NOTES
BONE & JOINT INFECTIONS

GENERALLY, WHAT ARE THEY?

PATHOLOGY & CAUSES

- Bacterial invasion and destruction of bone and joint cartilage
- Caused by bacteria
  - E.g. *Staphylococcus aureus* (*S. aureus*), *Mycobacterium tuberculosis* (*M. tuberculosis*), *Pseudomonas aeruginosa* (*P. aeruginosa*)

RISK FACTORS

- Trauma/open fractures, diabetes/atherosclerosis, orthopedic implants, existing infection etc.

COMPLICATIONS

- Chronic infections
- Bone fractures
- Loss of mobility
- Dissemination of infection

SIGNS & SYMPTOMS

- Pain → individual avoids using infected joint

Systemic

- Fever, chills, weakness, headache

Local

- Swollen, painful, warm

DIAGNOSIS

DIAGNOSTIC IMAGING

MRI

- Detect bone infections

CT scan, X-ray

- Detect fractures

LAB RESULTS

- Blood tests
- *Needle aspiration:* pathogen detection

TREATMENT

MEDICATIONS

- Before identifying pathogen → general antibiotics
- Known pathogen → specific antibiotics

SURGERY

- Surgical cleaning

OSTEOMYELITIS

osms.it/osteomyelitis

PATHOLOGY & CAUSES

- Bacterial infection (*S. aureus*, *M. tuberculosis* most common) → bone, bone marrow inflammation
- Bacteria → bone via bloodstream, nearby infection, open fractures/orthopedic implants
- *First week:* bacterial reproduction → inflammation → bone necrosis (e.g. sequestrum); if periosteum bursts → abscess
- *Later:* cytokines induce bone resorption → replacement with fibrous tissue → new bone formation around necrotic one (e.g. involucrum)

RISK FACTORS

- Diabetes, fractures, splenectomy, orthopedic procedures/hardware

COMPLICATIONS

- If *M. tuberculosis* disseminates from joint to vertebra → Pott disease
- Inadequate treatment → chronic infection → bone fractures, sepsis

SIGNS & SYMPTOMS

Local

- Redness, swelling, painful site, sinus connecting to abscess

Systemic

- Weakness, fever, headache, shivering

DIAGNOSIS

DIAGNOSTIC IMAGING

MRI

- Edema → signal changes
- Cortical loss
- Contrast enhancement of abscess rim

Nuclear medicine scans

- *If MRI not attainable:* higher radiotracer uptake

CT scan, X-ray

- not sensitive for 1–2 weeks
  - Osteopenia (decreased bone density)
  - Periosteal reaction (thickening of periosteum)
  - Aggressive infection → Codman's triangle (lifted periosteum with triangle-shaped, ossified edge)

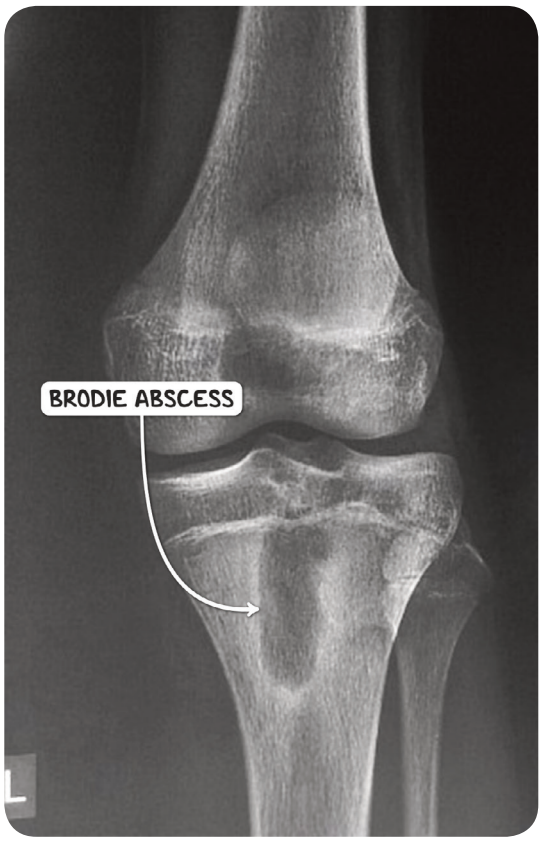

Figure 106.1 An X-ray image of the tibia demonstrating a radiolucency with a sclerotic border consistent with a Brodie abscess.

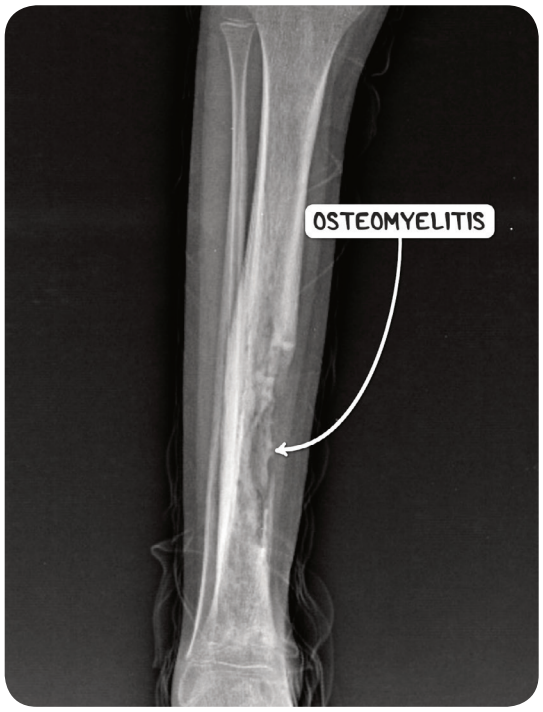

Figure 106.2 A plain radiograph of the right lower leg of an individual with postoperative osteomyelitis. The surgical wound started discharging pus two weeks post open reduction. There is medial cortical destruction and loss of trabeculations with lateral cortical thickening.

- Endosteal scalloping (focal resorption of endosteum)
- Advanced osteomyelitis → cortical bone breakage
- Peripheral sclerosis (increased density at periphery, lower density centrally)

OTHER DIAGNOSTICS

Needle aspiration guided with ultrasound

- Specific antibiotic therapy

TREATMENT

MEDICATIONS

- Long-term intravenous antibiotics

SURGERY

- Surgical removal of dead bone
- Severe cases → amputation

SEPTIC ARTHRITIS

osms.it/septic-arthritis

PATHOLOGY & CAUSES

- *Joint structures:* infected, damaged
- Pathogen enters the joint via bloodstream, from nearby infection/directly (e.g. open fracture)
- Infection of joint → endotoxin production → cytokine release → neutrophil attraction → inflammation, damage of joint structures

CAUSES

- Most commonly *S. aureus* (any age group), *Neisseria gonorrhoeae* (*N. gonorrhoeae*; sexual transmission → adults)

RISK FACTORS

- Diabetes
- Joint trauma
- Artificial joint, surgical procedure
- Osteomyelitis
- Chronic arthritis (e.g. rheumatoid arthritis)
- Immunocompromised
- HIV

SIGNS & SYMPTOMS

- Most commonly affects knee; less commonly ankle, hip, shoulder

Local

- Restricted range of motion; painful, warm, swollen joint

Systemic

- Fever, weakness

DIAGNOSIS

DIAGNOSTIC IMAGING

X-ray, CT scan

- Normal in early stages
- ↑ fluid in synovial part of joint
- Narrowing of joint space due to destruction of cartilage
- Destruction of bone adjacent to cartilage

MRI

- Edema around synovium
- Assess spread of infection outside the joint

Ultrasound

- ↑ fluid
- Guiding needle for aspiration

LAB RESULTS

Blood test

- ↑ white blood cells count (WBC); ↑ sedimentation rate (ESR)

Aspiration of joint fluid

- → bacterial culture → specific antibiotics

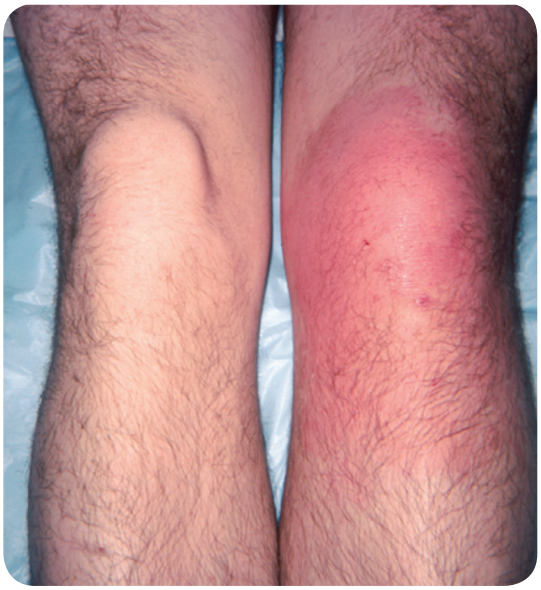

Figure 106.3 A red, hot, swollen left knee in an individual with septic arthritis.

TREATMENT

MEDICATIONS

- General antibiotics depending on Gram stain of joint fluid
- Switch to specific antibiotics once bacteria identified
- Pain medications (e.g. NSAIDs, acetaminophen)

SURGERY

- Surgically drain, cleanse joint fluid