

Septic Arthritis

Septic arthritis: one hot, swollen, red joint the patient refuses to move, plus fever. Tap it now, start IV antibiotics, then wash it out in the OR—delay kills the joint.

THE ONE-LINE TRUTH

Bacteria invade the joint space, fill it with pus, and destroy cartilage fast—hours matter.

The chain — how it unfolds

1. Bacteria enter the joint space — why: Most commonly, bacteria (especially *Staph aureus*) travel through the bloodstream from a distant infection—skin abscess, pneumonia, infected IV site—and seed the synovium, which is rich in blood vessels. In toddlers, a tiny cut or throat infection can spill *Kingella* into the blood; in sexually active teens and adults, gonorrhea spreads from the genitals. Less often, a puncture wound (stepping on a nail, a dog bite, a contaminated injection) injects germs directly, or an adjacent bone infection tunnels through.
2. Bacteria multiply on the synovium and in the synovial fluid — why: The warm, nutrient-rich synovial fluid is an ideal culture medium with no immune cells ready to fight at first. Bacteria double every 20–30 minutes, quickly reaching massive numbers. The synovium, normally a quiet factory, becomes inflamed and leaky.
3. The immune system floods the joint with white blood cells (neutrophils) — why: Chemical alarms (cytokines, chemokines) summon millions of neutrophils from the blood into the joint. These cells try to engulf and kill bacteria by releasing enzymes (proteases, elastase) and toxic oxygen radicals. The fluid turns thick, cloudy, and yellow-green—classic pus.
4. Pressure inside the joint skyrockets; the joint swells, turns hot and red, and hurts with any movement — why: The joint capsule is a tough, inelastic bag—pus has nowhere to expand, so pressure climbs. High pressure compresses the tiny blood vessels that feed cartilage, starving it of oxygen and nutrients. Nerve endings in the capsule fire intensely, causing severe pain. Blood flow to the synovium increases (heat, redness). The child holds the limb completely still because even a tiny bend stretches the capsule and hurts.
5. Enzymes from dying white cells digest the cartilage cushion — why: The same proteases meant to kill bacteria also break down collagen and proteoglycans—the proteins that make cartilage smooth and springy. Bacterial toxins add to the damage. Cartilage has no blood supply and cannot repair itself; once the matrix is chewed up, it is gone forever.

6. Fever spikes as the infection spreads into the bloodstream (bacteremia, sepsis risk) — why: Cytokines released in the joint spill into the bloodstream, signaling the hypothalamus (the brain's thermostat) to raise body temperature. If bacteria escape the joint and multiply in the blood, sepsis can develop—blood pressure drops, organs fail—especially in infants, elderly, and immunocompromised patients.
7. Without urgent treatment, the cartilage is destroyed, the joint space collapses, and permanent arthritis sets in — why: If pus sits in the joint for more than 24–48 hours, cartilage is so damaged that even after the infection clears, bone grinds on bone. The joint becomes stiff, painful, and deformed. In children, damage to the growth plate near the joint can stunt bone growth. That is why septic arthritis is treated as a surgical emergency: tap the joint (arthrocentesis) to confirm pus and identify the bug, start IV antibiotics immediately (before culture results), and wash out the joint in the operating room (arthrotomy or arthroscopy) to remove all pus and infected tissue—speed is the only way to save the cartilage.
8. Trace every clue backward to find the upstream source — why: If you see a hot, swollen knee in a child who will not walk, ask: Why is there pus in the joint? → Bacteria got in. How? → Bloodstream (check for skin infections, recent illness, IV lines), direct poke (ask about trauma, bites, injections), or spread from nearby bone (osteomyelitis). Finding and treating the source (drain an abscess, pull an infected line, treat gonorrhea) prevents recurrence and stops the bacteria from seeding other joints or the heart valves.

Spot it — what you see, and why

- Hot, red, swollen joint (usually just one): Bacteria invade the joint space and multiply. The immune system floods the area with white blood cells and fluid to fight back, which causes heat, redness, and swelling—like a battle raging inside the joint.
- Severe pain in the joint that gets worse with any movement: The infected fluid stretches the joint capsule (the tight sac around the joint) like an overfilled water balloon, and the immune chemicals irritate the nerve endings, making every tiny move excruciating.
- Not wanting to move or put weight on the joint: Moving the joint or pressing on it hurts so much that the body instinctively holds it still and refuses to use it—a kid might refuse to walk if the knee or hip is infected, and an adult might cradle an infected shoulder.
- Fever and chills: Bacteria release toxins into the bloodstream, and the hypothalamus (the brain's thermostat) cranks up body temperature to help the immune system fight harder—so the person feels hot and shaky.
- The joint looks bigger or puffier than the same joint on the other side: Pus (dead white cells and bacteria) and inflammatory fluid collect inside the infected joint, physically expanding it like a balloon filling with water, so comparing left knee to right knee or left elbow to right elbow shows the difference clearly.

- Warmth when you touch the skin over the joint: Blood vessels dilate (widen) near the infection to rush more immune cells to the fight, and all that extra blood flow heats up the skin—like holding your hand over a heater.

Red flags — act now

- Fever above 101°F (38.3°C) plus a hot, swollen joint—infection can destroy cartilage in hours
- Refusal to move or bear weight on a joint in a child—especially hip or knee—may be septic arthritis and needs same-day evaluation
- Joint pain plus signs of sepsis: confusion, very low blood pressure, fast breathing, or mottled skin—bacteria may be spreading through the whole body
- Prosthetic (artificial) joint that suddenly becomes painful, warm, or swollen—infection in a fake joint almost always needs surgery to clean out

Treat it — in this order

1. Urgent sterile joint aspiration (arthrocentesis) BEFORE starting any antibiotics → Removes synovial fluid for culture, Gram stain, cell count, and crystal exam so the lab can identify the exact bacteria and test which antibiotics kill it. Aspiration also relieves some pressure and pain by draining pus. Starting antibiotics before aspiration can make cultures falsely negative and leave you guessing the germ.
2. Empiric IV antibiotics — vancomycin PLUS either ceftriaxone or cefepime, started immediately after joint aspiration → Kills the most common bacteria before you know the exact type: Staphylococcus aureus (including MRSA, covered by vancomycin), Streptococcus species, Neisseria gonorrhoeae, and gram-negative rods like E. coli and Pseudomonas (covered by ceftriaxone or cefepime). Once culture and sensitivity results return, narrow to the single best antibiotic for that specific germ.
3. Urgent surgical drainage — arthroscopic or open irrigation and debridement of the joint within 24 hours → Physically washes out pus, fibrin clots, dead white blood cells, and bacteria from the joint space with sterile saline. Removes inflammatory debris that blocks antibiotics from reaching bacteria. Stops bacteria from eating away cartilage and bone. Large joints (knee, shoulder, ankle) can often be cleaned arthroscopically; smaller or deep joints (hip, sacroiliac) may need open surgery. Repeat washout may be needed if pus reaccumulates.

4. Continue IV antibiotics for 2 weeks, then switch to oral antibiotics to complete 4–6 weeks total for native joints (longer for prosthetic joints, osteomyelitis, or MRSA) → The long antibiotic course ensures bacteria die completely and do not hide in scar tissue, biofilm, or bone. Switching to oral antibiotics after 2 weeks keeps drug levels high in the blood and joint without needing a hospital stay, as long as the person can swallow pills and the bacteria are sensitive to an oral drug.
5. Identify and treat the source of bacteria — remove infected IV lines, drain skin abscesses, treat endocarditis, address IV drug use wounds → Stops new bacteria from seeding the bloodstream and landing in the joint again. Fixes the upstream break in the skin or blood vessel barrier, not just the downstream joint infection. Without source control, bacteria keep entering and the infection can come back even after antibiotics stop.

Your top priorities at the bedside

1. Keep the patient NPO (nothing by mouth) until the orthopedic surgeon evaluates them, because urgent surgical washout may be needed within hours. — why: The infected joint needs drainage of pus and inflamed tissue (irrigation and debridement) under anesthesia to prevent cartilage destruction; delaying surgery while waiting for the stomach to empty risks permanent joint damage.
2. Protect the painful joint by keeping it immobilized in a neutral position with pillows or a splint, and avoid any passive or active range-of-motion exercises. — why: Movement spreads bacteria and inflammatory enzymes (proteases) throughout the joint space, which destroys cartilage and bone faster; immobilization reduces pain and limits further tissue damage.
3. Draw blood cultures from two different sites before giving any antibiotics, and prepare the patient for immediate joint aspiration by the physician. — why: Blood cultures grow bacteria in about 50 percent of septic arthritis cases and identify the exact germ; joint fluid analysis (synovial fluid white blood cell count usually over 50,000 cells per microliter with over 90 percent neutrophils) confirms infection before antibiotics alter results.