

# SEPTIC ARTHRITIS

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# DEFINITION

## WHAT IS SEPTIC ARTHRITIS?

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- ❑ Septic arthritis is an **inflammation of** **synovial membrane** **into the joint capsule** **due to** **infection**
- ❑ Also called **Infectious arthritis**
- ❑ Septic arthritis is a key consideration in adults presenting with acute monoarticular arthritis.
- ❑ Considered as **medical emergency**
- ❑ Failure to initiate appropriate antibiotic therapy within the first 24 to 48 hours of onset can cause subchondral bone loss and permanent joint dysfunction.
- ❑ It can cause septic shock, which can be fatal.

# ANATOMY

## SYNOVIAL JOINT

Lines joint & cavity and secretes synovial fluid for lubrication

Prevents grinding of the bone and allow for smooth articulation

Protection of joint cavity

### Synovial Joint

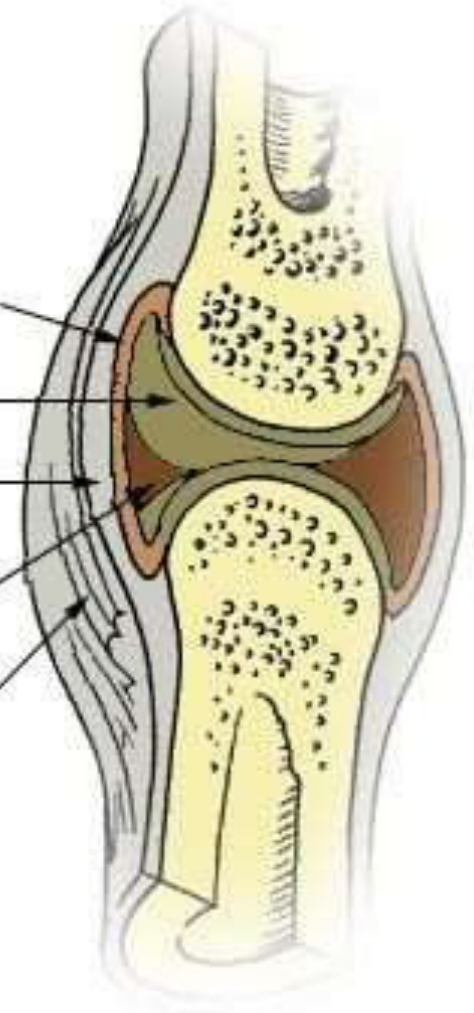
Synovial membrane

Articular cartilage

Fibrous joint capsule

Joint cavity filled with synovial fluid

Ligaments



# ANATOMY

Colour code:

Ball and socket

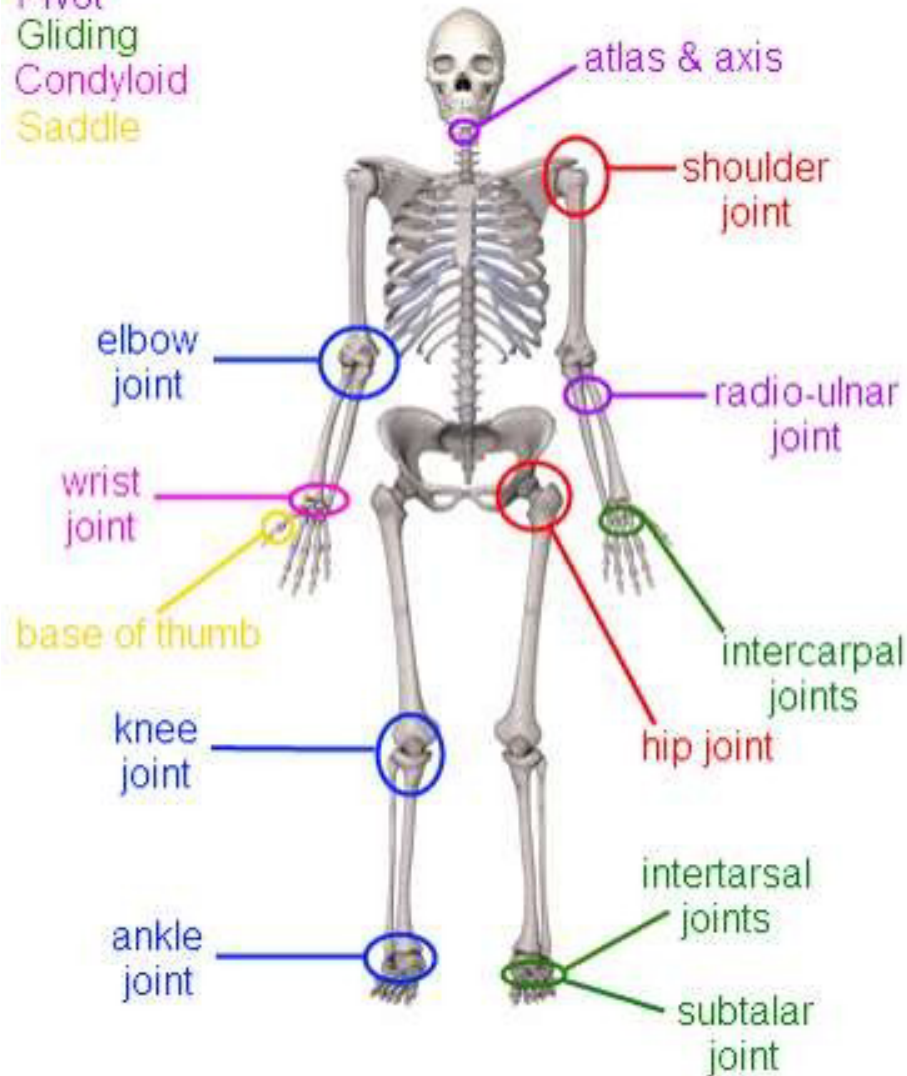
Hinge

Pivot

Gliding

Condyloid

Saddle





# EPIDEMIOLOGY

- ❑ The prevalence of bacterial arthritis as the diagnosis among adults presenting with one or more acutely painful joints has been estimated to range from 8% - 27%
- ❑ All age groups, infants and older adults are most likely to develop septic arthritis.
- ❑ M = F ratio
- ❑ The **knee** is the **most commonly affected joint** but any joint may be involved.

Infants	Hip
Children	Knee
Adults	Large joints
IVDU(Intravenous drug users)	Sacrioliac joint

# AETIOLOGY

- ❑ Any type of infection (bacteria, virus, fungus) can cause septic arthritis, but the causal organism is usually **S. aureus** in most cases of septic arthritis
- ❑ In children, between 1 and 4 years old, **H. influenzae** is an important pathogen unless they have been vaccinated against this organism.
- ❑ **N. Gonorrhoeae** may also cause septic arthritis in sexually active adult.
- ❑ *Colstridium tetani* may consider in case of nail injury

*✶ Up to know the empirical management for each age Group before knowing the culture Result*

	Age	Organisms
1	Neonates	Streptococcus sp Gram-negative organisms
2	Infants	Staphylococcus aureus Haemophilus influenza
3	Children	Staphylococcus aureus Salmonella
4	Adolescent	Staphylococcus aureus Nesseria gonorrhoea
5	Adults	Staphylococcus aureus Streptococcus Gram-negative organisms
6	IV Drug Abusers	Suspect Pseudomonas and atypical organisms

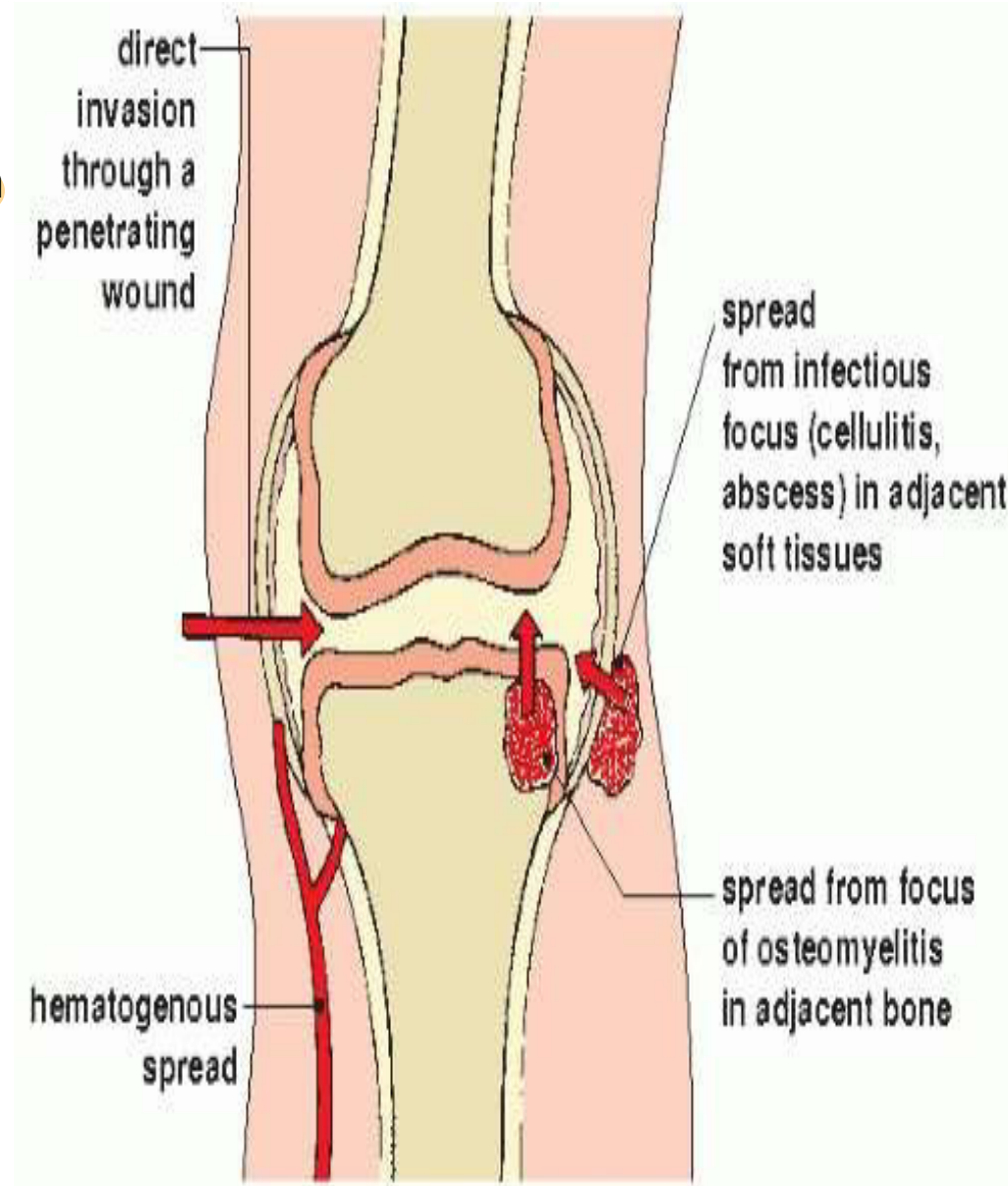
# AETIOLOGY

? The joint is invaded by micro-organism through :-

**1-HEMATOGENOUS SPREAD:-** Most common form of spread, usually affects people with underlying medical problems.

**2-DIRECT INVASION:-** May result from penetrating wound, or introduction of organisms during diagnostic and surgical procedures. E.g. intra-articular injection. (iatrogenic)

**3-DIRECT SPREAD FROM ADJACENT TISSUE:-** More common in children. Osteomyelitis usually begins in the metaphyseal region, from which it breaks through the periosteum into the joint





# Risk Factors

## 1. AGE

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Age > 80 years old

## 2. EXISTING JOINT PROBLEMS

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Chronic diseases and conditions that affect the joints — such as osteoarthritis, gout, rheumatoid arthritis or lupus — can increase the risk of septic arthritis, as can an artificial joint, previous joint surgery and joint injury.

## 3. MEDICATIONS

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**Taking medications for rheumatoid arthritis.** People with rheumatoid arthritis have a further increase in risk because of medications they take that can suppress the immune system, making infections more likely to occur. Diagnosing septic arthritis in people with rheumatoid arthritis is difficult because many of the signs and symptoms are similar.

## 4. SKIN FRAGILITY

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Skin that breaks easily and heals poorly can give bacteria access to your body. Skin conditions such as psoriasis and eczema increase your risk of septic arthritis, as do infected skin wounds. People who regularly inject drugs also have a higher risk of infection at the site of injection.

# Risk Factors

## 5. WEAK IMMUNE SYSTEM

People with a weak immune system are at greater risk of septic arthritis. This includes people with diabetes, kidney and liver problems, and those taking drugs that suppress their immune systems.

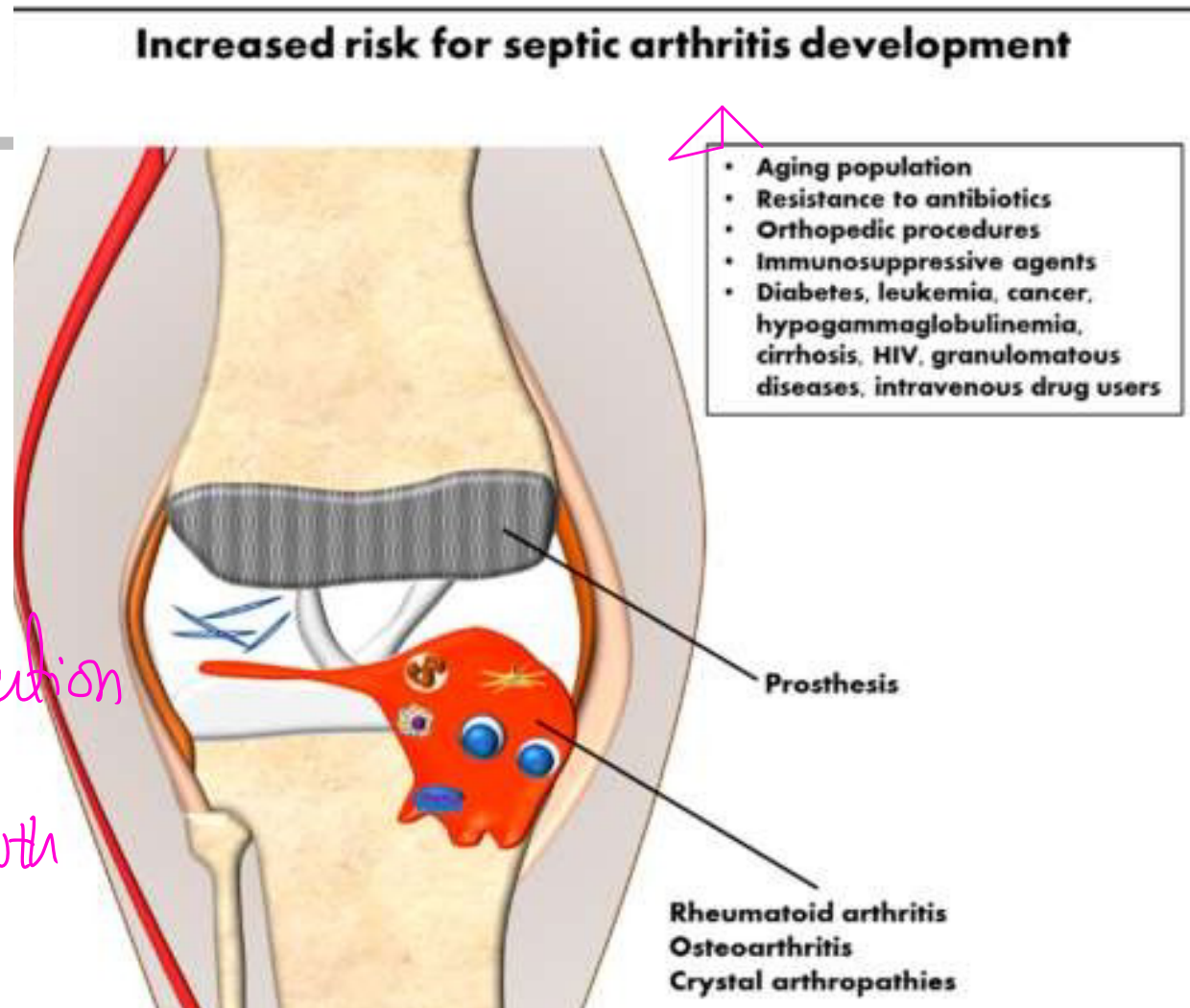
## 6. ALCOLOISM AND IVDU

\* Transphyseal BV

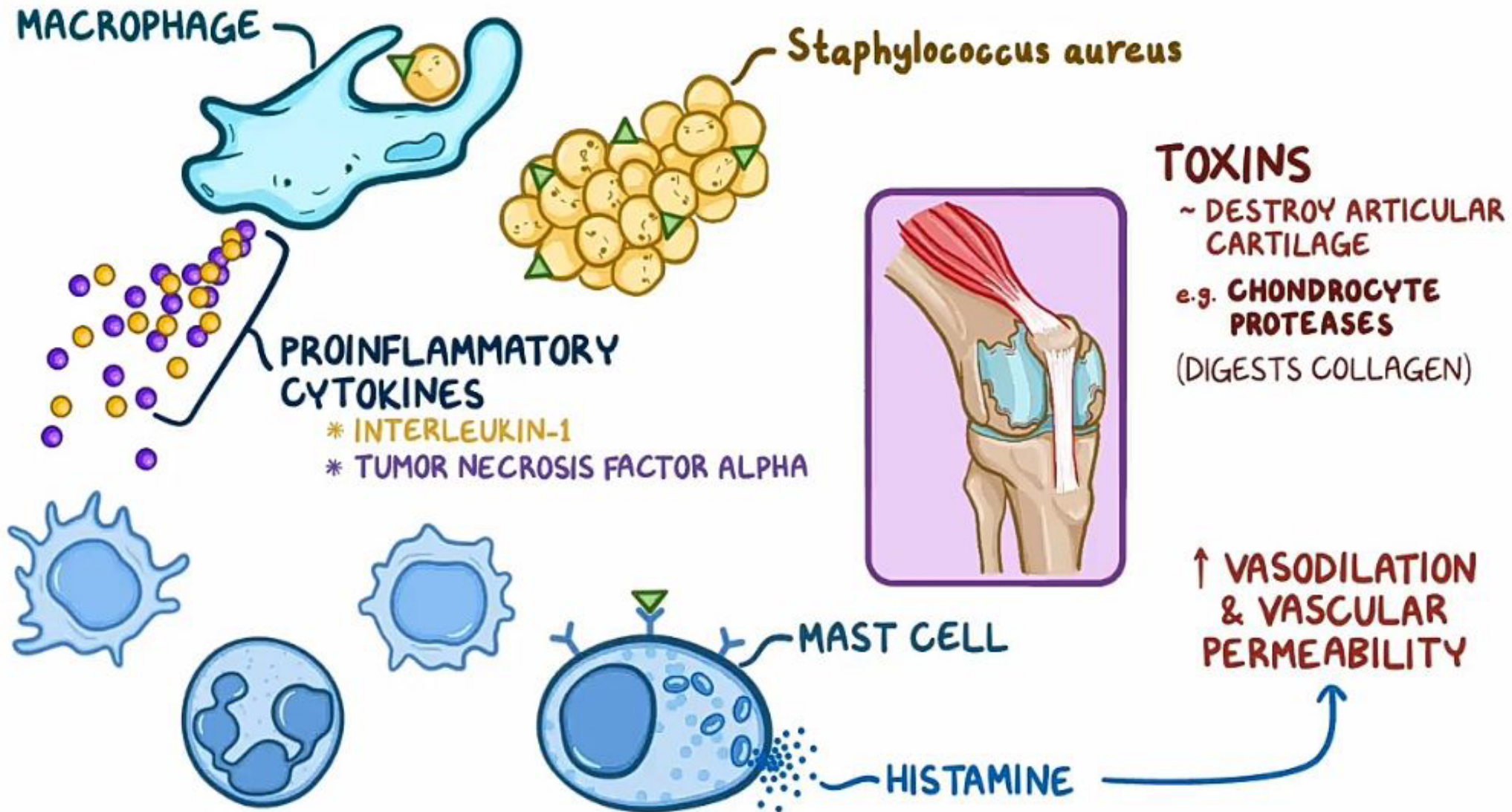
(within 1st year of life)

Aid in Direct spread from adjacent tissue.

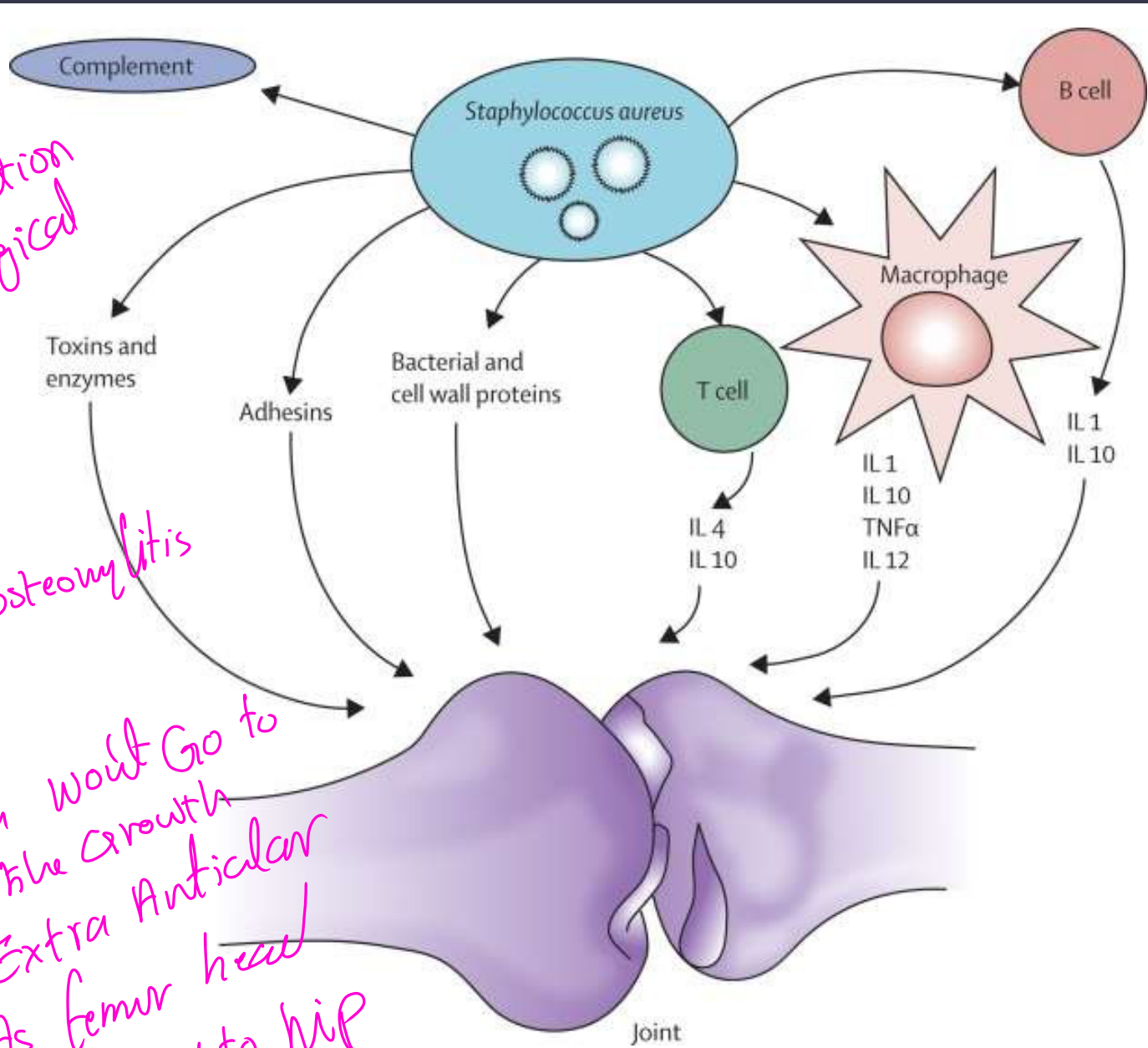
since the cause is mainly infection as osteomyelitis will move to the joint across the Growth Plate through these BVs



# PATHOPHYSIOLOGY



# PATHOPHYSIOLOGY



Drain the infection in joint infection bec its surgical emergency

Hip Shoulder Elbow } osteomyelitis

if in tibia woul Go to knee bec the growth plate is Extra Anticalar not As femur head Goes to hip





# CLINICAL FEATURES



Fever  
swelling  
Redness  
Pain



# IN CHILDREN



Irritable

Warm

Tenderness

Rapid pulse

Tenderness

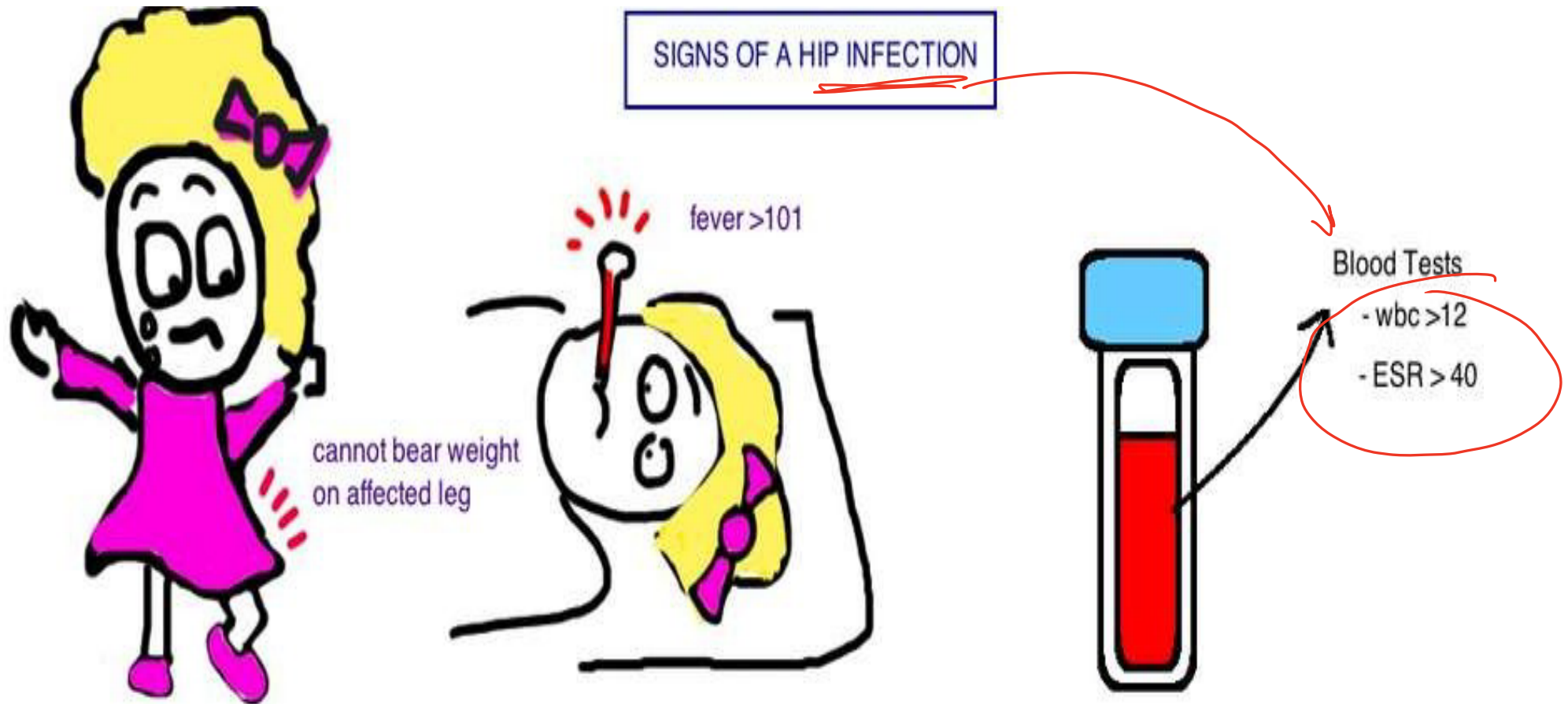
Refused feeding

pseudoparesis

pseudoparesis:-Loss of spontaneous movement of the extremity  
(flexion, Abduction, External Rotation) to maximize the space of joint  
→ this position is maintained by the child in hip Arthritis



# IN CHILDREN



# DIAGNOSIS

## DIFFERENTIAL DIAGNOSIS

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1. Acute osteomyelitis
2. Trauma
3. Hemophilic bleed
4. Rheumatic fever
5. Juvenile rheumatoid arthritis
6. Sickle-cell disease
7. Gaucher's disease
8. Gout and pseudo-gout

# WHAT IS NEXT?

**SEPTIC ARTHRITIS SUSPECTED**



**BLOOD AND SYNOVIAL FLUID SAMPLE**



**EMPIRIC PARENTERAL ANTIBIOTICS BASED ON GRAM STAIN**



**JOINT DRAINAGE**



**ADJUST ANTIBIOTICS BASED ON CULTURE AND SENSITIVITY RESULT**

# INVESTIGATIONS

## 1. BLOOD INVESTIGATIONS

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- ? Raised WCC
- ? Raised ESR and CRP
- ? Blood culture (positive)

## 2. IMAGING

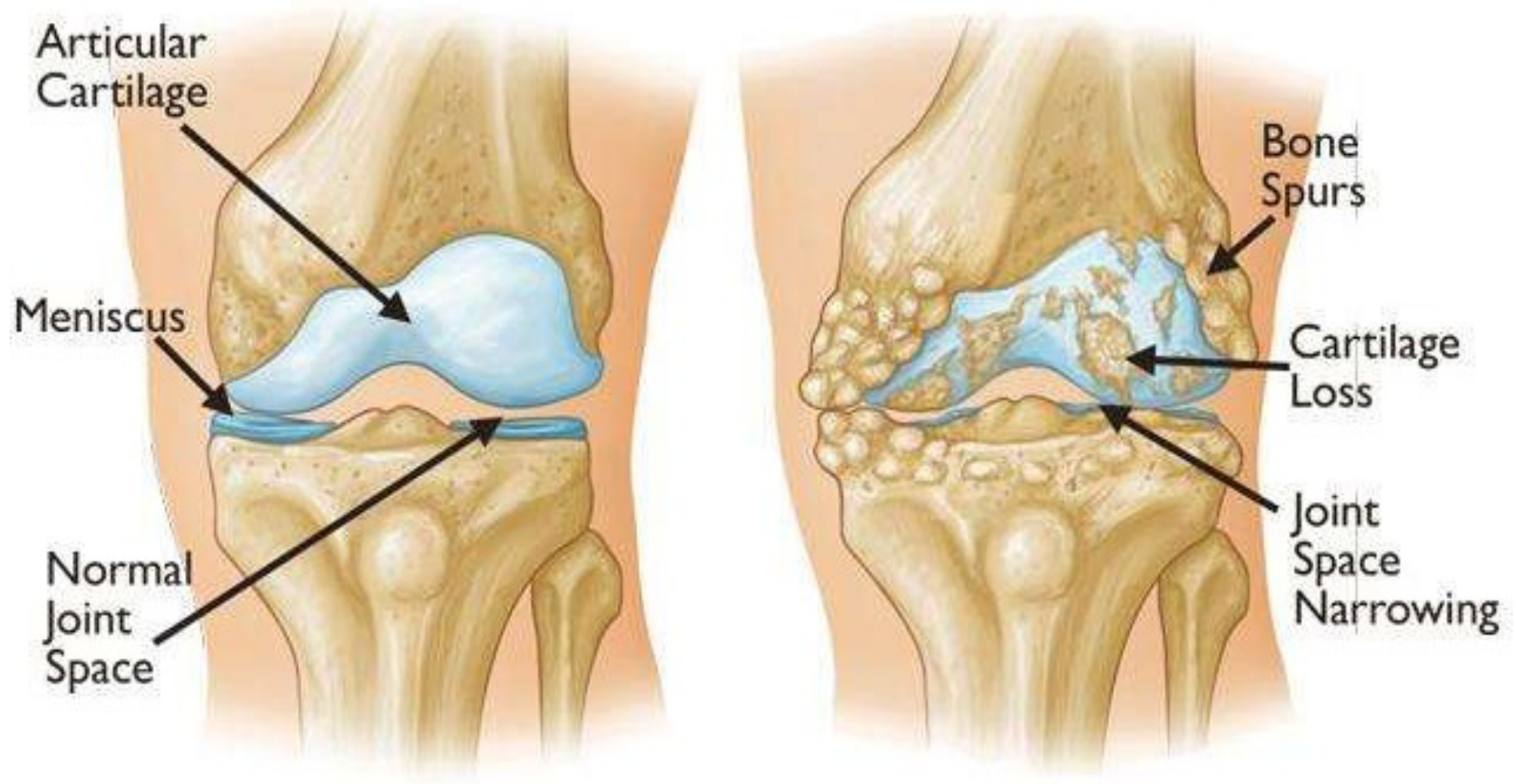
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- ? **X-ray**  
**Early stage:** May look normal except widening of joint space, ultrasound helpful  
**Late stage:** Narrowing and irregularity of joint space; may have OM changes of adjacent bones
- ? **MRI** and **radionuclide imaging** are helpful in diagnosing arthritis in obscure sites such as the sacroiliac and sterno-clavicular joint.

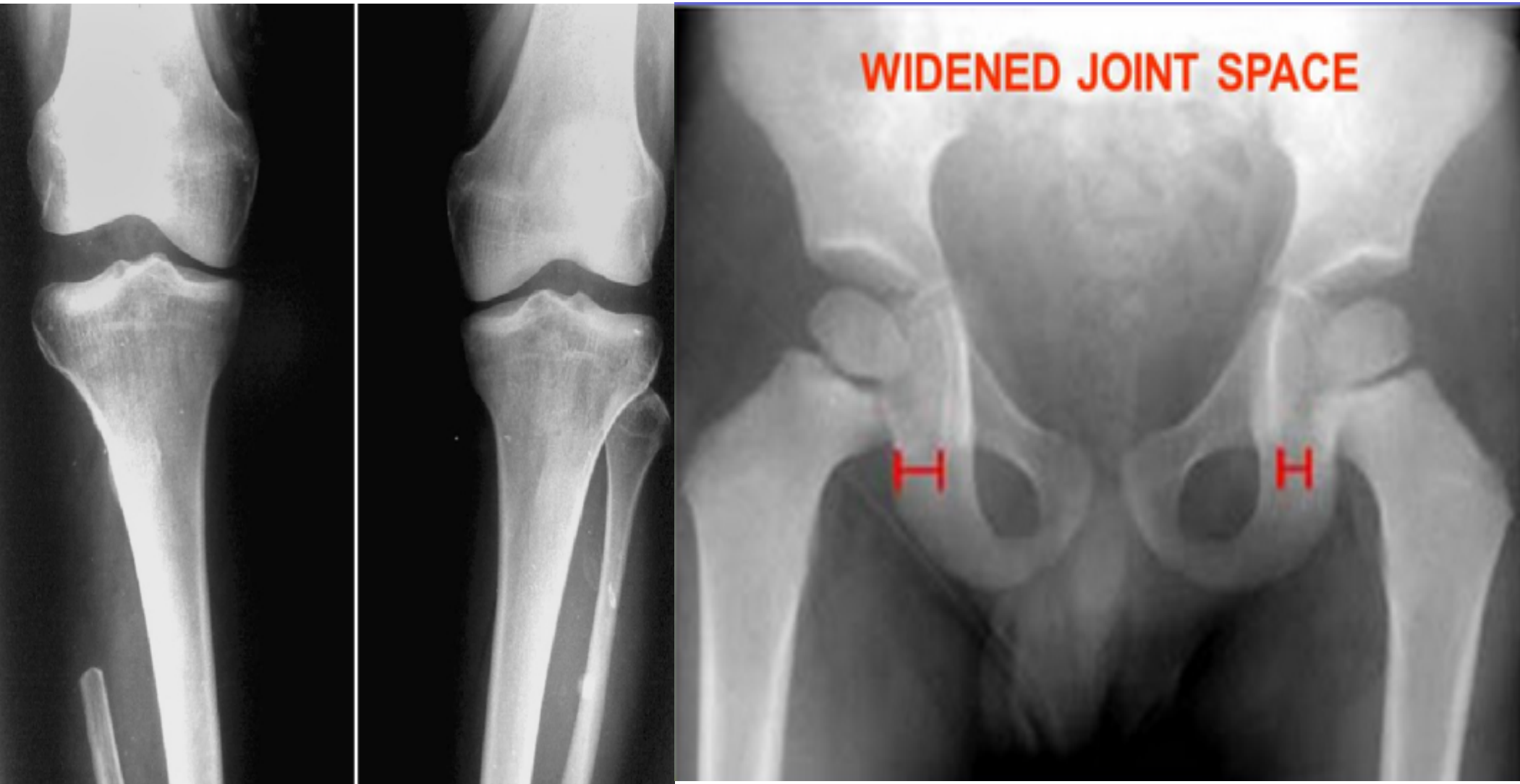
## 3. SYNOVIAL FLUID ANALYSIS

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# FINDINGS



## X-RAY FINDING – WIDENED JOINT SPACE



# FINDINGS

## LATER STAGE

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Normal  
joint space



Figure 1

Narrowed joint  
space from loss  
of cartilage

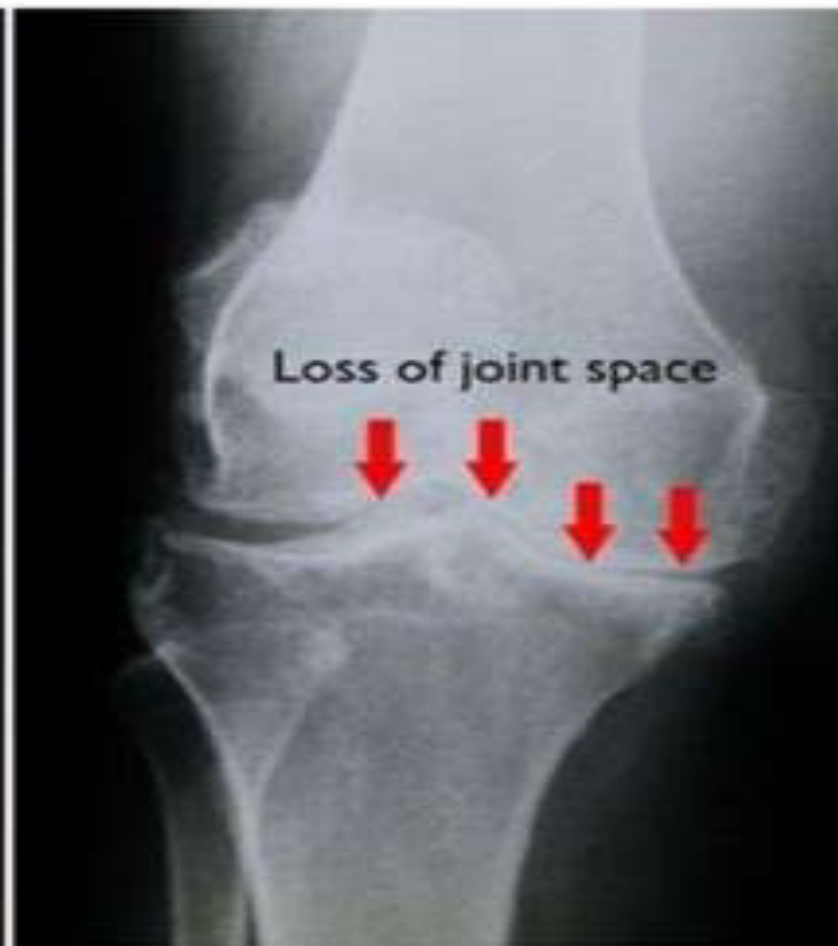
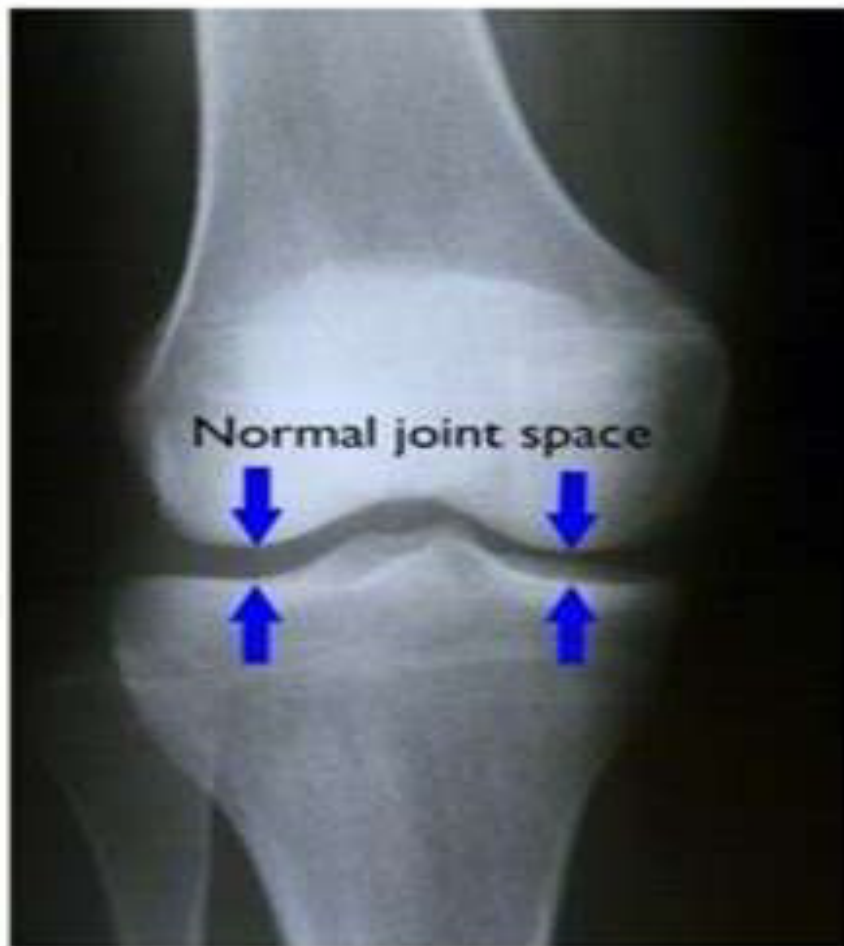


Figure 2

# FINDINGS

## X-RAY FINDING

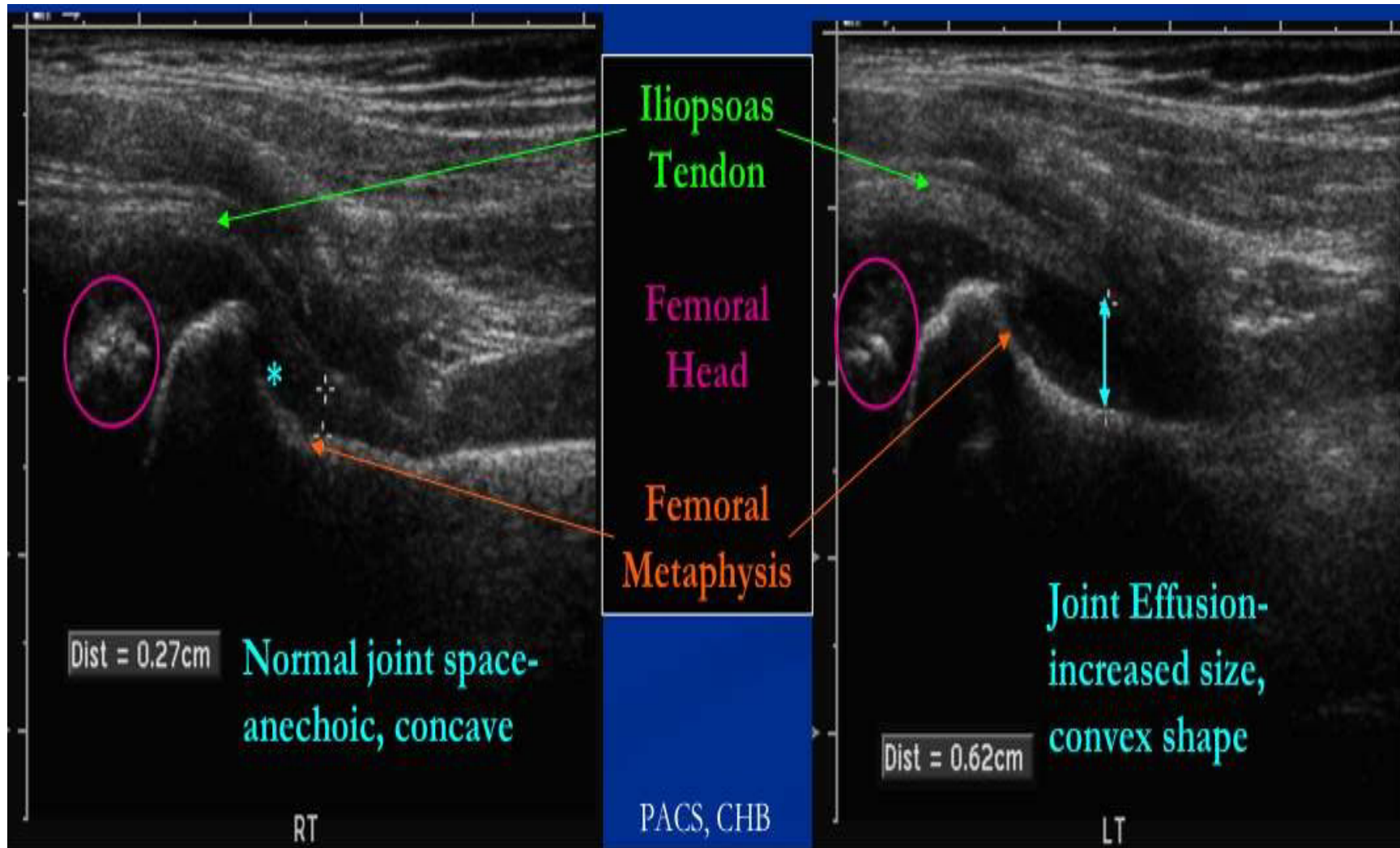
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# FINDINGS

## HIP ULTRASOUND



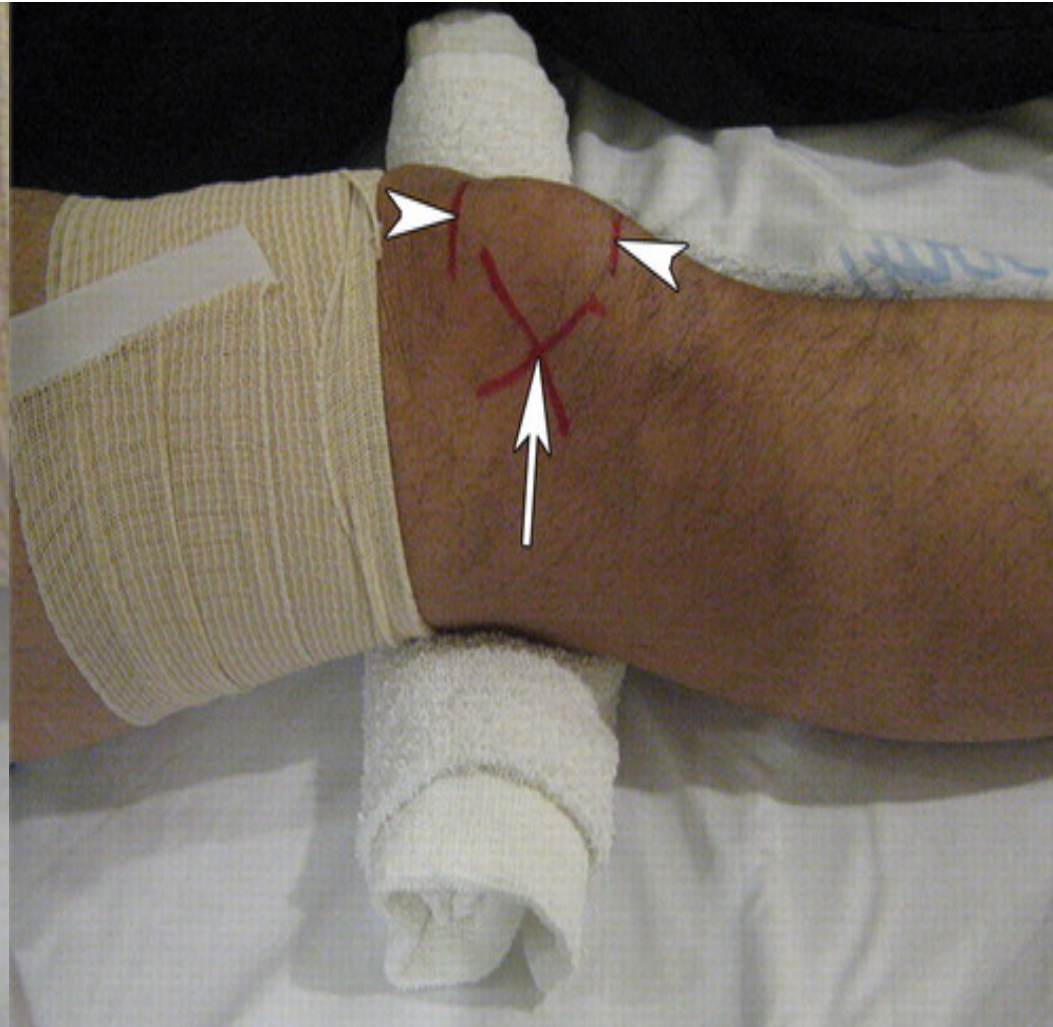
# INVESTIGATION



# INVESTIGATION



**?** The knee joint is the most common and the easiest joint for the physician to aspirate. One approach involves insertion of a needle 1 cm above and 1 cm lateral to the superior lateral aspect of the patella at a 45-degree angle.



# INVESTIGATION

## Synovial Fluid Analysis

	WBC/mm <sup>3</sup>	Color	Viscosity
Normal	< 150	Colorless/Straw	High
Noninflammatory	< 3,000	Straw/Yellow	High
Inflammatory	> 3,000	Yellow	Low
Septic (purulent)	> 50,000	Pus/Mixed	Mixed
Hemorrhagic	Similar to blood	Red	Low

↑ WBC, with left shift, ↑ protein, ↑ lactic acid, ↓ Glucose in 50 gm/dL than normal serum

# INVESTIGATION

Arthritis Type	Appearance	Viscosity	White cells/mm <sup>3</sup>	Crystals	Biochemistry	Culture
Normal	Clear yellow	High	Few	-	As per plasma	-
Septic arthritis	Purulent	Low	>>50,000	-	Glucose low	+
Tuberculous arthritis	Turbid	Low	<2000	-	Glucose low	+
Rheumatoid arthritis	Cloudy	Low	>2000	-	-	-
Gout	Cloudy	Normal	>2000	Urate NBF	-	-
Pseudogout	Cloudy	Normal	>2000	Pyrophosphate PBF	-	-
Osteoarthritis	Clear yellow	High	<2000	Often +	-	-

# KOCHER CRITERIA

<u>Kocher</u> Criteria	No (0 points)	Yes (1 point)
Non-Weight Bearing <i>"Refusal of patient to stand"</i>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Temp</u> > 38.5° C (101.3° F)	<input type="checkbox"/>	<input type="checkbox"/>
<u>ESR</u> > 40 mm/hr	<input type="checkbox"/>	<input type="checkbox"/>
<u>WBC</u> > 12,000 cells/mm <sup>3</sup>	<input type="checkbox"/>	<input type="checkbox"/>

Points	Likelihood of Septic Arthritis
0	0.20%
1	3%
2	40%
3	93% <i>or 94%</i>
4	99%



# TREATMENT

\* CRP if  $> 2$  + Refuse to gain weight  $\rightarrow$  75% Risk

\* you have 8 hours to save the joint if its septic Arthritis, in Osteomyelitis its not

[?] 1<sup>st</sup> priority – aspirate the joint (doing arthrotomy in some cases) and examine the fluid

*emergency  
you start the  
meds and not  
surgery*

[?] General supportive care – analgesics and IV fluid

[?] Splintage ?

[?] Antibiotics

a. Neonates and infants up to 6 months – penicillin ( flucloxacillin) + 3<sup>rd</sup> gen cephalosporin

b. Children from 6 months to puberty – similar to above.

c. Older teenager and adults – flucloxacillin and fusidic acid and 3<sup>rd</sup> generation cephalosporin

*TTT: 4 weeks*

Antibiotics given IV for 4-7 days, then orally for 3 weeks.

*1*

*3*

# ORGANISMS

**Table 4. Commonly Encountered Organisms In The Septic Arthritis Patient.**

Patient/condition	Expected organisms	Antibiotic considerations
Neonates and infants	<i>Staphylococcus</i> , gram-negative bacteria, group B <i>Streptococcus</i> , <i>Candida</i>	Nafcillin* plus aminoglycoside or third-generation cephalosporin, ampicillin-sulbactam
Children younger than 5 years	<i>Staphylococcus</i> , group A <i>Streptococcus</i> , <i>Pneumococcus</i> , <i>Haemophilus influenzae</i>	Nafcillin* plus cefuroxime, ampicillin-sulbactam
Older children and healthy adults	<i>Staphylococcus</i> , <i>Gonococcus</i> , <i>Streptococcus</i>	Nafcillin* plus third-generation cephalosporin, ampicillin-sulbactam
Involvement of the foot	<i>Staphylococcus</i> , <i>Pseudomonas</i>	Nafcillin* plus ceftazidime or aminoglycoside
Intravenous drug users	<i>Staphylococcus</i> , gram-negative bacilli	Nafcillin* plus aminoglycoside, ampicillin-sulbactam
Sickle-cell patients	<i>Salmonella</i>	Ciprofloxacin, ofloxacin, or ceftriaxone

\* First-generation cephalosporins may be substituted for penicillinase-resistant penicillin. Vancomycin should be employed for treatment of suspected methicillin-resistant *Staphylococci*.

Used with permission from: Tintinalli JE, Kelen GD, Stapczynski JS, eds. *Acute Disorders of the Joints and Bursae*. 5th ed. Table 278-4.



# COMPLICATIONS

1. Bone destruction and dislocation of the joint (especially hip)
2. Cartilage destruction
3. May lead to either fibrosis or bony ankylosis
4. In adult partial destruction of the joint will result in secondary osteoarthritis
5. Growth disturbance
6. Presenting as either localized deformity or shortening of the bone

