Queensland Trauma Education

SPINAL TRAUMA

Cervical spine trauma
Case discussion
Facilitator resource kit

CSDS
Clinical Skills Development Service

Queensland Government

Queensland Trauma Education

The resources developed for Queensland Trauma Education are designed for use in any Queensland Health facility that cares for patients who have been injured as a result of trauma. Each resource can be modified by the facilitator and scaled to the learners needs as well as the environment in which the education is being delivered, from tertiary to rural and remote facilities.

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About this training resource kit

This resource kit provides the learner with knowledge and skills in the clinical assessment of a patient with a possible cervical spine injury following trauma.

National Safety and Quality Health Service (NSQHS) Standards

Target audience

Emergency department medical and nursing clinicians

Duration

30-45 minutes

Group size

Suited to small group participation

Learning objectives

By the end of this session the participant will be able to:
- Identify risk factors for cervical spine injury
- Discuss examination and investigation options for identification of cervical spinal injury, including use of decision rule tools
- Review common cervical spine injury patterns.

Facilitation guide

- Facilitator to use case discussion and supporting resources to guide discussion.

Supporting resources (in Printable resources)

The following supporting documents are provided for this case discussion:

1. Alignment of cervical spine assessment
2. Plain XR and CT demonstrating XR appears 'normal' but the CT of same patient demonstrates oblique nondisplaced fracture of L C6 superior and inferior facets

Normal XR examples:
3. Normal AP: anteroposterior projection of the cervical spine demonstrating the vertebral bodies and intervertebral spaces

4. Normal Lateral X-ray: often utilised in trauma demonstrated
5. PEG view: Normal
6. Oblique X-ray: Normal
7. Swimmers: Normal

Anatomical vs mechanism of injury

8. Mechanism of injury in the cervical spine
9. Injuries:
     a. Dens fracture
     b. Hangman's fracture
     c. Bilateral facet dislocation
     d. Jefferson fracture

Case discussion

Case study

A 25 year old man is brought to the Emergency Department following a fall from a second story balcony. He is alert but complaining of sensory changes to his right hand following the event. He has normal vital signs, is not intoxicated and has no past medical history.

Question and answer guide

1. What injury history is associated with cervical spinal injury?

High energy trauma (For example: RTC > 60km/hr, fall > 2 meters)

Mechanism of trauma- hyperextension- elderly fall hitting forehead, rear- end at high speed

Pre-morbid conditions- ankylosing spondylitis, diffuse idiopathic skeletal hyperostosis, previous cervical spine fusion, connective tissue disorder with ligamentous laxity

2. How common are cervical spinal injuries?

5-10% blunt trauma presentations are associated with a cervical spinal injury [1]

Cervical spine involved in 50% spinal column injuries

Falls, RTC, pedestrian and diving [2]

C2 (30%) and C7 (70%) [2]

3. What clinical examination features may suggest a cervical spinal injury?

Pain- at rest or with palpation of spine

Associated head and facial injury

Seatbelt abrasion to chest/abdomen- suggesting flexion-distraction injury

Neck held in rotational deformity to suggest a unilateral facet dislocation

Neurological deficits- limb weakness, sensory deficits, perianal sensation and rectal tone

Abnormal breathing pattern (abdominal breathing)/respiratory failure- injury above C3-5 as innervate diaphragm

4. What factors commonly lead to missed spinal injuries?

Inadequate clinical assessment

Inadequate imaging of the affected area- more common with plain X-Ray due to limitations in imaging to T1

Altered conscious state- affecting reliability of clinical exam

Multi system trauma with life threats requiring emergent management- primary focus on other systems (ABC)

5. What is the NEXUS criteria?

The patient does not need imaging of the cervical spine if all the following are present:

- Awake, alert and clinically stable
- No focal neurological deficits
- No altered level of consciousness
- Not intoxicated
- No midline spinal tenderness
- No distracting injuries

6. How does the Canadian Cervical spine rule differ from the NEXUS criteria?

The Canadian C spine rule differs from the NEXUS criteria as it involves consideration of the trauma mechanism in addition to patient factors and clinical examination findings. The rule states that if features are present then the patient should undergo an imaging study (CT, rather than Xray).

The Canadian C Spine Rule is as follows:
Are *any* of the following present?
- Age older than 65 years
- Mechanism of injury considered dangerous
- Numbness or tingling present in the extremities

--> If *yes*, c spine imaging is indicated

--> If *no*, are **any** of the following low-risk indicators present?
- Simple rear-end motor vehicle collision
- Patient ambulatory at any time since injury
- Delayed onset of neck pain
- Patient in sitting position in emergency department
- Absence of midline cervical spine tenderness
- If **any** of these factors are present the patient then undergoes a clinical exam: are they able to rotate their neck 45° in each direction? If *yes*, c spine imaging is not necessary. If *no,* the patient is unable to rotate their neck, then c spine imaging should be performed.

If *none* of the low-risk criteria are present:
- CT c spine imaging should be performed.

Supplementary Question: in your department what rule is followed? Can discuss pros/cons of each and use of combined rule/decision tree.

7. If cervical spine X-rays are requested, what views are obtained? (Supporting resources 3-7 as required)

AP

Lateral (including T1 vertebra)

PEG view

If unable to visualise T1- supplementary views including oblique and swimmers' views

8. How is alignment assessed on imaging studies?

4 parallel lines on lateral radiograph (supporting document 1)

Looking for abnormalities in:

- Soft tissues
- Hypo lordosis
- Disc Space narrowing or widening
- Widened inter-spinous distances

9. What are the ABCS of Cervical Spine Imaging Evaluation? [2]

A - Alignment & Anatomy

B - Bony integrity

C - Cartilage (joint) spaces

S - Soft Tissues abnormalities

A - Alignment & Anatomy

- Visually trace the 4 lines labelled (supporting document 1)
- Look for disrupted anterior or posterior vertebral body lines
- Look for disruption of the spinolaminar line
- Look for asymmetry of the facets
- Look for widening of the spaces between the individual vertebrae
- Look for widened the predental soft tissue space

B – Bony integrity

- Overt fracture lucencies/deformities
- Once one fracture is seen, be sure to look for others
- Disruption of the ring of C1 (Odontoid Fracture)

C – Cartilage (joint) spaces

- Widened or narrowed disc space/facets

S – Soft tissue abnormalities

- Widened prevertebral space
- >7mm should prompt high suspicion for injury

10. Why is CT preferred over plain X-ray imaging? (Supporting document 2)

X-ray may miss nondisplaced injury

In elderly: plain X-ray is harder to interpret due to degenerative changes.

11: How are cervical spine injuries classified?

Anatomical vs mechanism of injury **(supporting resource 8 & 9)**

Anatomical:

- Occipito-atlantal dislocation- generally fatal
- C1- Jefferson burst fracture- axial compression
- Dens- type 2 (base of dens) vs type 3 (into C2 body)
- C2- Hangman's fracture
- Clay shovelers fracture- isolated spinous process fracture C7 (C6-T1)

Mechanical:

This is more common with lower cervical spine injury- pattern of injury: bones fail in compression; ligaments fail in distraction.

- Compression- wedge and teardrop
- Distraction flexion- posterior ligamentous tear, hyperflexion (perched spine), facet dislocation (unilateral or bilateral)
- Distraction extension- anterior ligamentous tear
- Hyperextension teardrop/dislocation
- Axial compression- burst fracture
- Lateral bending- unilateral body or posterior element fracture

12: What other injuries are associated with cervical spinal injury? [3]

Blunt cerebrovascular injury (BCVI)- with subluxation injury and those involving transverse foramen

Rib and sternal fractures

Base of skull fractures

Facial fractures

Acronyms and Abbreviations

Term	Definition
NEXUS	National Emergency X-Radiology Utilization Study Criteria
RTC	Road traffic collision
AP	Anterior posterior
CT	Computed tomography

References

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