

Guidelines for clearance of the cervical spine in the unconscious adult patient

University Hospital Wishaw

BACKGROUND

In blunt trauma, c-spine injury is present in 2-12% of patients with potentially life-changing consequences¹. C-spine immobilisation using a hard collar, head blocks and tape is routinely performed by the Scottish Ambulance Service following blunt trauma with the aim of reducing the risk of injury to the spinal cord from movement of an unstable c-spine injury². Guidance exists for the clearance of the cervical spine in the conscious and co-operative patient using both clinical and radiological criteria³. However, in the unconscious patient, these clinical criteria cannot be assessed therefore cervical immobilisation including the hard collar is often maintained as a precaution.

CT has previously been considered too insensitive to detect non-bony injuries, such as ligamentous, that may still progress to permanent disability if missed. However, there is an under-appreciation of the morbidity and mortality associated with prolonged immobilisation and use of a hard collar.

AIMS

To provide guidance on the management of potential c-spine injuries in unconscious or sedated adult patients in Adult Critical Care Unit in whom a clinical examination is not anticipated to be possible within 48 hours.

IMMOBILISATION OF THE C-SPINE³

Until the c-spine is cleared, immobilisation methods may include the following:

- Use of an appropriately sized hard collar, head blocks and tape
- Unbroken bed (up to 30° head up tilt if other injuries allow)
- Full log rolls with manual inline stabilisation (consideration to 20° tilts if other injuries present)
- Transfer using scoop stretcher or vacuum mattress

Spinal immobilisation should be individualised to the patient and extreme care should be taken when immobilising patients who have airway compromise, are uncooperative or agitated and those with a pre-existing or new neck deformity.

Recommended Radiology

High-quality CT imaging (axial thickness < 3mm) has a high negative predictive value for excluding the critically important unstable c-spine injury⁴. Helical CT scanning of C1 through to T4 with 3D reconstruction is carried out using 1 mm slices in University Hospital Wishaw. If these images are reported as no demonstrable fracture or dislocation, by a consultant radiologist, then the risk of the patient having a significant, missed injury is small enough to warrant safe removal of spinal immobilisation⁵.

In the obtunded trauma patient, CT clearance of c-spine injury is adequate, unless there is soft tissue injury or any non-bony abnormalities detected. The negative predictive value of a clinically significant ligamentous injury is nearly 100% therefore adjunctive imaging is not necessary^{6,7}. Nonetheless, if non-bony injuries or abnormalities are detected, there should be a low threshold for proceeding with definitive and confirmatory imaging with MRI when and where possible⁷.

However, CT should not exclude the use of clinical judgment. If there were any signs or symptoms pre-intubation that raise the suspicion of spinal injury, further evaluation should be considered with the help of the radiologist and orthopaedic surgeon.

BALANCE OF RISKS IN UNCONSCIOUS PATIENT WITHOUT CT EVIDENCE OF SPINAL INJURY

There is concern about the risk of unidentified unstable spinal injury in patients who are unconscious or sedated. A case series of CT imaging in over 14,000 trauma patients showed a sensitivity and specificity of greater than 99.9% in detecting an unstable cervical spine⁶. Another retrospective review of 14,577 blunt trauma patients found that ligamentous injuries without c-spine fracture are very rare (< 0.6%)⁸. Finally, a study was carried out in 1400 patients suffering blunt trauma to the head and neck. 366 patients were obtunded and therefore unable to be cleared clinically despite a normal c-spine CT. These patients were all scanned with MRI which revealed a total of 4 ligamentous injuries, none of which were unstable⁹.

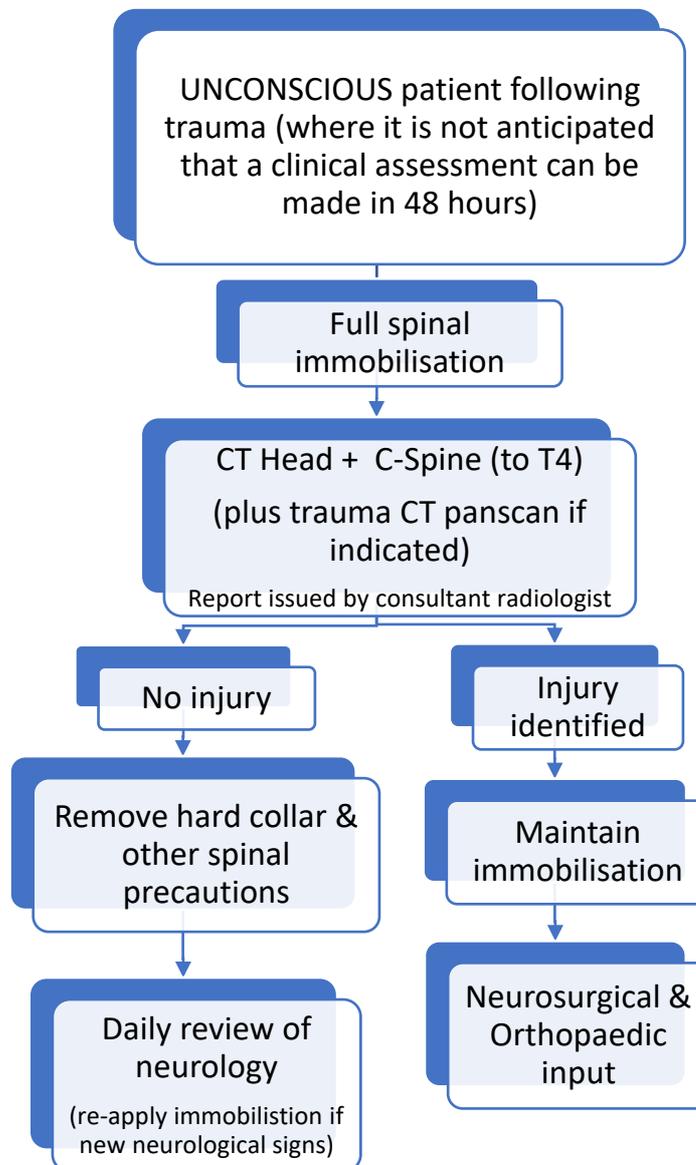
A systematic review of 1,017 patients reported no new neurological changes after cervical collar removal following a negative high-quality c-spine CT scan. Therefore the multispecialty authors of the EAST guideline conclude that in obtunded adult blunt trauma patients, cervical collars should be removed after a negative high-quality c-spine CT alone⁴.

The risks of prolonged spinal precautions in patients without evidence of injury is significant and usually outweighs the potential benefit of continued spinal immobilisation¹⁰. If the patient is not anticipated to regain consciousness with 48-72 hours to allow clinical assessment of the cervical spine, current evidence supports the decision to declare the cervical spine 'cleared' without further delay¹⁰. The current clinical guidance recommend a CT scan alone to rule out c-spine injury and that if no injury is detected, hard collars and spinal precautions should be removed as soon as possible¹¹.

COMPLICATIONS OF PROLONGED IMMOBILISATION USING A HARD COLLAR^{5,10}

- Impaired venous drainage and increased intracranial pressure
- Difficult laryngoscopy and intubation
- Increased risk of aspiration and ventilator-associated pneumonia
- Difficult central venous cannula insertion
- Increased risk of central venous cannula associated blood stream infections
- Increased risk of pulmonary thromboembolism
- Pressure necrosis leading to ulceration
- Inability to provide good oral care
- Failed enteral nutrition, gastrostasis and reflux
- Restricted physiotherapy
- Infection prevention difficult due to staffing requirements

Flowchart



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