

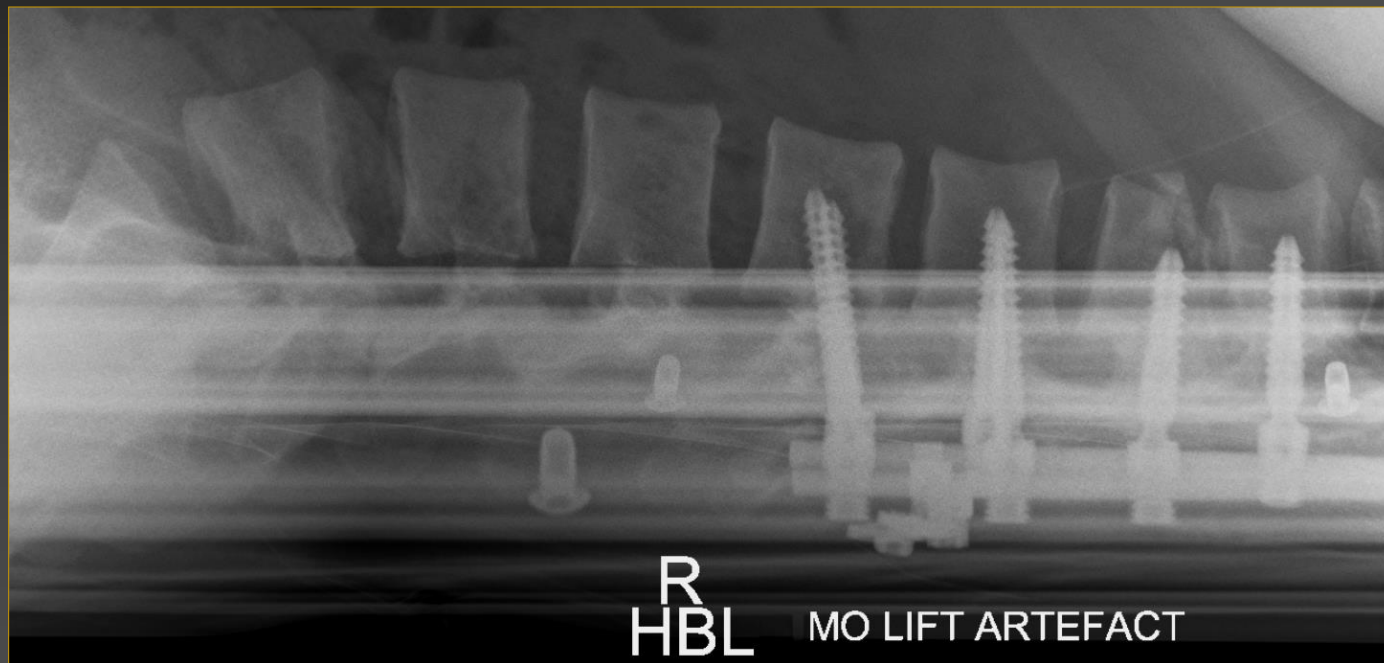
ESSENTIALS OF PLAIN FILM INTERPRETATION: SPINE

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INTRODUCTION



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- Spinal alignment
- Vertebral morphology
- Bone density
- Vertebral end-plates/entheses
- Vertebral cortex
- Disc space
- Neural arch
- Para-spinal soft tissues

SPINAL ALIGNMENT



■ NORMAL

- Cervical lordosis
 - C1-T2 30-40°
- Thoracic kyphosis
 - T2-T12 20-40°
- Lumbar lordosis
 - L1-L5 20-40°

SPINAL MALALIGNMENT

- Sagittal plane
 - Spondylolisthesis
 - Retrolisthesis
 - Kyphosis
- Coronal plane
 - Scoliosis
- Axial
 - Translation
 - Rotation

SPONDYLOLISTHESIS



Grade 1 L3/L4
Degenerative



Grade 2 L5/S1
Lytic

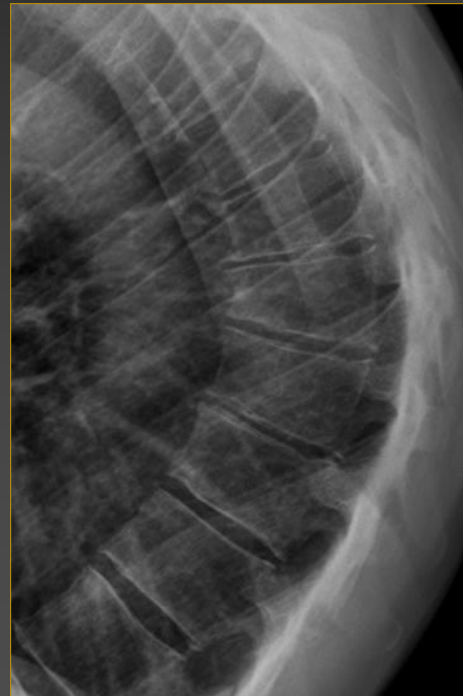
- Anterior slip of one vertebra on vertebra below
- Assess
 - Aetiology (lumbar)
 - Types 1-6
 - Degree
 - Grades 1-3 or 1-4
 - spondyloptosis

RETROLISTHESIS



- Posterior slip of one vertebra on vertebra below
- Usually mild
- Aetiology
 - Almost always degenerative
 - Pathological
 - Traumatic

KYPHOSIS



- Increased curvature of thoracic spine
- Generalised
 - Young- Scheuermann's
 - Old- osteoporosis
- Focal
 - Congenital
 - Acquired
 - Pathological collapse
 - Trauma

KYPHOSIS



Osteoporosis

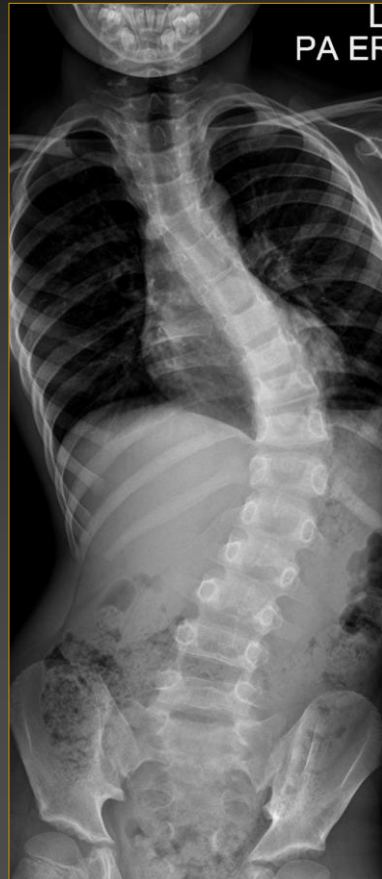
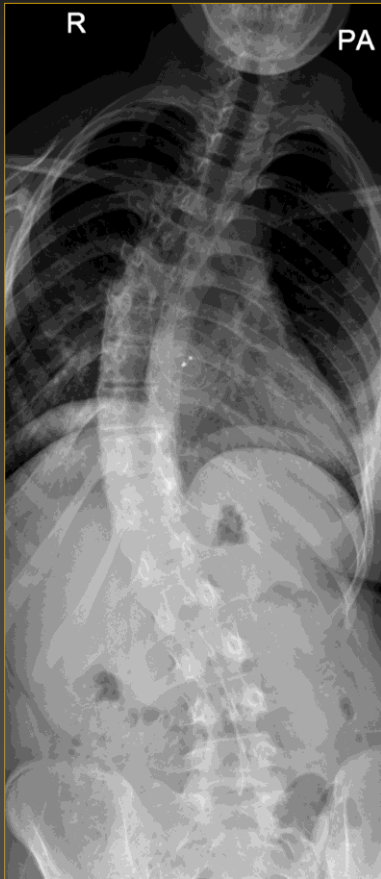


TB



Post-traumatic

SCOLIOSIS



- Lateral curvature of spine in coronal plane
- Cobb angle $>10^{\circ}$
- Side described by convexity
- Aetiology (paediatric)
 - Idiopathic
 - Osteogenic
 - Neuromuscular
 - Syndromic/developmental
 - Reactive

SCOLIOSIS



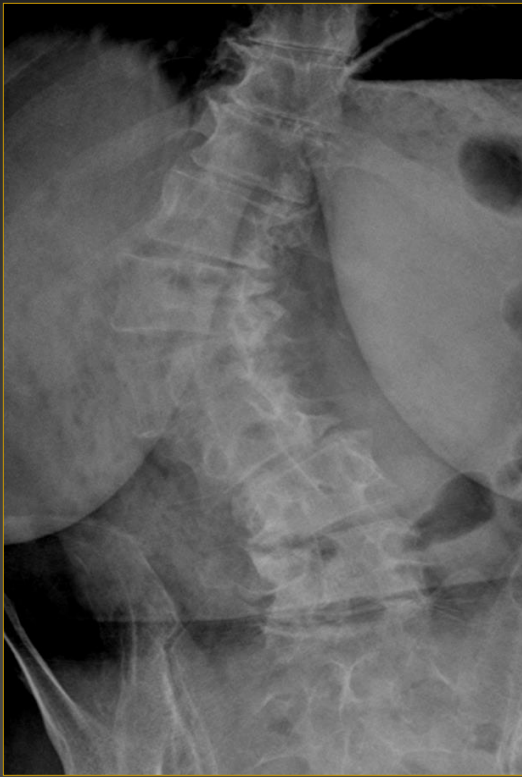
Hemivertebra



Bony bar

- Osteogenic
 - Look for vertebral anomalies
 - Failure of fusion
 - Failure of segmentation
 - Complex

SCOLIOSIS



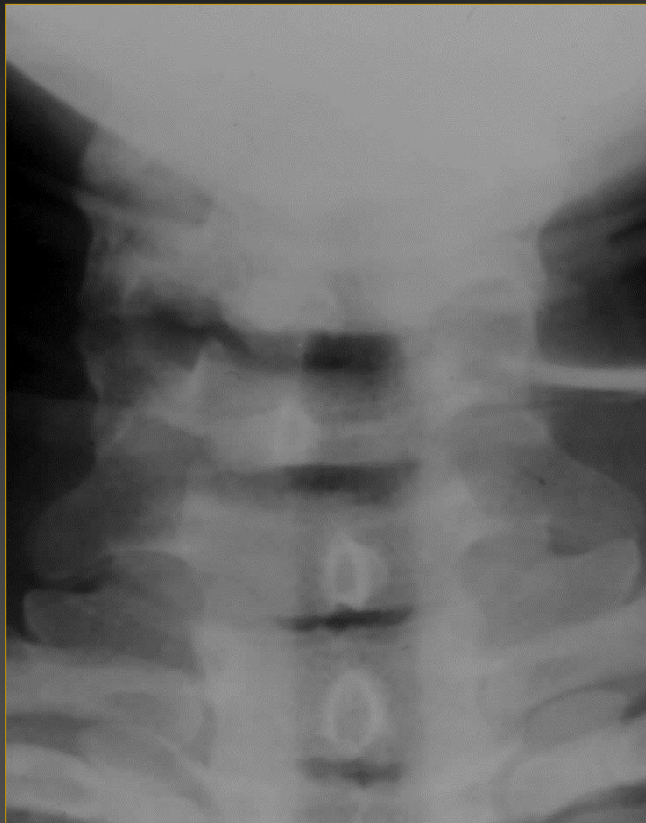
- Degenerative
 - Lumbar
 - Commonly associated with lateral vertebral subluxation at apex of curve

AXIAL MALALIGNMENT



- LATERAL TRANSLATION
 - Uncommon
 - Degenerative spondylolisthesis
 - Traumatic

AXIAL MALALIGNMENT



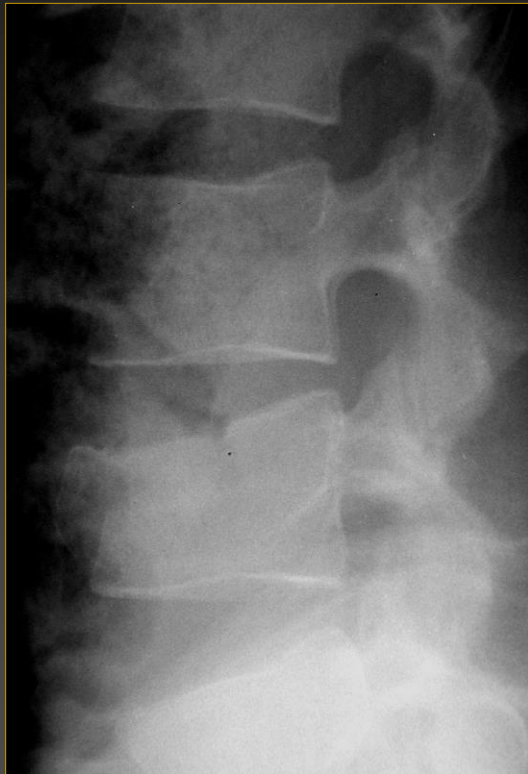
■ ROTATION

- Idiopathic scoliosis
- Traumatic
 - Unilateral facet dislocation

VERTEBRAL MORPHOLOGY

- Vertebral collapse
- Flattened vertebrae (platyspondyly)
- Vertebra plana
- Vertebral enlargement
- Abnormalities of shape
 - Bullet -Hurlers/Morquio's/achondroplasia
 - Tower -SSD
 - Reduced AP dimension -JRA

VERTEBRAL COLLAPSE



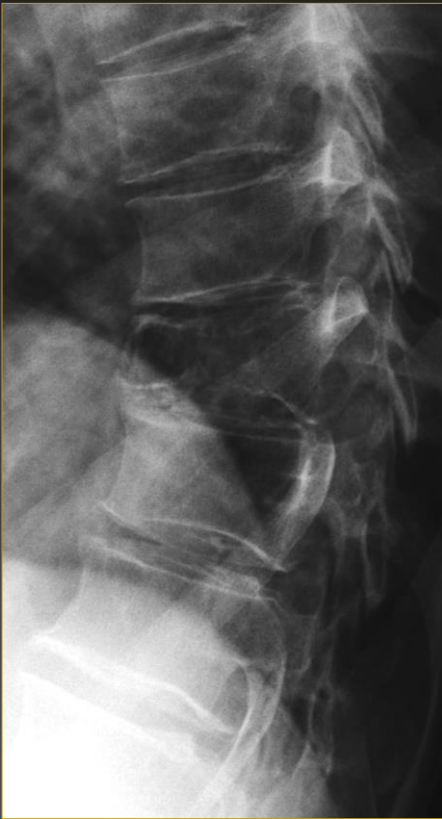
Wedge fracture



Burst fracture

- OP collapse
- Trauma
 - WC fracture
 - Burst fracture
- Look at PVBL

VERTEBRAL COLLAPSE



Myeloma



TB

- Pathological
 - Tumour
 - Infection

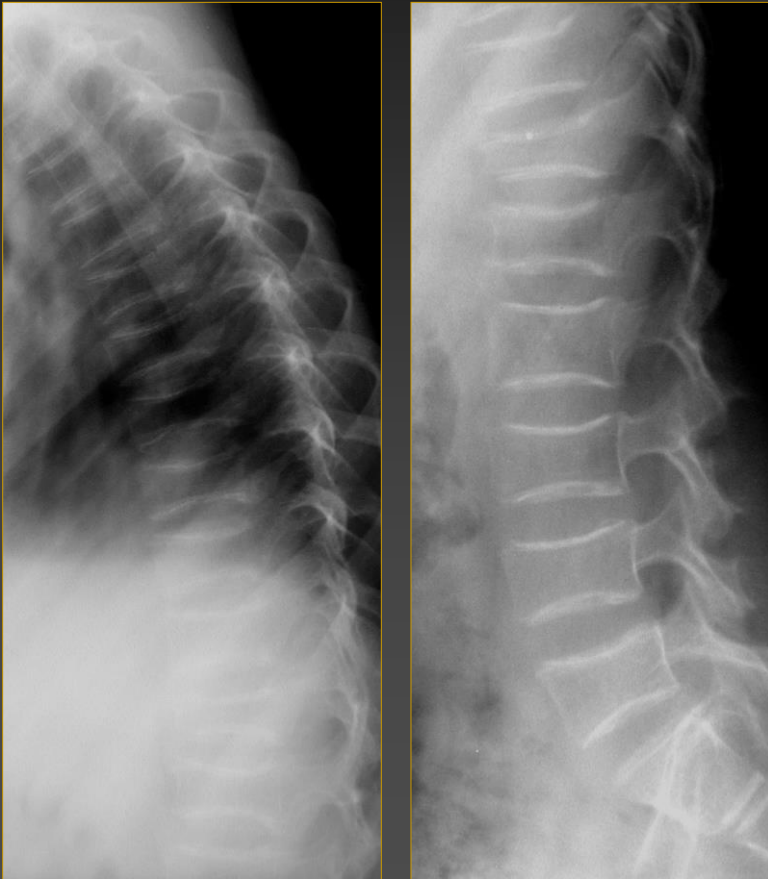
VERTEBRA PLANA



- Severe vertebral body collapse
 - LCH



PLATYSPONDYLY



Idiopathic
osteoporosis

- Multilevel flattening of the vertebral bodies
- Many causes

VERTEBRAL ENLARGEMENT



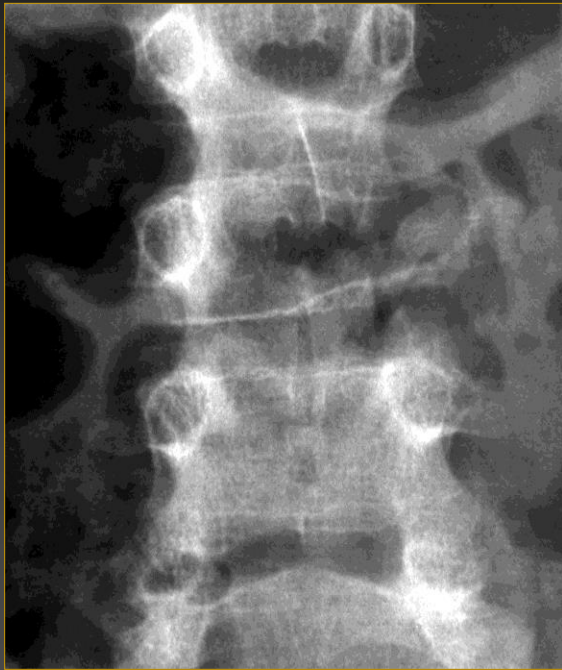
- Paget's disease
- Associated
 - Involvement of neural arch
 - Medullary sclerosis
 - Trabecular thickening

BONE DENSITY

- Reduced
 - Osteopenia
- Increased
 - Sclerosis

- Either can be focal or diffuse

FOCAL OSTEOPENIA



ABC



Early osteomyelitis

- Any cause of focal vertebral body destruction
 - Tumour
 - Infection

DIFFUSE OSTEOPENIA



Picture frame



Vertical striations

- Osteoporosis
- Metabolic bone diseases
- Neoplastic
 - Myeloma
 - Acute leukaemia

FOCAL SCLEROSIS



Osteoma



Prostate metastasis

Within vertebral body

- Tumours
 - Osteoma
 - Osteoblastic metastasis
- Multiple
 - Osteopoikilosis

FOCAL SCLEROSIS



Sub-Chondral

- Degenerative
 - DHVS
- 2^o Hyperparathyroidism
 - Multilevel T + L regions
 - 'rugger-jersey' spine

DIFFUSE SCLEROSIS



OB Ca bronchus met



Ivory Vertebra

- Paget's disease
- Reactive
 - OO/OB
 - Schmorl's node
- Neoplastic
 - Osteoblastic metastasis
 - Lymphoma

VERTEBRAL END-PLATES

- Abnormal morphology
 - Focal defect
 - Irregularity
 - Scheuermann's
 - Degenerative disc disease
 - Erosion
 - Bi-concave
 - OP compression fractures

FOCAL DEFECTS



'Pincer-type' burst#

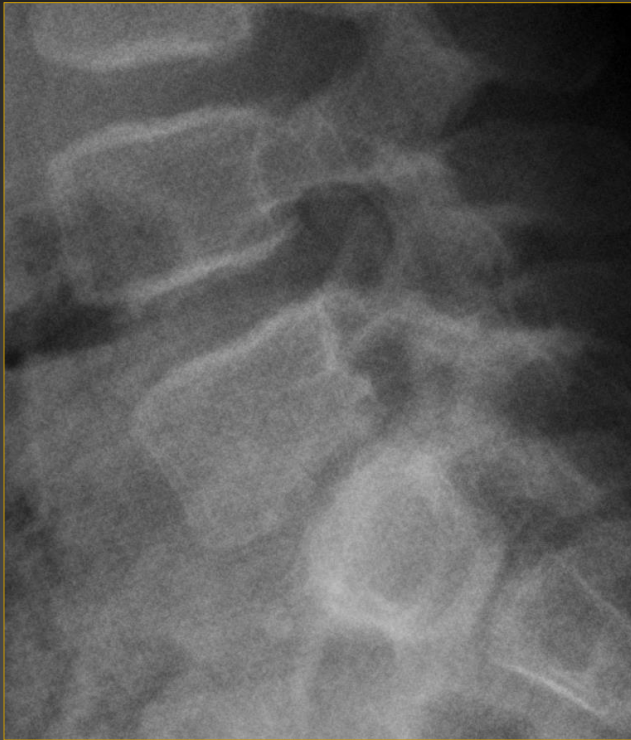
- Multilevel T/L spine
 - Normal variant
- Degenerative
 - Schmorl's nodes
- Traumatic
 - WC or burst fracture
- Neoplastic
 - plasmacytoma

FOCAL DEFECTS



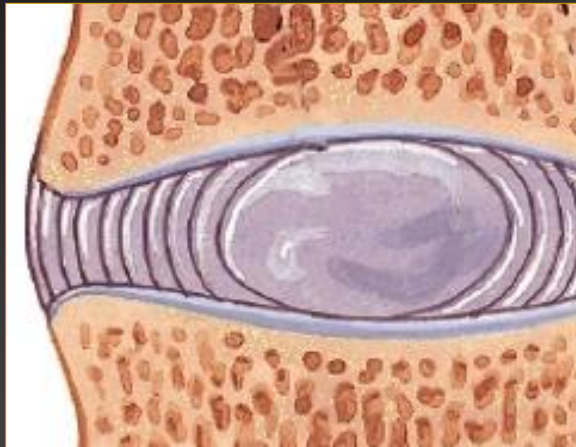
- Anterior limbus lesion
 - T/L junction
 - Physically active adolescents

END-PLATE EROSION



- Spondylodiscitis
- Usually combined with loss of disc height

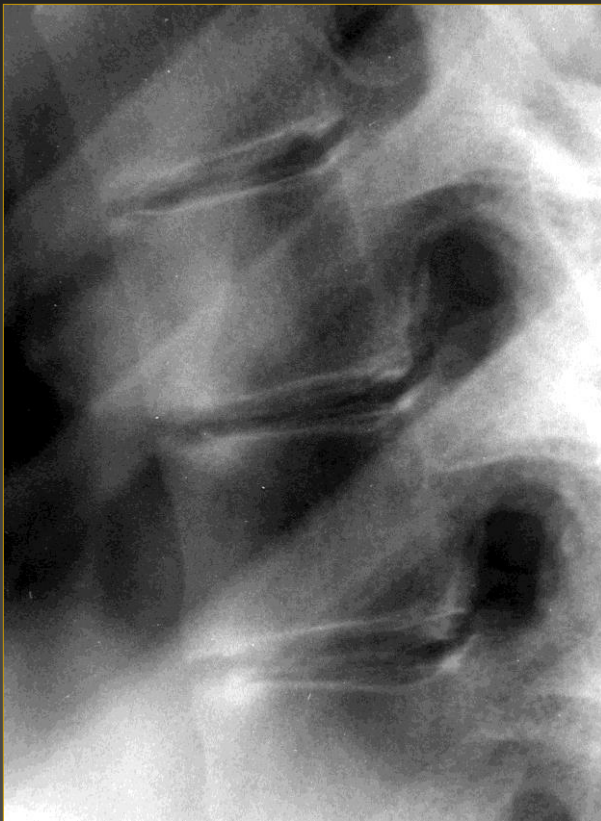
VERTEBRAL ENTHESES



- Insertion of Sharpey's fibres of disc annulus into end-plate
- Erosion
- Ossification
- Avulsion



VERTEBRAL ENTHESIS



- Erosion
 - Manifestation of spondyloarthritis
 - 'Shiny corner'
 - Associated with 'squaring' of vertebral body
- Ankylosing spondylitis

VERTEBRAL ENTHESIS



- Ossification of annulus



Bamboo
Spine

VERTEBRAL ENTHESES



- Disc marginal osteophytes
 - DDD
 - DISH

VERTEBRAL CORTEX

- Displaced
 - PVBL
 - Differentiates WC from burst fracture
- Scalloped
- Eroded



Wedge fracture



Burst fracture

SCALLOPED CORTEX



- Multilevel
 - NF
 - Marfan's
- Single level
 - Neural tumour
 - Nerve sheath cyst

ERODED CORTEX



Anterior

- Pre-vertebral tumour
 - lymphoma
- Pre-vertebral infection
 - TB
 - Sub-ligamentous spread

DISC SPACE

- Normal
- Reduced height
- Increased height
 - OP collapse
- Calcified
 - Thoracic DDD
- Vacuum



REDUCED DISC HEIGHT



Vacuum phenomenon

Generalised

- End-plate intact
 - DDD
- End-plate eroded
 - discitis

REDUCED DISC HEIGHT



Generalised

- End-plate intact
 - LSTV

REDUCED DISC HEIGHT



Focal Anterior

- Anterior limb lesion
- Do not mistake for infection

NEURAL ARCH

- Pedicle
 - Lamina
 - SAP
 - IAP
 - Transverse process
 - Pars interarticularis
 - Spinous process
 - Absent
 - Enlarged
 - Sclerotic
 - Interpediculate distance
 - Interspinous distance
-

ABSENT PEDICLE

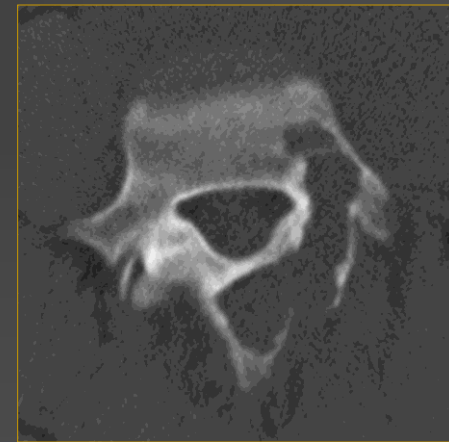


Metastasis



TB

- Congenital
- Acquired
 - Tumour
 - infection



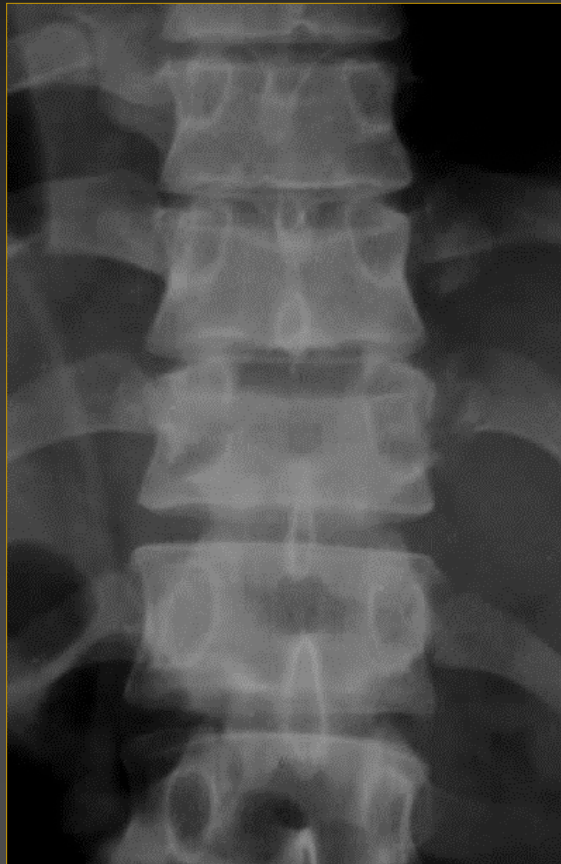
ENLARGED PEDICLE



- Tumour
 - OB



ENLARGED PEDICLE

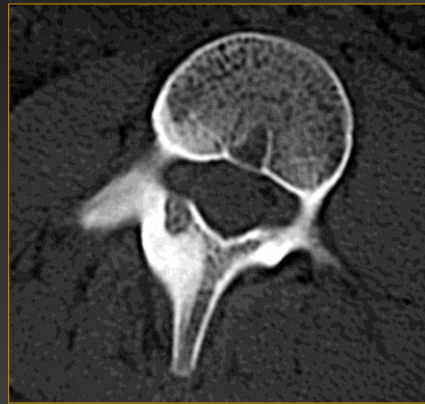


- Trauma
- Bony Chance fracture
 - Increased height of pedicle

SCLEROTIC PEDICLE



L3 OO

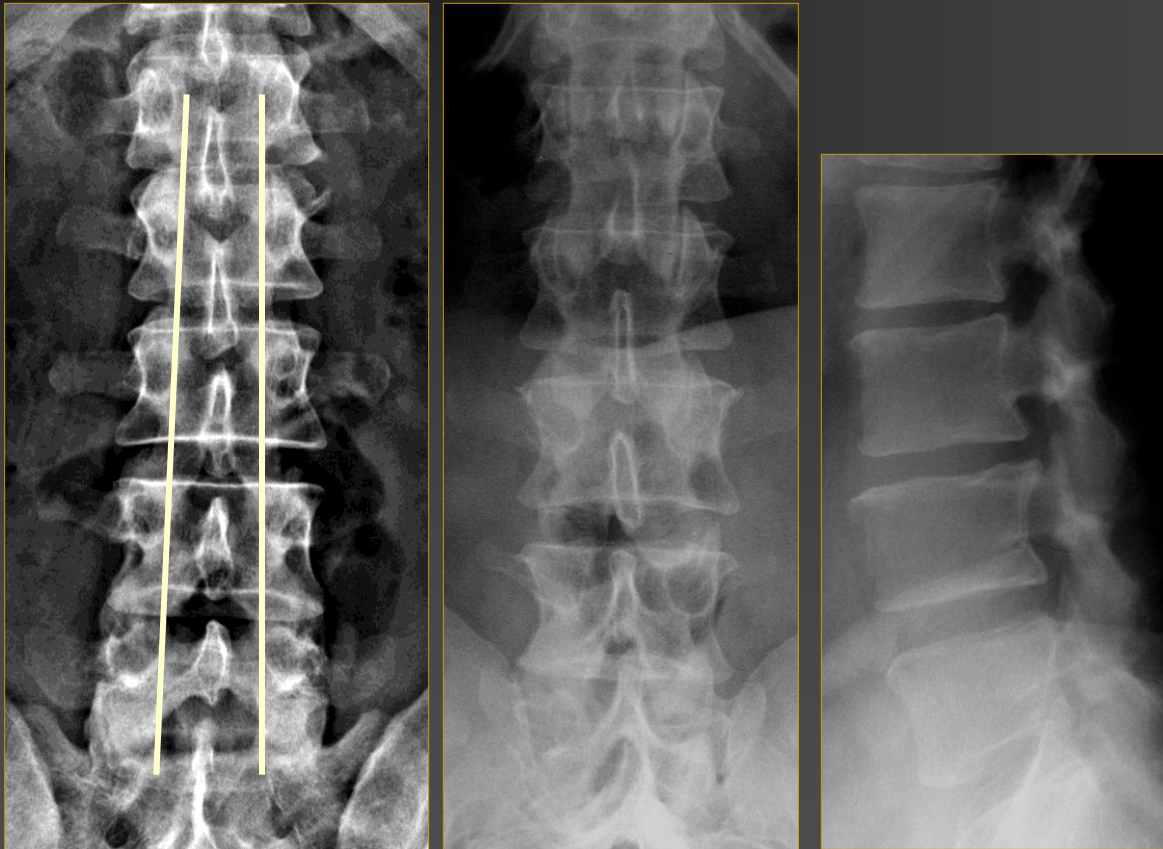


- Reactive due to underlying
 - Tumour
 - Pars stress fracture



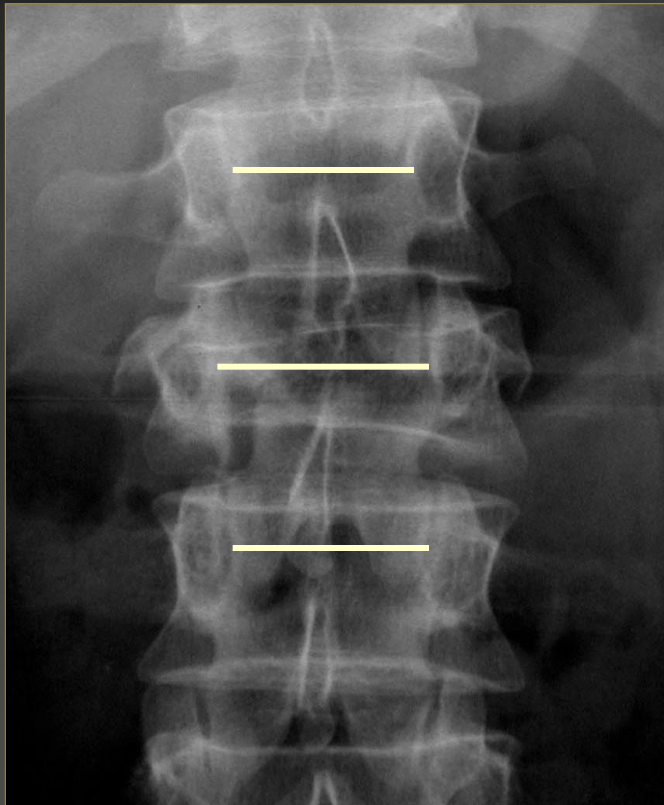
Lt L5 stress fracture

INTERPEDICULATE DISTANCE



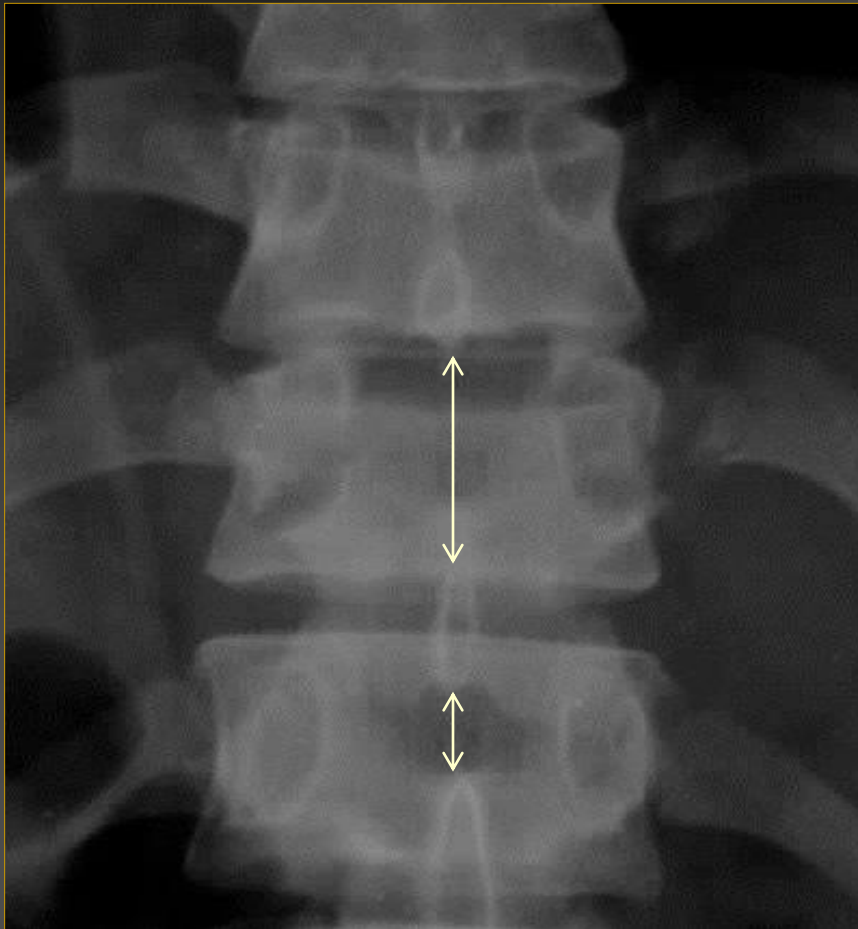
- Normal
 - Increases distally
- Reduced
 - Congenital canal stenosis
 - Short pedicles on lateral radiograph

INTERPEDICULATE DISTANCE



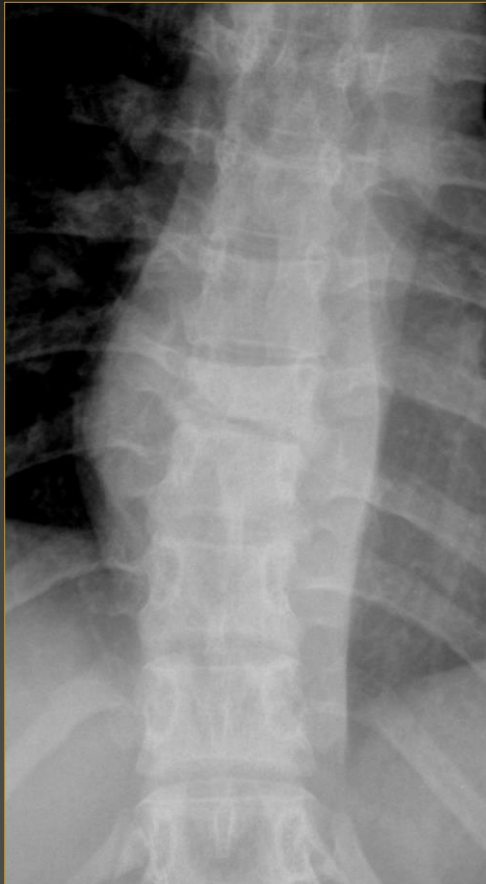
- Increased
 - Burst fracture

INTERSPINOUS DISTANCE



- Increased
 - flexion-distraction injuries

PARASPINAL SOFT TISSUES



- Swelling
 - Tumour
 - Infection
 - Trauma
- Calcification
 - TB
 - spondyloarthropathy
- Gas
 - Infection
 - Post-operative

CONCLUSIONS

- There is potentially a lot in a spinal radiograph
- Systematic approach to assessment will reduce misses

- Normal radiography excludes NOTHING!