SPINAL INFECTION

OSTEOMYELITIS

Risk factors

Diabetes, Dialysis, Drug addicts

UTI, Chest infection, skin infection

older debilitated patients

immune-compromised patient [HIV]

Clinical

70% arise from UTI, chronically ill, elderly adults.

Males are affected more often than females

Lumbar spine is commonly involved and thoraco-lumbar region is the second common site.

Rule of 6

60% Staph Aureus

60% secondary to other infection like UTI

60% in the lumbar spine

60% blood culture is positive

Tc + Indium together 60% specific

Common 6th decade

Causative organisms

Staph aureus is most common [50%] but MRSA is on the increase

Gram negatives (E coli, Pseudomonas, Proteus)= UTI & anaerobes [Diabetes]

Strep viridans: May cause indolent infection in immune-compromised

Brucellae: Occupational

Candida, coccidiomycosis, Pseudomonas (in immune-compromised)

TB in developing countries (commonest site is T10)

Salmonella infection more common in patient with Sickle cell anemia

Pathogenesis

Arterial seeding or venous spread [Batson's complex]

The organisms settle in the in metaphyseal region

Toxins cause thrombosis, infarct, abscess, blocks nutrition

Purulent material may break out of cortex: Paravertebral or epidural abscess.

Weakening of the bone may cause vertebral collapse causing Kyphus or Gibbus

Clinical

Often a significant delay in diagnosis (6-12 weeks)

Insidious course, with back pain developing over 1-3 months

Triad of fever[50%], back pain [100%],and tenderness

Rule out also bacterial endocarditis tuberculosis

Weight loss

Neurology:[10%]

X ray

2 weeks - disc space narrowing [cf. late in TB compared to septic discitis]]

2-4 wks – Paravertebral shadow .

6 weeks - erosion vertebral body endplate; osteolysis

8 weeks - reactive sclerosis due to trabecular collapse

12 weeks - new bone formation is noted

6-12 months – Ankylosis

Note: Disc destruction usually not present in neoplasm.

Examine Paravertebral soft tissues - retropharyngeal & psoas contours.

MRI

Gold Standard

Very sensitive and specific

96% Sensitivity; 94% specificity and 92% accurac

Gadolinium enhances sensitivity

Low in T1 and High signal on T2

There is loss of the normal intranuclear cleft

[note: TB will not show increase in T2]

Blood

FBC: TC may be normal,

ESR , CRP = usually very high

MSU

Bacteriologic diagnosis essential before antibiotics unless it is life threatening infection:

Blood cultures: 60% positive if patient is febrile

Percutaneous CT guided needle biopsy - positive in 80%

An open biopsy: through a Posterior approach [through the pedicle] is indicated sometimes

ASO Titre for anti-staph. Titres for endocarditis; Tuberculin skin tests for TB

Treatment

1. Identify organism: Percutaneous or open biopsy
2. IV antibiotics for 2weeks [Clinically better and Blood screen towards normal] then oral for 3months.
3. Rest; Orthosis TLSO, Nutrition
4. ESR/CRP used to follow treatment effects (gallium scans can also be used)

Good Prognostic signs

Age less than 60 years

Normal immune status

Decreasing ESR

Staph aureus infection

Surgery

Indications

- Tissue diagnosis not obtained by CT guided biopsy
- Progressive neurology
- Mechanical instability
- Paraspinal or epidural abscess
- Failure of response to medical treatment

Surgery

Anterior decompression, strut graft.

With or without anterior fixation, if required additional posterior stabilization.

Anterior Approaches to the spine

Cervical	anterior approach from the left side
Thoracic	R sided thoracotomy
Thoraco- lumbar	Left sided: Diaphragm reflection [thoracotomy-laparotomy approach]
Lumbar	Retroperitoneal: approach from left

Alternative

1. Vascularised bone graft: faster incorporation
2. Titanium mesh with autogenous graft 2 wks after initial debridement

DISCITIS [JUVENILE]

Age: Primarily in younger patients. 2-6 yrs

Male and female equally involved

Site: Lumbar spine is most common location. [L4-5 disc in 40%]

Pathogenesis: usually self-limiting infection. Inflammation of the intervertebral disc or probably autoimmune (Bianco)

Disc circulation in adults and children

In children the vessels penetrate end plate and supplies disc

In adults the vessels do not penetrate end plate

Therefore: primary disc infection is common in children and in adults disc involvement is usually secondary to infection of the end plate

Clinical

1. Unlike osteomyelitis, there are usually no systemic symptoms (children are typically afebrile)
2. child typically complains of back pain and refuses to flex the spine
3. May also complain of hip or abdominal pain and may refuse to stand or walk
4. Tenderness over the spine, Paravertebral muscle spasm, loss of normal lumbar lordosis, limitation of spine motion.

Investigations

WBC is usually normal

ESR elevated > 40 mm/hour

Blood culture: When positive, most common S. aureus.

X-rays

May appear normal early on.

Disc-space narrowing

Irregularity involving adjacent vertebral end-plates

Later - in adult disc space usually goes on to fusion

where as in child disc space is usually restored

Biopsy

Biopsy is indicated only for children who fail to respond to non-operative management, and for older children and adolescents in whom a different organism may be suspected or if TB or tumor is suspected

Bone Scan

Increased uptake of isotope in infected disc space - may be useful in early diagnosis of discitis.

There are false –ve's

MRI: Gold Standard

MRI is more sensitive than bone scans in early discitis

Treatment

Controversial: Infective or inflammatory

Bed rest

Immobilization and casting is uniformly recommended

Controversial: ? Empirical systemic antibiotics

Kingsiella Kingi may be the culprit. Difficult to culture

Some give antibiotic only in patients failed to respond to brace and rest

Most treat: IV Fluclox or cephalosporin as Discitis is now accepted to be a bacterial infection of the disc space

Reported healing without antibiotics: due to good immune system

Present trend: IV Fluclox for 1-2 wks until blood parameters are better and then a course of oral for 3-4 weeks.

Rarely Surgery: Mere presence of MRI abscess is not indication for surgery. However, when abscess present: any subtle neurology or no clinical improvement with antibiotics is an indication for drainage

Follow up: Partial reconstitution of the disk height occurs

Sometimes: vertebra magna

TB SPINE

Spine is the most common site of skeletal TB [60%]

Thoracic spine most commonly involved (lumbar for osteomyelitis and discitis)

Common part in the vertebra: 3 sites

commonest: Paradiscal

Anterior

Central

Unlike Pyogenic: TB spine can involve multiple vertebra

Clinical

Subacute presentation

Fever, night sweats, anorexia, and weight loss

Neurology: Early and late Potts paraplegia

Gibbus or Kyphosis deformity of thew spine

Chest examination

Bowel and bladder

X ray

Paravertebral abcess more common than epidural abscess [cf. septic discitis]

Early in the disease, the disc is relatively spared [cf. pyogenic]

MRI

Doest not show increase signal

Posterior element involved in 50%

Fibrous ankylosis [cf. pyogenic, bony Ankylosis is common]

Shows increase signal

Pott's Paraplegia

Causes: Abscess ; sequestra ;kyphosis

Chest X Ray (2/3 have abnormal CXRs)

ESR is very high

Mantoux test is positive

Tuberculin skin test (negative if immunocompromised) PPD

0.1 ml of 1 in 10,000 , 1 in 1000 and 1 in 100

>10 mm of induration : Test is +ve

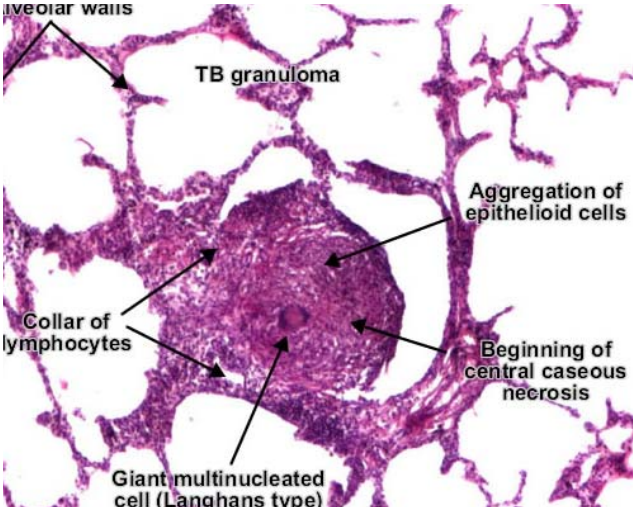
<5mm means test is –ve

+ ve test: means 1. Active infection 2. previous TB 3. BCG

Biopsy

Tubercle [granuloma]

1. Caseation in the centre
2. Langerhan's cells
3. Epitheloid cells,
4. lymphocytes



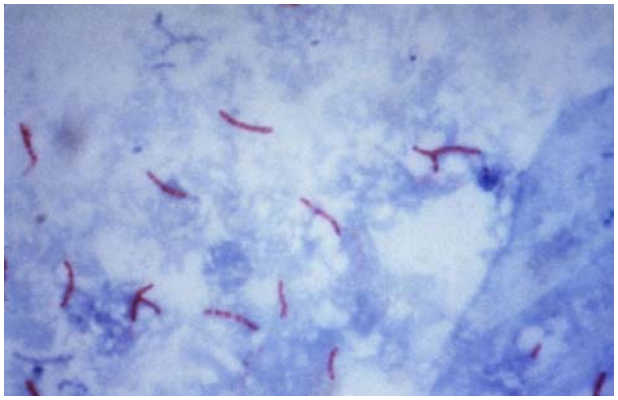
Stain

Ziehl-Neelsen stain

I stained with carbol fuschin

II then washed with H_2SO_4

III counter stain with Methylene blue



Lowenstien Culture

It requires use of enriched medium and adequate oxygenation; cultures only visible at 2-4 weeks

Treatment

1.Antituberculous drugs are the main stay of treatment. May require for 1 year

Drugs used: RIPES - Rifampicin, Isoniazid, Pyrazinamide, Ethambutol, Spectinomycin

2.Spinal orthosis to prevent deformity

3.Surgical Indications

- Large abscess
- Neurology
- Instability
- No response to medical therapy

Hong Kong Procedure

- Adjuvant chemotherapy beginning 10 days before surgery is essential
- Radical anterior debridement [fusion can be achieved by simple debridement]
- 90% recovery of neurology

EPIDURAL ABSCESS

More common in immunocompromised: Malignancy, Diabetes, Alcohol abuse

Rapid deterioration may occur; Intense Radicular pain, Paralysis over 72 to 96 hours,

Mortality rate 12%

Thoracic spine most common

X ray: Look for End plate irregularity

Disc height

Osteoporosis

Soft tissue shadow

Presence of gas: Anaerobic

Note: Disc space narrowing is quicker in pyogenic than tuberculosis

Bone scan: Tc and Gallium

Indium 111 scan: poor sensitivity in vertebral osteomyelitis

CT: Bone destruction

MRI: Investigation of choice: 96% sensitivity and specificity

Treatment

Antibiotic 2- Weeks of IV antibiotics + 3 months of oral.

Observation Subtle Neurology: careful observation.

Any increase in neurology, urgent surgical decompression.

Approach Abscess dorsal to the sac laminectomy [commoner

Or Anterior abscess: anterior decompression

Poor prognostic factors

Rapidly progressing paralysis

Complete paralysis

Neurological deficits for > 36 hours : unlikely to improve with surgery