

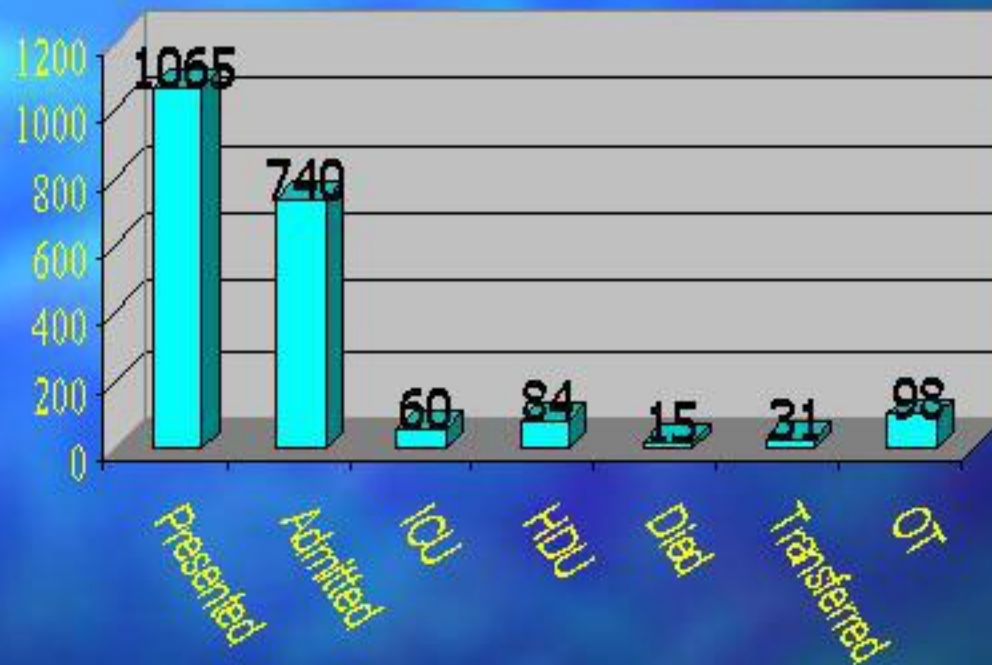
# Spine Trauma

## Facts, myths and tips

Kate Curtis

April 2004

# St George Trauma Patients 2003



Despatch Route

## Gender of 2003 Patients

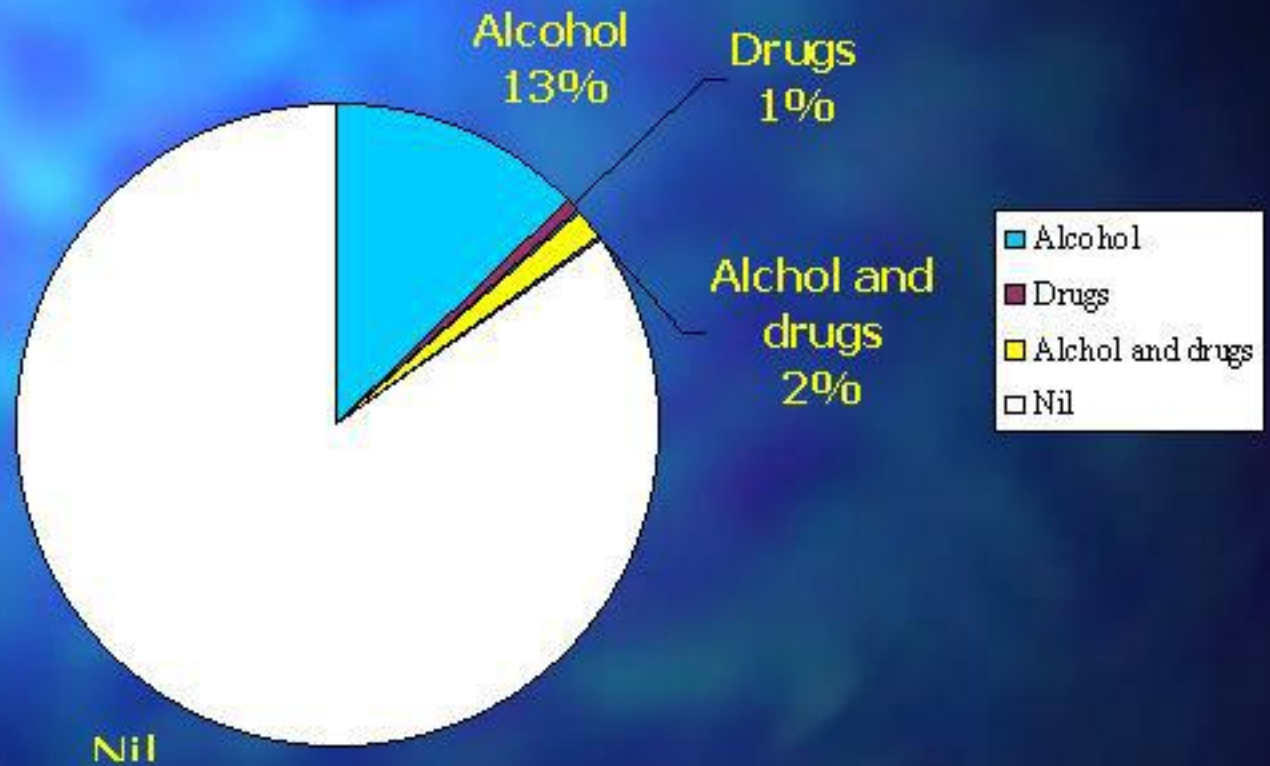


## Injury Severity





# Alcohol and Other Drugs



# 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

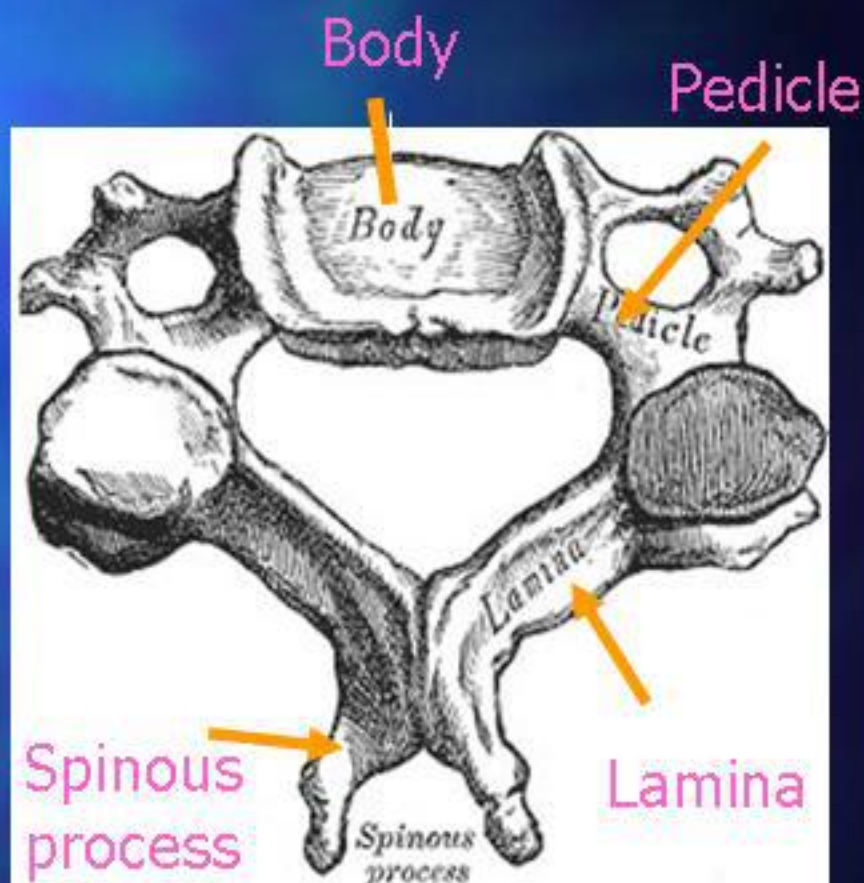


# Anatomy



# Cervical Spine

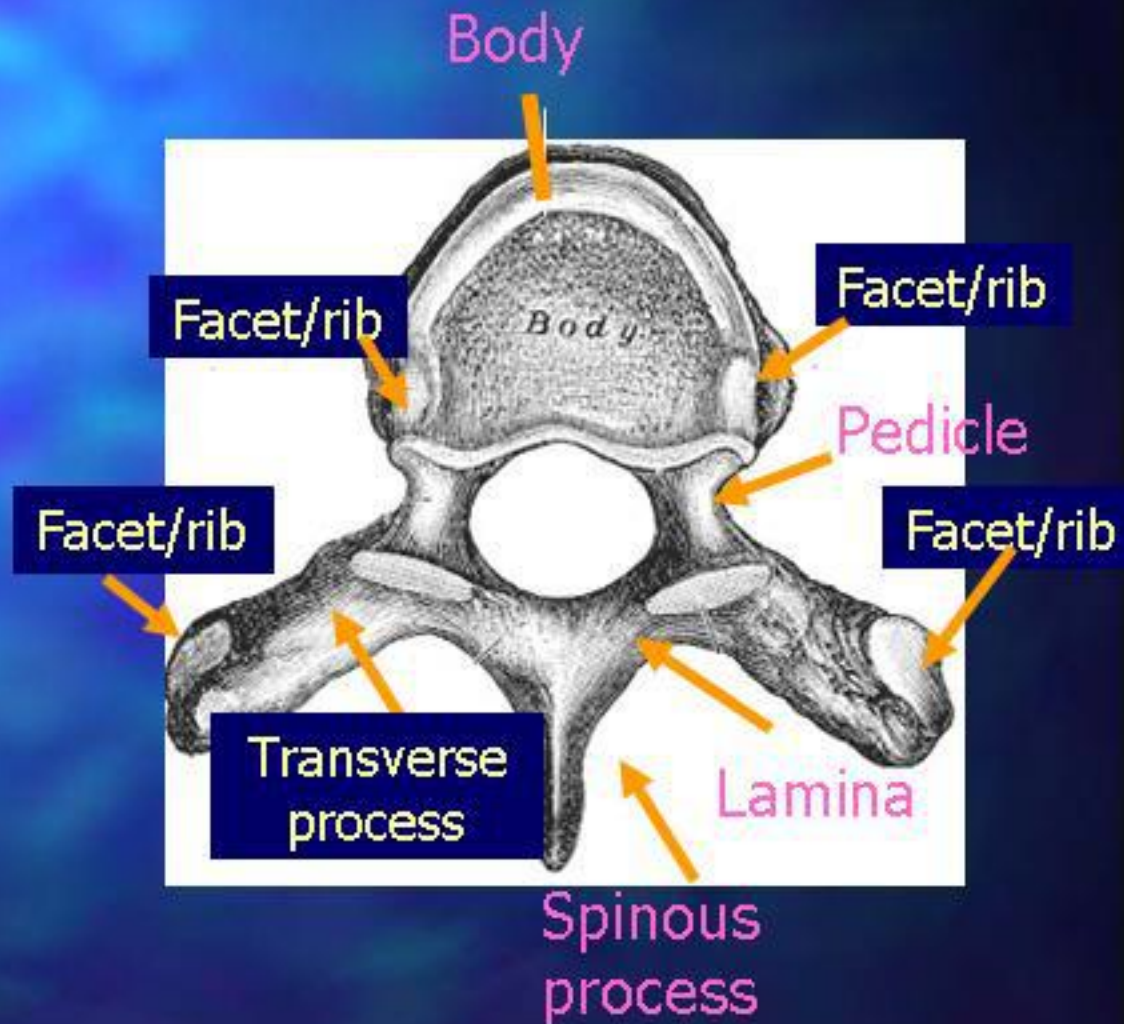
- Smallest and most flexible
- Cord fills 35% foramen at the atlas (C1), then 50%
- Spinal nerves exit bilaterally
- Cervical plexus = phrenic nerve (C3-5)
- Brachial plexus = upper extremities (C5-T1)





# Thoracic Spine

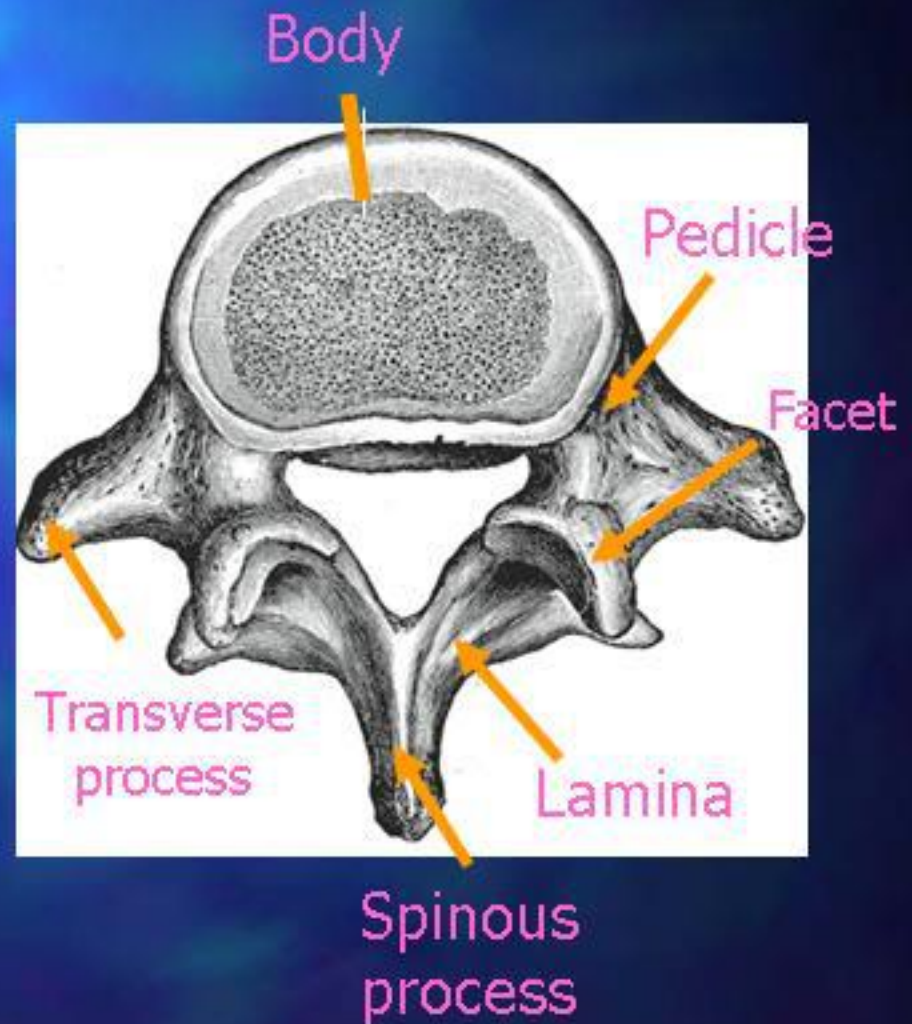
- Attach to ribs
- Innervate
  - thorax,
  - abdomen,
  - intercostal muscles





# Lumbar Spine

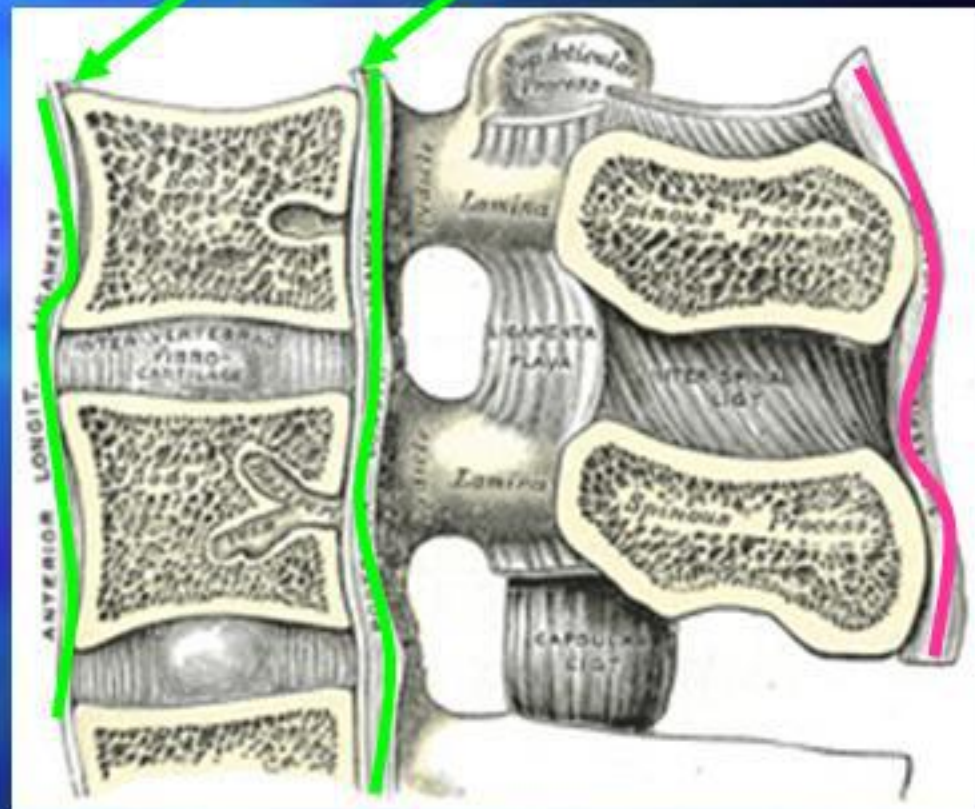
- Strongest
- Largest
- S1 to S5 are fused to form sacrum



# 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

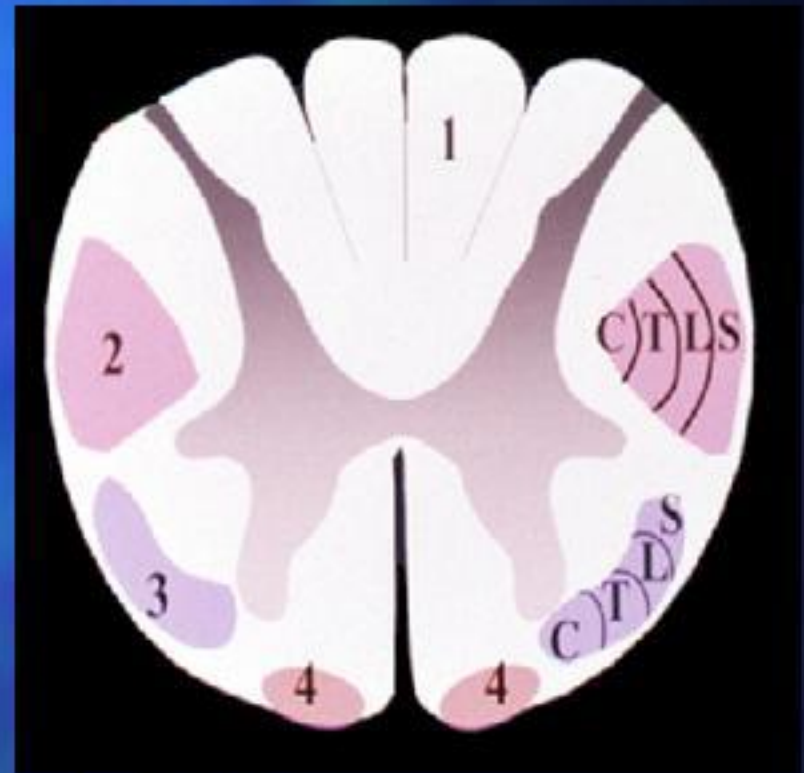
Anterior and posterior ligaments





# 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

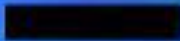
- Simple
- Compression or wedge
- Comminuted or burst
- Teardrop

# 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

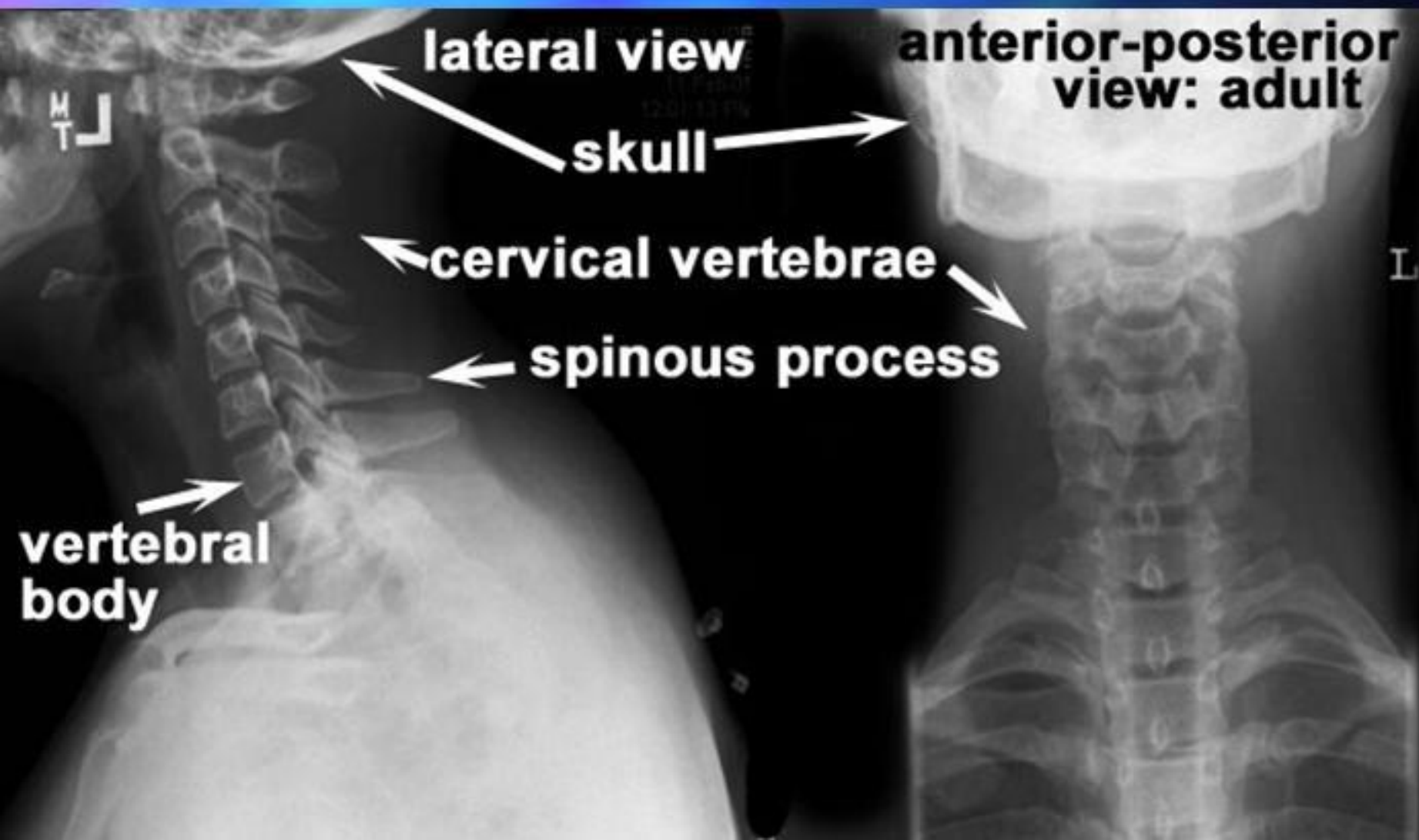




# C-Spine X-rays

- 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





# 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



# Aspen



# Miami J

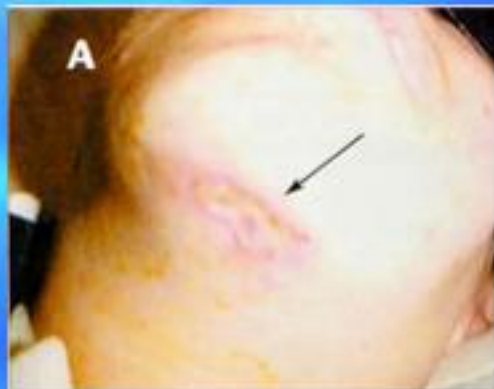






**But  
Beware**

# Pressure areas



# 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)



*Pictures of the year by NBC*



Jim Lavrakas / Anchorage Daily News

