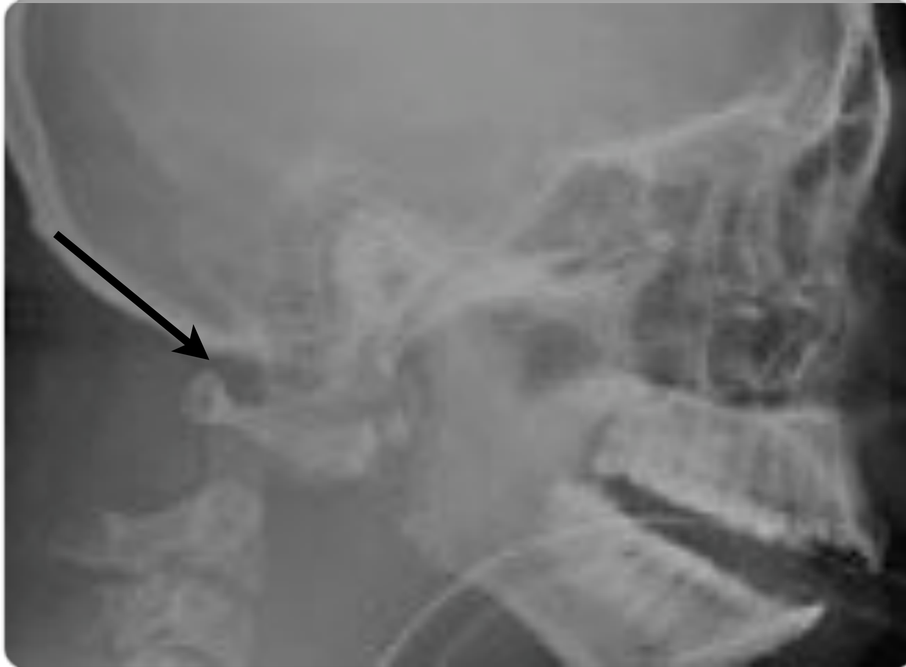
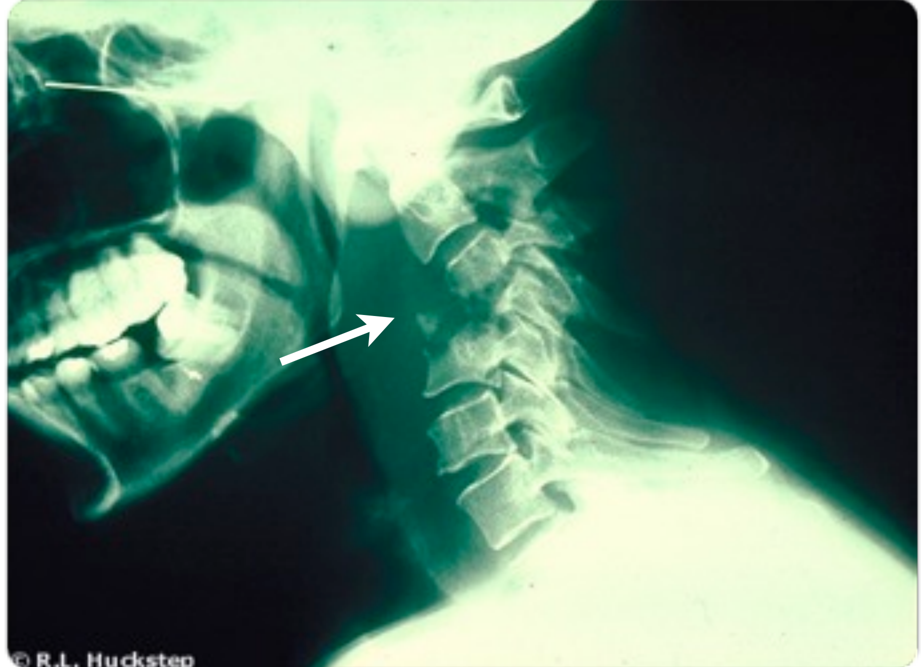
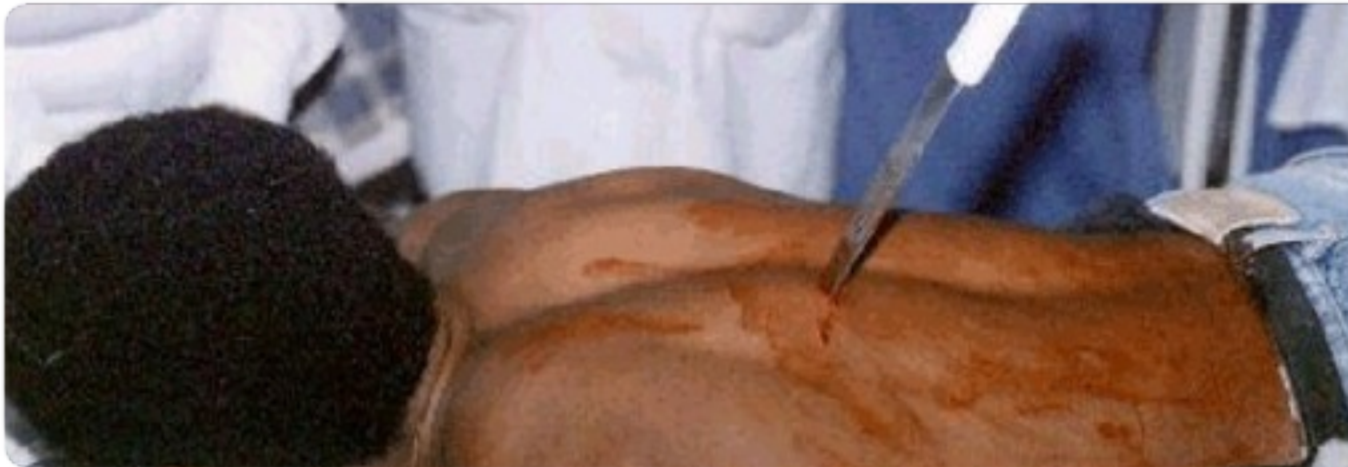
Spinal Injuries







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- Anatomy/Physiology
- Approach
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- Questions

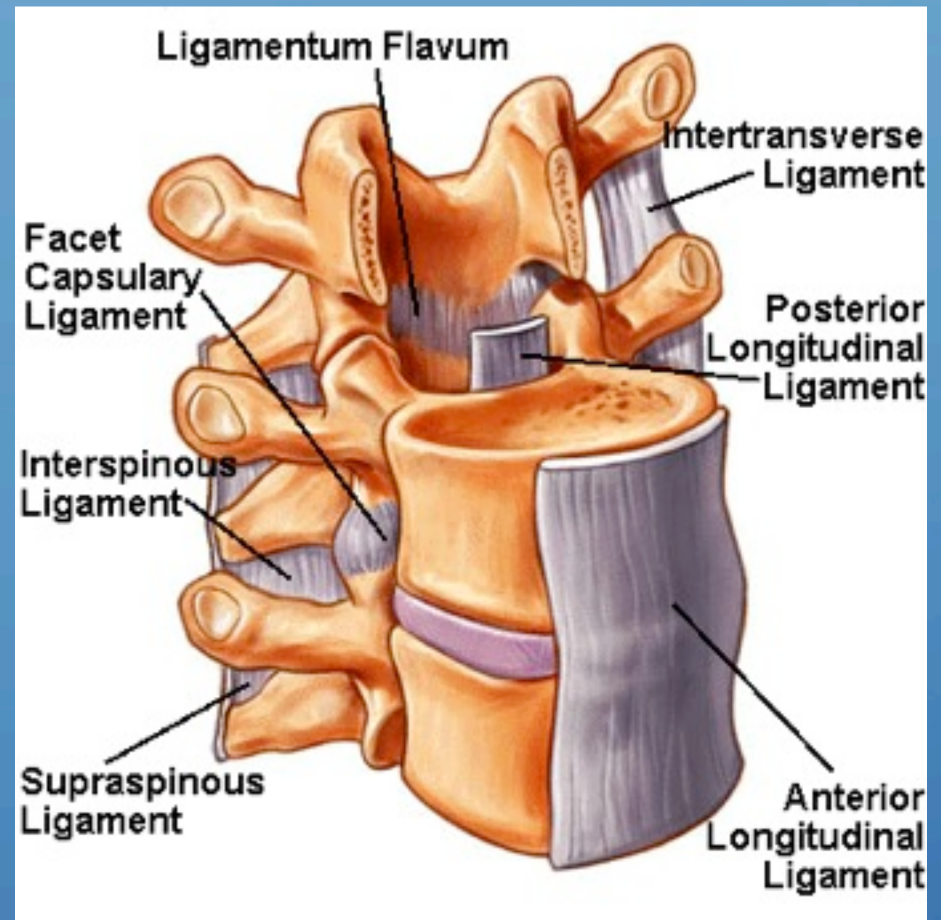
Introduction

- Cervical 55% (subluxation 5/6 commonest)
- Thoracic 15%
- Thoracolumbar 15%
- Lumbosacral 15%

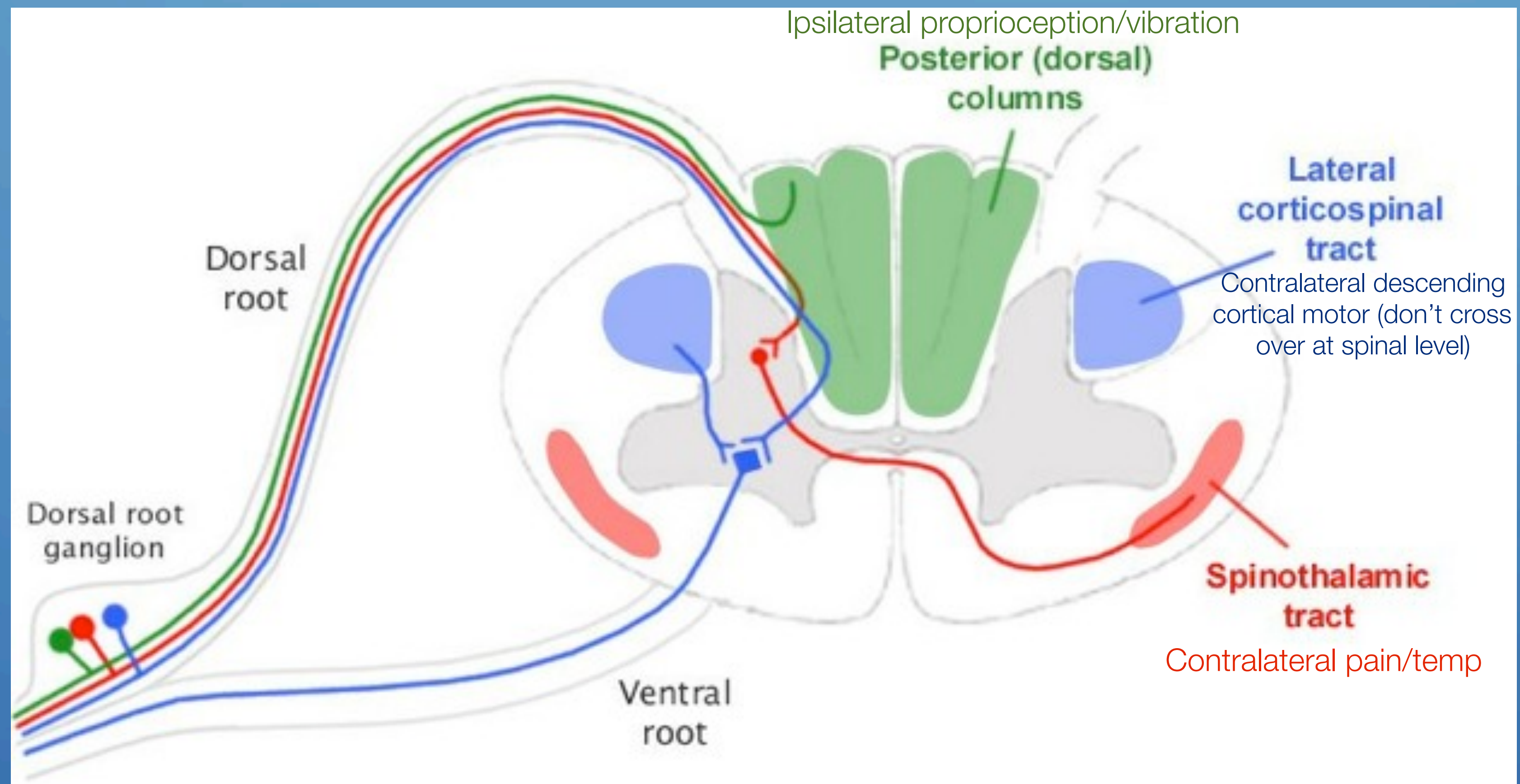
- 5% develop neurological symptoms in A&E
- in 5% of HI patients
- if 1 spinal injury-10% have second injury

Anatomy & Physiology

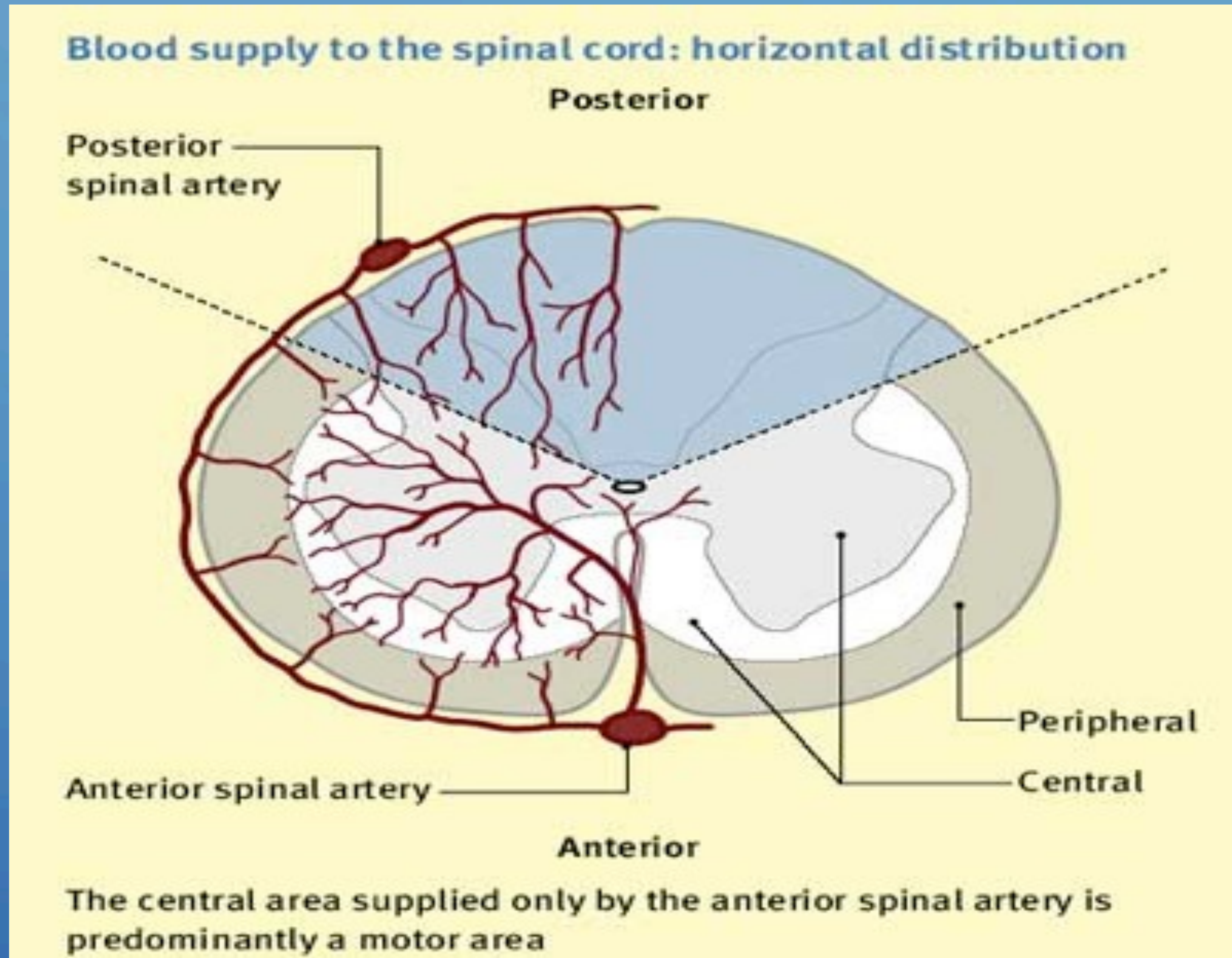
- 7 Cervical
- 12 Thoracic
- 5 Lumbar
- Sacrum/Coccyx
- Bodies/Discs/ Pedicles



Spinal Tracts



Blood Supply

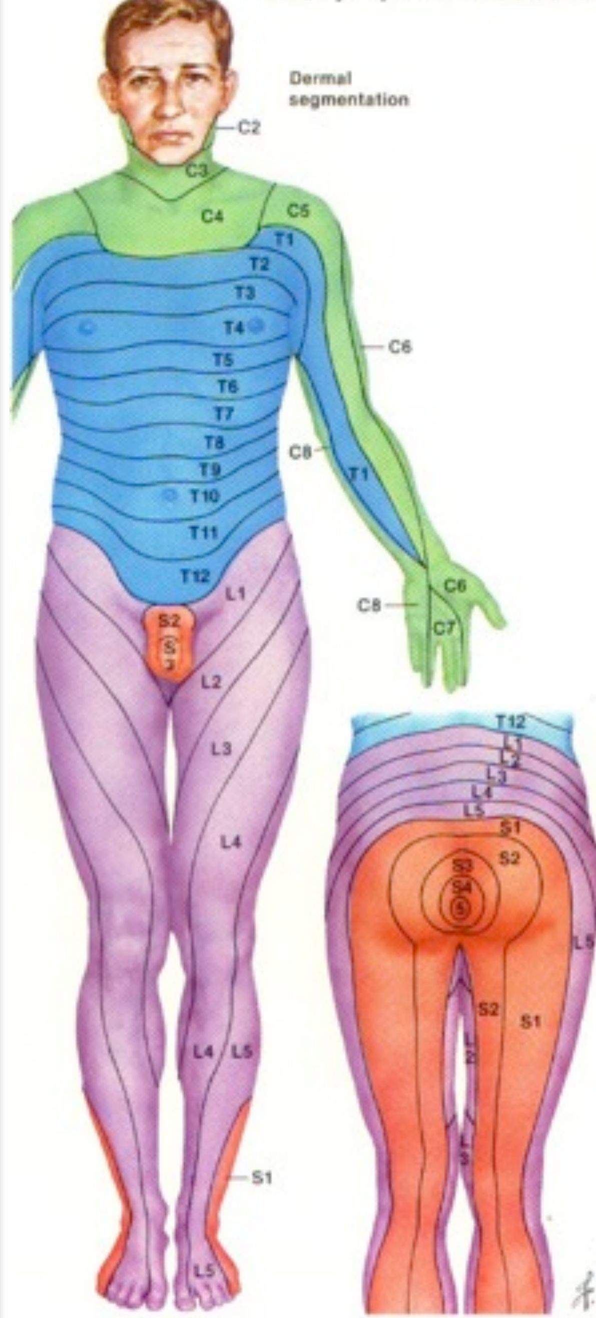


Approach

- ABCDE approach- assume injured especially if serious mechanism/history;
  - Significant Trauma?
  - Sports injury?
  - Secondaries?
  - Disc prolapse?
  - Infection?

- ➡ Resuscitate
- ➡ Maintain in line, collar/ blocks
- ➡ Detailed neurological assessment
- ➡ GCS, Pupils, Sensation, Motor (level??)
- ➡ Log Roll and examine spine
- ➡ Investigate

Sensory Impairment Related to Level of Spinal Cord Injury



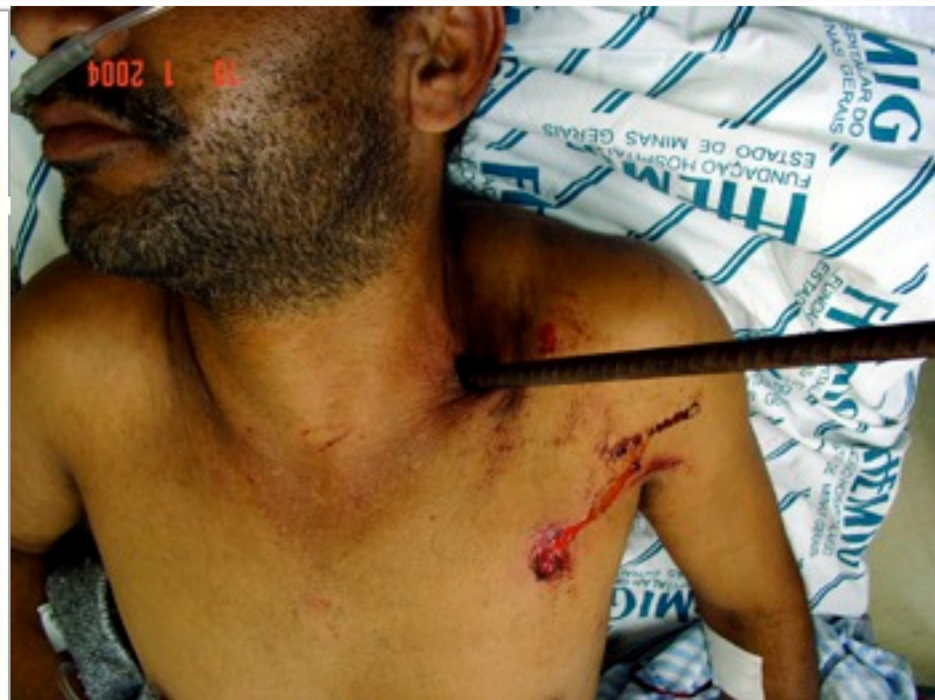
Key indicators

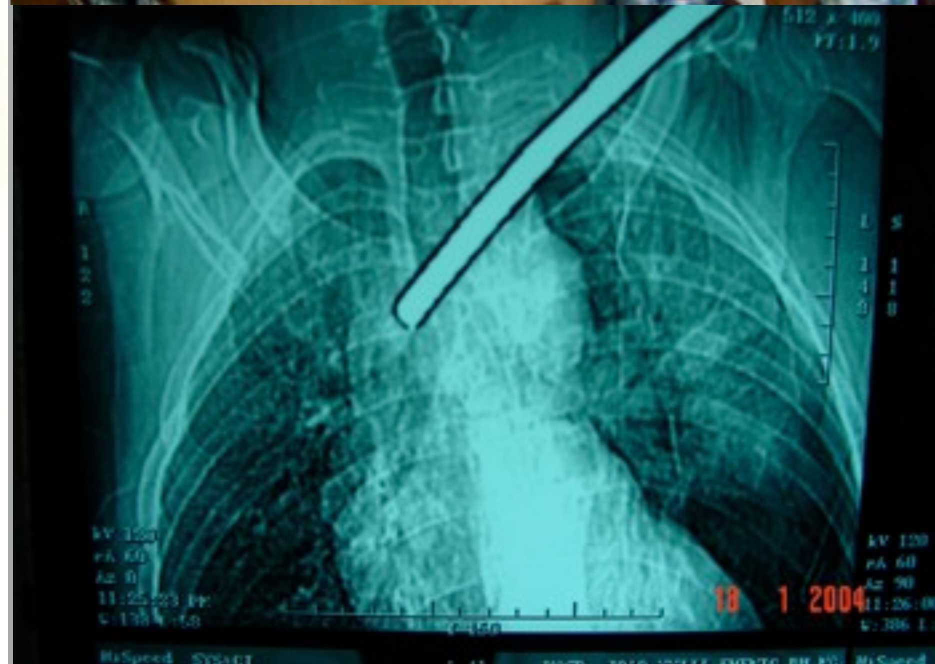
Cervical segments
- C5-Anterolateral shoulder
- C6-Thumb
- C7-Middle finger
- C8-Little finger

Thoracic segments
- T1-Medial arm
- T3-3rd, 4th interspace
- T4-Nipple line, 4th, 5th interspace
- T6-Xiphoid process
- T10-Navel
- T12-Pubis

Lumbar segments
- L2-Medial thigh
- L3-Medial knee
- L4-Medial ankle Great toe
- L5-Dorsum of foot

Sacral segments
- S1-Lateral foot
- S2-Posteromedial thigh
- S3, 4, 5-Perianal area





Examination-Dermatomes

- C5 Deltoid
- C6 Thumb
- C7 Middle finger
- C8 Little finger
- T4 Nipple
- T8 Xiphisternum
- T10 Umbilicus
- T12 Symphysis
- L3 Lateral Thigh
- L4 Medial calf
- L5 First web space, lateral leg
- S1 Lateral foot
- S3 Ischial tuberosity
- S4/5 Perianal

Examination-Myotomes

- C5 Deltoid
- C6,7 Wrist extension, elbow flexion
- C7,8 Elbow extensors
- C8 Wrist Flexion
- T1 Finger abduction
- L2 Hip Flexion
- L3,4 Knee extension
- L5 Ankle dorsiflexion
- S1 Ankle plantar flexion

Spinal Syndromes

- Central Cord Syndrome: neck pain & urinary retention, sacral sparing, complete loss sensation/motor, worse in upper limbs, esp. hands, elderly,
- Anterior Cord Syndrome: anterior 2/3 of cord (spinal artery), spares posterior columns, complete motor paralysis and sensory loss, spared proprioception/vibration
- Posterior Cord Syndrome: loss proprioception/vibration, rest spared,
- Brown-Sequard Syndrome: ipsilateral paralysis/loss of proprioception/vibration, contralateral pain/temp loss. Good prognosis.
- SCIWORA: cord injury, no fractures on x-ray, in Paediatric pts

Spinal X-rays

AP, lat and peg C-spine

AP and lat rest of spine

If in doubt-CT area

If in CT for head, do neck as well

The Canadian C-Spine Rule

For alert (GCS=15) and stable trauma patients where cervical spine injury is a concern

1. Any High-Risk Factor Which Mandates Radiography?

Age ≥ 65 years
or
Dangerous mechanism*
or
Paresthesias in extremities

Yes → Radiography

No ↓

2. Any Low-Risk Factor Which Allows Safe Assessment of Range of Motion?

Simple rearend MVC **
or
Sitting position in ED
or
Ambulatory at any time
or
Delayed onset of neck pain ***
or
Absence of midline c-spine tenderness

No → Radiography

Yes ↓

3. Able to Actively Rotate Neck?

45° left and right

Unable → Radiography

Able ↓

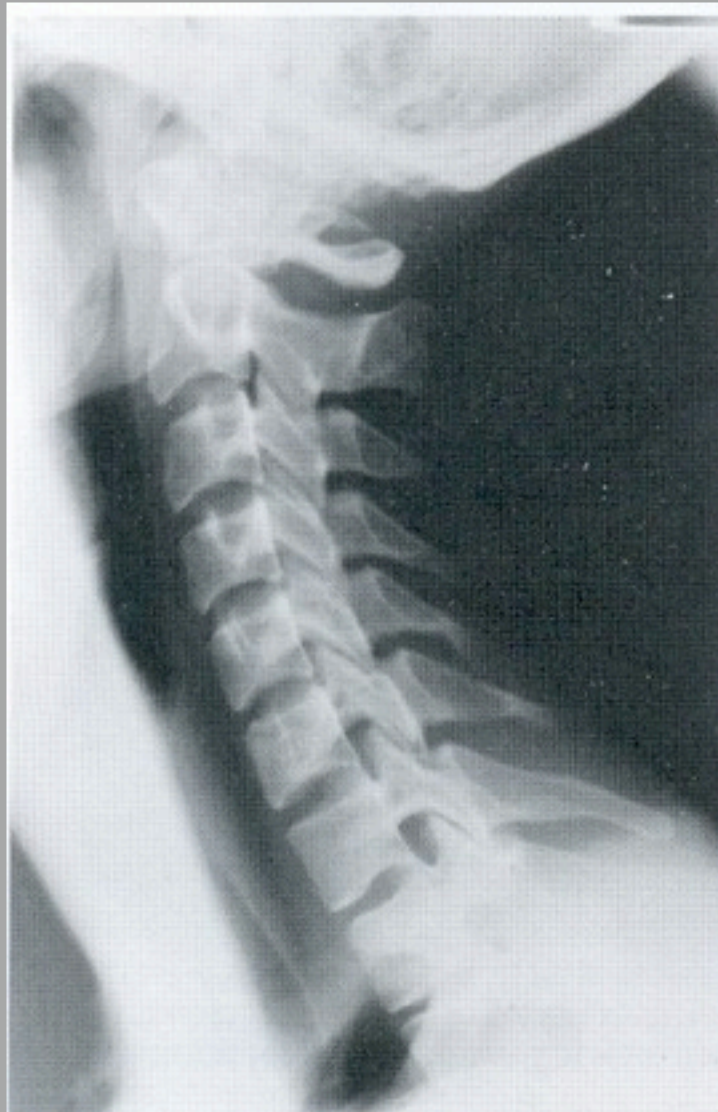
No Radiography

* **Dangerous Mechanism:**
- fall from elevation ≥ 3 feet / 5 stairs
- axial load to head, e.g. diving
- MVC high speed (>100km/hr), rollover, ejection
- motorized recreational vehicles
- bicycle collision

** **Simple Rearend MVC Excludes:**
- pushed into oncoming traffic
- hit by bus / large truck
- rollover
- hit by high speed vehicle

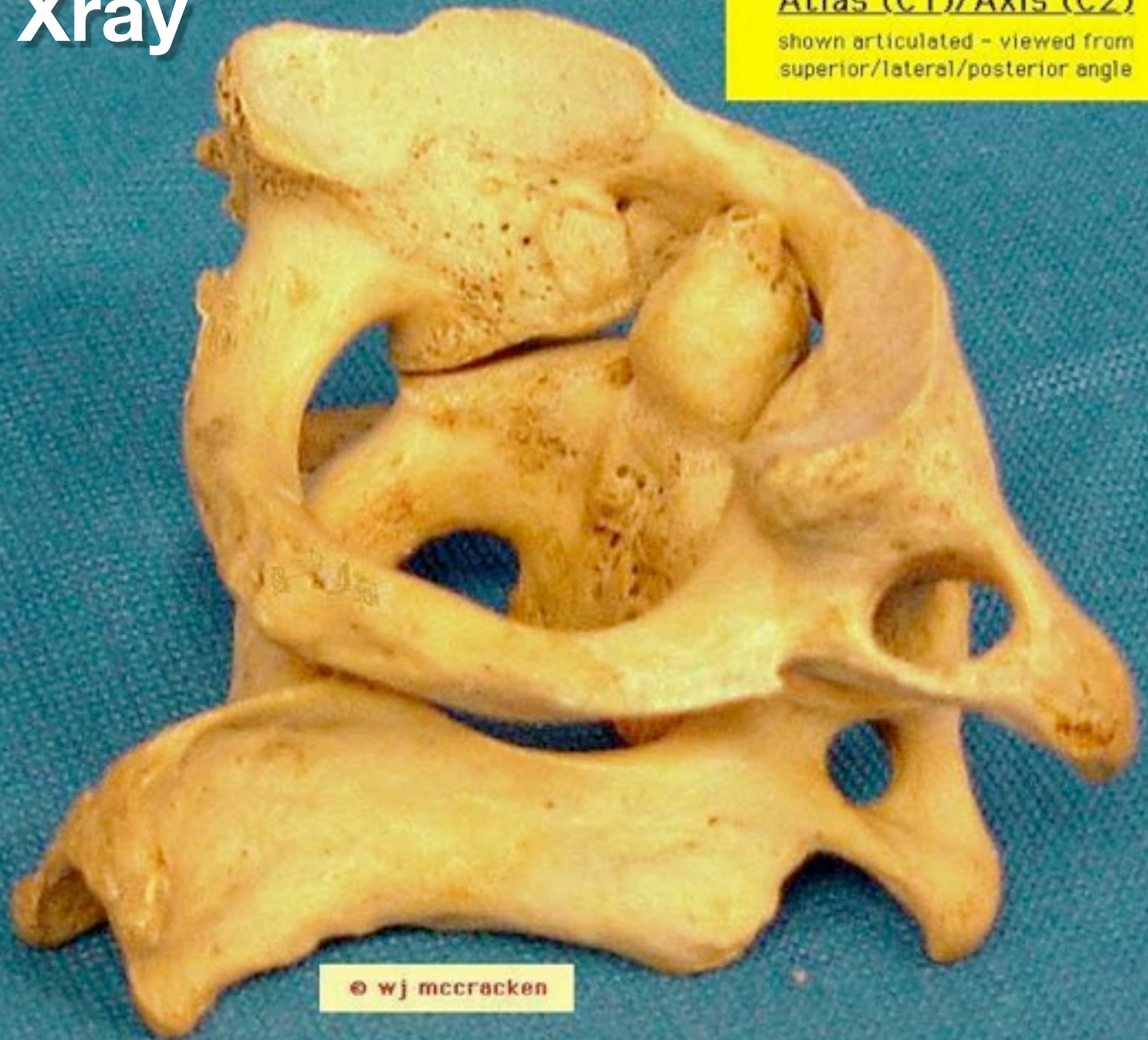
*** **Delayed:**
- i.e. not immediate onset of neck pain

C-spine Xray



Anterior arch of atlas
Dens of axis
Occipital bone
Posterior arch of atlas
Transverse process of axis
Mandible
Spinous process
Inferior facet articular surface
Superior facet articular surface
Pharynx
Body of C3
Facet joint
Pedicle
Top of T1
1 2 3 4
Longitudinal lines

C-spine Xray



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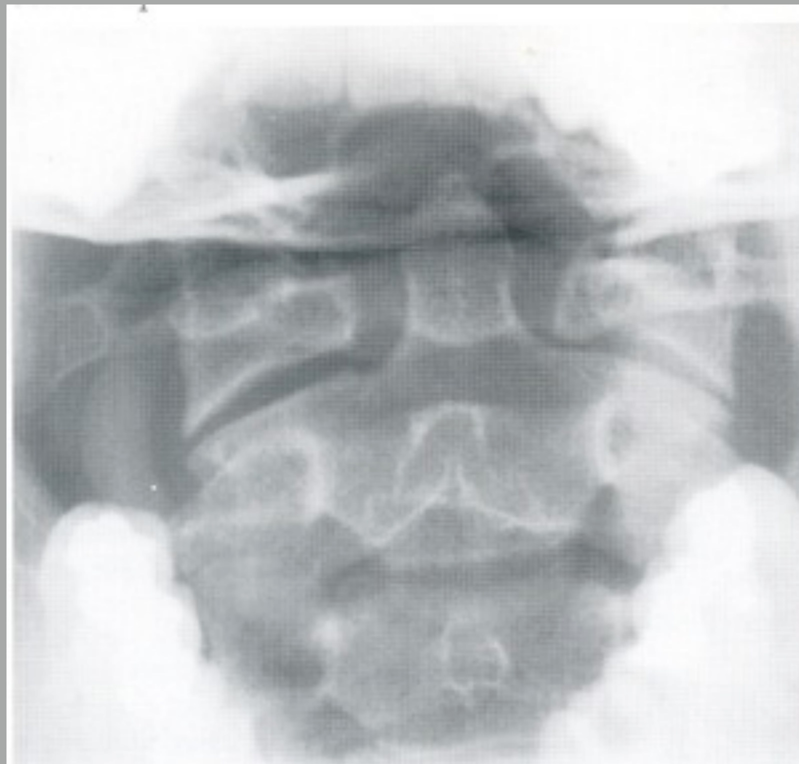

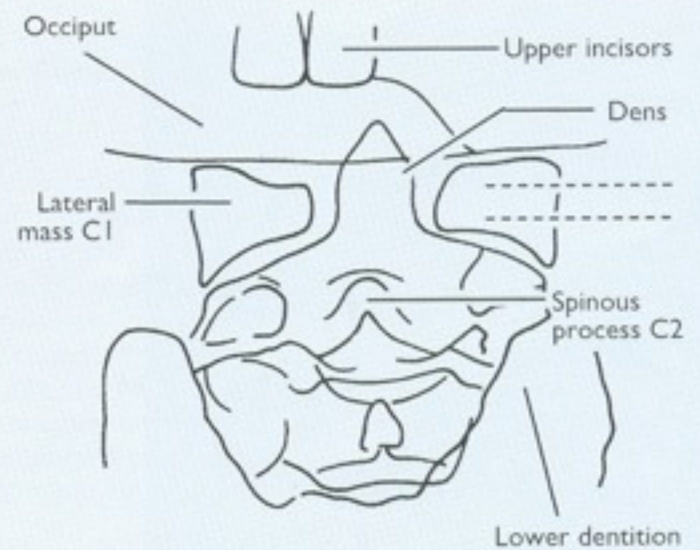

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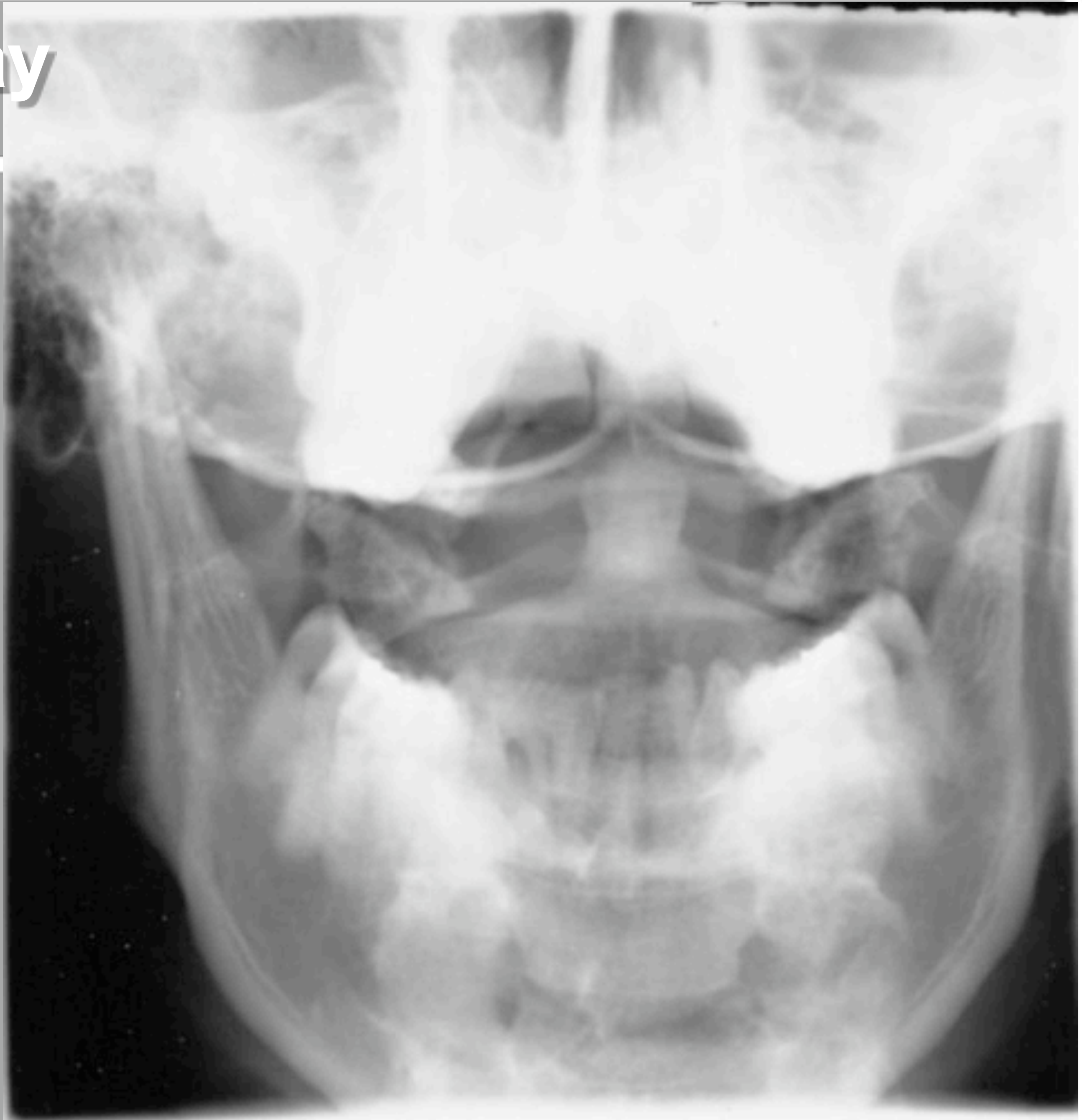

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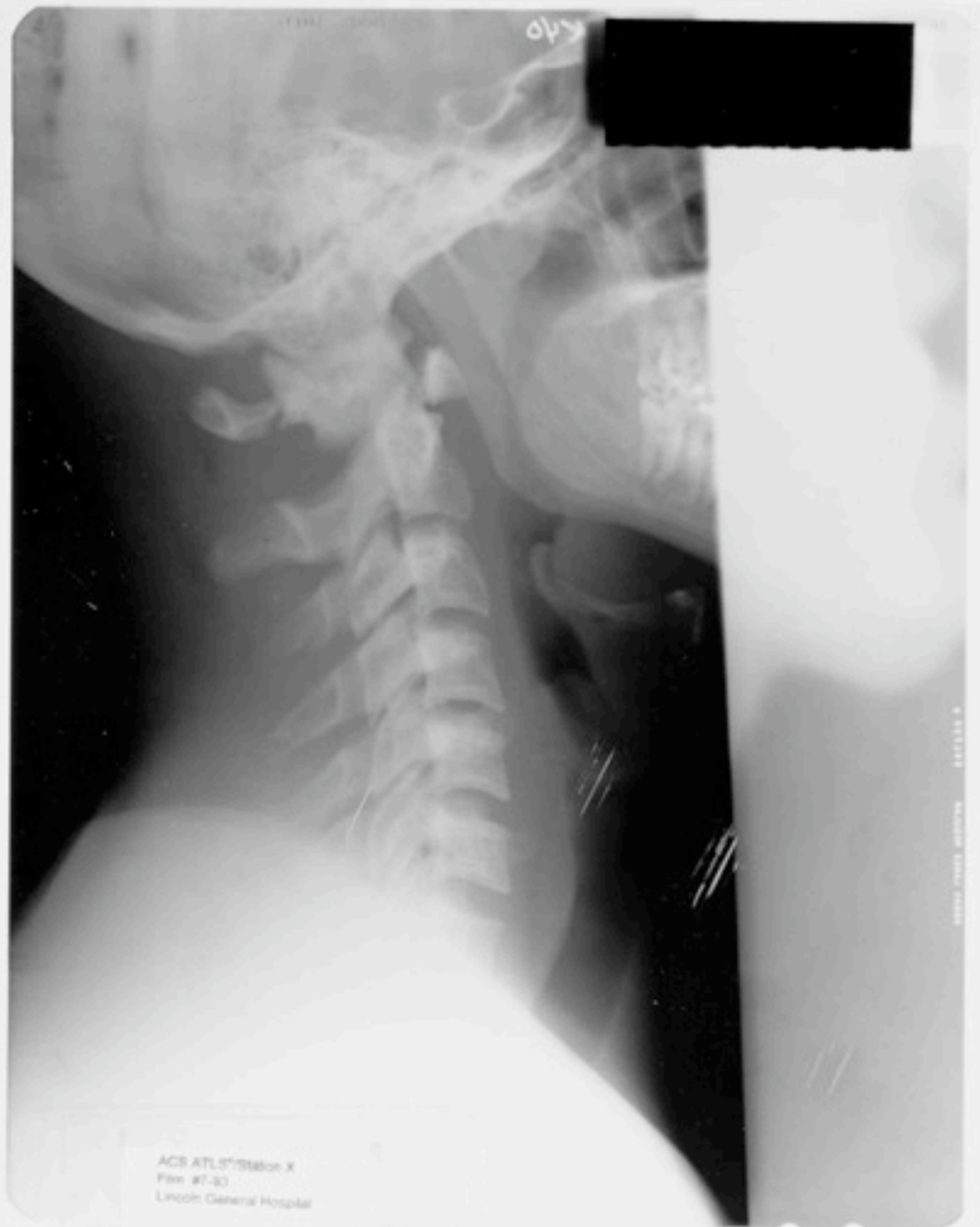

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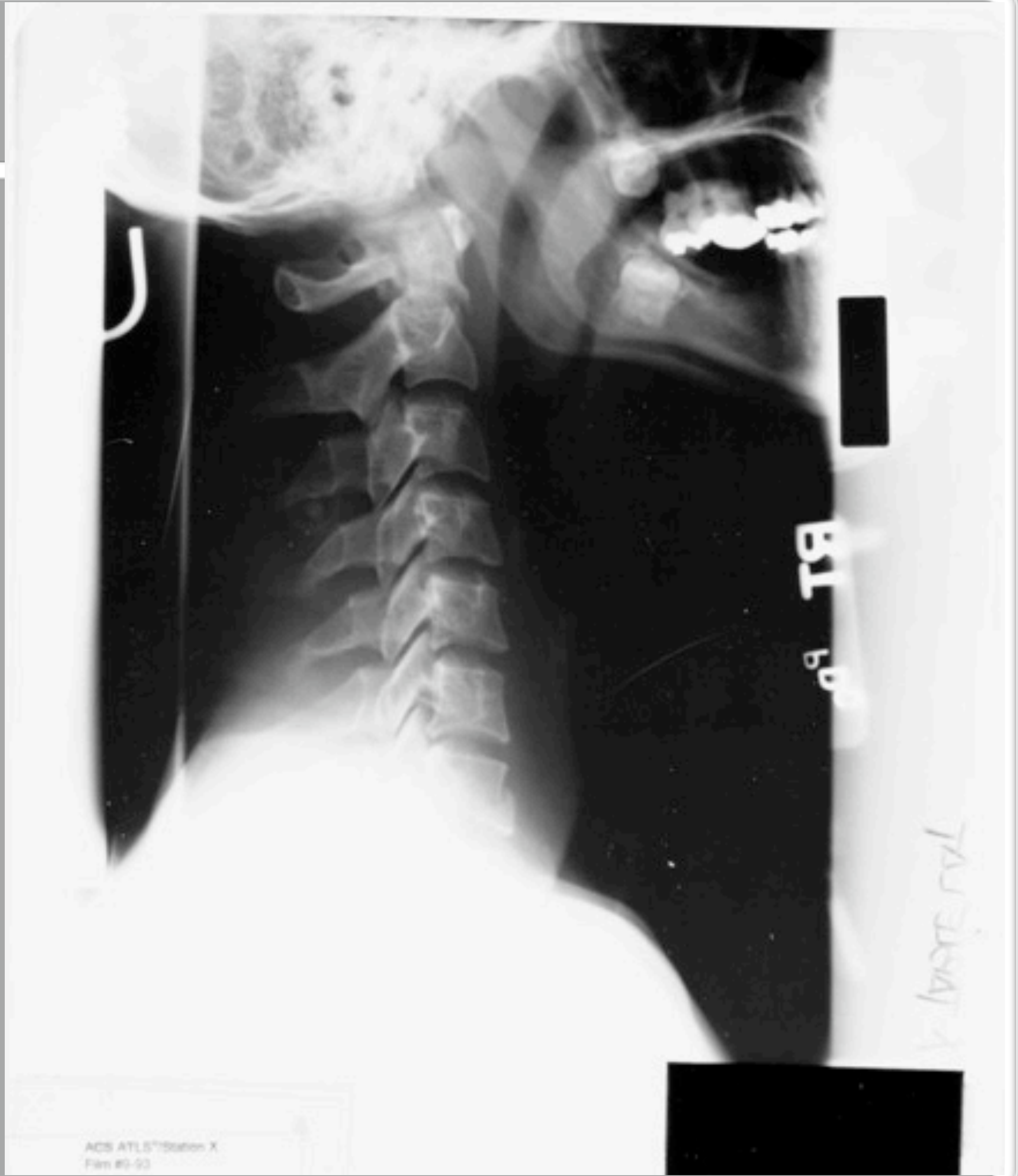

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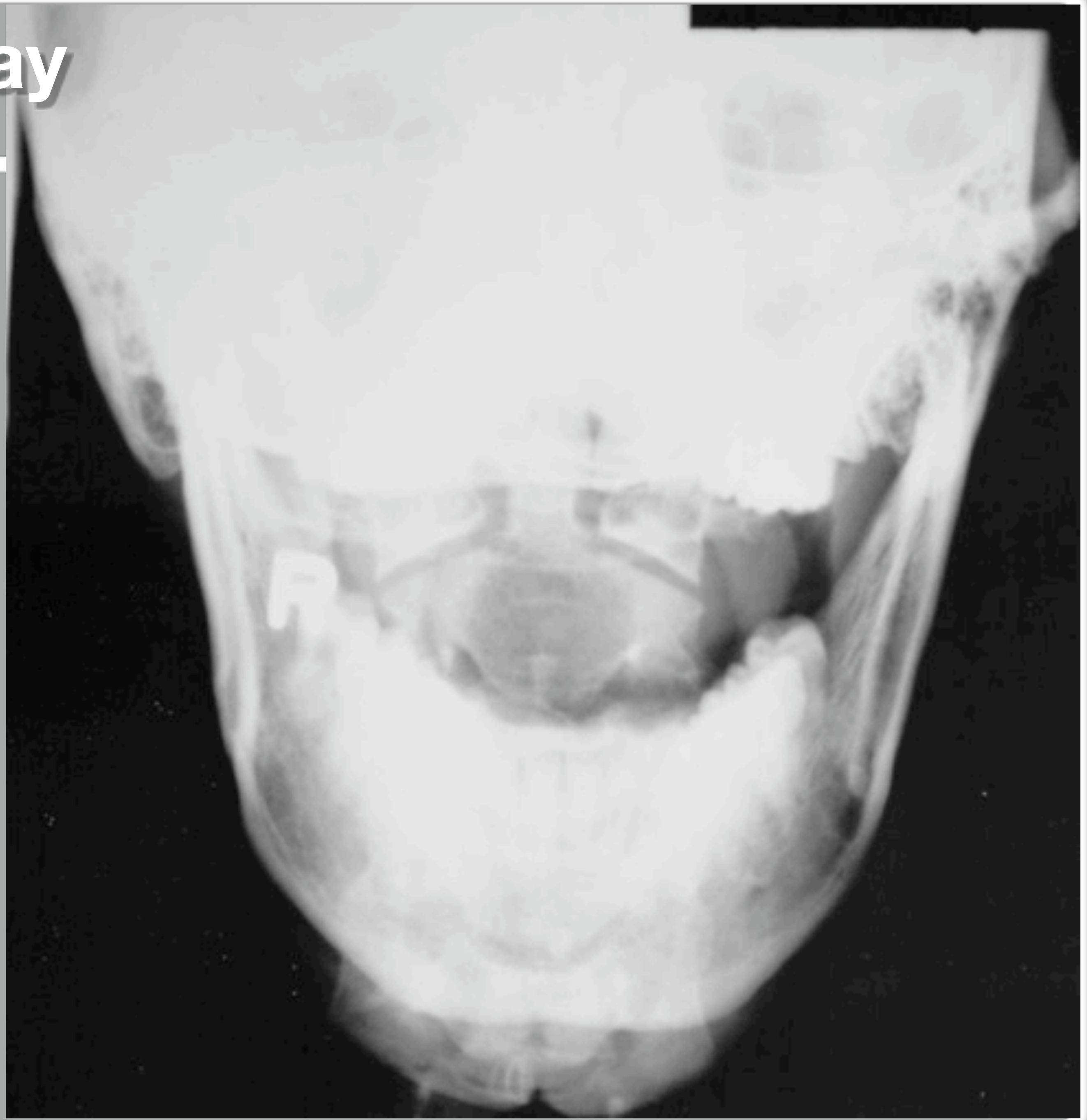

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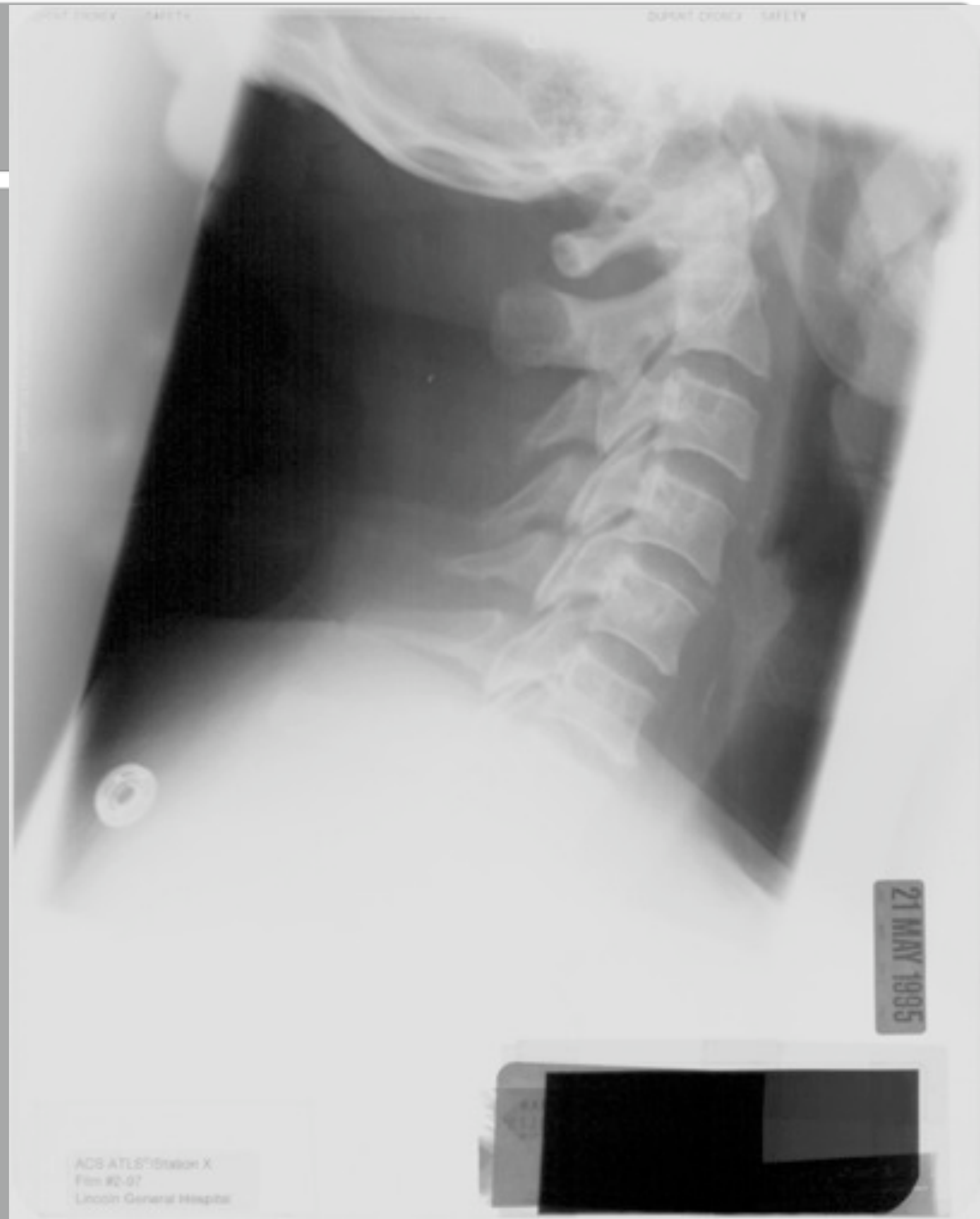
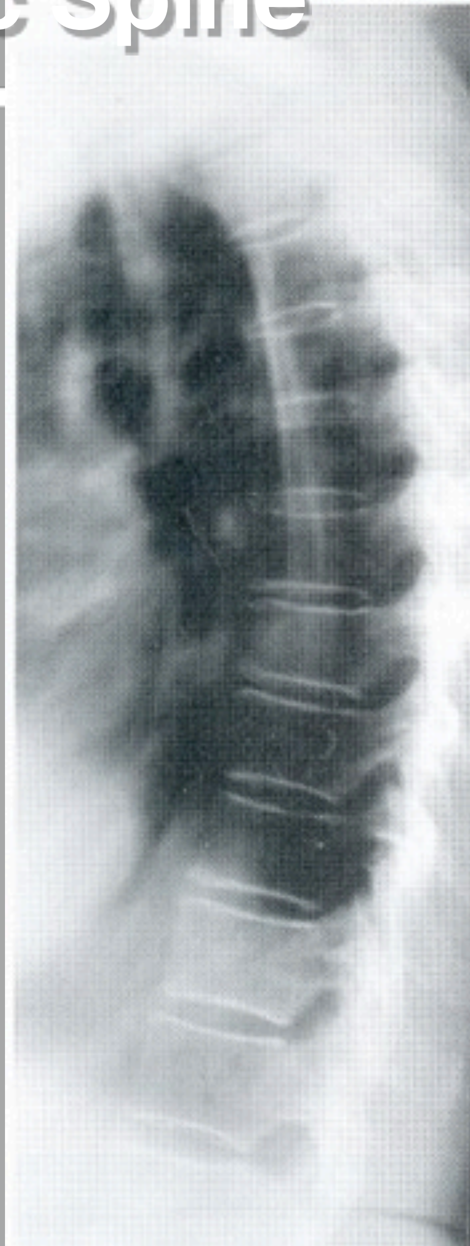
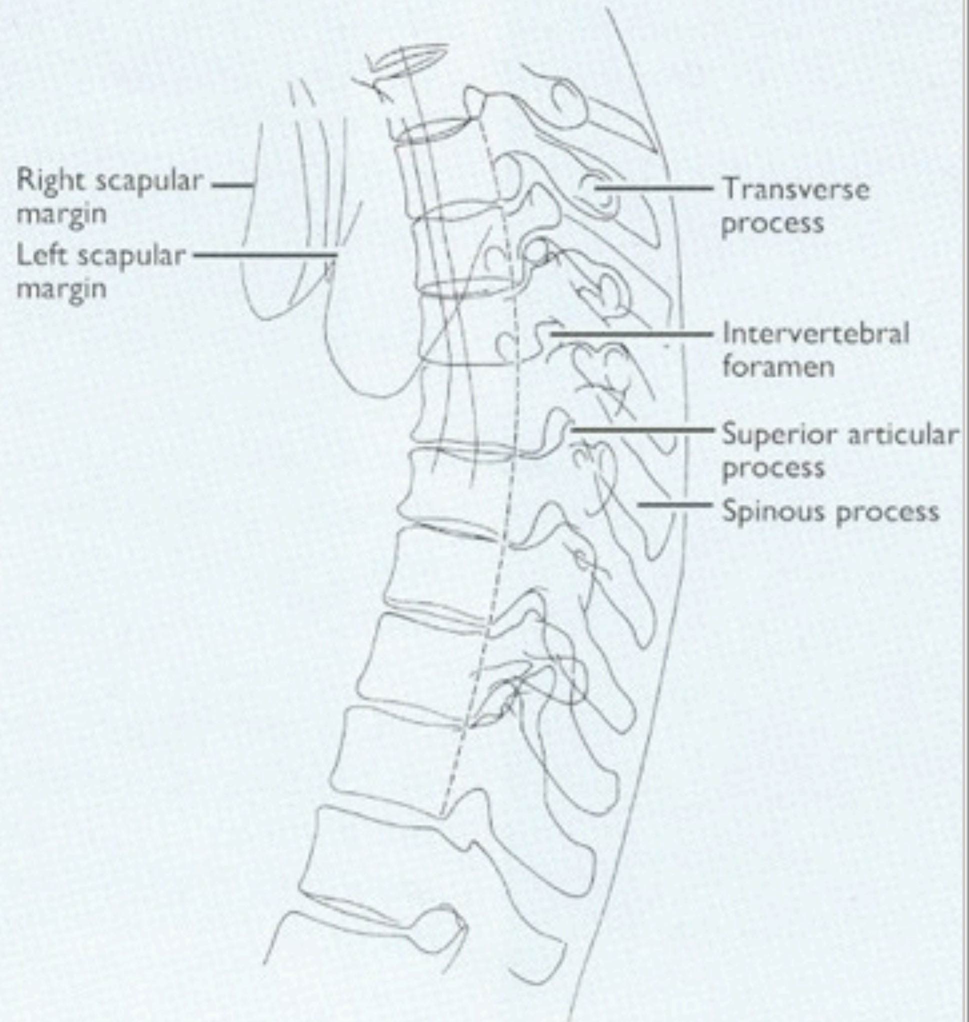


Thoracic Spine





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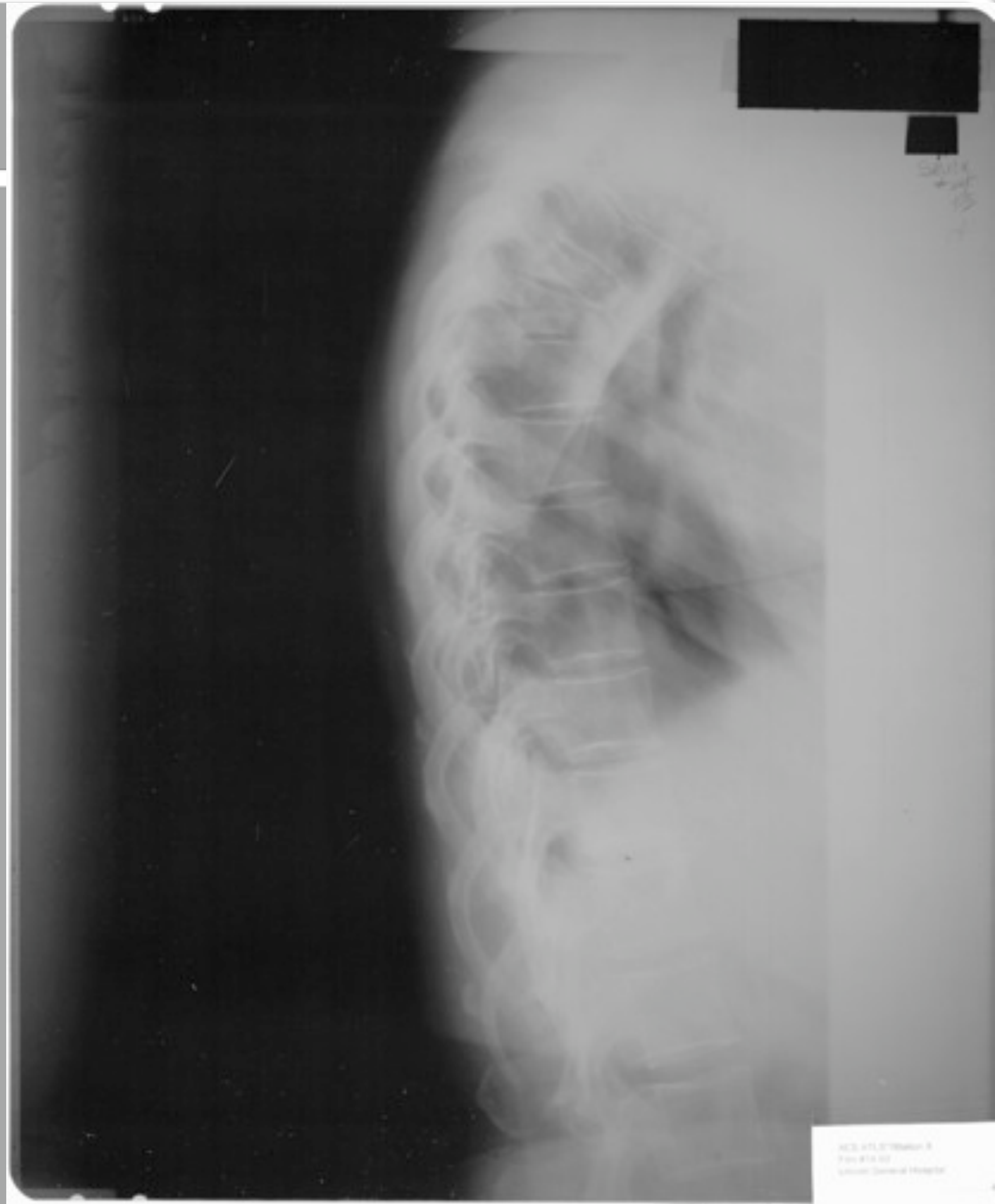
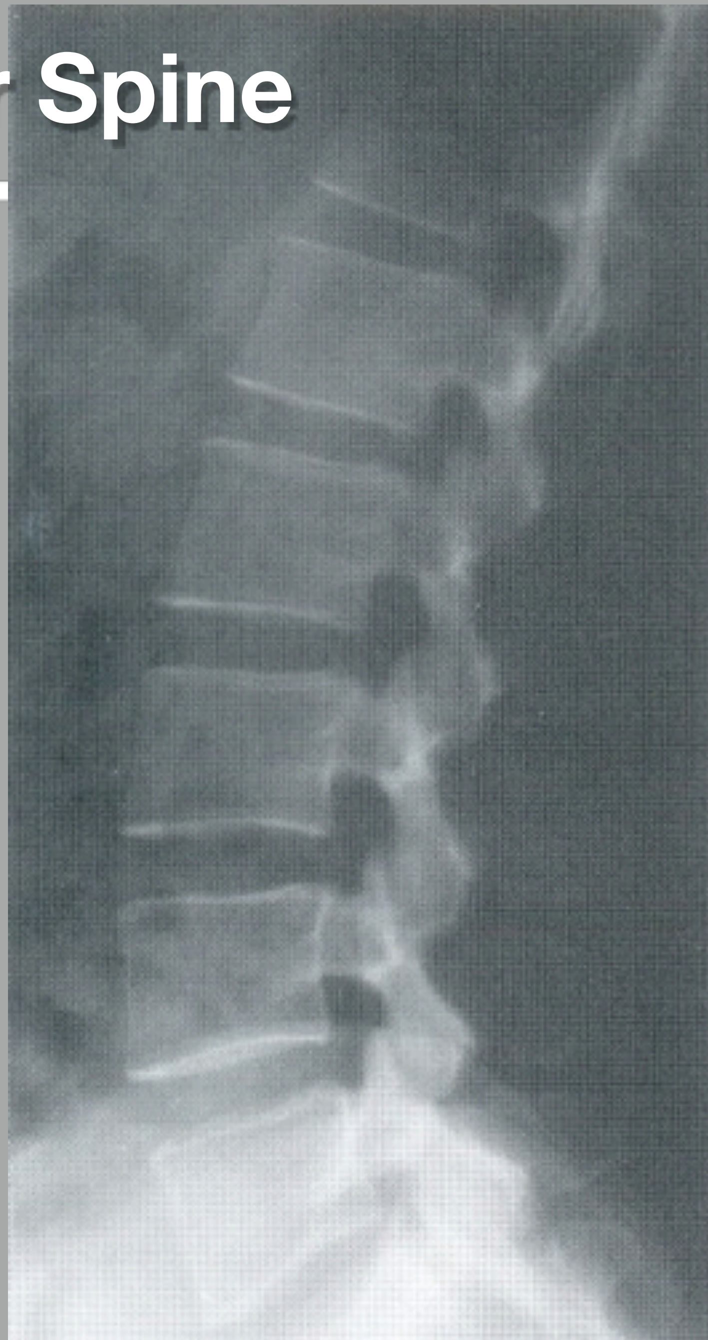
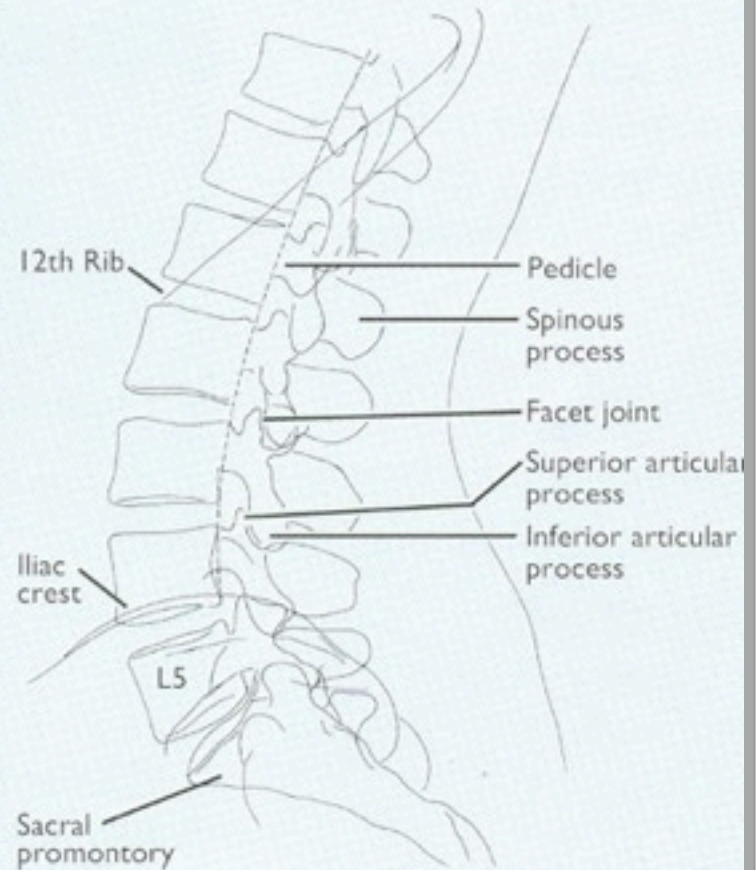


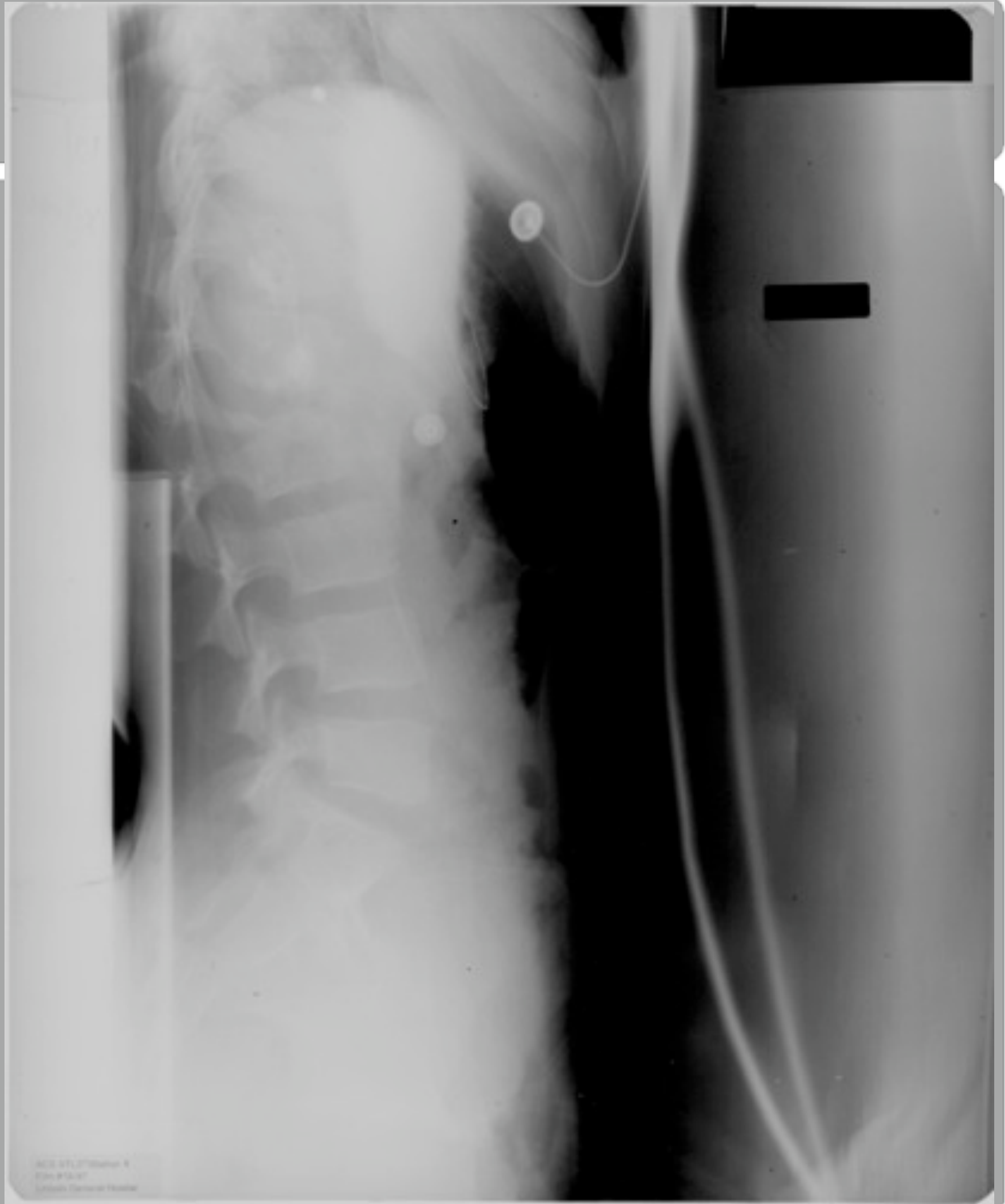
Thoracic Spine

Lumbar Spine





Lumbar Spine



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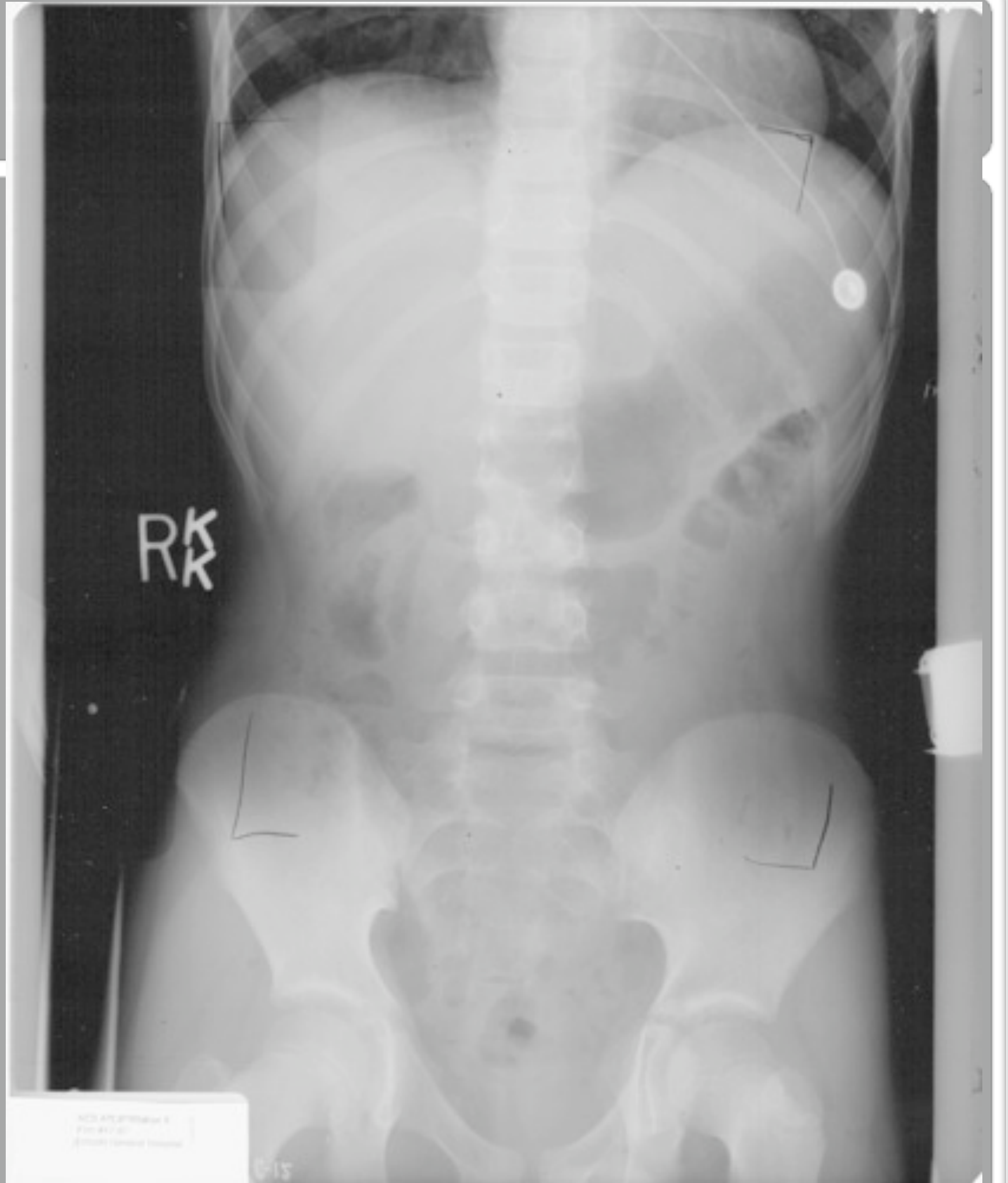

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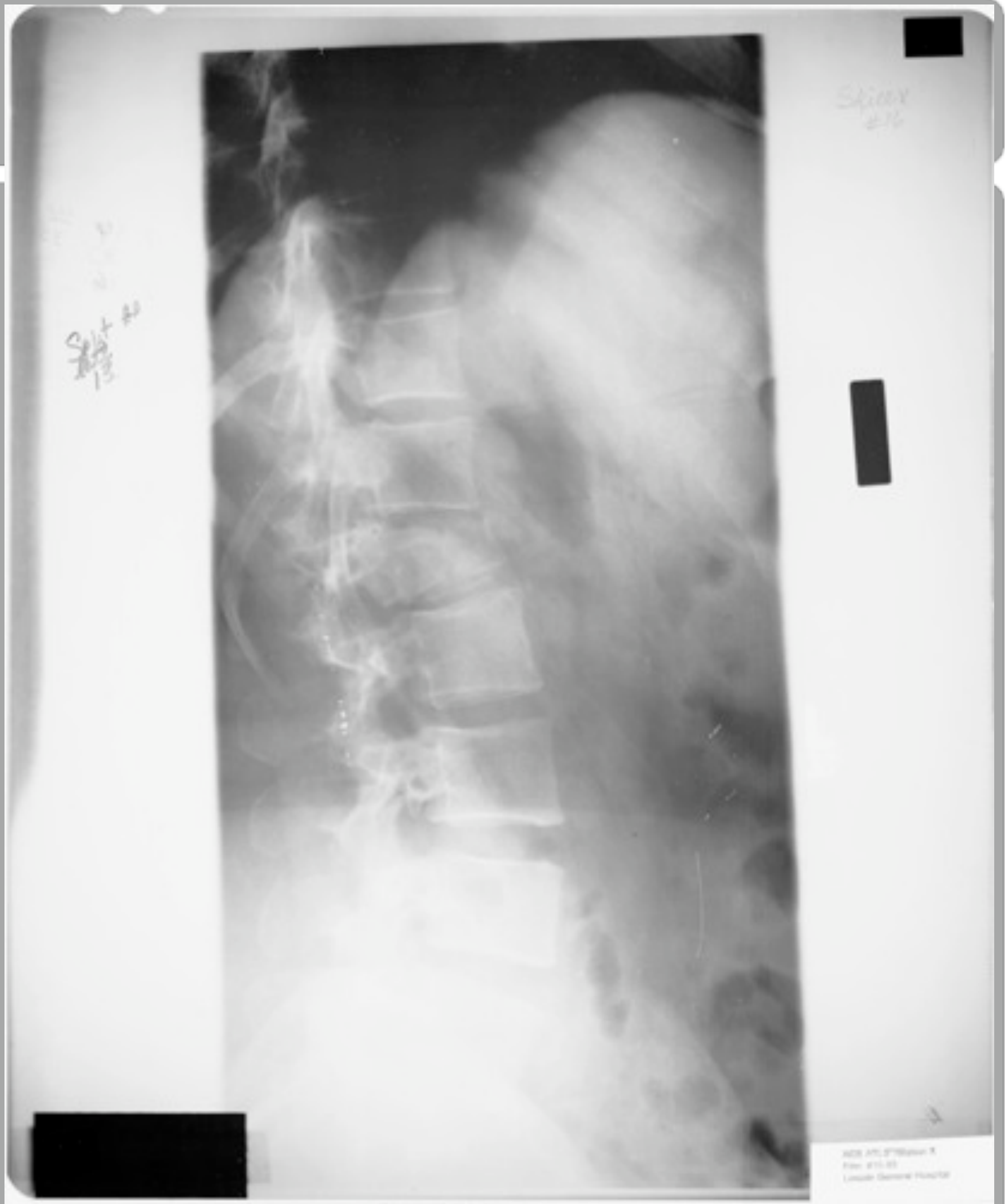

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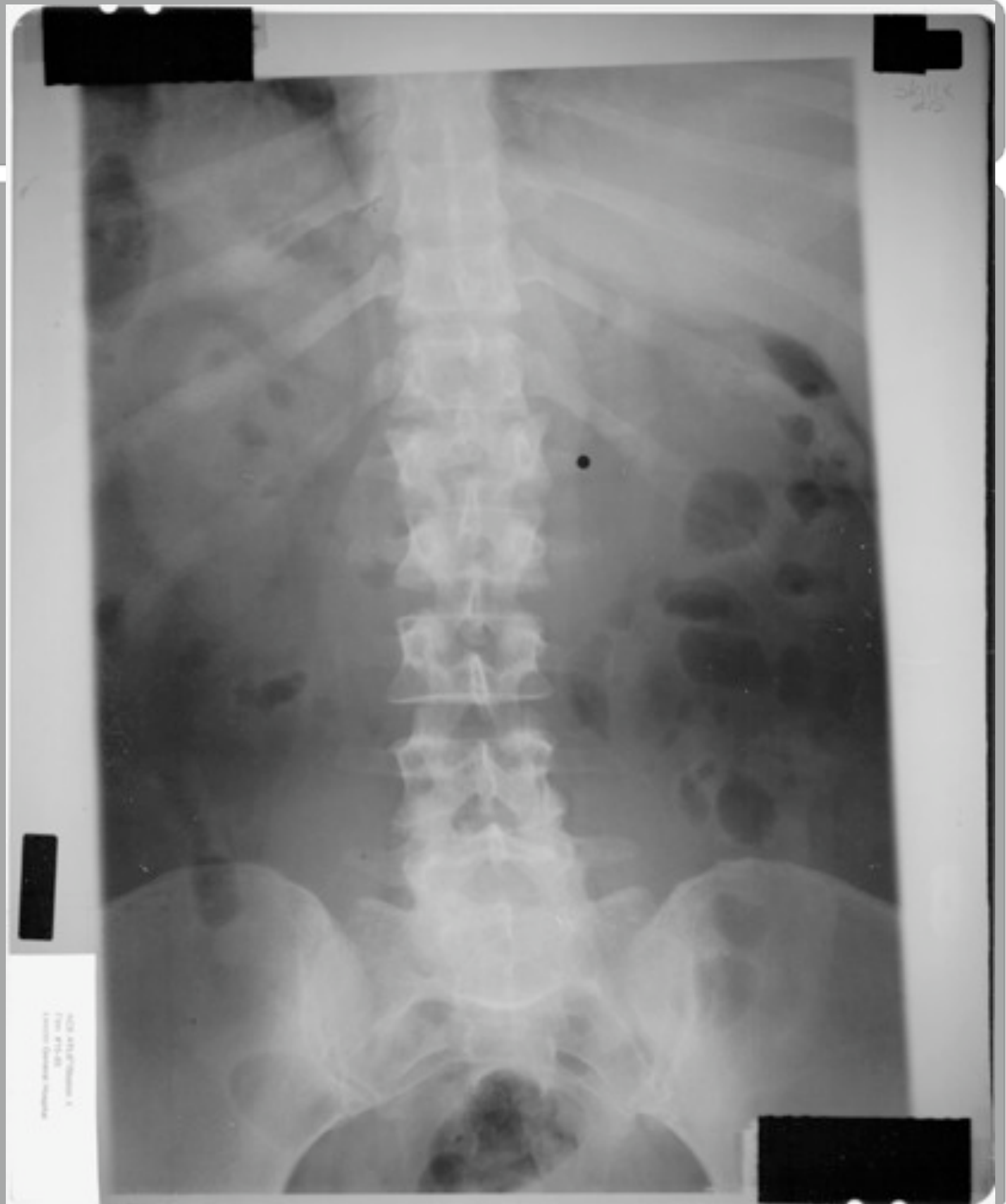

Management

Suspicion, recognition, documentation

- Immobilise in transit (board) and in hospital (spinal bed)
- Off board; <1hr if abnormal neurology
- 15L O_2
- IV fluids
- Dexamethasone no evidence so not routine

- Careful Documentation
- X-rays/CT/MRI scans
- Referral and safe transfer
- Rehabilitation, OT etc

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Summary

- Always assume spinal injury with mechanism and protect
- Early neuro assessment and documentation
- Always look for the second abnormality on x-ray
- Treat the ABC's first and it will help treat the spinal cord