

## Septic Arthritis in Children – Definition and Treatment

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**Septic arthritis is the bacterial infection of the synovial membrane and fluid in joints. The condition is more common in children. Nowadays, the most common causative organism is Staphylococcus aureus. Children usually present with severe pain, tenderness, warmth, swelling, and erythema of the affected joint. Fever is a common finding but is usually low-grade. Synovial fluid aspiration and examination is helpful in establishing the diagnosis. Antibiotic therapy is indicated and is usually started with parenteral dosage forms before being switched to the oral route.**



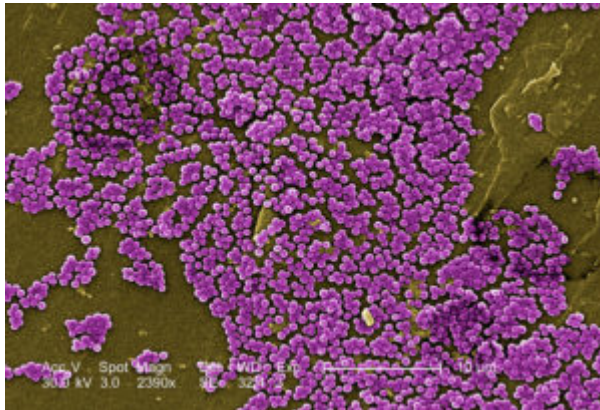
### Definition of Septic Arthritis in Children

Septic arthritis can be defined as the **inflammatory condition of the joints** that is caused by **microbial agents**, i.e. bacteria, or less commonly [fungi](#). While septic arthritis is a term that means an infection that is confined to the joints space, the condition usually presents as a **complication of [osteomyelitis](#)**.

# Epidemiology of Septic Arthritis in Children

The incidence of septic arthritis has reduced dramatically due to the prompt use of **antibiotics** in the last few decades. The condition, however, remains more common in children compared to adults.

The condition has become so rare that in a recent study of over four years duration, 34 cases were diagnosed in the United States. The most likely cause of this decline in incidence is the introduction of **Haemophilus influenzae type B vaccination**. Haemophilus influenzae type B is the most common etiology of septic arthritis in children.



**Image:** "This colorized 2005 scanning electron micrograph (SEM) depicted numerous clumps of methicillin-resistant Staphylococcus aureus bacteria, commonly referred to by the acronym, MRSA; Magnified 2390x." by CDC / Jeff Hageman, M.H.S. / Janice Haney Carr - This media comes from the Centers for Disease Control and Prevention's Public Health Image Library (PHIL), with identification number #10047. License: Public Domain

In recent years, **methicillin-resistant Staphylococcus aureus** has emerged in the community. Some experts fear that the risk of septic arthritis might increase in the coming years because of the emergence of this antibiotic-resistant bacterium in the community.

There are certain subgroups who are more likely to develop septic arthritis compared to the normal and healthy population. The **immunocompromised**, children infected with **immunodeficiency virus** and those with **sickle cell anemia** are examples of high-risk populations for septic arthritis. Patients with **hemophilia** are also at risk of developing septic arthritis as a complication to recurrent **hemarthrosis**, bleeding inside the joints. The most commonly affected sites of Septic arthritis are large joints of lower limbs. Children belonging to low-income families are more likely to develop the disease mostly in the age group 0-4 years.

Whether boys are more likely to develop septic arthritis than girls is still debatable. Due to the small number of cases, any statistical conclusions are usually difficult to be made.

## Etiology of Septic Arthritis in Children

Bacterial organisms might gain access to the **joint space** either by **hematogenous spread** or by **direct invasion of the synovium**.

The most likely causative organisms are different according to the child's age. Children who are younger than two months can develop **staphylococcus aureus** arthritis, **group**

**B streptococci**, or other **gram-negative bacilli** related arthritis.

Before the introduction of Haemophilus influenzae type b vaccination, it was the most common cause of septic arthritis in children aged between two months and five years. The most common cause nowadays in this age group is Staphylococcus aureus. Because of this, the recent trend of **increased community-acquired infections** caused by methicillin-resistant Staphylococcus aureus is feared to result in a mirrored increase in the incidence of septic arthritis.

Adolescents who develop septic arthritis might have **Neisseria gonorrhoeae** as the etiology. Children who have sickle cell disease might develop **Salmonella osteomyelitis** or septic arthritis.

Mycobacterium tuberculosis rarely cause chronic pyogenic arthritis.



<b>Kingella</b>	<b>In children under 6 years</b>
<b>Group B strep</b>	<b>In children under 3 months</b>
<b>Salmonella</b>	<b>In sickle cell disease</b>
<b>Gonorrhea</b>	<b>In sexually active adolescents</b>
<b>Pseudomonas aeruginosa</b>	<b>In IV drug users</b>

## Clinical Presentation of Septic Arthritis in Children

Patients with septic arthritis who are old enough to communicate complain of **intense joint pain** that can be in a **single joint** or less commonly in **multiple joints usually elbow or lower extremity joints especially knee and hip**. Pain caused by the disease is so severe that the child cannot tolerate even slight movement of the affected joint. The affected joint is usually **swollen** and very **tender** to touch. If joints in the lower extremities are affected, the patient might develop a **limp** or become unable to bear weight on their legs and avoid walking.

Neonates who develop septic arthritis usually have **associated osteomyelitis** and **multiple joint involvements**.

The affected joint is usually very tender and almost complete **loss of range of motion** around that joint can be evident. This presentation is known as **pseudoparalysis**. Because of this phenomenon, children usually refuse to walk or bear weight on the affected joints especially if the hip joint is involved. **Fever** is a very common finding in people with septic arthritis.

## Physical examination

Physical examination is very important in the evaluation of the patient with septic arthritis. The decreased or complete **absence of range of motion** of the affected joint due to **severe pain** is common. The affected joint is usually **swollen, warm** to touch and can be **red** in color. The hip joint if infected is less likely to cause swelling and erythema.

**Fever** is usually low-grade but is usually present. In some cases, fever might be absent. Children who present with severe pain in a swollen joint are very likely to have septic arthritis and the diagnosis should not be excluded based on the mere absence of fever.



- 50 % of cases are found in infants and children under 3 years
- Usually one joint, lower extremity (knee > hip)

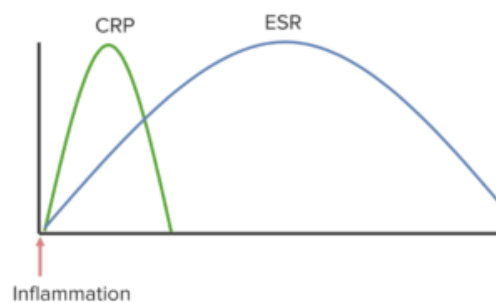
**Present with:**

- Red, swollen, hot, **painful joint**
- Significant **decreased ROM due to pain**
- Fever
- Irritability in a neonate

## Diagnostic Workup for Septic Arthritis in Children

1. In addition to the typical clinical picture, patients with septic arthritis should also have a **synovial fluid analysis by synovial culture. Arthrocentesis should** be used to establish the diagnosis in any patient who presents with painful monoarthritis despite the risk of introducing organisms in a sterile joint.
2. Septic arthritis is characterized by a **white blood cell count of** more than 50,000/mL in the synovial fluid. The white blood cell count is usually more than 100,000 per mL with a clear shift to **neutrophils**. The **glucose content** in the synovial fluid is usually 30 % of that in the serum, this is another important finding in septic arthritis.
3. **Erythrocyte sedimentation rate** is elevated in patients with septic arthritis. **C-reactive protein** is also elevated in children with septic arthritis

### 4. Blood tests



- Blood culture (50 % yield)
- CBC: elevated WBC count
- **ESR/CRP: elevated**

While synovial fluid culture can provide definite information to establish the diagnosis of septic arthritis, sensitivity and specificity are considered low. **Polymerase chain reaction testing, on the other hand,** can provide reliable information about the presence of a certain causative organism in a reasonable time frame.

**5. X-rays of the joint** are more helpful in excluding other causes of joint pain such as osteomyelitis rather than establishing the diagnosis of septic arthritis.

**6. Ultrasonography** of the affected joint is perhaps one of the best diagnostic modalities to establish the diagnosis of septic arthritis. The most common finding on ultrasonography of the joint is the presence of **effusions**. If an effusion is identified, **ultrasound-guided aspiration** of the joint's effusion is indicated.



- X-ray shows increased joint space in knee, hips, but not diagnostic
- A hip ultrasound is an option for checking for fluid.
- **MRI** is a gold standard.

## Treatment of Septic Arthritis in Children

Management of septic arthritis in children should be provided in an inpatient setting. The patient should be admitted to the hospital, **intravenous antibiotics** should be started and **joint immobilization** should be used. Joint immobilization should be limited to a maximum of three days, after which, **passive range of motion exercises** are recommended.

The duration of antibiotic use differs according to the causative organism, which can be predicted based on the patient's age. Patients who are more likely to have staphylococcal, Haemophilus influenzae, or Streptococcus pneumoniae as the etiology of their septic arthritis should receive antibiotics for three to four weeks. Adolescents with gonococcal septic arthritis should receive antibiotic therapy for up to ten days.

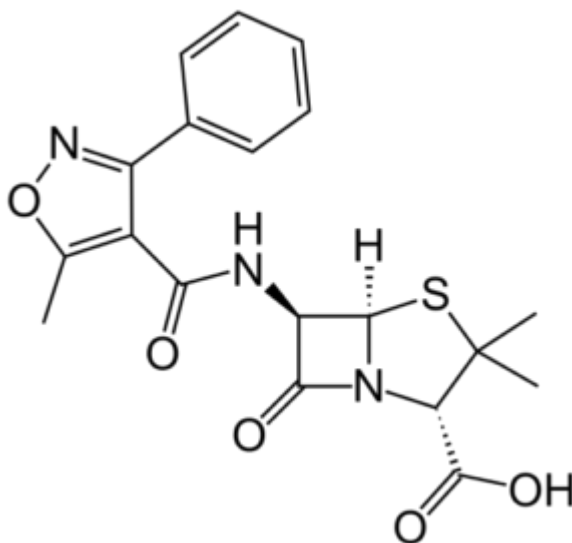


Image: "Skeletal formula of oxacillin." by Fvasconcellos - Own work. License: Public Domain

It is clear that the patient is going to receive antibiotics for a long duration. Therefore, the current recommendation is to start **intravenous antibiotics for few days** until the

patient shows good clinical improvement, and then to **switch to oral antibiotics**.

The antibiotic of choice for neonates with septic arthritis is **oxacillin plus gentamicin**. Older children who most likely have staphylococcus related septic arthritis should receive **oxacillin** alone. If the child is suspected to have methicillin-resistant Staphylococcus aureus, **clindamycin** should be used instead of oxacillin.

**Cephalosporins** are usually used for the treatment of gonococcal septic arthritis in affected adolescents.

## Clinical guidelines for treatment of septic arthritis :



- Surgical drainage and washout prevent complications.
  - **Delay in surgery results in worse outcomes.**
- IV antibiotics, the transition to oral when improving
- Total 2-3 weeks of antibiotics
- **Antibiotic selection:**
  - IV cefazolin, the transition to PO cephalexin for GAS/MSSA
  - IV clindamycin transition to PO clindamycin for MRSA
  - Vancomycin IV for severely ill children only
- **Systemic steroid therapy**
  - Improves outcomes and prevents long term complications
  - Shortens the duration of stay in the hospital
  - **Typically a 5 day course of orapred(prednisolone)**

## References

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