

III. PYOGENIC BONE INFECTION

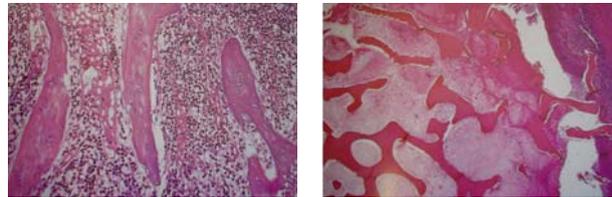
ACUTE OSTEOMYELITIS

Organism causing haematogenous Osteomyelitis

< 4 months	Staph Aureus Group A streptococci [not common as reported]
> 4 months	Staph Aureus
IV drug abuse	Staph, Pseudomonas
Post fixation[ORIF]	Staph Aureus
Nail puncture	Pseudomonas
Diabetic foot	Polymicrobial
Prosthetic infection	Staph Aureus and Staph Epidermides

Histopathology

Acute inflammatory cells (PMNC) and fibrin
Bone destruction is yet to be evident
Osteocytic death



Septic screen

PMNC	>12,000 cells/cu mm
ESR	>30 mm/hour
CRP >	>10 units
Blood culture	Positive

CRP more sensitive than ESR and is commonly used. CRP comes down on 5th day and ESR in 6 weeks

Radiological

First 10 days	Soft tissue shadow may be present
Bone changes	Patchy osteopenia at 10 days
Later:	Faint periosteal reaction at 14 days
[> 2weeks]	Destructive lesions [cortical destruction]
>3 wks	Sequestrum, Involucrum [chronic]



Bone scan

Bone scan: Tc 99m

I phase	Flow phase	5 sec
II	Pool phase	5 minutes
III	Bone image	3 hours
IV	Delayed phase	24 hours

Note: Woven bone Vs Lamellar (woven Tc99 is bound even at 24 hrs; where as in Lamellar for the first 4 hour)

With the advent of MRI, Bone scan is not used often

Ultrasound

Ultrasound examination determines subperiosteal abscess . Appearance of Sandwich is seen, with pus on the either side of the periosteum. Elevation of the periosteum more than 2 mm is significant. It also shows the swelling of the overlying muscle or subcutaneous. It could be detected within 24 hours of the onset.



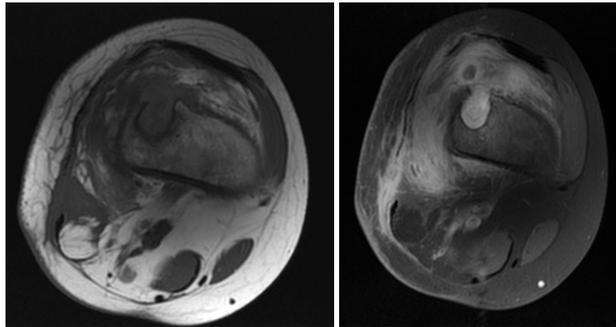
MRI

More sensitive. MRI is commonly used.

T1 low signal

T2 high signal in infection

Gad enhancement is positive



TREATMENT

Usually treatment is started on the clinical and blood investigation.

If no response within 24 hours then MRI is indicated which accurately depicts the amount of destruction, site of abscess, relation to the growth plate and helps in planning surgical approach.

Drug of choice IV Flucloxacillin 2 g qid [50 mg/kg wt] x 1 week

Mild allergy to penicillin: Cephazole

Severe allergy to penicillin: Vancomycin or clindamycin

Surgery if no clinical response by 24-hours

Culture and antibiotic (age/medical condition): Appropriate

IV 1-2 weeks and oral 3-5 wks (depending on response and hematological changes)

Protected weight bearing [weak bone may fracture]

Serial blood test: CRP

Repeat surgery if symptoms not settling

Technique

Tourniquet can be used but no exsanguinations.

Exposure periosteum at site of maximal tenderness. .Longitudinal periosteal incision.

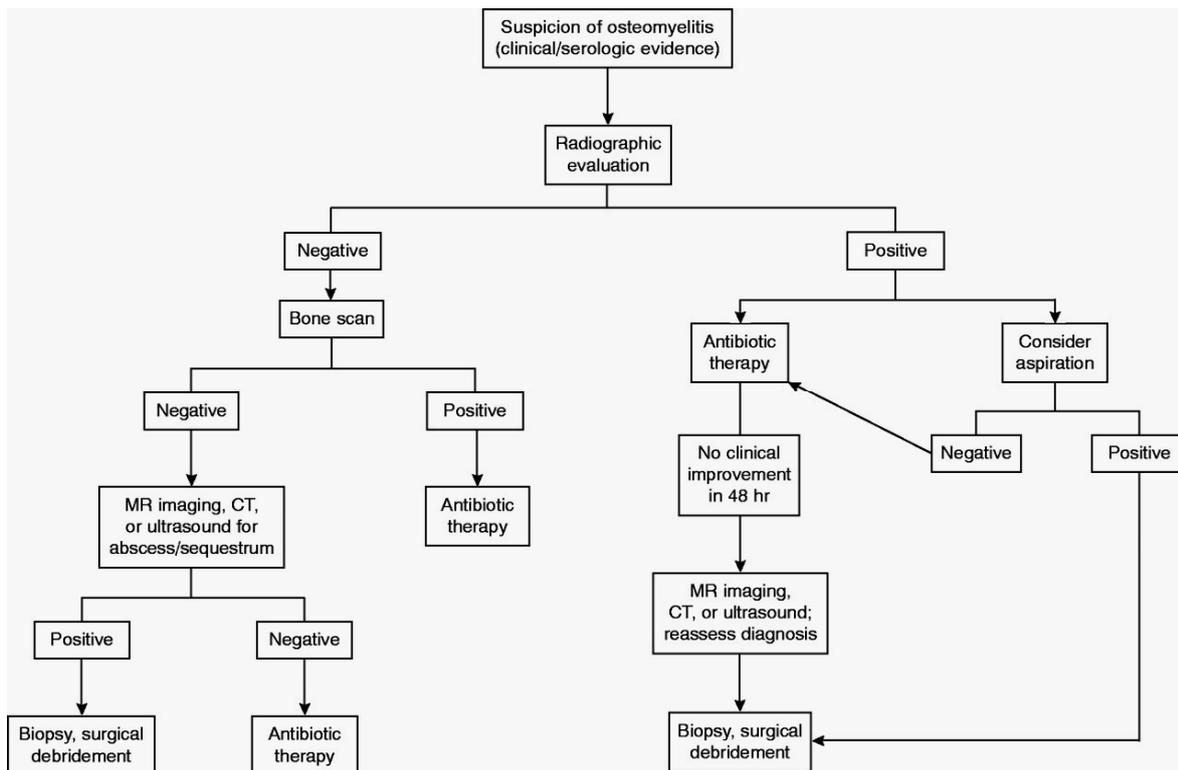
Pus drained and a through wash out is given.

Removed any devitalised tissue.

?drilling metaphysis of debatable benefit as pus is already out.

But if pus present on drilling, a small window and curettage.

Flow Chart



Internal fixation and infection

1. Septic screen
2. Culture swab
3. Surgical drainage
4. When fixation is good: Do not remove implant as instability outweighs foreign body
5. Gentamycin beads is useful
6. Repeat wash out after 48 hours and repeat beads
7. Clinical and hematological improvement means wound is ready for closure
 - Either delayed or flap
8. Continue antibiotics for 6 wks
9. When fixation is inadequate, removal of the plate and then stabilization with an external fixation [Ilizarov] or Other external fixator
 - In case of nailing, an over-reaming and an exchange nailing is indicated
10. When there is loss of tissue cover over the metal: exposed metal:
 - Consideration for early removal is essential as eradication of the infection not possible.
 - Then stabilize fracture in a cast or external fixation

CHRONIC OSTEOMYELITIS

20% of acute Osteomyelitis can become Chronic Osteomyelitis. Uncommon these days because of early aggressive management.

Problems: Recurrent infection

Chronic fistula

Squamous cell Ca 1% (30 yrs)

Pathological fracture

Amyloidosis

Pathogenesis: Infection occurs in the metaphysis. The pus travels through the Haversian and Volkmann's canal to become subperiosteal. Lifting the periosteum, the cortical bone dies become infected dead bone "sequestrum". The new reactive bone formed is called "Involucrum". Sometimes "cloaca" forms in the bone and pus is drained out of the bone. Pus can come out of the skin through a Sinus.

In children, the periosteum is loosely fixed, extensive stripping occurs causing massive involucrum.. Sometimes a localized infection occurs due to less virulent staphylococcus "Brodies abscess"

X ray Site and extent,

Destruction of bone

Sequestrum [my need CT]

Implant

Bone scan: usually not required

CT or Tomogram: for small sequestrum

IV Disulphine blue (Vascularized tissue becomes blue)

Culture: Deep culture is more important than from the sinus



Treatment

I. Cortical de-roofing

II. Decortication

III Saucerization: Use of high speed burr: until punctate bleeding [Paprika sign]

IV Gentamycin beads

V Reconstruction: Soft tissue procedure

Bone transfer

VI Stabilization of the skeleton

Ilizarov or Orthofix.

VI IV antibiotics

GENTAMYCIN BEADS

Factor influencing elution

1. Cement porosity

2. Concentration of antibiotic
[Tobra 3 g/40 g of PMMA, Vanco 3 g; Cefazol 6 g]
3. Type of antibiotic
4. Size of the bead

SEPTIC ARTHRITIS

Definition: Acute infectious joint disease, leading to destruction of articular cartilage.

Epidemiology

50% < age 3

Age < 1 year – hip
> 1 year – knee

Causes

Haematogenous

Intra-capsular metaphysis [infection from metaphysis into the joint]

e.g. prox. femur, humerus

Common organisms <6 months Staphylococcus Aureus Streptococcal A [not considered very common
Children <3 Staphylococcus Aureus, Coliforms

Haemophilus Influenzae Rare after vaccination
With Varicella Streptococcal

Children >3 Staphylococcus Aureus

Young adult Neisseria gonorrhoeae

Adults Staphylococcus Aureus,

IV abusers Gram Negatives

>50 Staphylococcus Aureus

Gram Negatives,

Streptococcal agalactasia

Polyarticular septic arthritis

1. Gonococcal
2. Lymes
3. Bacterial endocarditis
4. Virus: Rubella, HIV
5. Sapho syndrome

Treatment

Aspiration and joint washout [open or arthroscopic]

Culture and sensitivity and IV antibiotics for 2 weeks and then oral antibiotics for further 2 weeks]

Initial rest and early mobilisation

