

Evaluation and imaging of potential spinal injuries amongst clinically unevaluable adults in ICU; “clearing” the spine

Reference No:

Aim and Scope

To allow critically ill adults presenting to the ICU at RDH to be screened for potentially unstable VCI and spinal cord injury in the shortest possible time, with optimal sensitivity and specificity and consistent with the evaluation and management of other injuries.

Evaluation for spinal injuries: management guideline

Trauma victims admitted to ICU at RDH have suffered high energy polytrauma and are not clinically evaluable (eg distracting injury). Clearing the spine (cervical and thoracolumbar) will require

- 1) Helical CT of the cervical spine from the occipito-atlantal (C1) joint to the cervicothoracic junction (C7/T1)
- 2) High quality CT of the entire thoracic and lumbar spine to demonstrate bony alignment and exclude fractures. This is frequently possible through radiologist re-formatting abdominal and thoracic CT at a workstation

Patients in ICU should undergo spinal evaluation by CT imaging and interpretation by Consultant Radiologist within 24 hours of injury. If imaging is undertaken out of hours it is acceptable to continue spinal precautions overnight and review imaging early next day

Background

Amongst adult patients suffering high energy polytrauma approximately 5% will suffer a significant (ie mechanically unstable) vertebral column injury (VCI) and significantly < 1% suffer a spinal cord injury (SCI). The main risk from undiagnosed unstable VCI is that further neurological compromise will occur and that ultimately spinal precautions (see below) and stabilisation (surgical or non-surgical) will be required.

Balanced against this rare but potentially catastrophic risk of neurological deterioration is the fact that the majority of trauma patients do **not** have a VCI and prolonged application of spinal precautions and immobilisation is associated with multiple complications including pressures sores, raised intracranial pressure or ventilator associated pneumonia.

Furthermore, the efficacy of these interventions in reducing secondary neurological compromise is controversial.

The assessment of critically ill adults in RDH ICU with potential VCI is therefore a screening programme to establish who has “stability” and can be “cleared” of injury (the majority) vs the smaller numbers with an injury, whose care will not be detailed further. Of note

- 1) By definition patients remaining in RDH ICU or HDU for ongoing care of high energy blunt polytrauma (see below) will not be clinically evaluable due to any or all of tracheal intubation (eg chest injuries), head injury, alcohol or intoxicants or distracting injuries (eg long bone fracture). Any adult patient who has suffered high energy polytrauma sufficient to require ICU or HDU admission is considered “high risk” for VCI
- 2) Other imaging is dictated by injuries but increasingly a “head to pelvis” whole body CT is undertaken to allow discussions with Regional Trauma Centre QMC. Maximum information must be obtained from this scan to avoid transferring unstable patients. Where a trauma brain CT is indicated, in most cases the cervical spine should also undergo CT. Very rarely some patients, eg assault or localised injuries, may have their thoracolumbar spine assessed clinically in the absence of visible external injury. The cervical spine cannot be cleared in this manner
- 3) This guideline implies that spinal “clearance” is achieved between the consultant radiologist and intensivist in most cases
- 4) The conventional 3 view trauma radiographs of the cervical spine (lateral, AP and peg view) are inadequate and too frequently technically compromised to be used in clearing ICU patients
- 5) Modern CT as used in Derby implies a modern helical multidetector (MDCT) allowing 3D reformatting of images and dynamic interpretation at a workstation. Modern CT has largely replaced routine use of MRI. The risk of cervical isolated ligamentous injury following CT is controversial but probably <1% in Derby and MRI has low sensitivity for posterior vertebral fractures. CT is more sensitive than radiographs in the thoracolumbar spine and isolated ligamentous injury in this region is almost unheard of, unlike the cervical spine
- 6) Any patient manifesting neurological compromise at presentation (eg lateralisation, paresis, sensory level) should be regarded as having a SCI until excluded and requires emergency MR imaging and liaison with orthopaedic spinal surgery
- 7) Where polytrauma patients have been assessed using these guidelines, then the process will typically involve a senior radiologist and intensivist. In Derby all detected injuries or deficits require prompt involvement of a senior specialist orthopaedic spinal surgeon

- 8) As a screening protocol missed injuries are inevitable and potentially devastating. All staff must be mindful that once “cleared”, features of VCI may indicate a missed injury and require re-evaluation. This guideline screens for absence of significant and unstable VCI. It does *not* detail stability of a detected VCI or SCI, restoration of stability and surgical or non-surgical options where ongoing care in RDH is multi disciplinary co-ordinated by the Spinal Orthopaedic Surgeons and Radiologists in conjunction with Intensivists.

Abbreviations and definitions

Vertebral column injury (VCI) a vertebral bone or ligamentous injury which is of sufficient severity to allow significant mechanical distraction and cause secondary neurological compromise

Spinal cord injury a direct or indirect (eg VCI) injury to the spinal cord resulting neurological compromise, typically tetra or paraparesis or a partial cord syndrome.

Spinal immobilisation is the application of a bundle of interventions to attempt to reduce the risk of further vertebral displacement and cord injury. In adult trauma patients on ICU this typically involves

- 1) Sedation, often integral to management of other injuries eg chest or brain
- 2) Cervical collar
- 3) Lateral restraints
- 4) 30 degree head up and mattress

Some workers propose immobilisation may reduce complications eg hypoperfusion of the cord through postural changes. Many of these interventions are controversial and have little evidence of efficacy.

High energy blunt polytrauma may be defined in Derby as an injury sufficient to require admission to ICU or HDU. Up to 15% of significant VCI's are domestic eg fall down stairs.

References

Plumb JOM, Morris CGT. Clinical review: spinal imaging for the adult obtunded blunt trauma patient: update from 2004. *Intensive Care Medicine* 2012;38:752- 71

Morris CGT, McCoy E. Clearing the cervical spine in unconscious polytrauma victims, balancing risks and effective screening. *Anaesthesia* Volume 59, Issue 5, pages 464–482, May 2004

NICE are currently finalising guidelines detailing care of spinal injuries and this guideline will be reviewed after publication (2015)

Documentation Control

Development of Guideline: Dr Craig Morris and Dr James Low (Consultant Intensivists)

Consultation with: Consultant Intensivists , Dr Peter Thurley (Consultant Radiologist), and Mr Raj Bomireddy (Consultant Spinal Surgeon)

Approved by:

Signature:

Print name and Position:

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Key Contact: Dr. Craig Morris (Consultant Intensivist)

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