# Chapter 5
# Infectious Arthritis


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## Introduction

Septic arthritis is a true rheumatologic emergency that may lead to disability or death, needing prompt surgical evaluation [1]. Septic arthritis refers to an infection involving a joint. Most commonly this is due to a bacterial infection; however, viruses, fungi, and parasites can also invade articular surfaces and lead to infection. Septic arthritis affects two cases per 100,000 people per year [2]. Currently, the most commonly described organisms are *Staphylococcus aureus* – with MRSA increasing in incidence commensurate with the global increase, followed by gram-negative enteric organisms [3, 4]. Knowledge of the host, risk factors, and clinical presentation is crucial to allow for appropriate investigations, empiric antibiotic therapy, and management, particularly as this is a rheumatologic emergency.

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## Pathogenesis

A pathogen can gain access to a joint by a number of methods. An occult bacteremia is the most common cause of septic arthritis. Penetrating trauma, arthrocentesis, or joint injections can introduce infection, as well as smaller breaks in skin or mucous membranes may allow staph/strep to gain access to bloodstream. Septic arthritis from gram-negative enteric organisms is usually due to loss of integrity from the gastrointestinal or genitourinary tract [4, 5].

## Clinical Manifestations

In general, septic arthritis presents with a swollen, painful joint. Patients will typically display restricted movements on both active and passive movements, compared to a periarticular condition which should only elicit pain on active movements. The joint will typically be held in position of maximal intra-articular space [6]. In addition, septic arthritis will usually manifest with micro-motion tenderness, where even slight movements will exacerbate the pain. Most commonly patients will also have the classic signs of infection, including fevers; however, the elderly or immunosuppressed populations may not mount an infectious response.

The knee is involved in over 50% of cases; in addition the hip (15%), ankle (9%), elbow (8%), wrist (6%), and shoulder (5%) are commonly infected [7, 8]. Oligoarticular and polyarticular infection occurs in approximately 20% of septic joint infections and usually involves two or three joints – this has been reported more in the population of patients with inflammatory arthritis, namely, those with rheumatoid arthritis. This is of course exacerbated by immunosuppression with both DMARDs and biologics [9]. In addition, infections with pneumococcus, group B streptococcus, and gram-negative enteric organisms are more likely to present with polyarticular disease [7]. Importantly, particularly in cases of oligoarticular or polyarticular involvement, there should be a high index of clinical suspicion for hematogenous seeding, and a thorough evaluation for other sources of infection, including blood cultures, should be sought.

The cartilaginous joints including the pubic symphysis and sternoclavicular and sacroiliac joints are more likely to be affected in patients who use intravenous drugs. In these cases, it is recommended to evaluate for endocarditis [10].

## Diagnosis

The initial and imperative step to evaluating patients when there is any suspicion for septic arthritis is a joint aspiration. Ideally this is performed prior to administration of antibiotics. All synovial fluid specimens should be sent for gram stain, culture,

and cell count with differential. Additional tests for *Mycobacterium*, *Neisseria*, and *Borrelia burgdorferi* should be done in the appropriate clinical setting. When infected, the synovial fluid will typically be purulent and the leukocyte count is over 50,000, and these patients should be treated empirically for septic arthritis. Of note, if patients are either debilitated or immunosuppressed, they may have lower synovial fluid counts [11]. The gram stains are helpful when positive but not sensitive for the diagnosis of septic arthritis, and approximately 20% of suspected septic arthritis will have negative cultures on synovial fluid on solid media [12]. Serum procalcitonin level may be helpful in diagnosing septic arthritis [13]. It is also important to obtain blood cultures, as at least 1/3 of all patients with septic arthritis have associated bacteremia [2].

## Microbiology

Septic arthritis is monomicrobial in most cases, but polymicrobial infections may occur. This is usually in the setting of either hematogenous seeding from a polymicrobial bacteremia, direct extension from the bowel, or in the setting of penetrating trauma involving the joint space [14].

See Table 5.1 for a list of the most common pathogens.

## Staphylococcus

Staphylococcus is the most common cause of septic arthritis, seen in about 50% of cases. Septic arthritis caused by *Staphylococcus* is due to a transient bacteremia from a skin or mucous membrane source [16]. About half of these are MRSA joint

**Table 5.1** Common pathogens in septic arthritis [15]

| | Joint involvement | Pathogen |
|---|---|---|
| Soft tissue skin infection | Monoarticular, polyarticular | *S. aureus*<br>*Streptococcus* |
| Sexually active | Polyarticular | *Neisseria gonorrhoeae* |
| Elderly, UTI, skin breakdown | Monoarticular | Gram-negative rods including enteric organisms |
| IVDU | Sternoclavicular, sacroiliac, pubic symphysis | *Pseudomonas*, *S. aureus* |
| Rheumatoid arthritis | Monoarticular | *S. aureus* |
| Anti-TNF therapy | Monoarticular | *Salmonella*, *Listeria* |
| Animal bites | Small joints | Oral flora including anaerobes, *Pasteurella multocida* |
| Southwestern USA, Central and South America | Knee | *Coccidioides immitis* |

infections, which are associated with worse outcomes. This is also due to the fact that MRSA tends to affect older persons. It also reportedly commonly affects the shoulder – which is a difficult site to access [17].

## Streptococcus

Though the majority of streptococcal infections are monoarticular, polyarticular involvement has been reported in up to 36%. The incidence of *S. pneumoniae* has declined due to pneumococcal vaccinations. Beta-hemolytic strep seems most common in the elderly, those with diabetes, cirrhosis, and neurologic disease. Group B streptococcus has a high frequency of bacteremia with polyarticular involvement as a result. The mortality from septic arthritis caused by pneumococcus is high [18].

### *Gram-Negative Enteric Organisms*

Gram-negative enteric organisms are seen most often in intravenous injection drug users, neonates, older adults, and the immunosuppressed population. They account for up to 10% of cases of septic arthritis [19, 20]. Outcomes are found to be favorable for these patients [21].

### *Gonococcus*

Usually present in sexually active individuals. Seventy-five percent of cases occur in women; menses and pregnancy increase the risk of disseminated infection. There are two classic presentations of a disseminated gonococcal infection, the arthritis-dermatitis syndrome and a purulent arthritis. Patients with a disseminated gonococcal infection usually present with fevers, skin lesions, polyarthralgias, and tenosynovitis. Within a few weeks, these can evolve into a persistent monoarticular or oligoarticular arthritis. This purulent arthritis is characterized by abrupt onset, usually involving distal joints with knees, wrists, and ankles, with the knee being the most common. Axial involvement is rare. Routine cultures wont usually establish the diagnosis [22]. In order to isolate the organism, synovial fluid nucleic acid amplification testing or a culture on a chocolate agar or Thayer-Martin medium is usually required [22, 23]. That said, gonococci are recovered from joint fluid in fewer than 50% of cases. Current rising rates of gonorrhea resistant to fluoroquinolones and azithromycin suggest that epidemic gonorrhea may be recurring [7].

## Mycobacterium

*Mycobacterium tuberculosis* should be suspected in cases of an indolent presentation of persistent culture-negative monoarticular or oligoarticular arthritis in the setting of relevant epidemiologic exposure. The most common sites are the hip or knee and this is most often monoarticular – multifocal lesions are seen in 10–15% of cases [24]. Symptoms can be present for an average of a year before diagnosis. If patients present late in the course of they disease they may have evidence of joint destruction with deformity or reduced range of motion or chronic draining sinuses. The affected joint is generally cold, and obvious cardinal signs of infection, such as erythema and warmth, are usually absent. Constitutional symptoms such as fever and weight loss are seen in about 30% [7]. In order to isolate mycobacteria, a Ziehl-Neelsen stain is used, but it is important to note that this has low sensitivity for detecting acid-fast bacilli. The diagnosis is most accurately established via synovial membrane biopsy with histopathology and culture [25].

## *Fungal Infections*

Septic arthritis caused by fungal species usually has an indolent presentation. Similar to TB, this will be noted to have a persistent culture-negative oligo- or monoarthritis in the setting of relevant epidemiologic exposure. It is most commonly seen in those who are immunosuppressed. Fungal causes include sporotrichosis, coccidioidomycosis, and candidiasis. Diagnosis is established by a fungal stain and culture of synovial fluid or via synovial membrane histopathology and culture [26].

## *Viral Arthritis*

Usually present with polyarthritis and joints are sterile. Patients usually present with systemic symptoms including fevers, myalgia, and rashes. Examples include dengue, chikungunya, Zika, parvovirus, and rubella.

## *Parvovirus*

The spectrum of clinical disorders associated with B19 ranges from benign to life-threatening depending on age, hematologic status, and immunologic status of the host. Erythema infectiosum "fifth disease" is most common in children with fever, malaise, slapped cheek rash, and a maculopapular rash involving the trunk and limbs. Arthralgias may be seen in erythema infectiosum, but arthropathy usually

only presents in adults and is more prevalent in women. The arthritis can mimic rheumatoid arthritis and is typically a sudden onset symmetric polyarthritis primarily affecting the wrists, knees, ankles, and MCPs. The articular symptoms are usually brief in duration, but some do have prolonged symptoms that last weeks to years. The pathogenesis of arthritis in parvovirus is thought to be due to deposition of immune complexes in the synovial tissue because the onset coincides with appearance of B19-specific antibodies in the serum. Diagnosis is made by the presence of parvovirus IgM in serum. Treatment is supportive, and arthritis responds well to NSAID therapy [27].

### *Chikungunya*

Chikungunya virus is a single-stranded RNA virus and is transmitted by the Aedes vector. Generally there are two phases of the virus; the initial acute phase of the disease is called chikungunya fever and presents with high fever, rash, headache, severe polyarthralgia, and myalgias. This is usually followed by episodic and debilitating joint pain with joint swelling, and these patients may also have associated fatigue, myalgia, depression, and cognitive disorders. The inflammatory arthritis will often present in the acute phase and is unremitting; however, there can also be a phase of temporary remission prior to the development of a persistent arthritis. The arthritis is usually a symmetric polyarthritis involving the PIPs, MCPs, wrists, ankles, and knees, but there have been additional reports of hip, shoulder, and temporomandibular joint involvement. The arthritis can mimic other forms of inflammatory arthritis, such as rheumatoid arthritis, and it has been suggested by the ACR that patients with rheumatic symptoms persistent for more than 3 months should be referred for evaluation and classification as rheumatoid arthritis, spondyloarthritis, or undifferentiated polyarthritis. These patients can be treated with DMARDS also [28].

### *Acute Lyme Arthritis*

Caused by *Borrelia burgdorferi*. Acute monoarticular arthritis occurs in the setting of epidemiologic exposure in an endemic area. Erythema migrans, rash, fever, and migratory arthralgia may occur weeks or months prior. Diagnosis is usually established by serologic testing. The infection initially causes viral-like migratory arthralgia, followed by an intermittent oligoarticular arthritis that most commonly involves the knee but is also seen in other large joints. The diagnosis of Lyme arthritis can be made with a two-step serologic testing process involving enzyme-linked immunosorbent assay, followed by confirmation with a western blot or immunoblot test. *B. burgdorferi cannot* be cultured from synovial fluid, but PCR testing is positive in 85% of patients with Lyme arthritis, so this can also be used as a confirmatory test [29].

### *Less Common Pathogens*

#### Meningococcal Arthritis

This usually develops several days into antibiotic therapy and the joint fluid is sterile. Patients present with an isolated septic joint or an arthritis dermatitis syndrome similar to that of gonococcal arthritis.

#### Mycoplasma/Ureaplasma

These infections usually occur in the setting of hypogammaglobulinemia or organ transplantation [30, 31].

#### Whipples (*Tropheryma whippelii*)

In the majority of cases, this causes a nondestructive peripheral arthritis preceding the onset of abdominal pain, diarrhea, malabsorption, and weight loss by a mean of 8 years. These patients are often HLAB27 positive. Accompanying symptoms also include fever, lymphadenopathy, cutaneous hyperpigmentation, and cardiac and neurologic involvement. In order to make a definitive diagnosis, a small bowel biopsy is needed to isolate the organism, but PCR of synovial fluid may also be used [32].

#### *Brucella*

This involves the sacroiliac joint in 54% and about 7% develop spondylitis. It occurs in countries where livestock are not vaccinated and unpasteurized dairy products are consumed [33, 34].

## Prosthetic Joint Infections

Prosthetic joint infections occur in about 1% of knee and hip arthroplasties. These infections may lead to failure of the joint replacement [35]. Prosthetic joint infections are usually caused by gram-positive cocci, including coagulase-negative staphylococci and *S. aureus*. Risk factors for the development of prosthetic joint infections include previous fracture, seropositive rheumatoid arthritis, obesity, revision arthroplasty, and surgical site infections [36]. It is important to note that the intra-articular WBC cutoff values for a prosthetic joint infection may be as low as 1100. Another additional caveat making the diagnosis more difficult is the indolent

**Table 5.2** Empiric antibiotic therapy for suspected bacterial arthritis [6]

| Gram stain | Antibiotic |
|---|---|
| Gram-positive cocci | Vancomycin |
| Gram-negative cocci | Ceftriaxone |
| Gram-negative rods | Ceftazidime, cefepime, piperacillin/tazobactam, carbapenems.<br>If penicillin allergic: aztreonam, fluoroquinolones |
| Negative gram stain | Vancomycin plus either ceftazidime or an aminoglycoside |

clinical presentation. Antimicrobial treatment, debridement, exchange, or permanent removal of the prosthesis may be required. In some patients, long-term suppressive antimicrobial therapy may be warranted [37].

## Treatment

Empiric therapy depends on the gram stain (see Table 5.2 for an approach to treatment therapy). Failure to initiate antibiotics within 24–48 hours of onset can cause subchondral bone loss and permanent joint dysfunction. Given the increasing importance of MRSA as a cause of septic arthritis, the initial regimen should generally include an antibiotic active against MRSA such as vancomycin, along with a drug active against gram-negative bacilli with anti-pseudomonal coverage if critically ill or have a higher risk of gram-negative infection such as the elderly, immunocompromised, or IVDU [7]. The duration of therapy in patients with non-gonococcal arthritis is typically 3 or 4 weeks, usually 2 weeks parenteral therapy followed by 2 weeks of oral therapy, tailored to the microbial organism [38].

Drainage should be performed in setting of septic arthritis. This can be in the form of a needle aspiration, arthroscopic drainage, or open surgical drainage. Surgical drainage is indicated for septic arthritis of the hip, failure to respond to antibiotics after 5–7 days of antibiotic therapy and arthrocentesis, and soft tissue extension of infection. Of note, there is no data to support the efficacy of surgical drainage over arthrocentesis [6, 39].

## Prognosis and Complications

Predictors of mortality include age over 65, confusion at presentation, and polyarticular disease along with coexistent renal or cardiac disease and immunosuppression. Predictors of joint damage include age over 65, diabetes, and infection with beta-hemolytic strep [7]. If untreated, septic arthritis of the sternoclavicular or sacroiliac joint can lead to osteomyelitis as these are cartilaginous joints [10].

## Questions

1. A 37-year-old male presents with 2 days of pain and swelling in his L knee. He recently returned from a trip to Seattle with his friends, where he had two sexual partners and denies using any form of contraception. He denies any history of gout, or episodes of podagral. His vital signs are T 37.9, BP 122/78, HR 66, RR 18, POx 100% on room air. His CBC, CMP, and uric acid are unremarkable and his ESR is 42. On physical examination, you note no other systemic manifestations including absence of rashes and tenosynovitis. His knee is warm, with limited range of motion, and a palpable effusion. You decide to perform an arthrocentesis. In addition to routine cell count, gram stain, culture, and sensitivity, what else would you do at this time?

   A. Empiric treatment with vancomycin for septic arthritis
   B. Send additional synovial fluid to be cultured on Thayer-Martin media
   C. Send fluid for crystal analysis
   D. Start oral prednisone for a presumed gout flare

   Correct answer: B
   A disseminated gonococcal infection (DGI) can comprise of two major clinical syndromes: the arthritis-dermatitis syndrome and a localized purulent arthritis without associated skin lesions. There are also patients who present with symptoms that overlap these two presentations. This patient has presented with the localized purulent arthritis. Gonococcus will not culture on basic culture media and therefore requires Thayer-Martin media or chocolate agar to culture, and the diagnosis can be missed in cases where this is not properly assessed. At this time, if clinical suspicion was high, it would also be appropriate to start systemic treatment with IV ceftriaxone [40].

   Vancomycin does not cover gram-negative enteric organisms or gonococcus, and monotherapy with vancomycin alone would not be appropriate treatment at this time.

   Though a diagnosis of gout should be considered in young males presenting with acute monoarticular joint pain, septic arthritis should always be ruled out first as treating with steroids could exacerbate the septic arthritis. In addition, the presence of crystals alone does not rule out a concomitant infection.
2. A 75-year-old male presents to your office with 3 days of left shoulder pain. He was recently discharged from the hospital after a 2-week stay for cellulitis, complicated by a CHF exacerbation. He was discharged to an inpatient rehab facility 8 days ago. On physical exam his shoulder appears erythematous and swollen, and it is warm to palpation, and he has severe pain and limitation on both active and passive range of motion. His vital signs are T 100.9, BP 110/80, HR 101, RR 20, POx 95% on room air. You perform an arthrocentesis in your office and send off preliminary lab testing, which returns as follows:

- WBC: 14.7
- Hgb: 10.8
- Plt: 200
- BUN: 32
- Cr: 1.50
- ESR: 90
- CRP: 7.9

Synovial fluid analysis:

- Cell count 52,000 w/ 68% neutrophils
- Gram stain: numerous gram-positive cocci in clusters
- Crystals: none
- Culture: pending

What is your next step in management?

A. Oral Bactrim with close follow-up.
B. Await final culture data until deciding which organism to treat for.
C. Admit to hospital for IV vancomycin and contact orthopedic surgery for potential washout.
D. Admit to hospital for IV cefazolin and contact orthopedic surgery for potential washout.

Correct answer: C
This man has multiple risk factors for methicillin-resistant *S. aureus* (MRSA) including age and recent hospitalization, and he is currently also residing in a nursing home. For this reason, he should be empirically treated for MRSA until the culture data and sensitivities return [7]. Cefazolin does not cover for methicillin-resistant *S. AUREUS*.

Oral Bactrim would be inappropriate, as septic arthritis should always initially be treated with parenteral antibiotics as well as drainage.

Septic arthritis represents a medical emergency and should be treated with empiric antibiotics if there is any clinical suspicion, until an alternative diagnosis is made or infection is ruled out; therefore, it would not be correct to wait to treat until the culture data returns.

3. A 46-year-old male with a history of NIDDM presents with lower back pain for 2 months. He is a farmer and occasionally helps out his younger brothers on a farm in Mexico. He has not visited this farm in 2 years, but states that when he last returned 2 years ago, he had a 2-week flu-like illness. He states the pain is localized to the right buttocks and is most severe when he wakes up in the morning, usually feeling stiff for about 2 hours. He denies any other joint pain. You obtain radiographs of his lumbosacral spine and sacroiliac joints which reveal sclerosis and pseudo-widening at the right sacroiliac joint but are otherwise unremarkable.

What is the most likely pathogen?

A. *Brucella*
B. *E. coli*
C. *S. aureus*
D. *Pasteurella multocida*

Correct answer: A
Patient presents with sacroiliitis and a history of travelling to a farm in Mexico followed by a flu-like illness. This organism is most commonly found in those exposed to unpasteurized milk products. *Brucella* will usually present with a classic flu-like illness with fevers, myalgias, and arthralgias, and, if untreated, long-term complications can result in endocarditis, orchitis, and sacroiliitis [33, 34].

The other organisms mentioned are not typical pathogens that cause sacroiliitis.

4. A 27-year-old female who works as a nanny presents with diffuse joint pain in her MCPs, PIPs, and wrists as well as the MTPs. This started 4 days ago. She states that her joints feel stiff. She states she has also been feeling unwell and reports she measured her temperature yesterday and it was 100.4. She has no visible rashes, and her preliminary lab workup is essentially unremarkable with the exception of a low WCC 3.0 and an ESR of 50. Two days later, her parvovirus IgM returns highly elevated. You call her to discuss the results, and she is concerned about developing deformities in her joints.

   What do you tell her with regard to the long-term outcome?

   A. She is at increased risk of developing rheumatoid arthritis.
   B. She will likely develop some deformities in her MCPs.
   C. There is no risk of the development of deformities after a parvovirus infection.
   D. She is at increased risk for developing lupus.

   Correct answer: C
   Patient presents with an acute parvovirus B19 infection, which can present with a polyarticular arthritis or arthralgias, mainly affecting the small joints of the hands and feet, as well as knees and wrists. This can mimic many other forms of arthritis such as rheumatoid arthritis and Jaccoud's arthritis in SLE; however, these patients will not develop deformities or erosions, and the articular symptoms should resolve in less than 6 weeks [41].

5. The following is a predictor of joint damage in patients with septic arthritis:

   A. Diabetes
   B. Infection with MRSA
   C. Confusion at presentation
   D. Polyarticular disease

Correct answer: A
Diabetes is a predictor of joint damage in patients with septic arthritis. Confusion at presentation and polyarticular disease are predictors of mortality [7].

6. Which of the following organisms would be expected to present with a lower cell count in synovial fluid?

   A. *Neisseria gonorrhoeae*
   B. *S. aureus*
   C. *S. pneumoniae*
   D. *Borrelia burgdorferi*

   Correct answer: A
   Patients with *Neisseria gonorrhoeae* can present with lower synovial fluid counts, sometimes in the inflammatory range. For this reason, in the appropriate clinically setting, a high index of suspicion should remain for a septic arthritis due to gonococcus and appropriate, and evaluation and treatment should be performed.

7. A 26-year-old female returns to your office for follow-up. One month ago you diagnosed her with Lyme arthritis after she presented with monoarticular swelling in her knee in the setting of a recent tick bite and positive western blot. You treated her with a 28-day course of doxycycline 100 mg BID, and she returns today reporting suboptimal improvement.

   What is your next step in management?

   A. Admit for IV ceftriaxone.
   B. Reassurance and supportive care with NSAIDs.
   C. Repeat with another course of doxycycline 100 mg BID for 28 days.
   D. Amoxicillin 500 mg BID for 30 days.

   Correct answer: C
   According to the Infectious Disease Society of America, patients with Lyme disease should be treated with a 30-day course of oral doxycycline 100 mg twice daily or amoxicillin 500 mg three times daily. If there is residual joint swelling after a 30-day course of oral antibiotics, then it is advised to repeat the oral regimen for another 30 days. If this second antibiotic course does resolve the arthritis, patient should be admitted for IV ceftriaxone. Of note, there is no added efficacy of treating with amoxicillin over doxycycline [42].

8. A 37-year-old male who recently moved to the United States from Bangladesh presents to your office with 3 weeks of pain and swelling in his MCPs and wrists bilaterally. Two months ago he developed a dry cough and notes intermittent fevers, but he has not been to see a doctor since this began.

   He is currently afebrile, BP 101/78, HR 88, RR 18, pOx 95% on room air. On physical exam there is a notable symmetric polyarthritis involving the MCPs, PIPs, and wrists without visible deformities. There are reduced breath sounds in the right upper lobe.

What is the next step in evaluating this patient?

A. Check RF and CCP.
B. Check hepatitis serologies.
C. Check quantiferon and chest XR.
D. XR of bilateral hands.

Correct answer: C
Poncet's disease is a form of reactive arthritis that develops in patients with active tuberculosis (TB). It is a nondestructive para-infective symmetric polyarthritis that can present in a similar nature to RA, predominantly involving the MCPs, PIPs, and wrists. PD is essentially a diagnosis of exclusion and requires a high degree of clinical suspicion. The dramatic response of arthritis in PD on starting anti-tubercular treatment substantiates the diagnosis [43].

9. A 44-year-old women who works at a daycare presents low-grade fevers to your office. She has rheumatoid arthritis and is currently taking methotrexate 25 mg weekly and adalimumab 40 mg SQ every 2 weeks and has recently tapered off a 3-month course of prednisone. Given her immunosuppression, you send her to the hospital for further evaluation. She gets admitted and found to be parvovirus B19 positive. Given her level of immunosuppression, which treatment could exacerbate her joint and cutaneous symptoms?

A. Tacrolimus
B. Prednisone
C. Indomethacin
D. IVIG

Correct answer: C
In patients who are immunosuppressed, including those treated with chronic corticosteroids and biologic therapy, parvovirus may not present with the classic symptoms and signs and may only manifest with fever. In these cases, treatment with IVIG could exacerbate the musculoskeletal and cutaneous manifestations of parvovirus [27].

10. A 26-year-old female presents to your office after a trip to the Caribbean. She presents with fever to 101, a diffuse maculopapular rash, arthralgias, and periorbital pain. After discussion with your colleague who is an infectious disease specialist, you send off viral serologies which return positive for both dengue fever and chikungunya. Her most debilitating symptom is her arthralgia and she asks you what she can take for pain. What would you recommend for her to take at this time?

A. Indomethacin
B. Acetaminophen
C. High-dose aspirin
D. Ibuprofen

Correct answer: B
In cases of a co-infection of parvovirus with dengue fever, aspirin or NSAIDs can exacerbate the hepatitis and bleeding complications associated with dengue fever and should be avoided [28].

**Key Points**

- Septic arthritis is a true rheumatologic emergency requiring prompt surgical evaluation.
- Bacterial infections are usually monoarticular and the knee is the most common joint involved.
- Bacterial infections are the most prevalent, of which *S. aureus* being the most common organism, with the incidence of MRSA on the rise.
- Multiple viral infections can mimic inflammatory arthritis as the arthritis is present mostly in the smaller joints in the hands and feet; these joints are often sterile.
- Gonococcal arthritis should be considered in young patients presenting with monoarticular knee arthritis, particularly if there is coexisting tenosynovitis or skin lesions.
- Fungal infections usually have an indolent presentation, considered in immunosuppressed.
- Prosthetic joint infections are usually caused by GPCs and may present with lower cell counts and a more indolent presentation.
- In the immunosuppressed population, the presentation may be atypical, with absence of fever or classic erythema, warmth, and limited range of motion.
- The most important step in both evaluation and for guiding treatment is arthrocentesis in order to identify the organism and rule out differential diagnoses such as crystalline arthritis.
- Empiric antibiotic therapy should be started immediately following aspiration to avoid subchondral bone loss and permanent joint dysfunction.
- Involvement of orthopedic surgery early on is necessary for drainage of the involved joint.

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