Septic Arthritis – An Overview

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Abstract: Septic arthritis is a medical emergency characterized by joint inflammation resulting from infectious agents, predominantly bacteria. This article presents a comprehensive overview of septic arthritis, spanning its bacterial etiology, risk factors, pathophysiology, diagnostic methods, clinical manifestations, and pharmacological management. In children, Staphylococcus aureus and Kingella kingae are significant pathogens, while Staphylococcus aureus remains prevalent in adults. Common symptoms encompass fever, joint pain, swelling, redness, and stiffness, with large joints often affected. Treatment involves prompt administration of antibiotics, removal of purulent material, and, occasionally, surgical debridement. Physical therapy may aid in joint function recovery. In cases of infected artificial joints, replacement joint removal and antibiotic therapy are considered. Recognizing the gravity of septic arthritis and adhering to updated management guidelines are essential for ensuring timely and effective patient care.

Key Words: Septic arthritis, bacteria, antibiotic, replacement joint removal.

INTRODUCTION

Joint inflammation brought on by an infectious cause, such as a bacterial, fungal, mycobacterial, viral, or other infection, is known as septic arthritis. Although monoarticular septic arthritis is more common, polyarticular septic arthritis involving multiple or smaller joints can also happen. This activity describes the diagnosis and management of septic arthritis and the function of the interprofessional team in enhancing patient care.

BACTERIAL SEPTIC ARTHRITIS

Bacterial septic arthritis (SA) is an infection of the joints brought on by a pathogenic bacterium colonising the joint. Acute bacterial arthritis is a medical emergency that requires prompt diagnosis and vigorous care to prevent irreversible joint damage and save the patient's life. When septic arthritis is left untreated, the patient may recover from the acute stage but develop a chronic inflammatory condition that is far more difficult to cure.

Most cases of septic arthritis caused by a pathogenic bacterial strain only affect one joint, which is typically red, swollen, and painful.[1]

ETIOLOGY

❖ *CHILDREN'S AETIOLOGY:*

- There are numerous aetiologies for arthritis or joint inflammation in children. In general, Staphylococcus aureus is the most prevalent bacterial pathogen. Certain etiologic agents are linked to certain age groups and underlying illnesses. The most frequent gram-negative bacterial cause in children under the age of three is Kingellakingae.
- Neonates frequently contract Group B Streptococcus, Staphylococcus aureus, Neisseria gonorrhoea, and gram-negative Bacilli. In adolescents who are sexually active, Neisseria gonorrhoea is a concern.
- Sickle cell disease and salmonella species infection are related. Patients who receive long-term antibiotic treatment are susceptible to fungus infections. Pseudomonas aeruginosa-caused joint infections are linked to injectable medication usage and puncture wounds. Children are most frequently impacted by hip joint disorders.[2]

❖ *ADULTS AETIOLOGY:*

Adults are most commonly infected with Staphylococcus aureus. Although less frequent, streptococcus pneumonia is still a significant source of infection in adults. Neisseria gonorrhoea should be

cultured from different locations in high-risk patients, such as the oropharynx, vagina, cervix, urethra, or anus, as the organism grows poorly in synovial fluid. Insidiously presenting fungi and mycobacteria may be more challenging to identify. While a synovial biopsy is positive in 95% of cases, the acid-fast smear of synovial fluid is frequently negative. Adults most frequently have joint pain in the hip and knee.[3]

RISK FACTORS

- Age increase (80 years)
- A history of chronic illness
- A superficial skin ulcer or another mild primary condition infection
- Staphylococcus aureus
- Diabetes;
- Biologic agent therapy;
- Prosthetic joints.

PATHOPHYSIOLOGY

- Bacterial invasion of the synovial space can happen mainly through two routes: hematogenous spread (most frequent) or direct invasion. Because of the synovium's high level of vascularity and lack of a restricting basement membrane, the synovial space is easily accessible.
- A local soft-tissue infection, a diagnostic or therapeutic treatment, or piercing wounds are all possible sources of bacteria that can spread from a neighbouring osteomyelitis.
- [Based on animal studies] Dramatic neutrophil infiltration, vascular congestion, and cell proliferation lining the joint area become evident within 24-48 hours of bacterial invasion. The week after bacterial invasion sees the development of abscesses, granulation tissue, significant synovial proliferation, chronic purulent effusion, and mononuclear cell infiltration.
- After a while, the production of cytokine-induced proteolytic enzymes causes the degradation of cartilage and bone in as little as 10 days.
- Joint degeneration and systemic sepsis are the outcome. Reduced phagocytic activity in rheumatoid arthritis patients may make them more susceptible to septic arthritis.
- Gram-negative bacteria infections happen in roughly 30% of cases, despite the fact that members of the gram-positive Staphylococcus and Streptococcus genera are the most frequent pathogens that cause septic arthritis.
- Septic arthritis can also be brought on by other organisms including anaerobes and fungi. Staphylococci, in particular, may colonise the surfaces of prosthetic joint implants. The virulence traits of the many microbial infections, weakened host defences, and the presence of prosthetic joints all contribute to making the infection more challenging to treat. [4]

DIAGNOSIS

- The aspirated fluid must be sent for microbiological testing examination (such as Gram's staining, culture, and cell count) should be performed before starting medication.
- Fluid is aspirated after empiric antibiotic therapy has begun, making the situation more difficult. Simultaneous blood culture and culture of additional potential infection sites may help identify the pathogen.
- A synovial fluid leukocyte count above 20 109/L is regarded as raised, and one above 50 109/L is regarded as markedly elevated. Gram's staining results that are negative should not prevent the beginning of empiric antibiotic therapy if septic arthritis is suspected.
- A biopsy may be considered to check for slower-growing organisms like mycobacteria or fungus if the initial bacterial culture is negative. The polymerase chain reaction could one day help with early detection. Elevated levels of inflammatory indicators, such as erythrocyte sedimentation rate and C-reactive protein, as well as a higher-than-normal peripheral leukocyte count may also be helpful, however not conclusive evidence of septic arthritis.
- In patients with underlying inflammatory arthritis, radiologic tests like bone and gallium scans are frequently ineffective at the outset in differentiating between infectious arthritis and inflammatory arthritis. For technically challenging joints like the hip or sacroiliac joints,

radiologically guided aspiration may be necessary [5].

SIGNS AND SYMPTOMS

- Septic arthritis is characterised by fever, chills, joint pain, edema, redness, stiffness, and warmth. Large joints, like the knees, ankles, hips, and elbows, are the ones that experience joint discomfort the most frequently.
- Unusual joints, such as the joint where the sternum and collarbone meet, can become infected in people who have risk factors for joint infection.[4]
- terrible discomfort that gets worse when you move
- A fever, chills, weariness, and weakness are present along with joint swelling, warmth, and redness.
- reduction in appetite
- a quick heartbeat agitation
- Typically, the joint is swollen, heated, tender, and excruciatingly painful to move. An effusion could be clear. The knee, followed by the hip, shoulder, ankle, and wrists, is the joint most frequently affected by septic arthritis (approximately 50% of cases).
- In the elderly, immune compromised, drug users, and those with spinal infections, signs may be less obvious or poorly localised.
- shoulder and hip joints.
- Before a drainage sinus forms, an infection of a prosthetic joint may not exhibit any symptoms. Pain might occasionally be a sign of an implant that is becoming loose or an infection around the joint.[6]

PHARMACOLOGICAL MANAGEMENT

- The cornerstone of treatment for septic arthritis is prompt administration of antibiotics together with removal of any purulent material.
- Currently, the selection of an antibiotic is made based on the likelihood of the organism involved, as amended by the findings of Gram staining and culture.
- antibiotics are often administered through a vein in your arm. You might be able to transition to oral antibiotics later on.
- Treatment typically lasts between two and six weeks. There is a chance of adverse reactions from antibiotics, such as nausea, vomiting, and diarrhoea. Another possibility is allergic responses.[7]

Surgery: In the majority of instances, surgery is required to remove the inflammatory tissue (surgical debridement) and administer IV (intravenous) antibiotics.

Antibiotics: Antibiotics must be used to treat all cases of septic arthritis. Your medical professional may administer antibiotics intravenously or as pills.

Joint fluid aspiration: Your doctor could use a tiny needle to drain (aspirate) fluid from your joint. As you recuperate, they might need to perform this more than once.

Physical treatment is likely necessary to restore function to your joint and stop the surrounding muscles from deteriorating.

Atypical organisms have no risk factors:

- Flucloxacillin 2 g IV qd. Fusidic acid 500 mg TDS po or gentamicin IV may be added according to local policy.
- If penicillin is allergic, clindamycin (450–600 mg twice daily) or a second- or third-generation cephalosporin may be used.

High probability of gram-negative sepsis:

Cephalosporin of the second or third generation (for example, cefuroxime 1.5 g TDS). Flucloxacillin may be added according to local policy. Discuss allergic patients with microbiology-Gram stain may impact antibiotic decision.[8]

NON-PHARMACOLOGICAL TREATMENT:

Treatment options	Categories and examples
Diet and weight loss	
Exercise	Land based
	Hydrotherapy
Oral analgesic	Acetaminophen
	Non-steroidal anti-inflammatory drugs (NSAIDs), such as acetylsalicylic acid, ibuprofen, naproxen, diclofenac, and celecoxib.
	Opioid, such as codeine, oxycodone, and morphine.
Transdermal analgesic	Transdermal opioid, such as buprenorphine and fentanyl.
Nutritional supplements[a]	Glucosamine and chondroitin sulfate
Intraarticular injection	Glucocorticoids
	Hyaluronic acid
Surgery	Arthroscopy
	Joint lavage
	Total joint replacement
Other possible treatment	Acupuncture, heat and cold pad, mechanical unloading (i.e., footwear)
Disease-modifying osteoarthritis drug	Non-registered for osteoarthritis, several research on, for example, interleukin-1 (IL-1) and tumor necrosis factor alpha (TNF-α) antagonists.

Figure : 1 Non – pharmacological treatment

❖ *DIET AND WEIGHT EXERCISE:*

Being overweight increases the chance of septic arthritis worsening; hence, the patient may benefit from dietary weight loss as a treatment. Research on weight loss techniques has frequently been done in knee Patients with septic arthritis have showed some benefit.[9]

❖ *PHYSICAL EXERCISE:*

Exercise must therefore be customised based on the patient's condition and preferences. Exercise without involving the joint, or static (isometric) exercise, can be recommended for patients having a joint that is excessively painful or one that just partially functions. Isometric quadriceps workout is an illustration of this kind of exercise. The patient is instructed to tighten his thigh muscles to their fullest extent and hold the contraction for 5 seconds while lying on his back with a towel tucked up under his knee.[10]

REPLACEMENT JOINT REMOVAL

In order to treat an infected artificial joint, it is frequently removed and momentarily replaced with a joint spacer, a device constructed of antibiotic cement. A new replacement joint is placed some months later. A doctor may clean the joint, remove any injured tissue, and leave the artificial joint in place sif a replacement joint cannot be removed. To stop the illness from returning, oral antibiotics are given for several months after intravenous treatment.[11]

CONCLUSION

Treating bacterial septic arthritis can be quite challenging. It is crucial not to underestimate its seriousness because, despite prompt surgical intervention, aggressive antibiotic treatment, and fluid resuscitation, death can unfortunately be a sad, though not uncommon, result. Consequently, it is essential for physicians to remain vigilant about considering a diagnosis of bacterial septic arthritis when they encounter a patient experiencing symptomatic arthralgia. Hence, it is crucial to obtain relevant samples for culture before initiating empirical antibiotic therapy. Additionally, it is essential to regularly review and update the guidelines for managing septic arthritis.

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