Spine Trauma
Facts, myths and tips

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April 2004
St George Trauma Patients 2003

Despatch Route:
- Presented: 1065
- Admitted: 740
- ICU: 60
- HDU: 84
- Died: 15
- Transferred: 21
- CT: 98
Alcohol and Other Drugs

- Alcohol: 13%
- Drugs: 1%
- Alcohol and drugs: 2%
- Nil
Role of the trauma service

- Attend trauma calls
- Liaise
- Refer
- Coordinate
- Issues
- Policy
- Education
- IHT follow-up
- Data collection
- Research
Objectives

- Describe basic spinal anatomy and physiology
- Evaluate for suspected spine injury
- Identify types of spinal injuries and x-ray features
- Appropriately manage spinal injury
Spinal Injury Etiology

- SCI occur in 2.6% of trauma pts 55% being cervical
- 60% aged between 16 – 30 years
- 75% are male
- MVC highest cause of SC and vertebral column injury
- 60% SCI in age > 75 years caused by falls
- High mortality, social and financial impact
Anatomy
Cervical Spine

- Smallest and most flexible
- Cord fills 35% foramen at the atlas (C1), then 50%
- Spinal nerves exit bilaterally
- Cervical plexus = phrenic nerve (C3-5)
- Brachial plexus = upper extremities (C5-T1)
Thoracic Spine

- Attach to ribs
- Innervate
  - thorax,
  - abdomen,
  - intercostal muscles
Lumbar Spine

- Strongest
- Largest
- S1 to S5 are fused to form sacrum
Ligaments and discs

- Support and stability
- Anterior and posterior run length
- Hold vertebra in position
- Prevent excessive flexion/extension
- SP and TP attach to muscles and other ligaments
- Discs are shock absorbers

Anterior and posterior ligaments
Spinal Cord

- Mass of nerve tissue
- Centre is nerve bodies (grey matter)
- White matter = pathways
- Extends to L2
- Becomes a series of nerve roots (caudina equina)

1. Posterior
2. Lateral corticospinal tract
3. Lateral spinothalamic tract
4. Ventral spinothalamic tract
Mechanism of Injury

- Blunt
  - Hyperflexion (chin to chest)
  - Hyperextension

- Penetrating

- Secondary
  - Hypovolaemic shock/hypoperfusion
  - Biochemical response (edema, cellular necrosis)
  - Hypoxia
  - Iatrogenic
Hyperextension
Hyperflexion
Selected column and cord injuries

Incomplete spinal cord syndromes

- Central cord (loss of motor and sensory below lesion)
- Anterior cord (intact fine touch, pressure and vibration)
- Brown-Sequard (loss motor on same side, pain/ temp opposite side)

Complete spinal cord lesion

- Loss of all motor and sensory function below level of lesion
Vertebral Column Fractures

- Simple
- Compression or wedge
- Comminuted or burst
- Teardrop
Simple

- Linear fracture of processes, facets or pedicles
- Compression of cord rare
- Column remains aligned
Wedge/Chance

- Fracture of vertebral body
- May or may not have compression
- Loss of height
Burst

- Comminuted fracture of body
- May result in cord compression
Teardrop

- Small fracture of anterior edge of vertebra
- Fragment may impinge on cord
- May have dislocation
Hangman’s

- C2
- Axial loading
Dislocation

- Anterior and posterior ligament injury
- Subluxation = not completely dislocated
Stable or Unstable

- Potential for progressive or impingement or injury to cord
- Potential for displacement during healing process
- No displacement after healing has occurred
Pre-Hospital Management
Nursing Assessment
Primary Survey – spinal considerations

A - Cervical spine immobilisation

B - Effectiveness and rate
   (diaphragm and intercostal muscle interference)

C - Skin temp, pulse rate
   (Neurogenic shock – strong slow pulse, skin is dry/warm)

D - Neurological deficit
Nursing assessment

As part of secondary survey ask questions

- Pain?
- Altered movement/sensation in extremities?
- Wiggle fingers and toes
- Gently move arms and legs
- Ask patient to squeeze their buttocks
- Inspect for bruising, swelling, priapism
- Palpate
- Remove hard board on initial log roll
How should we clear the c-spine?

- Protocol of Institution
- NEXUS study, EAST and ATLS guidelines

(Hoffman et al. (2000) Validity of a Set of Clinical Criteria to Rule Out Injury to the Cervical Spine in Patients with Blunt Trauma NEJM, 343(2) 94-99)

1. Alert
2. No mental status changes
3. No neurological deficit
4. No neck pain
5. No distracting pain
Screening for Spinal Injury

Alert, sober, neurologically normal patient:

1. If no neck or spine pain or tenderness to palpation or voluntary movement
2. If no painful distracting injury
3. Remove c-collar
4. If still no pain or tenderness with voluntary movement
5. No further spine evaluation or c-spine x-ray necessary
Screening for Spinal Injury

Alert, sober, neurologically normal patient:

- Neck or spine pain or tenderness to palpation or voluntary movement?
- If “yes” to any question
  - Protect c-spine
  - Obtain necessary x-ray exams
Collar size
X-rays in the conscious patient?

- Crosstable lateral film excludes 85% of fractures

- Additional 2 views excludes most fractures

- Also may require
  - Swimmer’s view
  - CT scan for bony detail
  - Flexion / extension views
  - MRI
C-Spine X-rays

- 10% of patients with a c-spine fracture have a 2nd, associated noncontiguous vertebral column fracture
- Identify one abnormality?
  Look for another!
- Radiographic screening of entire spine required in this instance
Normal c-spine xray

- lateral view
- anterior-posterior view: adult
- skull
- cervical vertebrae
- spinous process
- vertebral body
Screening for Spinal Injury

Altered LOC

- Radiographic visualisation of entire spine
- Plain films
- CT scan of suspicious areas
- Put in Philadelphia Collar
Ongoing Management

- Reassessment of ABCD
- Monitor vital signs
- Maintain immobilisation
- Analgesia
- IDC/NGT
- IV Methylprednisolone
  - Proven spinal cord injury
  - Start within 1st 8 hours from injury only
- Management plan – think ahead
Management

**Immobilisation**
- Entire patient
- Proper padding
- Maintain until spine injury excluded
- Avoid prolonged use of backboard!
Immobilisation Problems?

Prolonged time to clear c-spine

- Airway compromise
- Uncooperative patients
- Pressure area development
- Patient discomfort
- Respiratory issues
The Log Roll
Thinking ahead

- Ensure patient and family aware of plan
- Documentation
  - Plan
  - Analgesia – consider types
  - Pressure area care
  - DVT prophylaxis
- Transfer?
Philadelphia Collar
Miami J
But Beware
Pressure areas

Images:
- A: Pressure sore on the side of the head
- B: Pressure sore on the back
- C: Pressure sore on the cheek
- D: Pressure sore on the shoulder
Myths

- Spine board immobilises the spine
- It’s comfortable on a spine board
- Clock watching = drug seeking
- Sleeping = no pain
- Priapism = aroused patient
Tips

- Have a good protocol
- Listen to MOI, always be suspicious of injury
- Folded towel under head of adult
- Remove board on initial log roll
- Change to Philadelphia Collar early (collar care)
- Analgesia
- Reassess
- Document
Summary

- Treat life-threatening injuries first
- Immobilise
- Remove board
- Appropriate spine films
- Document (status, abnormalities, plan)
- Transfer unstable fracture/cord injury (organise early and have pt on Jordan Frame)