OSTEOMYELITIS, SEPTIC ARTHRITIS, and SOFT TISSUE INFECTION MECHANISMS
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Patterns of Contamination:

- Inside-out

  - Osteomyelitis
  - Infective osteitis
  - Infective periostitis
  - Soft tissue infection
OVERVIEW

Patterns of Contamination:

- **Outside-in**

  - Soft tissue infection
  - Infective periostitis
  - Infective osteitis
  - Osteomyelitis
OVERVIEW

Patterns of Contamination:

• Outside-in

  Soft tissue infection
  Infective periostitis
  Infective osteitis
  Osteomyelitis
ROUTES OF CONTAMINATION

Hematogenous
Contiguous Source
Direct Implantation
Postoperative

- Joint
- Soft Tissue
- Periosteum
- Cortex
- Marrow
ROUTES OF CONTAMINATION

Hematogenous

Joint
Soft Tissue
Periosteum
Cortex
Marrow
ROUTES OF CONTAMINATION

Hematogenous
Hematogenous

Vascular patterns:
• Child
Hematogenous

Vascular patterns:

- Infant
Hematogenous

Vascular patterns:

- Adult
Hematogenous Osteomyelitis: Child
Hematogenous Osteomyelitis: Child
Hematogenous Osteomyelitis:

Child
ROUTES OF CONTAMINATION

Hematogenous Osteomyelitis:

Child
ROUTES OF CONTAMINATION

Hematogenous Osteomyelitis:

Child
Hematogenous Osteomyelitis: Transphyseal spread

**Child**

| T2 FS FSE | T1 | T1 | T2 FS FSE |
ROUTES OF CONTAMINATION

Hematogenous Osteomyelitis: Child

Metaphyseal equivalent areas

T1                       T2 FS FSE
Hematogenous Osteomyelitis:

Infant
Hematogenous Osteomyelitis: Infant
Hematogenous Osteomyelitis: Tuberculosis

Infant
Hematogenous Osteomyelitis:

Adult

T1 FS SE

T1 FS SE

IV Gd

T1 SE
Hematogenous Osteomyelitis:

Adult

T1 SE  Intramedullary fat  T2 FS FSE

 ROUTES OF CONTAMINATION

Contiguous Source

Infective periostitis

Joint
Soft Tissue
Periosteum
Cortex
Marrow
CONTIGUOUS SOURCE

Infective osteitis

ROUTES OF CONTAMINATION

Joint
Soft Tissue
Periosteum
Cortex
Marrow
ROUTES OF CONTAMINATION

Contiguous Source

Osteomyelitis

Joint
Soft Tissue
Periosteum
Cortex
Marrow
ROUTES OF CONTAMINATION

Contiguous Source

• Hand
Contiguous Source

- Hand
ROUTES OF CONTAMINATION

Contiguous Source

• Hand
 ROUTES OF CONTAMINATION

Contiguous Source

• Foot
ROUTES OF CONTAMINATION

Contiguous Source

• Foot
ROUTES OF CONTAMINATION

Contiguous Source

- Foot

S/P Resection of Great Toe with Recurrent Osteomyelitis

T1 FS IV Gd
ROUTES OF CONTAMINATION

Contiguous Source

- Gnathic bones
ROUTES OF CONTAMINATION

Contiguous Source

- Other sites
ROUTES OF CONTAMINATION

Contiguous Source

• Other sites

Trochanteric Bursitis

Olecranon Bursitis
DIRECT IMPLANTATION

- *Human bite*
- *Animal bite*
- *Puncture wound*
- *Open fracture*
Direct Implantation

- Human bite
- **Animal bite**
- Puncture wound
- Open fracture

Dog Bite
Direct Implantation

- Human bite
- Animal bite
- Puncture wound
- Open fracture
ROUTES OF CONTAMINATION

Direct Implantation

- Human bite
- Animal bite
- **Puncture wound**
- Open fracture
DIRECT IMPLANTATION

- Human bite
- Animal bite
- **Puncture wound**
- Open fracture
DIRECT IMPLANTATION

- Human bite
- Animal bite
- **Puncture wound**
- Open fracture

*Wood-induced inflammation*
ROUTES OF CONTAMINATION

Direct Implantation

- Human bite
- Animal bite
- **Puncture wound**
- Open fracture

*Wood-induced inflammation*
ROUTES OF CONTAMINATION

Direct Implantation

- Human bite
- Animal bite
- **Puncture wound**
- Open fracture

*Thorn-induced synovitis*
ROUTES OF CONTAMINATION

Direct Implantation

- Human bite
- Animal bite
- Puncture wound
- Open fracture

Thorn-induced inflammation
ROUTES OF CONTAMINATION

Postoperative

Joint
Soft Tissue
Periosteum
Cortex
Marrow
SEPTIC ARTHRITIS

Hematogenous

- Direct transport of organisms to synovial membrane
SEPTIC ARTHRITIS

Hematogenous

- Direct transport of organisms to synovial membrane
- Spread from epiphyseal focus by vascular continuity with synovium
ROUTES OF CONTAMINATION

SEPTIC ARTHRITIS

Hematogenous

Increased risk when involved joint is abnormal

Rheumatoid and septic arthritis
SEPTIC ARTHRITIS

Contiguous Source

• Intra-articular spread from an epiphyseal site of infection
SEPTIC ARTHRITIS

Contiguous Source

• Intra-articular spread from an epiphyseal site of infection

• Intra-articular spread from a metaphyseal site of infection
SEPTIC ARTHRITIS

Direct Implantation

- Direct inoculation during aspiration, arthrography, arthroscopy, or penetrating wound
SEPTIC ARTHRITIS

Postoperative

- Direct inoculation during any of a variety of surgical procedures
ROUTES OF CONTAMINATION

SEPTIC ARTHRITIS

Postoperative

- Direct inoculation during any of a variety of surgical procedures

Intramedullary rod placement
STAGE OF CONTAMINATION

Acute
Subacute
Chronic

• Brodie’s abscess
STAGE OF CONTAMINATION

- Acute
- Subacute
- Chronic

- Brodie’s abscess
- Sequestered bone
STAGE OF CONTAMINATION

Acute
Subacute
Chronic

• Brodie’s abscess
• Sequestered bone
• Bone sclerosis
STAGE OF CONTAMINATION

- Brodie’s abscess
  - Subacute / chronic OM
  - Tubular bones of lower extremity
  - Common involvement of the tibia
  - Staphylococcal origin
STAGE OF CONTAMINATION

• Brodie’s abscess
  - Subacute / chronic OM
  - Tubular bones of lower extremity
  - Common involvement of the tibia
  - Staphylococcal origin
STAGE OF CONTAMINATION

- Brodie’s abscess

Tract Sign:
- Physeal extension
- Joint extension
- Bone surface extension
STAGE OF CONTAMINATION

- Brodie’s abscess
STAGE OF CONTAMINATION

• Brodie’s abscess
STAGE OF CONTAMINATION

- Brodie’s abscess
STAGE OF CONTAMINATION

- Brodie’s abscess
STAGE OF CONTAMINATION

- Brodie’s abscess
STAGE OF CONTAMINATION

- Brodie’s abscess

[Images: STIR and T1 FS SE IV Gd]
STAGE OF CONTAMINATION

• Sequestered bone

- Subacute / chronic OM
- Necrotic pieces of bone that often are surrounded by viable bacteria
- If the sequestered pieces are small, they may be extruded spontaneously
STAGE OF CONTAMINATION

- Sequestered bone
  - A sinus tract may develop allowing the sequestered bone to be discharged
STAGE OF CONTAMINATION

- Sequestered bone

- Cloaca
- Sequestered bone
- Involucrum
STAGE OF CONTAMINATION

- Sequestered bone
- Cloaca
- Sequestered bone
STAGE OF CONTAMINATION

- Sequestered bone

Courtesy of L. Rogers, M.D.
STAGE OF CONTAMINATION

- Sequestered bone
STAGE OF CONTAMINATION

- Sequestered bone

T1 SE

T1 FS SE IV Gd
STAGE OF CONTAMINATION

- Sequestered bone
STAGE OF CONTAMINATION

- Bone sclerosis

  - Subacute / chronic OM
  - Dominant bone sclerosis with few or no areas of osteolysis
  - Seen especially in the mandible and maxilla
STAGE OF CONTAMINATION

• Bone sclerosis
STAGE OF CONTAMINATION

• Bone sclerosis
Bone sclerosis, Synovitis (S), acne (A), pustulosis (P), hyperostosis (H), and osteitis (O).

T1 FS IV Gd     T2 FSE
STAGE OF CONTAMINATION

- Bone sclerosis

-Synovitis (S), acne (A), pustulosis (P), hyperostosis (H), and osteitis (O)

SAPHO

Marcelo Abreu
COMPLICATIONS

- Severe osteolysis
- Growth disturbance
- Neoplasm

- Squamous cell carcinoma of the sinus tract
COMPLICATIONS

• Severe osteolysis
• Growth disturbance
• Neoplasm
  - Squamous cell carcinoma of the sinus tract
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COMPLICATIONS

• Severe osteolysis
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OSTEOMYELITIS, SEPTIC ARTHRITIS, and SOFT TISSUE INFECTION MECHANISMS