

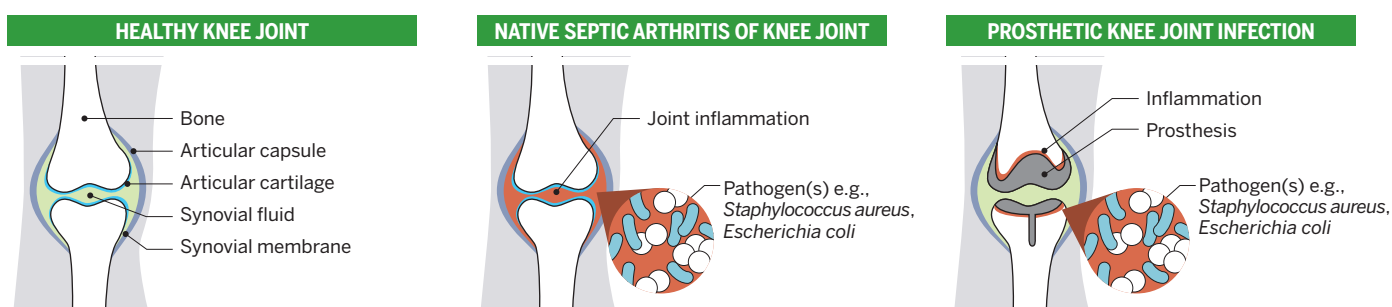


SEPTIC ARTHRITIS

Septic arthritis, also known as infectious arthritis, is a severe type of orthopedic infection. It occurs when bacteria, mycobacteria, fungi, or viruses infect an articulating joint, causing inflammation of the synovial membrane and accumulation of purulent fluid within the joint capsule.

SEPTIC ARTHRITIS

- **Septic arthritis is a medical emergency** which, if not treated rapidly, can lead to irreversible damage to the joint resulting in significant disability and an increased risk of death.
- Septic arthritis most commonly affects young children, the elderly, anyone with an artificial joint or existing joint disease, and immunocompromised people.
- **Prosthetic joint infection (PJI)** is a subcategory of septic arthritis where the infection involves an artificial joint that has been surgically implanted. It is useful to think of PJI and **native joint septic arthritis (NSA)** separately because the evaluation, differential diagnosis, and treatment strategies are somewhat different.¹



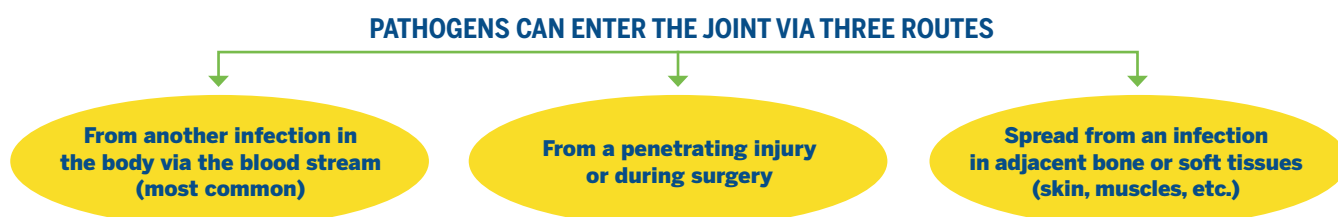
THE BURDEN OF SEPTIC ARTHRITIS

Joint infections represent a **heavy health and economic burden** for patients and society, and prosthetic joint infections are particularly costly to treat.

NATIVE SEPTIC ARTHRITIS ¹⁻³	PROSTHETIC JOINT INFECTION ^{1,4-6}
• 6-10 new cases/year/100,000 population • 84% admitted to hospital • ~2.5% mortality rate during hospitalization • 55% discharged to skilled care facility or require home health care • Cost = \$759 million	• Number of arthroplasties rising in developed countries • Examples of infection rates: • 2.2% US • 0.85% Germany • 1.41% Finland • 0.76% Taiwan • Estimated combined costs >\$1.85 billion by 2030 in US

CAUSES AND CLINICAL PRESENTATION OF SEPTIC ARTHRITIS^{1,2,4}

Septic arthritis is caused by bacteria, mycobacteria, fungi and, less commonly, viruses.



NATIVE SEPTIC ARTHRITIS

• Many gram-positive and gram-negative bacteria can cause NSA:²

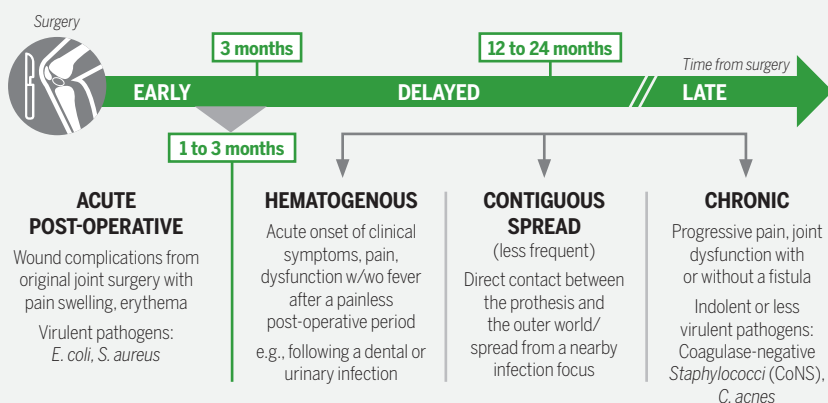
- *S. aureus* is the most common for all ages
- *K. kingae* is significant in children <5 years
- *N. gonorrhoeae* is an important cause in sexually active patients

• Signs and symptoms:

- joint pain/tenderness
- erythema
- warmth
- edema/joint effusion
- fever

PROSTHETIC JOINT INFECTION

Likely pathogens correlate with time since surgery ^{4,7,12}



DIAGNOSTIC APPROACH ^{1,2,4,7}

- **Diagnosis of joint infections is complicated** as they are often associated with hard-to-grow organisms. In PJI, biofilm-forming organisms and polymicrobial infections may also be present. Traditional testing methods may therefore require multiple tests and it can take up to two weeks to identify the pathogen(s). Also, it is not uncommon for the diagnosis to be made without ever identifying the pathogen.
- **Molecular diagnostics such as polymerase chain reaction (PCR) tests are emerging as new and powerful diagnostic tools.** The molecular syndromic testing approach enables **rapid accurate identification of multiple target pathogens** and **antimicrobial resistance markers**. It can also detect fastidious organisms, hard-to-grow anaerobes and polymicrobial infections. This may be possible even when the patient has been pre-treated with antibiotics.
- Syndromic tests may help to more rapidly and easily identify the cause of non-specific symptoms, such as joint pain, red or swollen joints in a **clinically actionable timeframe**. More rapid results may potentially **reduce the time to targeted therapy** and **avoid unnecessary antibiotic treatments**.

NATIVE SEPTIC ARTHRITIS

A positive synovial fluid culture is the only definitive diagnosis ^{2,13}

Blood culture bottles are frequently used to increase the sensitivity of synovial fluid culture.

- Arthrocentesis/surgery to collect synovial fluid for gram stain, culture and chemical/cellular analysis
- Radiologic assessment of the joint
- Blood tests for markers of inflammation
- Differential diagnosis includes rheumatoid arthritis, reactive arthritis, gout/pseudogout, trauma, degenerative joint disease.

PROSTHETIC JOINT INFECTION

Diagnosis is criteria-based and various organizations have published slightly different criteria ^{7,14-18}

- Presence of a sinus tract is a common, definitive criteria.
- In addition to synovial fluid analysis/culture, blood tests, and radiologic evaluation:
 - Multiple peri-prosthetic tissue biopsies are obtained for histopathology and culture
 - Sonicate fluid culture (useful for detecting biofilm-producing organisms)
- Two or more positive cultures with the same organism are recommended to differentiate a true infection from a contamination.

TREATMENT STRATEGIES

NATIVE SEPTIC ARTHRITIS ^{2,13}

- **Surgery** to drain the infection and wash out the joint
- **Antibiotics** are usually given for 3 – 6 weeks, based on susceptibility testing when available or local resistance patterns and trends.

PROSTHETIC JOINT INFECTION ^{1,4,11-13,16}

Along with antibiotics and drainage, a decision must be made in regard to **retaining vs removing/replacing the prosthesis**. While this treatment decision is not standardized, the table below lists different options and their considerations.

SURGICAL OPTIONS	CONSIDERATION	TREATMENT / PROCEDURE
DAIR*	Presentation <30 days	ATBX** (e.g., Rifampin + Fluoroquinolone) x 2-6 weeks
One-Stage Replacement Arthroplasty (More common in hip)	No sinus tract Healthy patient and soft tissue Prolonged ATBX use No bone graft Low-virulence organism with good ATBX sensitivity	Remove and replace prosthesis ATBX Impregnated cement IV*** ATBX x 4-6 weeks
Two-Stage Replacement Arthroplasty	Gold standard for infected joint >4 weeks Must be medically fit for multiple surgeries Requires adequate bone stock	Remove prosthesis → ATBX spacer → IV ATBX x 4-6 weeks → new prosthesis implanted
Resection Arthroplasty	Poor bone and soft tissue quality Recurrent infection with MDR**** organism	Remove infected tissue and hardware without reimplantation Joint fused
Unfit for Surgery	Refuse surgery	Suppressive ATBX

* DAIR: Debridement, antibiotics and implant retention; **ATBX: Antibiotics; ***IV: Intravenous; ****MDR: Multi-drug resistant.

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