

Chapter 14

Miscellaneous – Bone Infections and Others

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1) Osteomyelitis:

Introduction

Osteomyelitis is an infection of bone and bone marrow, usually caused by bacteria. It may occur following haematogenous spread, direct inoculation of organisms into bone, or spread from an adjacent soft-tissue infection. Osteomyelitis can affect individuals of any age, but its presentation and common causes vary with age and underlying conditions.

Etiology and Risk Factors

The most common causative organism is *Staphylococcus aureus*. Other organisms include *Streptococci*, Gram-negative bacilli, and, in certain clinical situations, *Pseudomonas*. Risk factors include diabetes mellitus, peripheral vascular disease, open fractures, orthopaedic implants, recent surgery, pressure sores, immunosuppression and intravenous drug use.

Classification

Osteomyelitis may be classified according to its duration and route of infection:

- Acute osteomyelitis – usually develops over days to weeks and may result from haematogenous spread or direct infection.
- Chronic osteomyelitis – persists for a prolonged period and is often associated with necrotic bone, sinus formation and recurrent infection.
- Haematogenous osteomyelitis – more common in children and commonly involves the metaphysis of long bones.

- Contiguous-focus osteomyelitis – commonly occurs following trauma, surgery, open fractures or spread from adjacent infected tissue.

Clinical Features

The clinical presentation depends on the age of the patient, site and duration of infection. Acute osteomyelitis commonly presents with fever, malaise, localized pain, tenderness, swelling and restriction of movement. In children, the child may refuse to use the affected limb.

Chronic osteomyelitis may present more subtly with persistent pain, swelling, recurrent discharge or a discharging sinus. A sinus may communicate with the infected bone and is an important clinical feature of chronic disease.

Investigations

Laboratory investigations may show leukocytosis and raised inflammatory markers, particularly C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR). Blood cultures should be obtained when haematogenous infection is suspected.

Plain radiographs are useful but may be normal during the early stages of acute infection. Later findings may include bone destruction, sclerosis, periosteal reaction and sequestrum. MRI is highly sensitive for detecting early bone marrow involvement and is particularly useful when the diagnosis is uncertain. CT can demonstrate cortical destruction and sequestra.

Whenever possible, deep tissue or bone samples should be obtained for microbiological culture and sensitivity before starting antibiotics, provided that doing so does not compromise the patient's condition.

Treatment

Treatment depends on the type, severity and organism responsible. Antibiotic therapy is the mainstay of treatment and should initially cover the likely organisms before being modified according to culture and sensitivity results.

Surgical treatment may be required when there is abscess formation, necrotic bone, sequestrum, infected implants, chronic sinus formation or failure of medical treatment. Procedures may include drainage of abscesses, debridement of infected tissue and removal of non-viable bone. Appropriate soft-tissue coverage and management of associated conditions, such as diabetes or vascular insufficiency, are important for successful healing.

Complications

Untreated or inadequately treated osteomyelitis can lead to chronic infection, pathological fracture, deformity, growth disturbance in children, joint involvement and systemic sepsis. Long-standing chronic osteomyelitis may rarely be complicated by malignant transformation in a chronic sinus.

2) Pott's Spine:

Introduction

Pott's spine is tuberculosis of the vertebral column caused by *Mycobacterium tuberculosis*. It is the most common form of skeletal tuberculosis and commonly affects the lower thoracic and thoracolumbar spine. Infection usually reaches the vertebra through the bloodstream or lymphatic system from another focus of tuberculosis.

Pathology

The infection initially involves the vertebral body, usually near the end plate. It may spread to the adjacent vertebral body through the intervertebral disc. Progressive destruction of the vertebral bodies can result in vertebral collapse, kyphotic deformity and neurological compression. A characteristic cold abscess may develop in the paravertebral or psoas region.

Clinical Features

The presentation is usually insidious. Common symptoms include:

- Persistent back pain
- Localized tenderness and stiffness

- Low-grade fever, weight loss and loss of appetite
- Constitutional symptoms may be absent
- Progressive kyphosis or gibbus deformity
- Neurological symptoms such as weakness, sensory disturbance or bladder/bowel involvement in advanced disease

In children, spinal tuberculosis may produce significant deformity because of ongoing vertebral growth.

Investigations

Blood tests may show raised ESR and CRP, although they can be normal.

X-ray spine may show:

- Narrowing of the intervertebral disc space
- Destruction of adjacent vertebral bodies
- Vertebral collapse and kyphosis
- Paravertebral soft-tissue shadow

MRI is the investigation of choice for assessing the extent of spinal infection, epidural or paravertebral abscess, neural compression and cord involvement.

Microbiological confirmation should be attempted whenever feasible. Samples from an abscess or affected tissue can be sent for AFB testing, culture and molecular tests such as CBNAAT/Xpert, along with histopathological examination.

Treatment

Treatment consists primarily of anti-tubercular therapy (ATT) according to current tuberculosis treatment guidelines. Treatment should be appropriately supervised and modified when drug resistance is identified.

Most patients without significant neurological deficit or mechanical instability can be treated conservatively with ATT, analgesia and appropriate spinal support when required.

Indications for Surgery

Surgery may be considered in selected patients with:

- Progressive or significant neurological deficit
- Spinal cord compression
- Severe or progressive deformity
- Mechanical instability
- Large abscess causing compression or failing to resolve with medical treatment
- Diagnostic uncertainty
- Failure of appropriate medical treatment

Surgical procedures may include decompression, abscess drainage, debridement and spinal stabilization/fusion depending on the pathology.

Complications

Important complications include vertebral collapse, kyphotic deformity, spinal cord compression, paraplegia, radiculopathy, instability and residual deformity.

3) CTEV:

Definition

Congenital Talipes EquinoVarus (clubfoot) is a congenital 3-D deformity with four components: CAVE – Cavus, Adductus, Varus and Equinus.

Assessment

Assess flexibility, calf wasting, skin creases and associated hip/spine/neurological abnormalities. Grade severity with Pirani (0–6) or Dimeglio score.

Pirani score

Six signs, each scored 0, 0.5 or 1. Midfoot: curved lateral border, medial crease, lateral head of talus. Hindfoot: posterior crease, rigid equinus, empty heel. Total = 0–6.

Ponseti treatment

Weekly gentle manipulation and above-knee serial casts. Sequence: correct cavus → adductus/varus by abduction around the talar head → equinus last. Residual equinus usually requires percutaneous Achilles tenotomy. Final cast is generally maintained for 3 weeks, followed by a foot-abduction brace.

Brace

Brace is worn full-time initially and then during sleep/naps for several years to reduce relapse.

Relapse

Repeat casting for early relapse; tibialis anterior tendon transfer for persistent dynamic supination; resistant/neglected feet may require soft-tissue or bony procedures.

CTEV – PONSETI SERIAL CASTING



Clinical sequence of serial Ponseti casting; casts are typically changed weekly.

**Key sequence: Cavus → Adductus/Varus → Equinus →
Achilles tenotomy if required → brace.**

1) AMPUTATION:

Definition

Surgical removal of a limb or part of a limb through bone or a joint, removing non-viable/diseased tissue while preserving maximum useful length and function.

Indications

Irreversible ischemia/gangrene • uncontrolled infection/sepsis • non-reconstructable trauma • malignant tumour • painful, useless limb.

Levels

Toe/digital → transmetatarsal → Lisfranc/Chopart → Syme → BKA → knee disarticulation → AKA → hip disarticulation.

What is cut/preserved

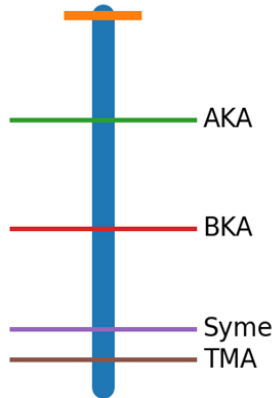
Structure	Action	Exam point
Skin/subcutis	Planned flap	Viable, tension-free cover
Muscle	Transect at planned level	Balanced myodesis/myoplasty
Vessels	Identify and ligate	Secure haemostasis
Nerve	Gentle traction → sharp division	Proximal retraction; reduce neuroma
Bone	Cut, smooth/bevel	Adequate soft-tissue coverage

Infective vs Ischaemic amputation

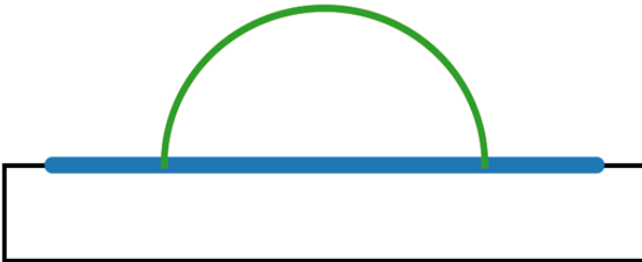
Feature	Infective	Ischaemic
Tissue	Wet, oedematous, purulent/malodorous	Dry, mummified, demarcated
Systemic features	Fever/SIRS/sepsis may occur	Usually no sepsis unless infected
Approach	Urgent source control; staged/guillotine may be needed	Assess revascularization; choose level that will heal
Level	Proximal to all infection/non-viable tissue	Most distal level with adequate perfusion

AMPUTATION – LEVELS & FLAPS

Common Lower-Limb Amputation Levels



Flap concept



Bone cut • smooth edges • tension-free soft-tissue cover

Goal: painless, durable, sensate and prosthesis-ready stump.