16 years of age or older

It does not apply to patients who:

1. Have sustained penetrating neck injuries
SUMMARY OF GUIDANCE

1. C-spine injury should be suspected in all patients presenting with an altered level of consciousness following blunt trauma (especially above the clavicle). These patients need to have their C-spine cleared and should have their neck immobilised with a collar until this can be done.

2. Patients with a suspected C-spine injury and a GCS of ≤13 should have an urgent multidetector computed tomography (MDCT) or Helical CT scan of the C-spine (slices less than 2mm), with sagittal and coronal reconstructions, to assess for vertebral fractures. If a fracture is detected at this stage, proceed to step 5.

3. If no vertebral fractures are detected on CT imaging, clinical assessment of the patient’s motor function should be performed. This should include assessment of the following:
   i) motor response
   ii) muscle tone
   iii) deep tendon reflexes
   iv) plantar reflexes

   If no abnormalities in motor function are detected, proceed to step 6.

4. If motor function is abnormal on clinical examination, the patient should undergo an MRI scan of the C-spine, to rule out potential injury to soft tissues (ligaments, disc interspaces, and facet capsules). If no injuries are detected at this stage, proceed to step 6.

5. If an injury to the C-spine is detected on either CT or MRI imaging, spinal immobilisation should be continued, the on-call spinal surgeons should be contacted and definitive management should be initiated.

6. If CT imaging reveal no injuries and either assessment of motor function or MRI reveal no abnormalities, the risk of missing a C-spine injury is deemed to be less than the risk of complications due to prolonged spinal immobilisation. The C-spine can therefore be cleared and C-spine immobilisation discontinued. This decision should be made with the support of a consultant and following clearance of the entire spine.

7. The absence of a C-spine injury does not rule out injuries to the thoracic, lumbar or sacral spine. Therefore, caution should still be exercised and steps should be taken to rule out other spinal injuries.

A NOTE ON DIFFERENT IMAGING MODALITIES

CT: Current literature points to CT being the best imaging modality to
assess for the presence of C-spine injury in obtunded or unconscious patients. MDCT or Helical CT scans with sagittal and coronal reconstructions slices up to 2mm from C1 to T1, should be used. CT should be performed within one hour of identification of risk factors and reported within one hour of the scan. This is now a key performance indicator in many trauma centres.

Radiographs: Single lateral plain radiographs are now widely recognised as being inadequate. Whilst three-view cervical ‘trauma series’ show increased sensitivity compared to the single lateral view, these are no longer regarded as adequate in facilities where CT is available. If used, three-view plain radiographs should be supplemented by CT to define suspicious or poorly visualised areas.

MRI: There is consensus that MRI of the C-spine is not a good stand-alone investigation, but should be used to complement CT. This can identify ‘soft tissue’ injuries to supportive ligaments, disc interspaces, and facet capsules. However MRI can be difficult to undertake in intensive care patients.

Dynamic Fluoroscopy: Fluoroscopy is a safe test but has not been shown to have any diagnostic advantage over CT. This test is often difficult in obtunded or comatose patients and may miss instability of the lower C-spine and therefore should not be used in these patients.

All imaging should be assessed and reported on by an experienced radiologist so as not to miss any subtle signs.

**Learning points**

1. Clearing the cervical spine in obtunded or comatose patients following blunt trauma is not possible with clinical examination alone and requires imaging.
2. Current guidelines still differ in their recommendations of the best imaging techniques. If unsure, always follow your agreed local protocol.
3. C-spine injury should be assumed until the C-spine is adequately cleared.
4. Injuries to other parts of the spine may be present even in the absence of C-spine injuries and should therefore always be investigated.

**Abbreviations**

- C-spine: cervical spine
- GCS: Glasgow coma scale score
- MDCT: multi-detector computed tomography
- CT: computed tomography
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- Immobilisation with collar

- C-Spine MDCT or Helical CT with sagittal + coronal reconstructions

  Normal

  - Assess gross motor function

  Abnormal

  - MRI (if available)

    Normal

    - Collar may be removed (decision should be made with support of a consultant)

    Abnormal

    - Continue C-Spine immobilisation
    - Contact spine surgeon
    - Initiate definitive management

References


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