



# Intra-Articular Corticosteroid Injection + Oral Antibiotics and Joint Drainage as Outpatient Treatment for Knee Septic Arthritis

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## ABSTRACT

Septic arthritis caused by bacterial infection is a serious disease and the prognosis has not improved significantly over the past two decades. The most often etiology is *Staphylococcus aureus*. The diagnosis of septic arthritis rests on isolation of the pathogen from joint fluid. Appropriate antibiotic treatment and adequate joint drainage should begin immediately in suspected septic arthritis after collection of proper sample for microbiologic studies. This case was treated with intra-articular triamcinolon acetonide injection, oral amoxicilin-clavulanate, and needle aspiration for joint drainage.

**Keywords:** Outpatient care, septic arthritis

## ABSTRAK

Artritis septik yang disebabkan infeksi bakteri merupakan penyakit serius dan prognosinya tidak membaik dalam beberapa tahun. Etiologi tersering artritis septik adalah *Staphylococcus aureus*. Diagnosis artritis septik harus berdasarkan isolasi bakteri patogen dari cairan sendi. Pemberian antibiotik dan drainase cairan sendi harus segera jika dicurigai artritis septik setelah sediaan mikrobiologi diambil. Kasus ini menggunakan injeksi kortikosteroid *triamcinolon acetonide* ke dalam sendi lutut bersamaan dengan antibiotik oral amoksilin-klavulanat dan aspirasi cairan sendi untuk drainase. Andersen, Ganda Purba. Terapi Injeksi Kortikosteroid Intra-Artikular + Antibiotik Oral dan Drainage Sendi untuk Terapi Artritis Septik Lutut

**Kata kunci:** Artritis septik, terapi rawat jalan

## INTRODUCTION

Septic arthritis is infection of one or more joints by microorganisms.<sup>1</sup> The most common causes is *Staphylococcus aureus*, with occasional involvement of other organisms, including coagulase-negative staphylococci and anaerobes.<sup>2</sup> Septic arthritis can lead to rapid cartilage destruction and irreversible joint damage and is associated with a significant mortality.<sup>1</sup> The process of joint infection can be divided into three steps: bacterial colonization, establishing an infection, and induction of host inflammatory response.<sup>1,3</sup>

Septic arthritis is an uncommon condition with an incidence of 4-10/100.000/year that requires prompt diagnosis and treatment.<sup>4,5</sup> Diagnosis rests on isolation of pathogen from joint fluid; but diagnosis should not

be delayed if there were classic signs and associated symptoms.<sup>5</sup>

Management of septic arthritis include antibiotics and joint drainage. Use of corticosteroid in infection has classically been contra-indicated due to a theoretical risk of sepsis.<sup>6</sup> But, corticosteroids are also known to have beneficial effects on the cartilage through a variety of mediators such as synovial RANKL expression, mast cells, and pro-inflammatory cytokines.<sup>6</sup> Investigation has suggested improved outcomes with corticosteroid use despite the theoretical risks.<sup>7</sup> Corticosteroids use is a well-established method for reducing joint inflammation, used in rheumatoid arthritis for decades.<sup>7</sup> Joint decompression can be achieved by closed-needle aspiration, tidal irrigation, arthroscopy, and arthrotomy.<sup>3</sup>

We describe management of septic arthritis with intra-articular corticosteroid injection alongside oral antibiotics and joint drainage in outpatient care/ hospital clinic.

## SOURCES OF INFECTION

Hematogenous spread occurs in 55% adult cases and 90% children cases.<sup>4</sup> Source of bacteremia are: (1) infections or invasive actions on the skin, respiratory tract, urinary tract, oral cavity, (2) intravascular catheter installation including central vein catheterization, percutaneous femoral artery catheterization, (3) intravenous drug injection.<sup>4,8</sup> Direct inoculation of bacteria occurs in 22%-37% in joints without prosthetics and up to 62% in joints with prosthetics.<sup>4</sup> In prosthetics, bacterial inoculation usually occurs during surgical procedure.<sup>4</sup> In the intact joint, bacterial inoculation occurs during joint surgery or



secondary to penetrating trauma, animal bites, or puncture into the joint space.<sup>4,8,9</sup>

The most common cause is *Staphylococcus aureus* followed by *Streptococcus pneumoniae*. *Streptococcus pyogenes* is often found in patients with autoimmune diseases, systemic skin infections, and trauma. Patients with a history of intravenous drug abuse (IVDA), extreme age, immunocompromise are often infected by gram negative bacillus *Pseudomonas aeruginosa* and *Escherichia coli*.<sup>10</sup> Anaerobic germs are usually found in DM patients and joint prosthesis.<sup>10</sup>

Predisposing factors are systemic factors such as extreme age, arthritis rheumatoid, diabetes mellitus, immunosuppression drug use, liver disease, alcoholism, chronic liver disease, malignancy, chronic kidney disease, hemodialysis, organ transplantation and local factors such as prosthetic joints, skin infections, surgery joints, joint trauma, osteoarthritis.<sup>3,10,11</sup>

### JOINT DRAINAGE (Synovial Fluid Aspiration)

Arthrocentesis (synovial fluid aspiration) of the knee can be performed either for diagnosis (for identification of the etiology in acute arthritis) or therapeutic (for pain relief, drainage of effusion, or injection of medications).<sup>12,13</sup> To avoid puncture of tendons, blood vessels, and nerves, clinician should be familiar with the anatomy of the specific joint. The risk of such injuries can be minimized by recognizing anatomic landmarks and palpation-guided arthrocentesis.<sup>14</sup> Ultrasound-guided arthrocentesis and injection of the knee seems superior to arthrocentesis and injection guided by anatomic landmarks and palpation significantly gave less procedural pain, improved arthrocentesis success, greater synovial fluid yield, more complete joint decompression, and improved clinical outcomes.<sup>14</sup>

### Indication

Indications for diagnostic knee arthrocentesis include the following:<sup>12-15</sup>

- Evaluation of monoarticular arthritis
- Evaluation of suspected septic arthritis
- Evaluation of joint effusion
- Identification of intra-articular fracture
- Identification of crystal arthropathy

Indications for therapeutic knee arthrocentesis include the following:

- Relief of pain by aspirating effusion or hemarthrosis
- Injection of medications (eg, corticosteroids, antibiotics, or anesthetics)
- Drainage of septic effusion

### Contraindication

No absolute contraindications for knee arthrocentesis. Relative contraindications include the following:<sup>12-15</sup>

- Cellulitis overlying the joint - If arthrocentesis is performed, the patient should be admitted for the administration of intravenous (IV) antibiotics, even if the synovial fluid is not suggestive of infectious arthritis
- Skin lesion or dermatitis overlying the joint
- Known bacteremia
- Adjacent osteomyelitis
- Uncontrolled coagulopathy
- Joint prosthesis – Preferably, a joint prosthesis is tapped by an orthopedist

### Patient Preparation

#### Anesthesia

Patients who are anxious, in severe pain, or unable to cooperate (most commonly children) might require procedural sedation and/or analgesia. Local anesthesia is always warranted. After skin preparation, draping, and identification of the needle insertion site, use a 25- or 27-gauge needle to inject 2-5 mL of local anesthetic (eg, lidocaine 1%) into the subcutaneous tissue (Figure 1). Deep injections that might enter the joint space are not recommended, because they may alter the synovial fluid analysis results.



Figure 1. Infiltration of local anesthetic via medial parapatellar approach (left knee).<sup>16</sup>

#### Positioning

Patient in supine position. Place a rolled towel below the patient's knee. A small but randomized study demonstrated that more

joint fluid was aspirated from supine position than from sitting position.<sup>15</sup>

### Technique<sup>12,16</sup>

The clinician should be familiar with the anatomy of the specific joint and cognizant of the relevant landmarks in order to avoid puncture of tendons, blood vessels, and nerves. (Figure 2)

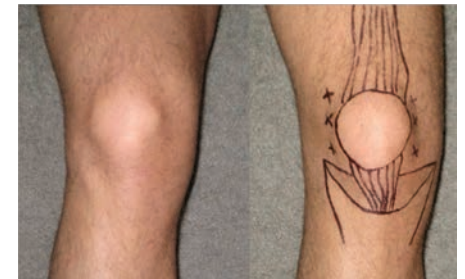


Figure 2. Anterior view and anatomic landmarks for knee aspiration<sup>16</sup>

### Aspiration of Synovial Fluid<sup>13</sup>

Knee arthrocentesis may be done via a parapatellar approach (preferred), a suprapatellar approach, or an infrapatellar approach.<sup>13</sup> Prepare the skin in the insertion site with sterile solution, allow drying, and then drape. Use a sterile technique, attach the 18- or 20-gauge needle to the 20 mL syringe, and pull the plunger in order to break resistance. Because the knee may hold up to 70 mL of fluid, a larger (50 mL) syringe is advisable in certain cases; an extra syringe should be available.

Stretch the skin over the insertion site, and insert the needle briskly into the joint space while gently aspirating until synovial fluid enters the syringe (in average adult, this usually occurs at 1-2 cm). Relaxation of the quadriceps muscle facilitates needle insertion. Placement of a towel under the popliteal region to flex the knee to 15-20° may facilitate entry by opening up the joint space.

For the parapatellar approach, identify the midpoint of either the medial or the lateral border of the patella. Insert an 18-gauge needle 3-4 mm below the midpoint of either the medial or the lateral border of the patella. Direct the needle perpendicular to the long axis of the femur and toward the intercondylar notch of the femur.

For the suprapatellar approach, identify the

midpoint of either the superomedial or the superolateral border of the patella. Insert an 18-gauge needle through the midpoint of either superior borders. Direct the needle toward the intercondylar notch of the femur. With this approach, the needle enters the suprapatellar bursa. In 10% population, the suprapatellar bursa does not communicate with the knee joint.<sup>13</sup>

For the infrapatellar approach, position the patient sit upright with the knee bent at 90° over the edge of the bed. Identify both sides of the inferior border of the patella and the patellar tendon. Insert an 18-gauge needle 5 mm below the inferior border of the patella and just lateral to the edge of the patellar tendon. Be careful not to go through the patellar tendon while inserting the needle.

If a bone is encountered during needle insertion, pull back the needle, verify the anatomic landmarks, and advance the needle in a corrected direction. If fluid stops flowing into the syringe, attempt to “milk” the suprapatellar region by applying gentle pressure to the region. If removal of more fluid is desired, a hemostat can be used to secure the needle in place while the syringe is replaced with a new one. Once aspiration is complete, the needle is removed and a bandage applied.

## CASE

A 30 year-old male, was admitted in orthopaedic policlinic at level II Army Hospital, Kubu Raya Regency with fever (40°C), difficult to walk because of left knee joint pain, swelling, redness, stiffness, and warmth (Figure 3). The symptoms occurred three days ago without trauma history.



Figure 3. Left knee with arthritis.

AP/Lateral X-Ray of left knee shows a normal knee joint (Figure 4). Blood analysis shows leukosytosis 19.800 cells/ul (granulocytes 16.100 cell/ul) and *Staphylococcus aureus* was found from the joint fluid culture.

## Diagnosis

Classic symptoms of septic arthritis: fever, malaise, local pain of the infected knee, swelling, and decreased joint movement.

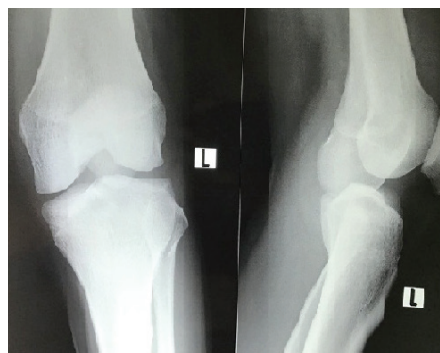


Figure 4. A normal knee x-ray on AP/Lateral views.

## Intervention

Aseptic procedure was done before injection. Joint drainage (joint decompression) was with closed needle aspiration of synovial fluid. The aspiration yielded hematopurulent fluid (Figure 5). After aspiration, intra-articular triamcinolone acetonide 40 mg and lidocain 2% 2 mL was injected, in addition to oral antibiotics (amoxicilin-clavulanate 500 mg/125 mg three times daily for 8 weeks).



Figure 5. Aspirate from the left knee joint (hematopurulent).

## DISCUSSION

Corticosteroids was used to relieve pain, to reduce joint inflammation and swelling, inhibition, and deleterious effect on several pro-inflammatory cytokines.<sup>7,17,18</sup> Corticosteroids use was based on the observation that bacterial antigens can promote cytokine proliferation within the joint and activate chondrocyte proteases<sup>19,20</sup>



and despite adequate treatment of infection, cytokine mediated inflammation persists, and that intraarticular corticosteroid may limit damage and improve outcome.<sup>19,20</sup> But corticosteroid injection can lead to post-injection septic arthritis. The reported incidence of post-injection septic arthritis is 1:3000–1:50000, according to large reported series, mainly in the United States.<sup>21</sup> Septic arthritis is a major complication following intraarticular steroid injections, as bacterial arthritis of any cause is associated with up to 15% mortality and residual impairment of joint function in up to 50% of the survivors.<sup>22</sup> Aseptic antiseptic procedures must done before injection. In Mayo Clinic, where 3000 intra- and periarticular steroid injections are performed annually, no infections were encountered with aseptic antiseptic techniques.<sup>23</sup>

In this case, antiseptic procedure was performed and drainage of the synovial fluid with closed needle aspiration. Oral antibiotics was used. Triamcinolone acetonide at doses of 40 mg and lidocain 2% injections were repeated three times within two weeks.

After 8 weeks, symptoms were significantly reduced, the patient can walk as usual (Figure 6).

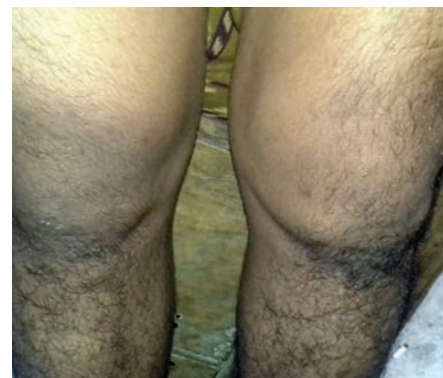


Figure 6. Left knee 8 weeks later, the symptoms were significantly reduced.

## CONCLUSION

A positive effect can be achieved through the combination of intra-articular corticosteroid injection with antibiotic therapy and joint drainage. Large prospective studies are needed to determine whether potential benefits outweigh the potential risks of intra-articular corticosteroid injection. Data on long term safety and the optimum route, dose and timing of corticosteroids are also required.



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