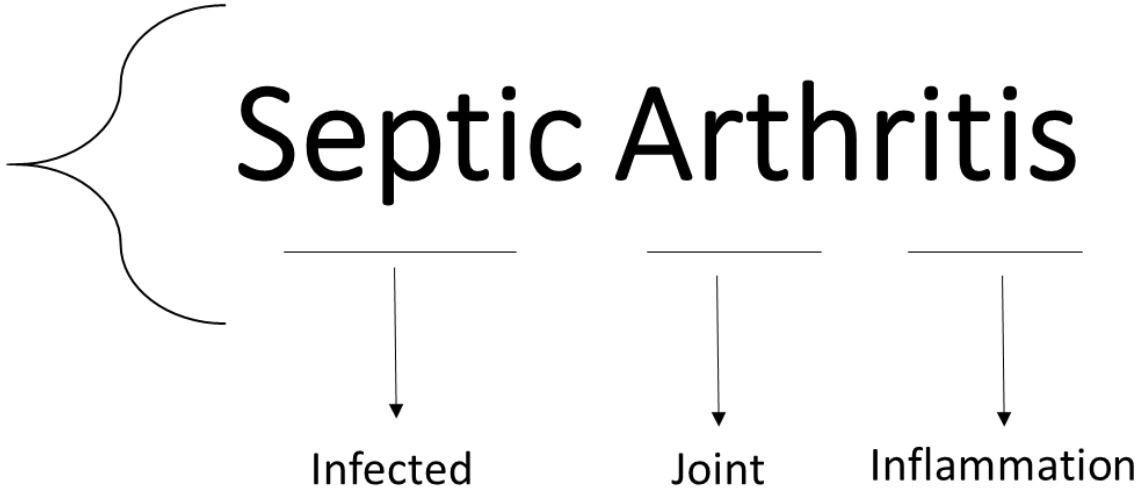
Septic Arthritis

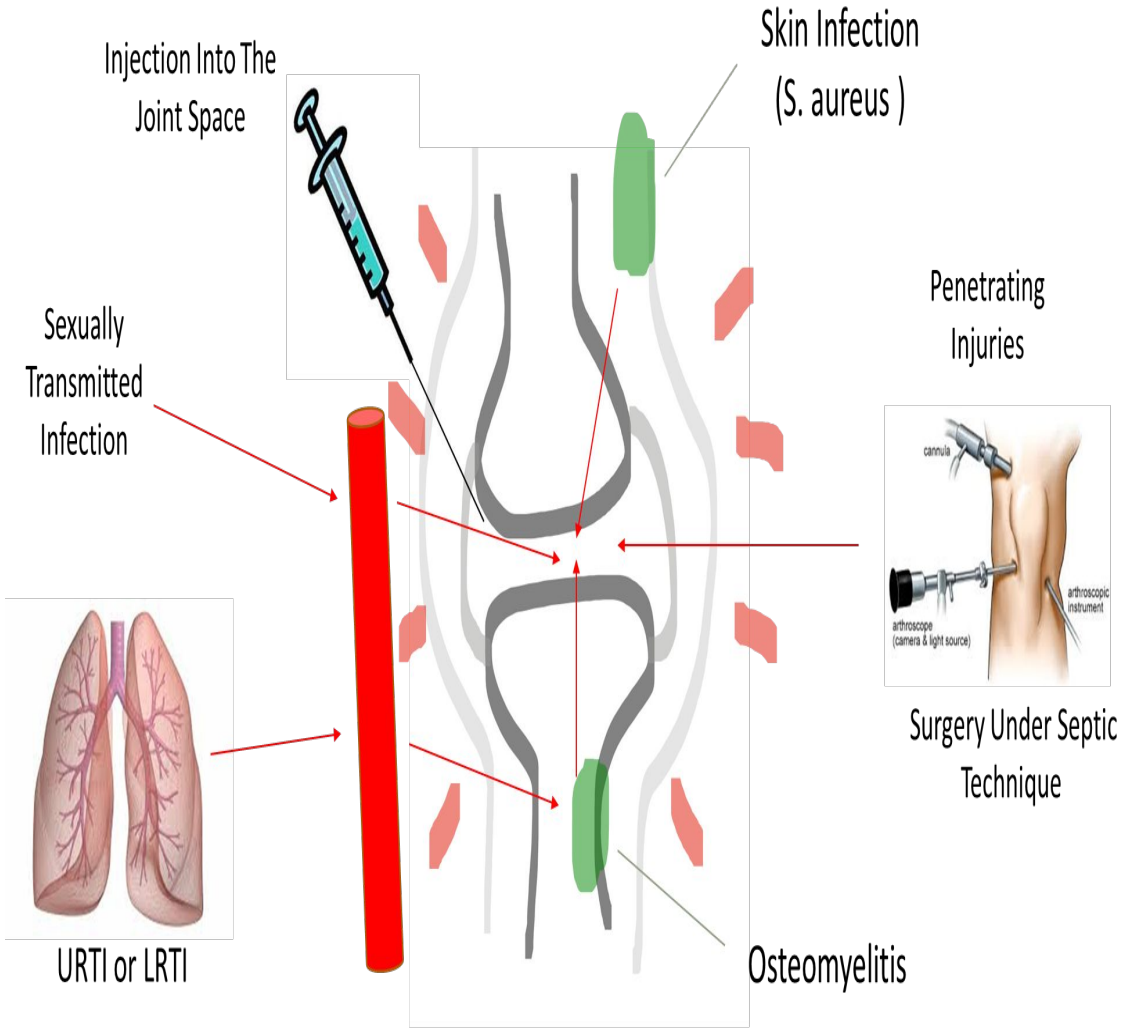
Infection of The Joint



Causative Agents

1. The causal organism is usually Staphylococcus aureus.
2. In children between 1 and 4 years old, Hemophilus influenzae is an important pathogen unless they have been vaccinated against this organism.
3. Occasionally other microbes, such as Streptococcus, Escherichia coli, Neisseria Gonorrhea and Proteus, are encountered.

- Predisposing conditions are rheumatoid arthritis, chronic debilitating disorders, intravenous drug abuse, immunosuppressive drug therapy and acquired immune deficiency syndrome (AIDS).



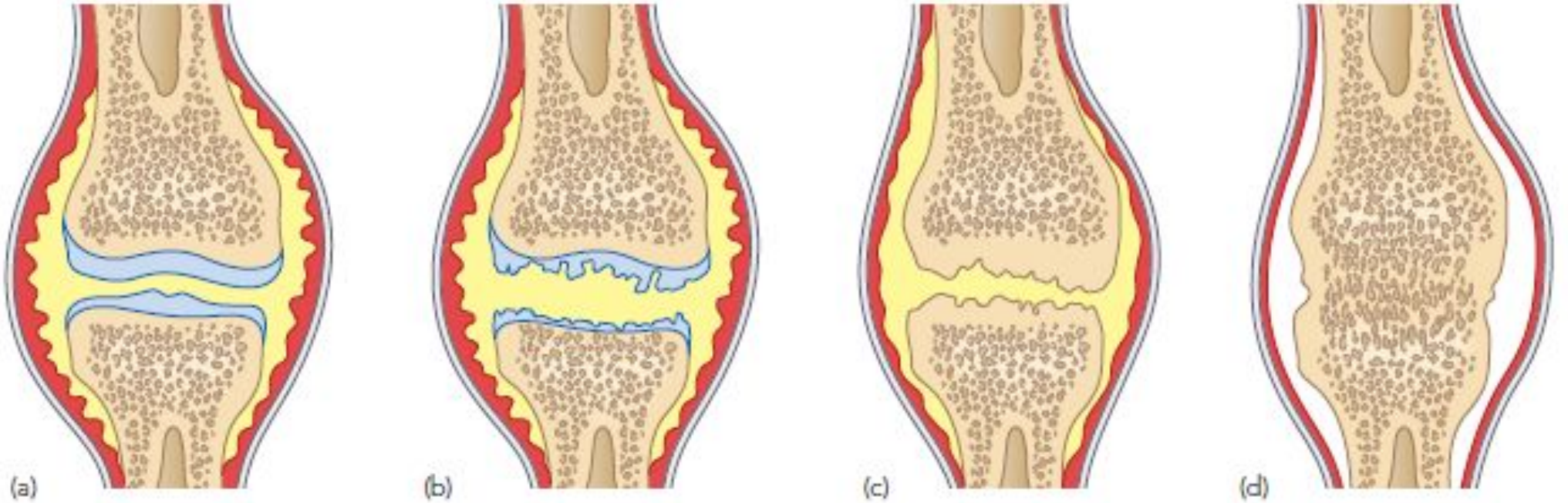
Root of Entry

1. Direct invasion through a penetrating wound, intra-articular injection or arthroscopy.
2. Direct spread from an adjacent bone abscess.
3. Blood spread from a distant site.

- In infants it is often difficult to tell whether the infection started in the metaphyseal bone and spread to the joint or vice versa.
- In practice it hardly matters and in advanced cases it should be assumed that the entire joint and the adjacent bone ends are involved.

Pathology

- The usual trigger is a hematogenous infection which settles in the synovial membrane; there is an acute inflammatory reaction with a serous or seropurulent exudate and an increase in synovial fluid.
- As pus appears in the joint, articular cartilage is eroded and destroyed, partly by bacterial enzymes and partly by proteolytic enzymes released from synovial cells, inflammatory cells and pus.
- In infants the entire epiphysis, which is still largely cartilaginous, may be severely damaged; in older children, vascular occlusion may lead to necrosis of the epiphyseal bone. In adults the effects are usually confined to the articular cartilage, but in late cases there may be extensive erosion due to synovial proliferation and ingrowth.
- If the infection goes untreated, it will spread to the underlying bone or burst out of the joint to form abscesses and sinuses.
- With healing there may be:
  1. Complete resolution and a return to normal.
  2. Partial loss of articular cartilage and fibrosis of the joint.
  3. Loss of articular cartilage and bony ankylosis.
  4. Bone destruction and permanent deformity of the joint.



2.5 Acute suppurative arthritis – pathology In the early stage (a), there is an acute synovitis with a purulent joint effusion. (b) Soon the articular cartilage is attacked by bacterial and cellular enzymes. If the infection is not arrested, the cartilage may be completely destroyed (c). Healing then leads to bony ankylosis (d).

Septic Arthritis

- With any monoarthritis, it's important to role out septic arthritis as it is a medical emergency that requires rapid diagnosis & immediate management to avoid Irreversible joint damage .
- A delay in diagnosis and treatment, particularly with septic arthritis, can have catastrophic results including sepsis, bacteremia, joint destruction and/or death.

Clinical Features – Newborn Infants

- In newborn infants the emphasis is on septicemia rather than joint pain.
- The baby is irritable and refuses to feed; there is a rapid pulse and sometimes a fever.
- Infection is often suspected, but it could be anywhere! The joints should be carefully felt and moved to elicit the local signs of warmth, tenderness and resistance to movement.
- The umbilical cord should be examined for a source of infection. An inflamed intravenous infusion site should always excite suspicion.
- The baby's chest, spine and abdomen should be carefully examined to exclude other sites of infection.
- Special care should be taken not to miss a concomitant osteomyelitis in an adjacent bone end.

Septic Arthritis in Adults

- Often a superficial joint (knee, wrist, a finger, ankle or toe) that is painful, swollen and inflamed.
- There is warmth and marked local tenderness, and movements are restricted.
- The patient should be questioned and examined for evidence of gonococcal infection or drug abuse.
- Patients with rheumatoid arthritis, and especially those on corticosteroid treatment, may develop a ‘silent’ joint infection. Suspicion may be aroused by an unexplained deterioration in the patient’s general condition; every joint should be carefully examined.

Septic Arthritis in children

- In children the usual features are acute pain in a single large joint (commonly the hip).
- Reluctance to move the limb (‘pseudoparesis’). The child is ill, with a rapid pulse and a swinging fever.
- The overlying skin looks red and in a superficial joint swelling may be obvious. There is local warmth and marked tenderness. All movements are restricted, and often completely abolished, by pain and spasm.
- It is essential to look for a source of infection – a septic toe, a boil or a discharge from the ear.

Kocher Criteria
Non-Weight Bearing
Temp > 38.5° C (101.3° F)
ESR > 40 mm/hr
WBC >12,000 cells/mm^3

Points	Likelihood of Septic Arthritis
0	0.20%
1	3%
2	40%
3	93%
4	99%

Septic Arthritis – Kocher Criteria

Examination

- A thorough inspection of all joints for signs of erythema, swelling (90% of cases), warmth, and tenderness is essential for diagnosing infection. Infected joints usually exhibit an obvious effusion, which is associated with marked limitation of both active and passive Ranges of motion (ROMs(

Investigations

- The diagnosis can usually be confirmed by joint aspiration and immediate microbiological investigation of the fluid.
- Blood cultures also may be positive, though only in about 50% of proven cases.
- Non-specific features of acute inflammation (leukocytosis, raised ESR and positive CRP) are suggestive but not diagnostic.
- Imaging
  - X-rays may show soft-tissue swelling, widening of the joint space (due to the effusion) and periarticular osteoporosis during the first 2 weeks of bacterial arthritis.
  - Later, when the articular cartilage is attacked, the ‘joint space’ is narrowed. In advanced cases there are signs of bone destruction.
  - Radionuclide imaging and MRI are helpful for detecting signs in difficult sites such as the sternoclavicular and sacroiliac joints.

2.6 Suppurative arthritis – x-ray (a) In this child the left hip is subluxated and the soft tissues are swollen. (b) If the infection persists untreated, the cartilaginous epiphysis may be entirely destroyed leaving a permanent pseudarthrosis (Tom Smith's dislocation).

(b)

(c)

(c) Septic arthritis in an adult knee joint.

Differential Diagnosis

1. Osteomyelitis near a joint may be indistinguishable from septic arthritis; the safest is to assume that both are present.
2. An acute hemarthrosis, either post-traumatic or due to a hemophilic bleed, can closely resemble infection. The history is helpful and joint aspiration will resolve any doubt.
3. Transient synovitis (irritable joint) in children causes symptoms and signs which are less acute, but there is always the fear that this is the beginning of an infection.
4. Gout and pseudogout in adults can be indistinguishable from joint infection and cellulitis. Aspirated fluid may look turbid, but the presence of urate or pyrophosphate crystals will confirm the diagnosis.

Table 1.2 Examination of synovial fluid

Suspected condition	Appearance	Viscosity	White cells	Crystals	Biochemistry	Bacteriology
Normal	Clear yellow	High	Few	–	As for plasma	–
Septic arthritis	Purulent	Low	+	–	Glucose low	+
Tuberculous arthritis	Turbid	Low	+	–	Glucose low	+
Rheumatoid arthritis	Cloudy	Low	++	–	–	–
Gout	Cloudy	Normal	++	Urate	–	–
Pseudogout	Cloudy	Normal	+	Pyrophosphate	–	–
Osteoarthritis	Clear yellow	High	Few	Often+	–	–

Synovial Fluid Analysis

	NORMAL	Non-Inflammatory	Inflammatory	Septic	Hemorrhagic
Clarity	Transparent	Transparent	Translucent	Opaque	Bloody
Colour	Clear	Yellow	Yellow	Dirty/Yellow	Red
Viscosity	High	High	Low	Variable	Variable
WBC/mm3	<200	200-2,000	2000-10,000 (up to 100,000)	>80,000	200-2,000
PMNs %	<25%	<25%	>50%	>75%	50-75%

Depending on the clinical scenario, synovial fluid is analysed for:

- Cell count and differential
- Crystals
- Culture and sensitivity (if septic arthritis suspected)
- Cytology (if malignancy suspected)

Complications

1. Dislocation: a tense effusion may cause dislocation.
2. Epiphyseal destruction: in neglected infants the largely cartilaginous epiphysis may be destroyed, leaving an unstable pseudoarthrosis.
3. Growth disturbance: physeal damage may result in shortening or deformity.
4. Ankylosis: if articular cartilage is eroded, healing may lead to ankylosis.

Treatment

- The first priority is to aspirate the joint and examine the fluid.
- Treatment is then started without further delay and follows the same lines as for acute osteomyelitis.

1. Antibiotics
   - Intravenous antibiotics (3rd Generation Cephalosporins will cover both Gram-positive and Gram-negative organisms.) should be started as soon as joint fluid and blood samples have been taken for culture.
   - Once the bacterial sensitivity is known the appropriate drug is substituted.
   - Intravenous administration is continued for several weeks and is followed by oral antibiotics for a further 2 or 3 weeks.
2. Splintage
   - The joint must be rested either on a splint or in a widely split plaster. At the hip, the joint should be held abducted and 30 degrees flexed.

Treatment

3. Drainage
   - Under anesthesia, pus is drained, and the joint washed out.
   - This is best done by open operation, but in a superficial joint it can be achieved by repeated needle aspiration and irrigation or, in the case of the knee, by arthroscopy.
   - Once the patient's general condition is good and the joint is no longer inflamed, gentle and gradually increasing movements are encouraged. But if articular cartilage has been destroyed, the aim is to keep the joint immobile in the optimum position while ankylosis is awaited.