

Back pain in children

An overview of pathological findings and value of imaging procedures

M. Mearadji

International Foundation for Pediatric Imaging Aid

Medical history

- The history should start with general questions regarding the onset, location, frequency, duration and intensity of symptoms
- It is useful to identify specific movements or activities that aggravate or relieve symptoms
- Night pain is an essential symptom to identify
- Special attention should be paid to bowel and bladder habits

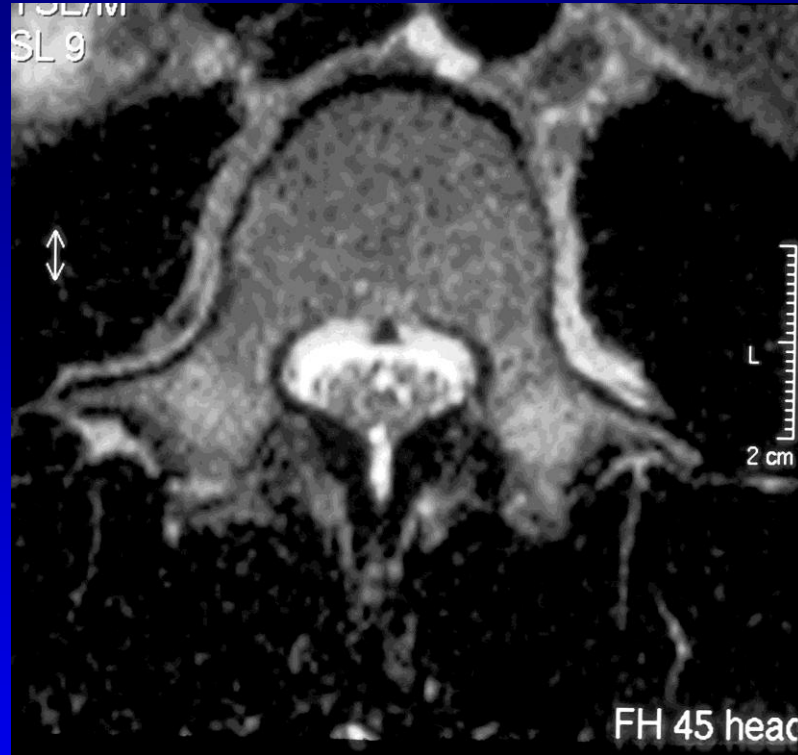
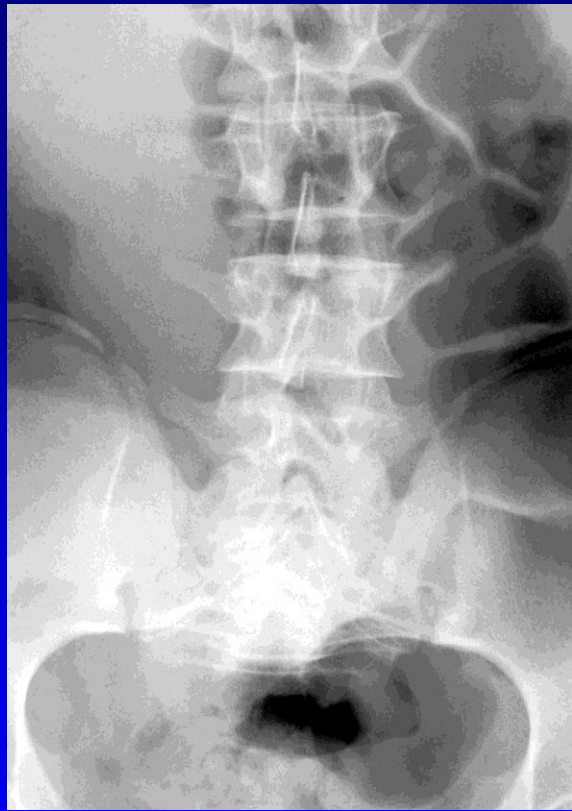
Reasons for back pain in children

(Categories following Bunnel)

- Mechanical derangement
- Developmental abnormalities
- Inflammatory process
- Neoplastic changes

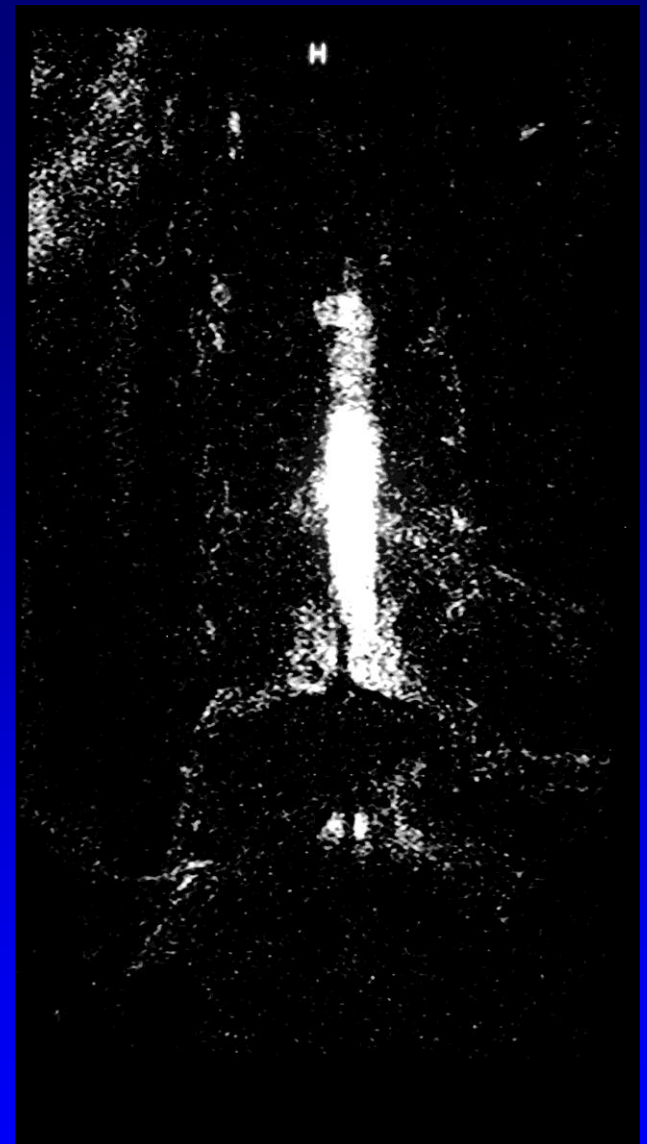
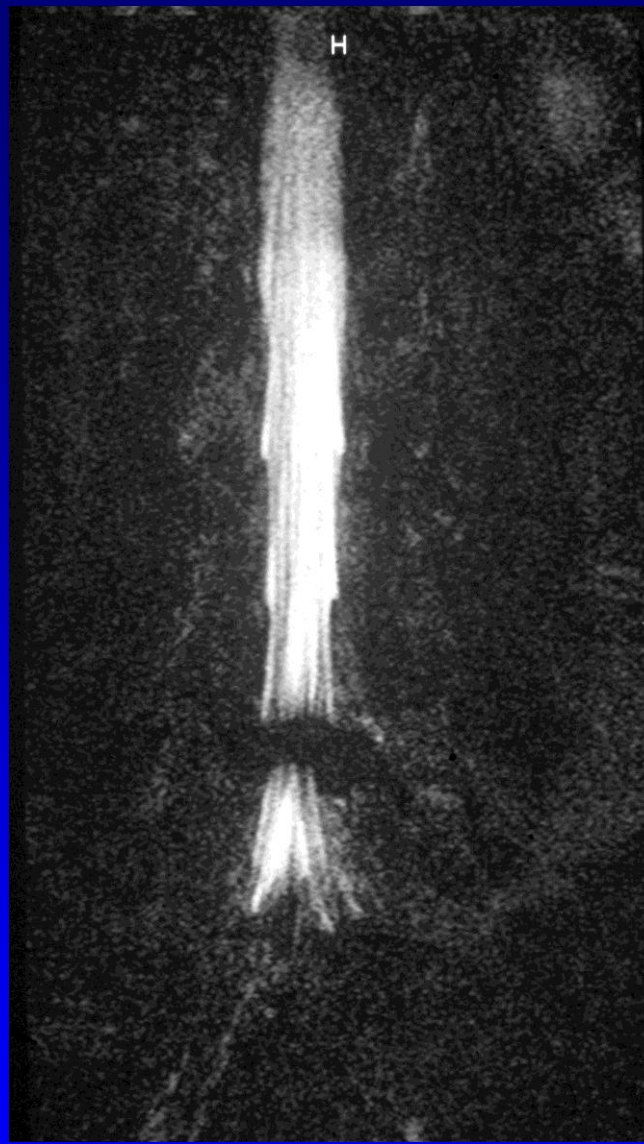
Mechanical derangement

- Postural abnormality
- Muscle strain
- Herniated nucleus pulposus
- Iatrogenic and non-iatrogenic osteoporosis
- Traumatic fractures
- Avascular necrosis



Achondroplasia with backpain

Note the narrowing of the spinal canal



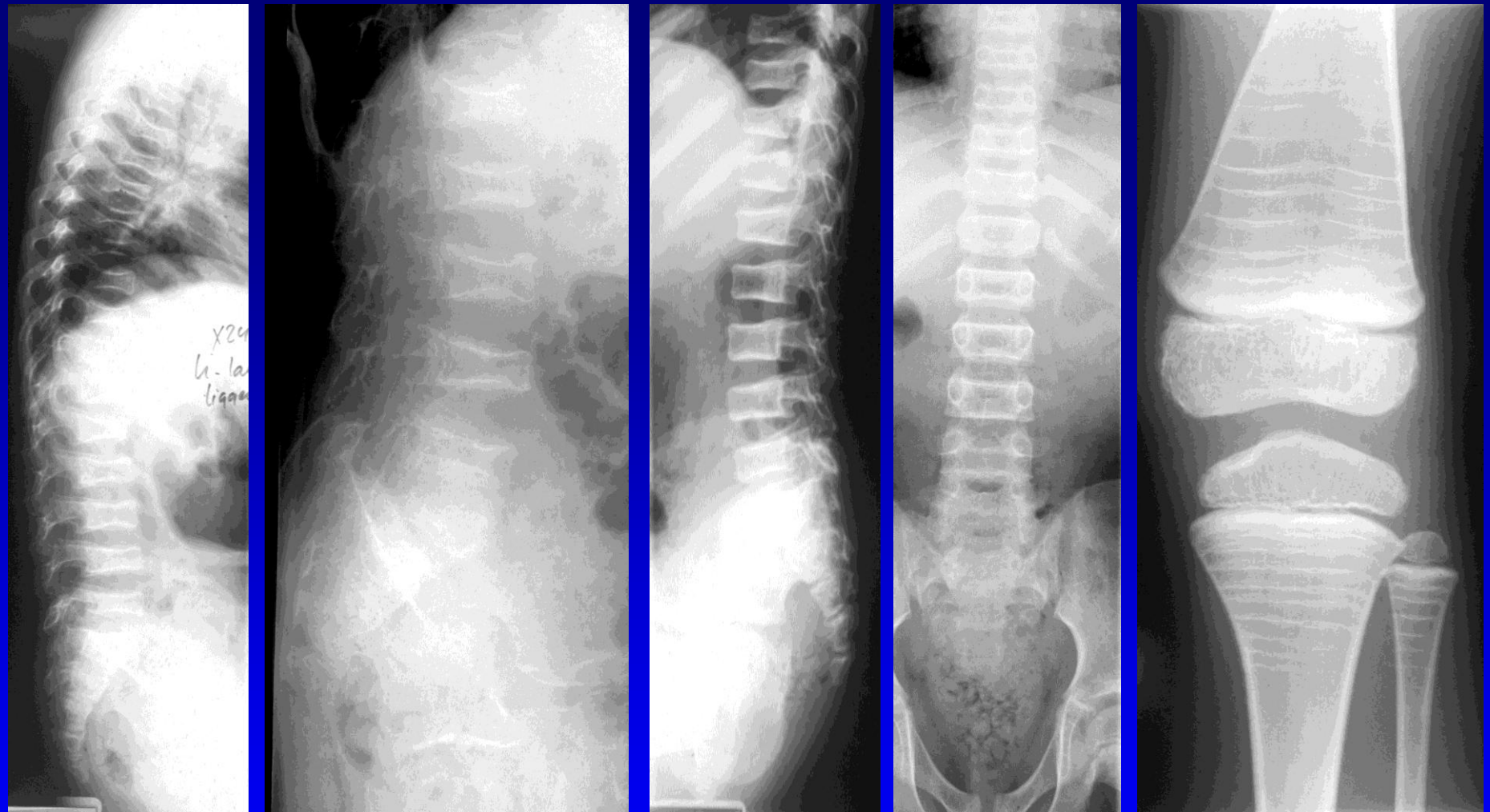
17-year-old boy with backpain

Note bulging discus niveau L4/L5 (herniated nucleus pulposis)

Osteoporosis in childhood

Primary disorders

- Juvenile arthritis
- Diabetes mellitus
- Osteogenesis imperfecta
- Hyperparathyreoidea
- Cushing's syndrome
- Malabsorption syndrome
- Anorexia nervosa
- Renal diseases
- Leucemia
- Juvenile osteoporosis
- Osteoporosis-pseudoglioma syndrome



Osteoporosis before and after bifosfanate therapy

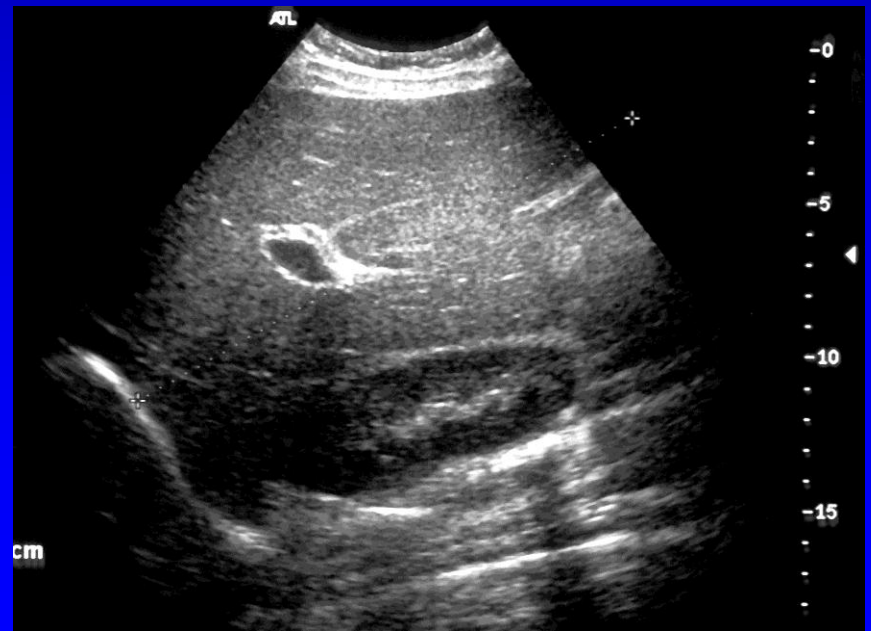
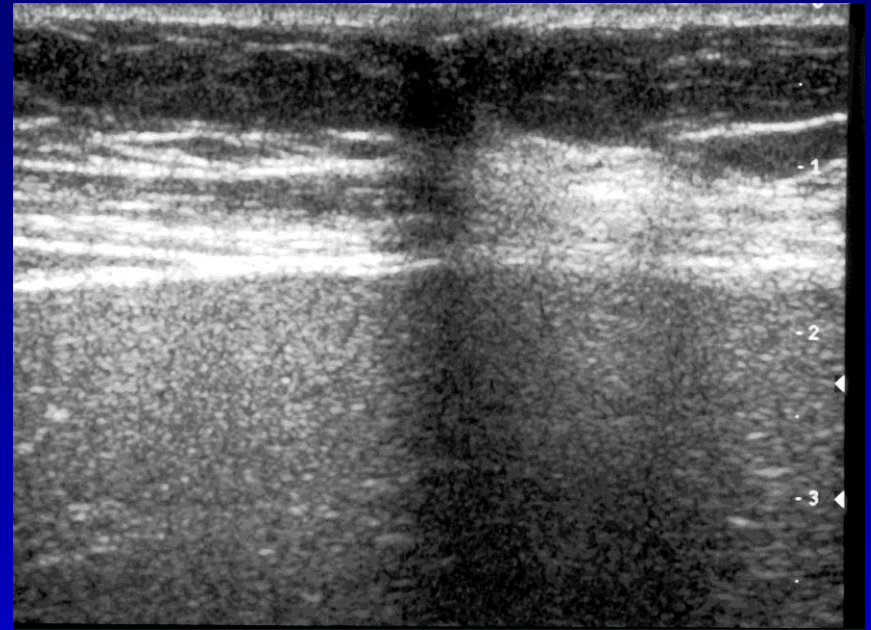
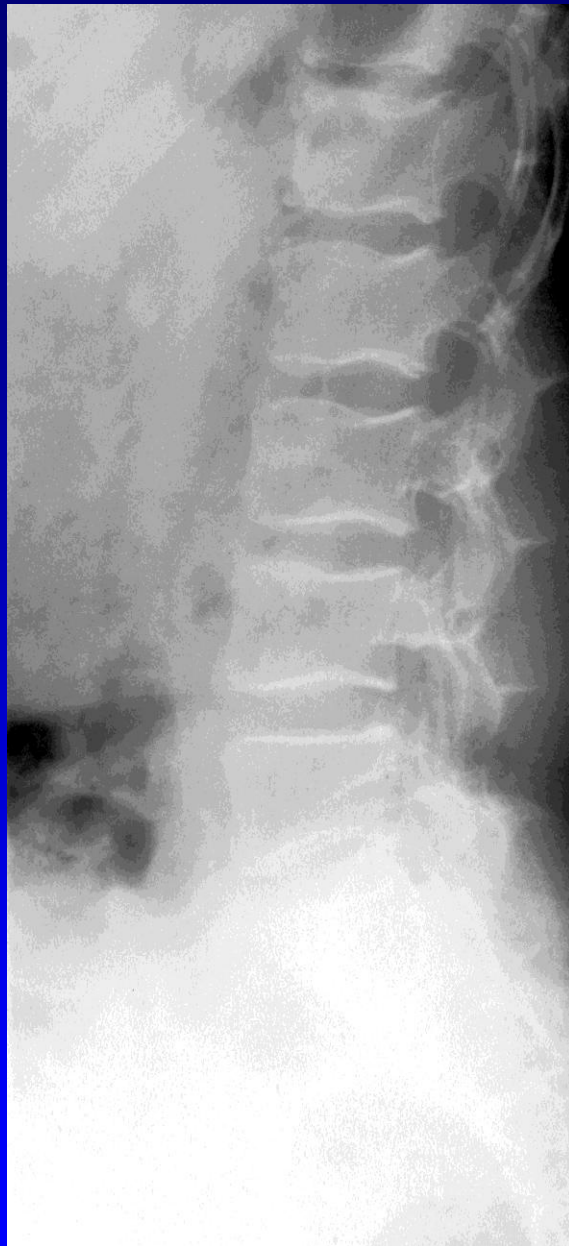


Secondary osteoporosis in 2 cases of acute lymphatic leukemia

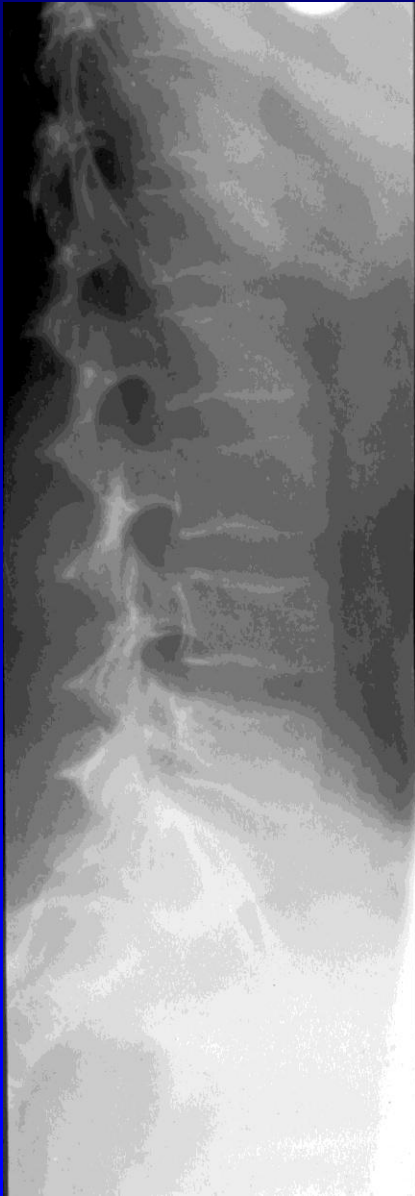
Osteoporosis in childhood

Iatrogenic

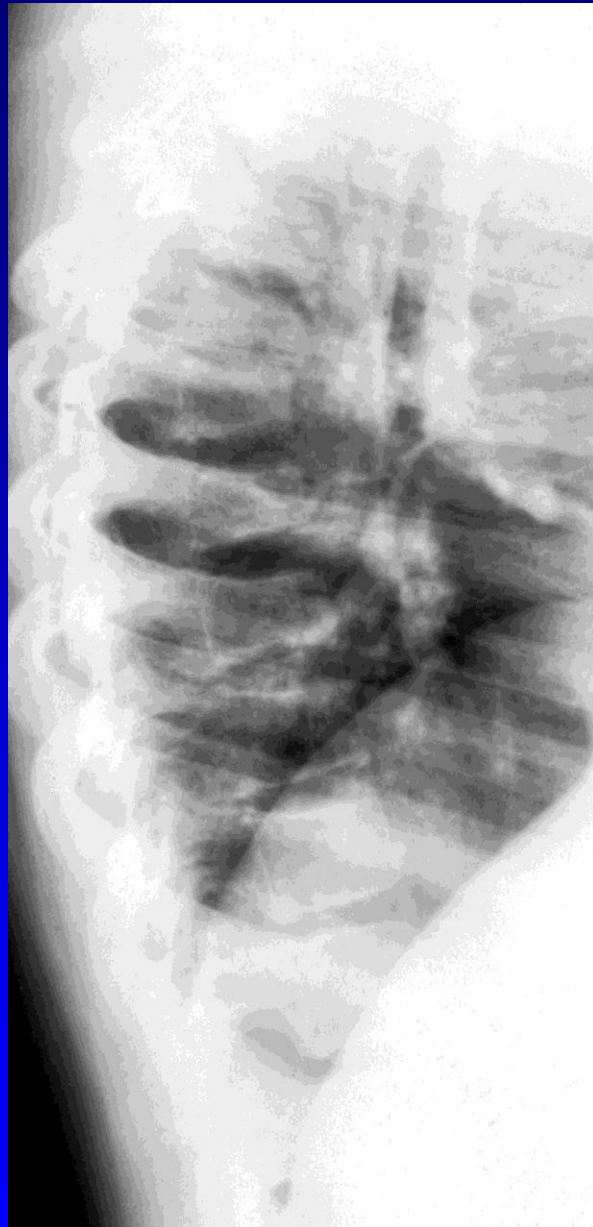
- Anti-convulsants
- Corticosteroids
- Immunosuppressiva



Hemosiderosis of liver. (osteoporosis with backpain)



2 cases of osteoporosis following corticosteroid therapy



Traumatic fracture from Th5 to Th7.

Sickle cell disease

Vascular-occlusive phenomena

- Can be the reason of back pain in children
- The spine represents the second most common area of bone involvement (26%), especially lumbosacral
- Clinical signs are local tenderness over the spinous process and a decrease of backmotion in some cases (Roger E et al.)



Bone infarction in vertebral bodies in a child with Sickle cell disease (backpain).

Note the irregular structure of lumbar spine

Developmental abnormalities

- Spondylolysis
- Scheuermann disease
- Painful scoliosis

Spondylolysis

- Spondylolysis appears during infancy, childhood or adolescence and has a frequency of 5% to 6% after the age of 10 years in white population
- The etiology seems to be related to a congenital abnormality and/or a fatigue fracture of the pars interarticularis
- Back pain is the main complaint of patients with spondylolysis
- Less than one half of those with spondylolysis will develop spondylolisthesis



Stressfracture of pedicle as forerunner of spondylolisthesis



Spondylolysis without listhesis



Spondylolysis with listhesis



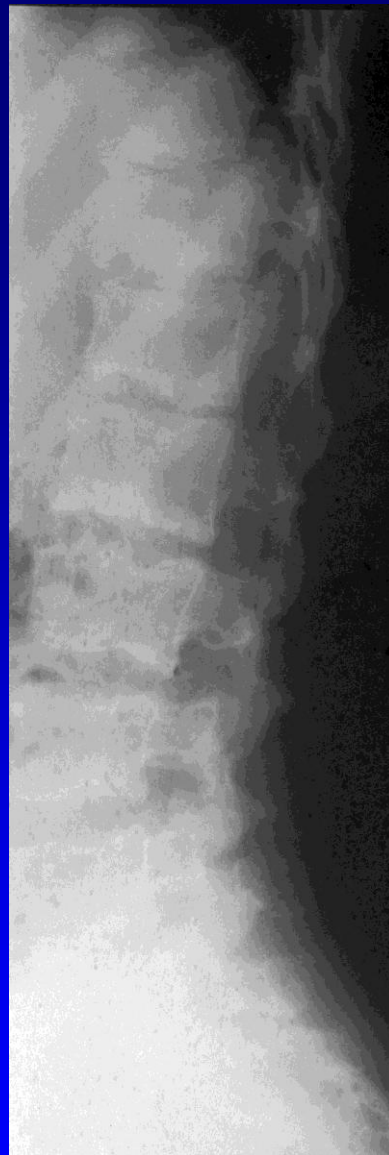
Spondylolisthesis
with listhesis
grade III

Note the
compression of
nerve root L5



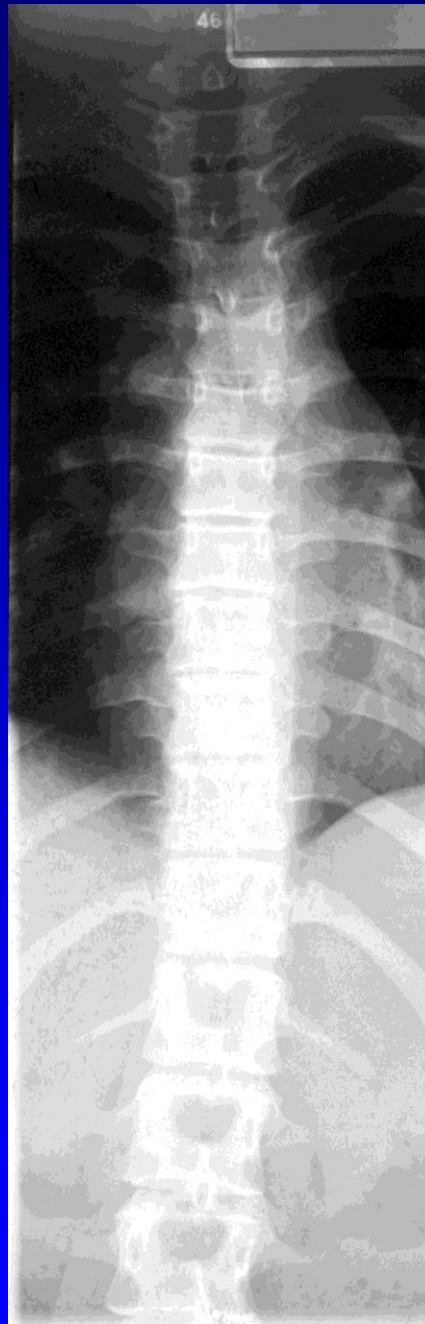
Scheuermann's kyphosis

- Poor posture and frequent back pain are both characteristic for Scheuermann's kyphosis
- Abnormal and fixed kyphosis develops around the time of puberty
- A distinction should be made between Scheuermann's kyphosis and postural round back



Three different cases of Scheuermann disease

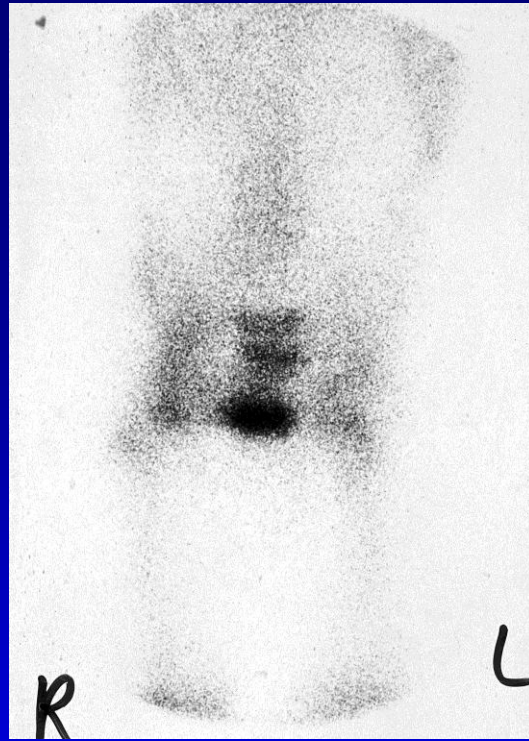
Left sided thoracal scoliosis with backpain.



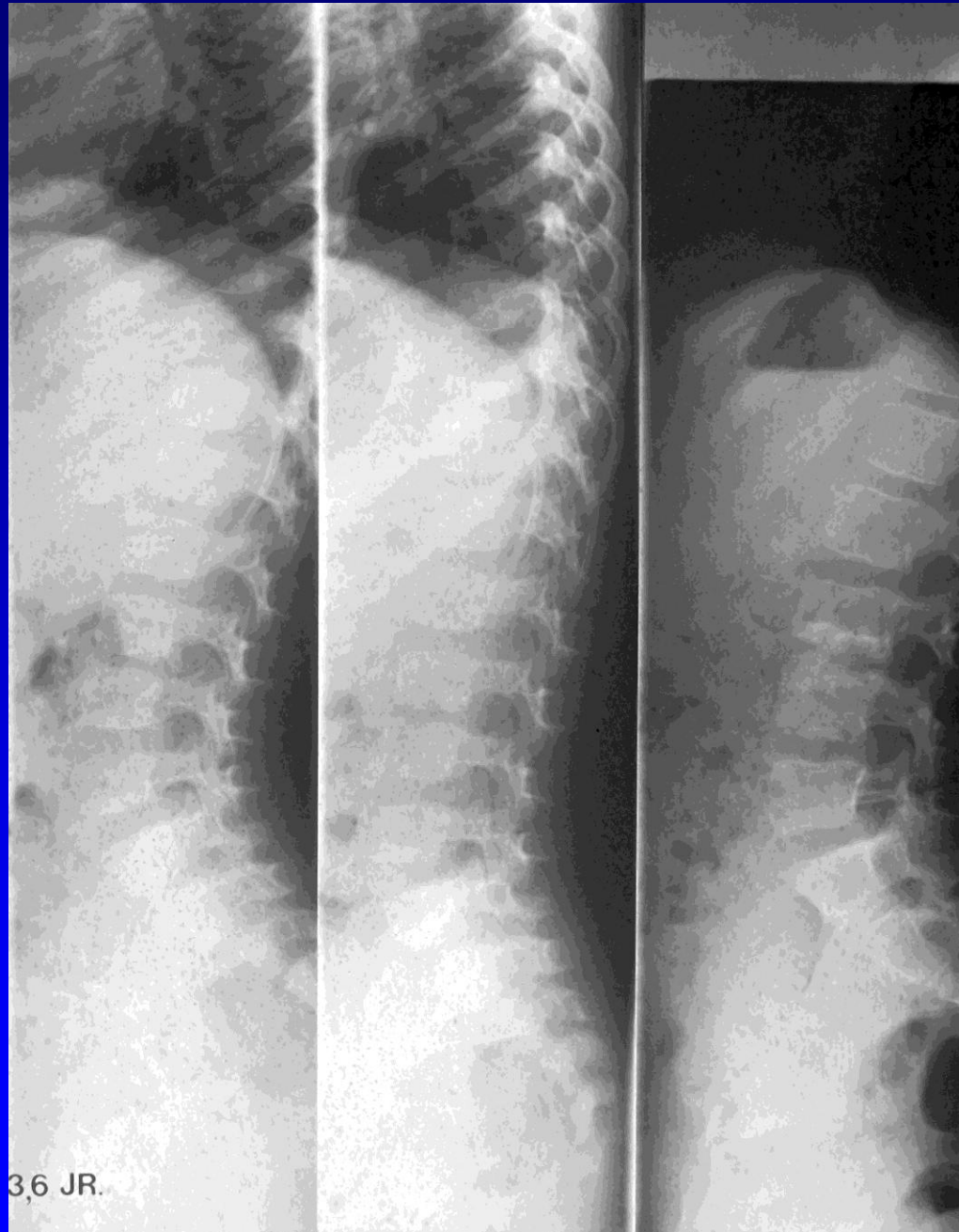
The cause of the scoliosis is vertebral block in the cervical region.

Inflammatory process

- Spondylodiscitis
- Spondylodiscitis tuberculosa
- Pyogenic spondylolitis
- Rheumatic diseases

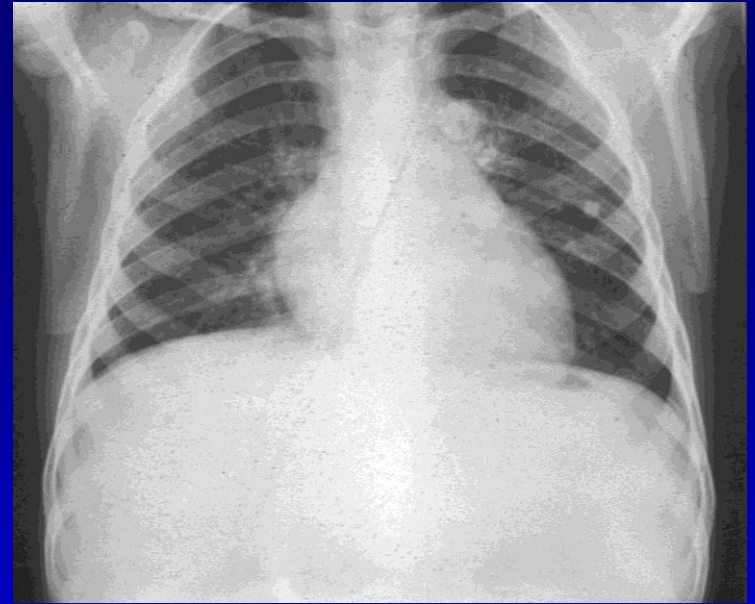


Follow up of spondylodiscitis in two cases

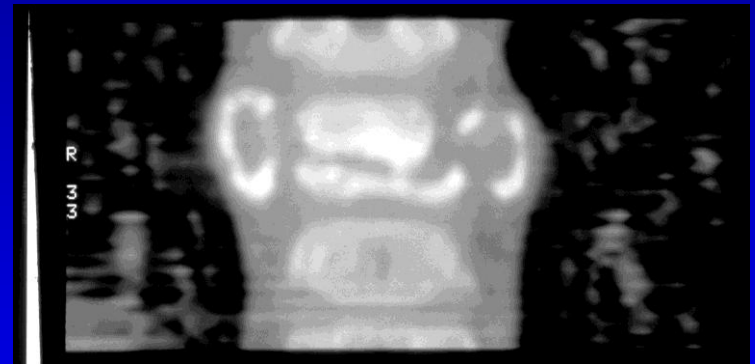
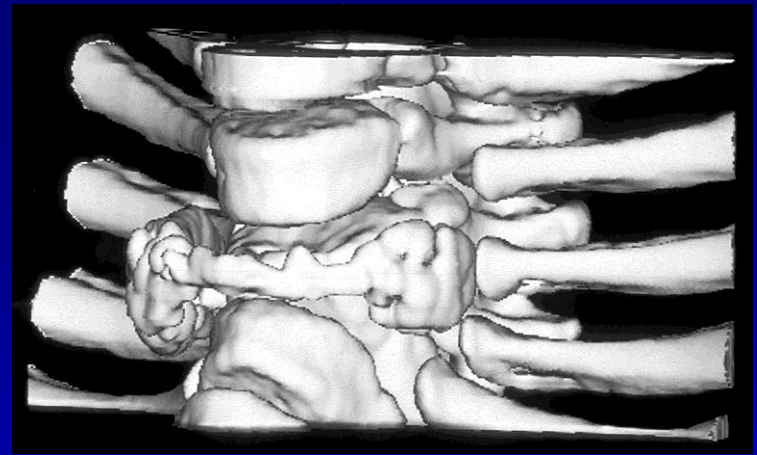
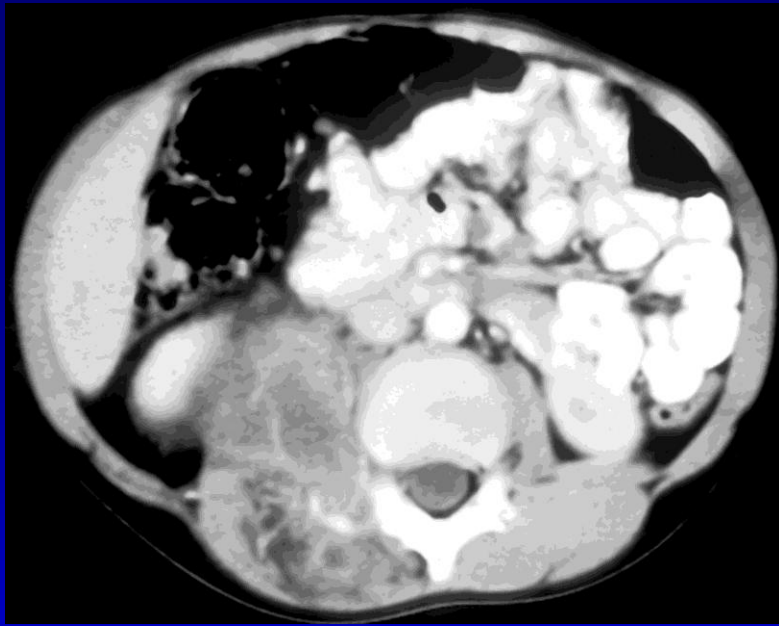


3,6 JR.

Follow up of
spondylodiscitis

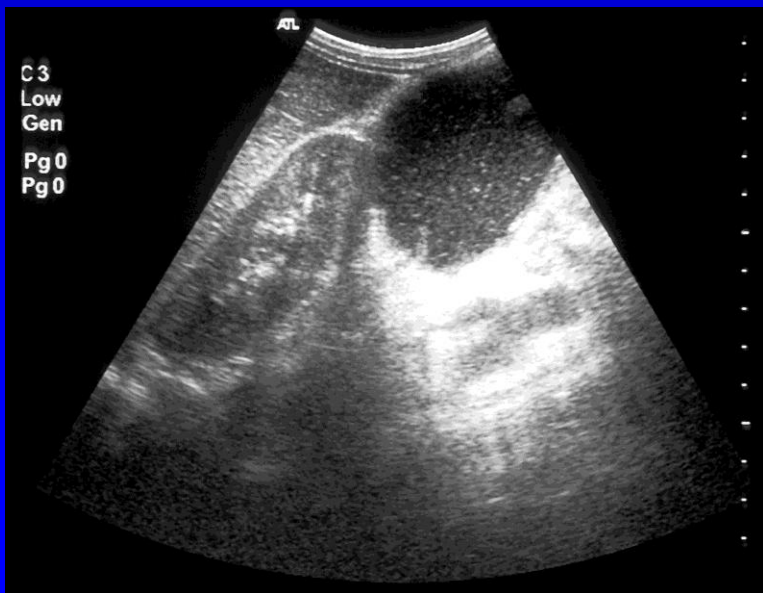


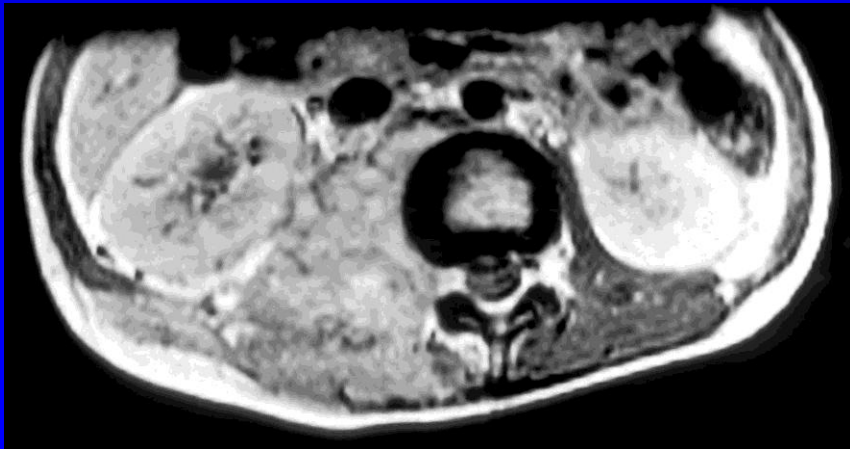
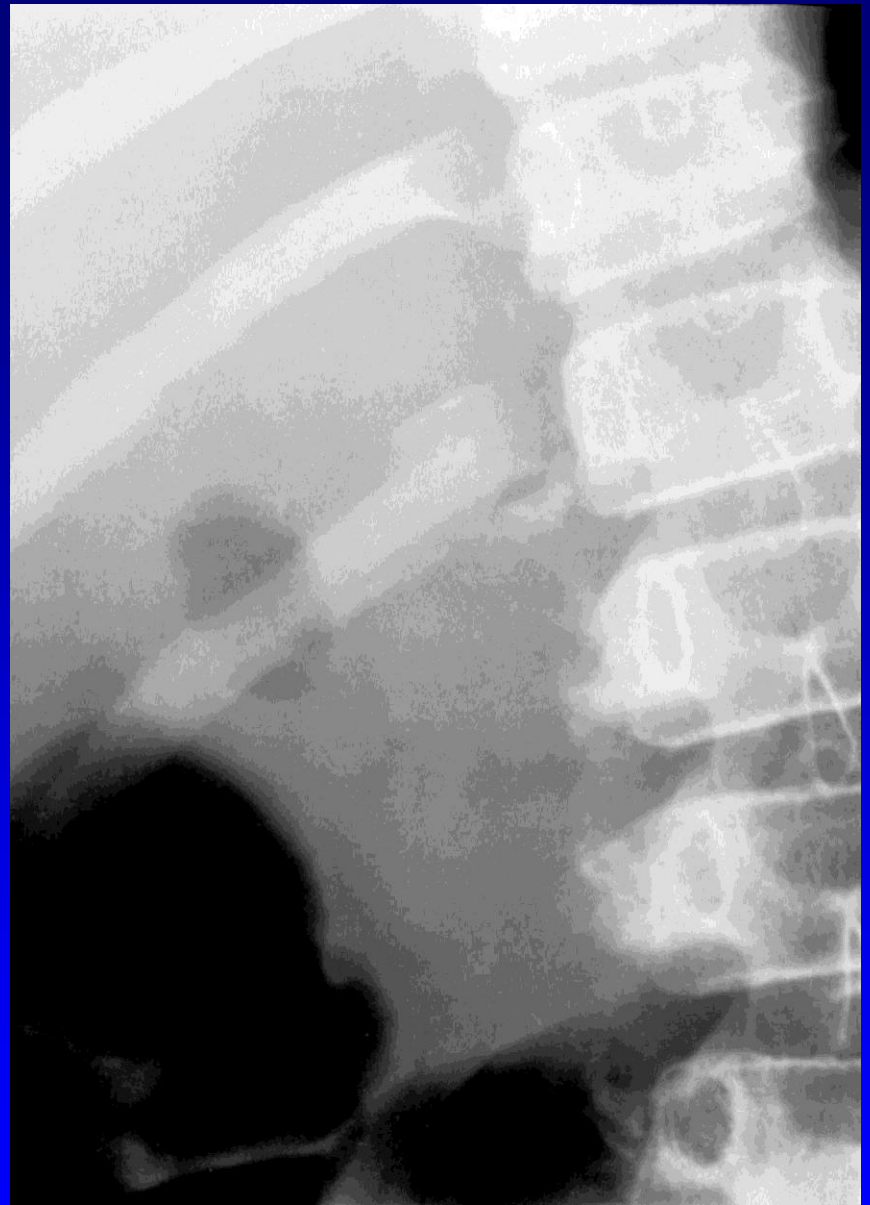
Tuberculosis of lung and spine



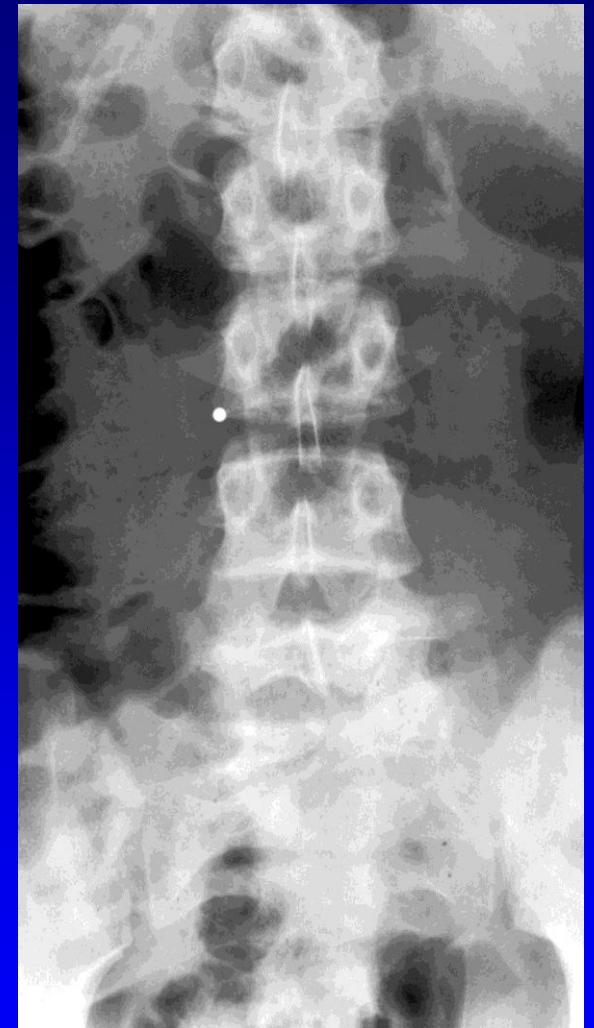
Deformity of spine following tuberculosis

Abcess os psoas in case of spondylitis tuberculosa





Actinomycosis of the level of Th12 and rib



Pyogenic spondylitis



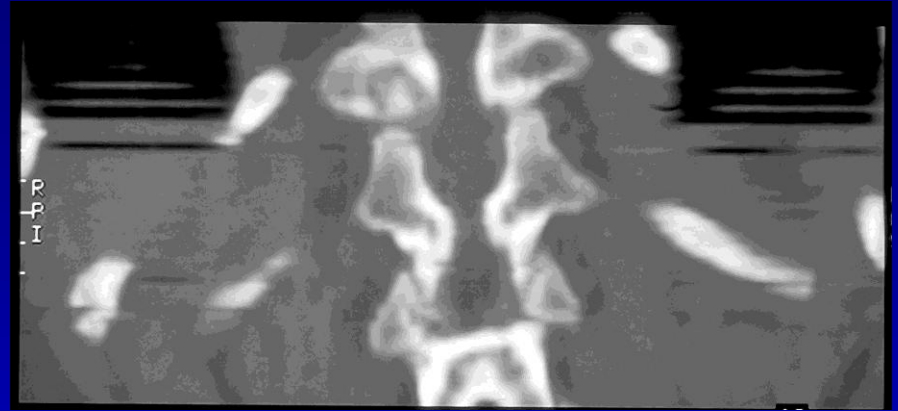
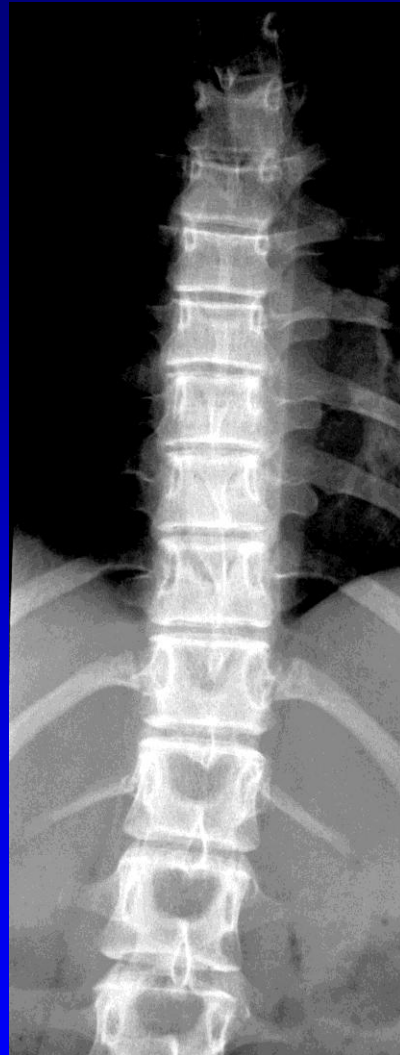
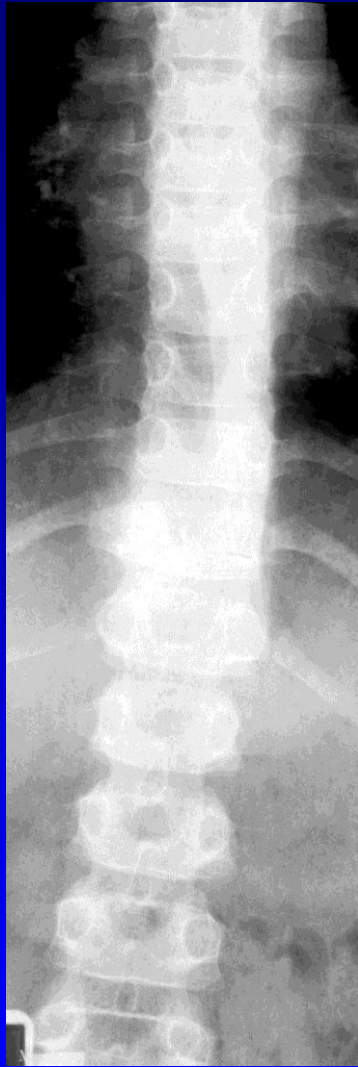
Sacro-iliitis in a case of juvenile chronic arthritis

Neoplastic diseases

- Osteoid osteoma
- Osteoblastoma
- Aneurysmatic bone cyst
- Eosinophile granuloma
- Metastasis in spine
- Primary or metastatic tumour of spine
- Tumours in spinal canal

Osteoid osteoma

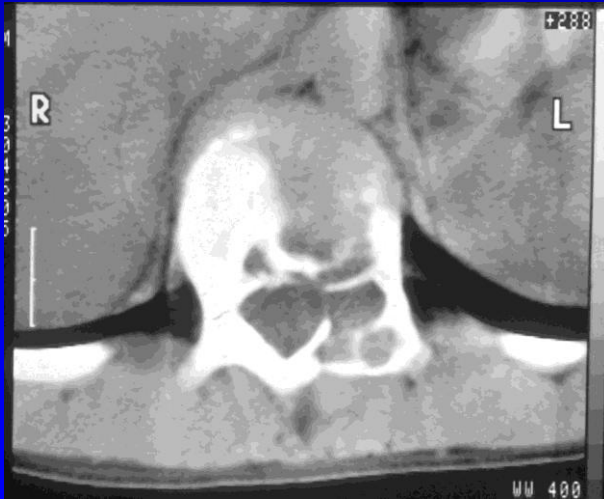
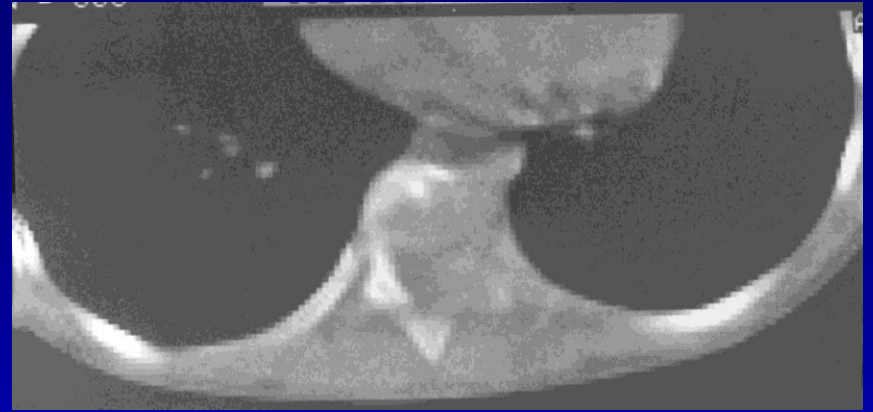
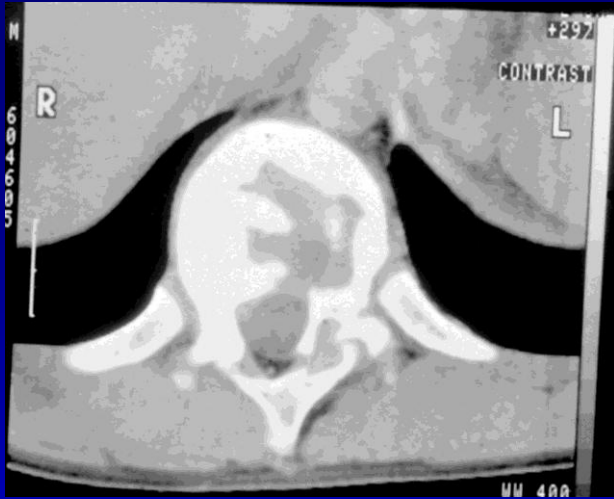
- Most patients (90%) between 7 and 33 years of age
- Male predominance of 2:1
- Dull pain worse at night. Salicylate medication gives almost instant relief of pain
- Localisation 12% in vertebra



Osteoid osteoma in pedicle
of Th11 rightsided

Osteoblastoma

- Age between 10 and 20 years
- Male predominate 2:1
- Mild pain and local gradual onset
- Localisation: 35% in the vertebrae

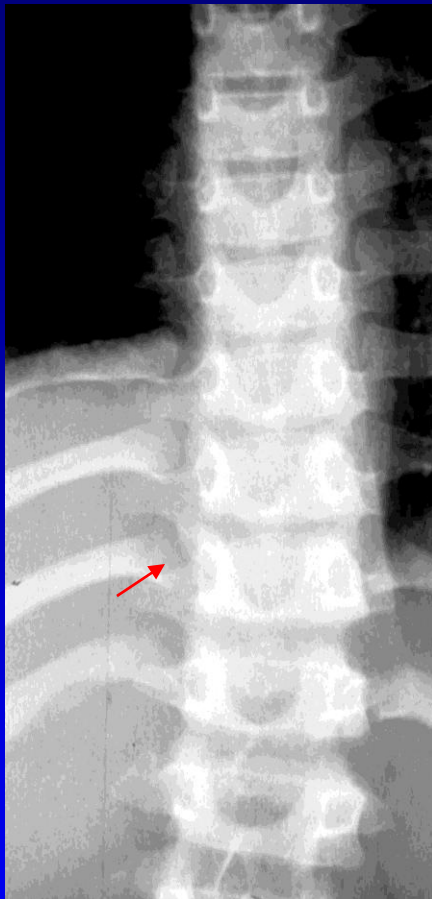


2 cases of osteoblastoma.

Note the hypervascularity of the tumour

Ewing sarcoma

- Median age 14 years
- Ratio female to male 2:3
- Pain common symptom
- Localisation 5% in vertebrae



Ewing sarcoma processus transversales of Th11.

Eosinophilic granuloma

- Median age 10 years
- Males more frequently affected (2:1)
- Local pain
- Localisation in vertebra in 8 %



Eosinophilic
granuloma L2
(Vertebra plana)

Aneurysmal bone cyst

- 75% of all patients with ABC are younger than 20 years
- Most common symptom: pain
- Can cause neurological symptoms in case of compression of spinal cord

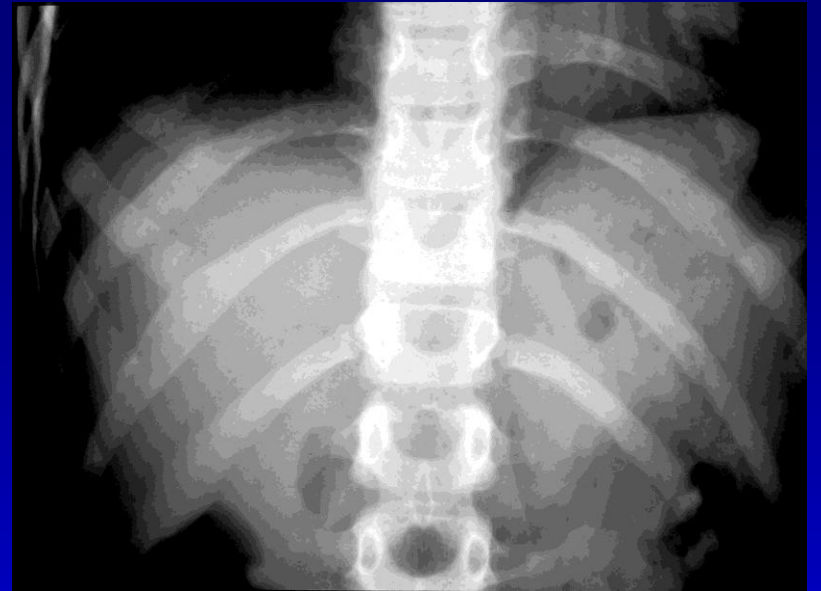
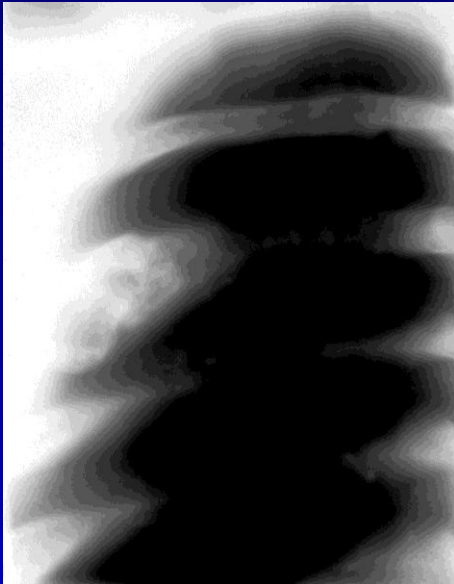


Aneurysmatic bone cyst in L5

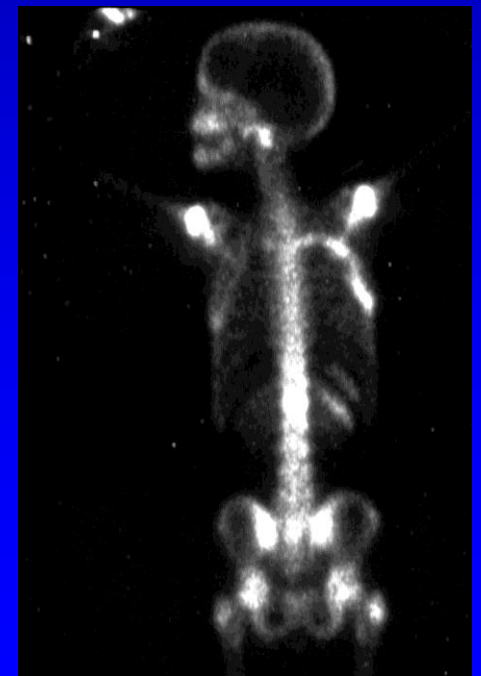


Spinal tumours

- Approximately half of the reported cases of tumours of the spinal canal occur within the first four years of life
- The most important symptoms of tumours in the spinal canal include weakness of legs, limping gait, back pain (31%), incontinence and pain in the extremities. Pain is often ill defined and poorly described by the patient. The pain is usually persistent and constant

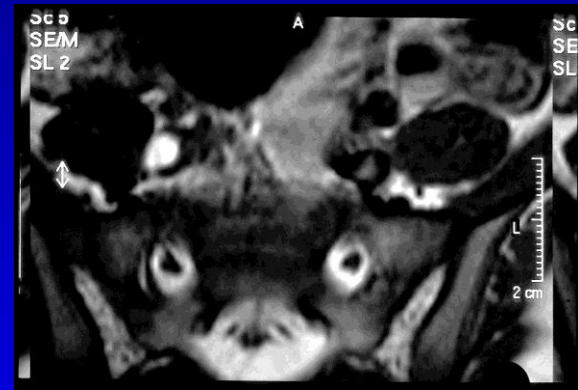


Fibrous dysplasia poly-
ostotic located on spine
and ribs





Schwannoma of cauda equina



Intradural lipoma with clinical backpain



Meningiosarcoma in case of glioblastoma multiforme
(in neurofibromatosis)

Conclusions I

- The incidence of organic causes for back pain in children and adolescents is more frequent than it is in adults
- A careful clinical evaluation including medical history and physical examination is the first step in the diagnostic approach of back pain
- The first image modality that should be used is an AP and lateral radiograph of the spine

Conclusions II

- Nuclear scanning is indicated in cases of suspicion of inflammatory or neoplastic changes
- MRI and CT are absolutely useful to elicit the extent and origin of pathological changes in spine, spinal cord and surrounding tissues