Serious Spinal Pathology 3 Spinal Infections and LBP in the Child

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Objectives 1

- List the presenting features and risk factors for spinal infections
- Explain the ways in which spinal infections can cause spinal cord compression
- Recognise spinal infection as a serious condition and understand the initial steps in its investigation and management
- Recognise epidural abscess as a surgical emergency
- List the more common infective agents that can cause spinal infections (including tuberculosis)

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Objectives 2

- Recognise the serious causes of back pain in a child
- Understand the principles and causes of childhood spinal deformity

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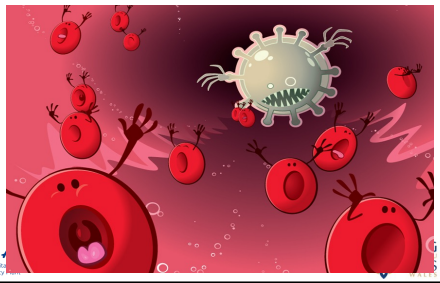
A Bit About Spinal Infections



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The Presentation

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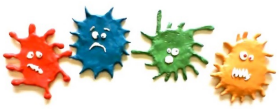
The Infection



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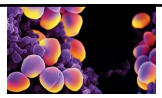
Infection



- Spread:
  - Haematogenous
    - Venous vs Arteriolar theories
  - Contiguous
  - Direct Implantation
- Disc Involvement:
  - Pyogenic infection nearly always
  - Granulomatous do not typically involve the disc

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The Patient

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The Diagnosis

- Lab tests
  - Blood cultures yield correct organism 6-24%
- Imaging
  - XR changes 4/52, standing XR - deformity…
  - MRI – Imaging of choice
  - CT – bony destruction, biopsy
- Biopsy
  - IS THERE SOMETHING TO BIOPSY?
  - Stop abs if able
  - Identifies organism 68-82% (at best but probably <50%)
  - 2 negative closed biopsies - ? proceed to open biopsy
  - All samples sent for micro and histology

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Rule of 50%

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The Treatment

- Non-specialist in the majority of cases
- Rest / Brace
- Blood Cultures
- Massive and prolonged antibiotics
  - Talk to the bug doctors
  - Pref 2 agents with good bone penetration
- Watch for bone stock loss
  - Don't wait for the deformity to get worse
  - Get erect XRs during course of treatment
- "Complicated" cases – involve the spinal team

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The Complications

- Mortality rate up to 20%
  - Comorbidities
- Ongoing infection and sepsis
- Paralysis
  - Abscess / Deformity / Fracture / Thrombosis
- Deformity
- Pain
- Instability

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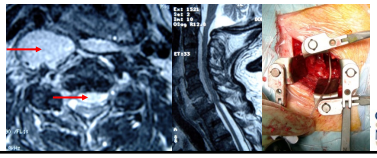
Epidural Abscess



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The Little People

- Back pain
- Refusal to weight bear
- Flexed spine
- Hip pain
- Non specific abdominal pain
- <50% have fever
- Blood cultures usually negative

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The Red God / White Plague

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Goals of Treatment

- Early diagnosis
- Eradicate infection / treat sepsis
- Preserve spinal stability
- Prevent / reverse neurological deficits
- Pain relief
- Correct deformity

Please Involve The Spinal Surgeons EARLY

BUT, majority can be managed by non specialists

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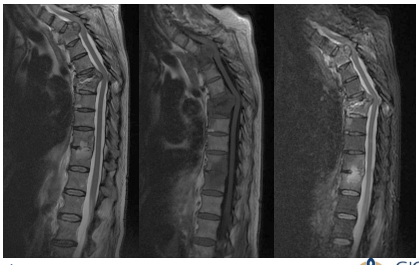

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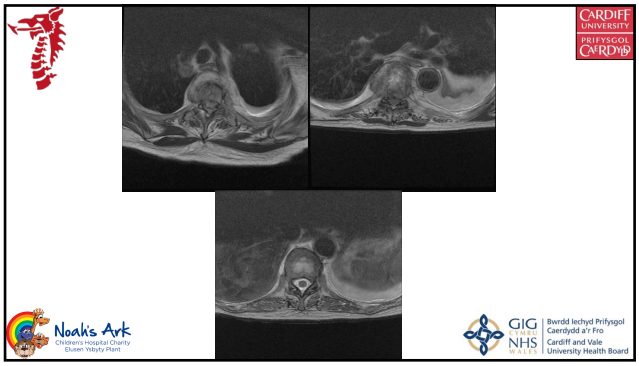

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Operative Intervention

- Open biopsy required for diagnosis
- Failure of medical management
- Drainage of abscess (?)
- Decompression of spinal cord compression with neurological deficit
- Correction of progressive or unacceptable spinal deformity / instability

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Goals of Surgery

- Complete debridement of all non-viable and infected tissue
- Decompress neural elements
- Long term stability through fusion
- Decompress / Realign / Stabilise / Prevent Late Pain Deformity

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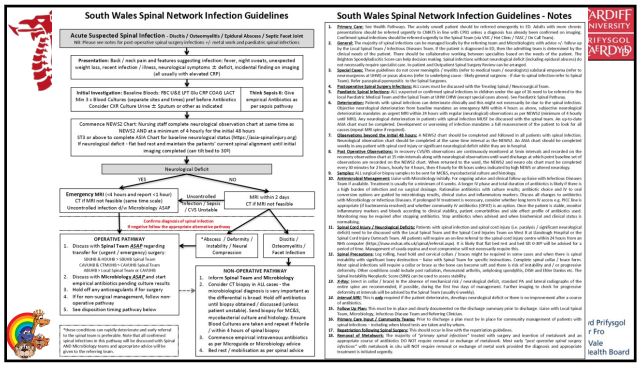

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Surgical Site Infections

- Spinal SSI 0.7 – 12+%
- Increased morbidity, mortality and health care costs
- SSIs = 1/3 of HAIs
- CDC Jan 2014 SSI:
  - 30 days after surgery without instrumentation
  - 1 year with instrumentation
    - Other classifications:
      - Acute (<3 weeks)
      - Subacute (3 weeks to 3 months)
      - Chronic (>3 months)

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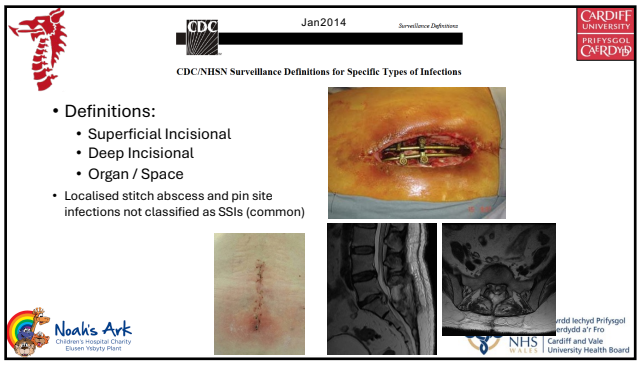

- Definitions:
  - Superficial Incisional
  - Deep Incisional
  - Organ / Space
- Localised stitch abscess and pin site infections not classified as SSIs (common)

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CDC Jan 2014

- All SSIs:
  - Staph aureus 30%
  - Coag neg staph 13.7%
  - Enterococcus 11.2%
  - E.coli 9.6%
  - Pseudomonas 5.6%

1. Direct innoculation at surgery
2. Contamination early post op
3. Contamination haematogenous seeding

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SSIs - CDC Jan 2014

- Endogenous:
  - Pt flora
    - Skin
    - Membranes
    - GI tract
  - Seeding from distal focus infection
- Exogenous sources:
  - Surgical personnel
    - Soiled attire
    - Aseptic tech
    - Hand hygiene
  - OR environment and ventilation
  - Tools, equipment, materials / implants

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Low Back Pain Children

- History and Examination
- History, history, history…

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Low Back Pain Children

- Spondylolysis and Spondylolisthesis
- Disc prolapse
- Trauma - Apophyseal ring fractures
- Infections
- Inflammatory Spondyloarthropathy – Rh / AS
- Neoplasms
- Non Accidental Injury
- Scheuermann's disease / kyphosis
- Scoliosis

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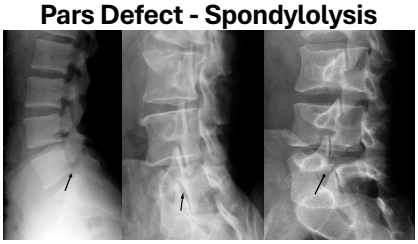
Pars Defect - Spondylolysis



- Most common cause of significant LBP in child
- Think certain sports as a cause
- Mainstay of treatment remains non-operative

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Spondylolisthesis

- Developmental
- Acquired

- High Grade
- Low Grade

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Spondylolisthesis

- Asymptomatic
- LBP, buttock, thigh, groin pain
- +/- radicular pain
- +/- numbness weakness L5-S1
- +/- urinary / bowel
- O/E – nil, restricted motion, hyperlordosis, palpable step, kyphosis above, trunk short, rib on crests, tight hamstrings, L5-S1 neuro findings

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Spondylolisthesis

- Refer
- Indications surgery:
  - Failed conservative management
  - High grade slip immature patient (will progress)
  - Neurological compromise

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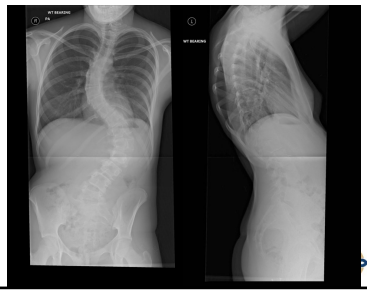
Scoliosis



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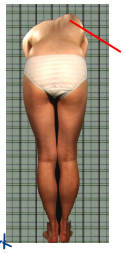
Adams Test



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BOX 3-1 Etiologic Classification of Scoliosis

Idiopathic
Early-onset
Late-onset
Adult

Congenital
Osteogenic (vertebral anomaly)
Anomalous formation
Wedge vertebra
Hemivertebra
Anomalous segmentation
Unilateral bar
Fused ribs
Fused vertebra
Neuropathic (spinal dysraphism)
Tethered cord
Chiari malformations
Syringomyelia
Diastematomyelia
Meningocele/myelomeningocele

Neuromuscular
Neuropathic
Upper motor neuron

Neuromuscular—cont'd
Spinocerebellar degeneration
Cerebral palsy
Lower motor neuron
Poliomyelitis
Myopathic
Congenital hypotonia
Duchenne muscular dystrophy

Developmental Syndromes
Skeletal dysostosis (e.g., neurofibromatosis)
Skeletal dysplasias (e.g., osteogenesis imperfecta)

Tumor Associated
Vertebral
Osteoblastoma
Osteoid osteoma
Intraspinal
Intramedullary (e.g., astrocytoma)
Extramedullary (e.g., neurofibroma)

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Idiopathic Scoliosis

- Infantile 0-3yrs
- Juvenile 3-10yrs
- Adolescent >10 yrs
- Early / Late Onset (10 yrs - SRS)
- (23% AIS have LBP)

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Congenital Scoliosis

- Failure Formation / Segmentation / Both

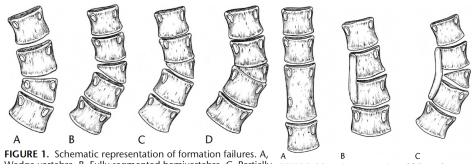

FIGURE 1. Schematic representation of formation failures. A, Wedge vertebra. B, Fully segmented hemivertebra. C, Partially segmented hemivertebra. D, Unsegmented hemivertebra. Reproduced with permission from Hedequist and Emans.[14]

FIGURE 2. Schematic representations of failures of segmentation. A, Block vertebra. B, Bar. C, Bar with contralateral hemivertebra. Reproduced with permission from Hedequist and Emans.[14]

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Ass Congenital Anomalies

- V - Vertebral
- A - Anorectal
- C - Cardiac
- T - Tracheo
- E - Esophageal
- R - Renal
- L - Limbs

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Neuromuscular Scoliosis

BOX 11-1 Neuromuscular Disorders Associated with Scoliosis and Their Classification

Neuropathic
Upper motor neuron
- Cerebral palsy
- Spinocerebellar degeneration
- Friedreich's ataxia
- Charcot-Marie-Tooth
- Rossay-Levy
- Syringomyelia
- Spinal cord tumor
- Spinal cord trauma

Lower motor neuron
- Poliomyelitis and other viral myelitides
- Traumatic
- Spinal muscle atrophy
- Werdnig-Hoffmann
- Kugelberg-Welander
- Dysautonomia

Myopathic
- Arthrogryposis
- Muscular dystrophy
  - Duchenne
  - Limb-girdle
  - Facioscapulohumeral
- Fiber-type disproportion
- Congenital hypotonia
- Myotonia dystrophica

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Other Forms Scoliosis

- Syndromes
- Neurofibromatosis
- Connective Tissue Disorders
  - Marfans / Ehlers Danlos
- Skeletal Dysplasias
- Tumour
- Infection

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Scoliosis

- Refer
- Non-surgical: possible bracing
- Indications for surgery:
  - Curve > 40º skeletally immature
  - Curve > 50º skeletally mature
  - Relentless curve progression
  - Cardiopulmonary complications
  - Function
  - Prevent neurological deterioration

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Objectives of Treatment

- Prevent curve progression
- Permit longitudinal growth
- Avoid cardio-pulmonary complications
  - Alveoli develop up to 9yrs age
  - Spinal (chest) deformity limits lung formation
- Facilitate sitting and handling (large curves)
  - Level shoulders and pelvis
  - Centre of Gravity over sacrum
- Cosmesis

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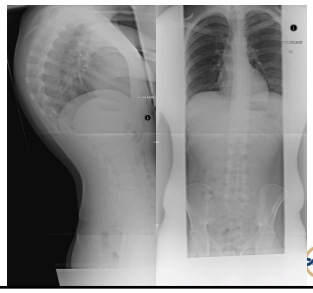
Kyphosis



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Kyphosis

- Scheuermann's
- Ankylosing spondylitis
- Neurofibromatosis
- Diastrophic dysplastic
- Syndromes: Hurler/Marfan/Achondroplasia
- Congenital
- Post laminectomy
- Post traumatic
- Infective

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Scheuermann's Kyphosis

- Rigid round back deformity adolescents
- ? Pathophysiology
- 5 degree anterior wedging of 3 contiguous vertebral bodies
- End plate irregularities
- 2 types – thoracic and thoracolumbar
- Ass with LBP

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Summary

- Covered lots…
- Spinal infections are serious
- Thou shalt not forget that…

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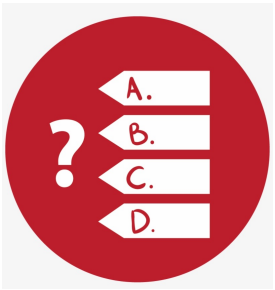

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Radiology SBAs

- Which of the following is an absolute contraindication to MRI scanning?

A. Modern cardiac pacemaker
B. Total hip replacement
C. Dental implants
D. Cerebral aneurysm clip
E. Pregnancy

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Radiology SBAs

- DEXA scans can be used to diagnose which of the following conditions?

A. Osteomyelitis
B. Osteitis
C. Osteopetrosis
D. Osteochondritis
E. Osteoporosis

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Radiology SBAs

- A 35-year-old man attends the emergency department of a district general hospital complaining of lower cervical neck pain having fallen off his mountain bike at low velocity. He has a normal neurological examination and a slightly restricted range of movement in his neck which is slightly tender in the midline. The doctor arranges an XR which reveals normal bony anatomy from the Occiput to C6. What is the next most appropriate investigation / management?

A. CT Cervical Spine
B. MRI Cervical Spine
C. XR Cervical Spine with facet views
D. Discharge to GP follow up
E. Cervical collar and fracture clinic follow up

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Serious Pathology SBAs

- A 20 year old female is involved in a high speed road traffic accident. She is brought straight into the resuscitation room of the emergency department by her partner and placed on a trolley. Her left lower limb is deformed and there is a lot of blood on her trousers. You are the junior doctor in the ED. Which of the following should you do next?

A. Perform cardiopulmonary resuscitation
B. Assess her breathing
C. Attain intravenous access and give fluid resuscitation
D. Immediately straighten her lower limb and put pressure on the point of bleeding
E. Assess her airway whilst providing cervical spine control

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Serious Pathology SBAs

A 26-year-old man is reviewed on the spinal injuries unit. On examination he has an asymmetric spastic paraparesis and has a urinary catheter in situ. In his right leg there is loss of joint position sense below the anterior superior iliac spine and in his left leg there is loss of pain and temperature below T8. What is the most likely site of the lesion?

A. Anterior horn cell
B. Anterior spinal cord
C. Dorso-lateral spinal cord
D. Cauda equina
E. Lumbosacral plexus

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Serious Pathology SBAs

- A 30 year old diabetic male presents to his General Practitioner with a 2 day history of severe neck pain, fever, altered sensation in his hands and difficulty with coordination and dexterity. Which condition needs to be ruled out urgently?

A. Diabetic peripheral neuropathy
B. Diabetic ketoacidosis
C. Cervical epidural abscess
D. Cervical myelopathy
E. Transverse myelitis

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Serious Pathology SBAs

- The term Scoliosis describes:

A. An abnormal curvature of the spine in the sagittal plane
B. An abnormal curvature of the spine in the coronal plane
C. An excessive normal curvature of the spine in the sagittal plane
D. An excessive normal curvature of the spine in the coronal plane
E. All spinal deformities

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Serious Pathology SBAs

- A 70 year old male presents to his General Practitioner with low back pain, bilateral leg heaviness when standing for 10 minutes, severe left leg pain in an L5 distribution when walking for 5 minutes, nocturia and terminal dribbling when passing urine. The most likely diagnosis is:

A. L4/5 degenerative spondylolisthesis
B. L5/1 lytic spondylolisthesis
C. Cauda equina syndrome
D. Prostate cancer metastases
E. Epidural abscess

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