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Management of Septic Arthritis in Emergency Department

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Bacterial arthritis is an inflammation of the joints caused by an infectious etiology, usually bacterial, but there are also fungi, mycobacteria, viruses, or other rare pathogens. Both healthy and predisposed people can be infected.

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Nongonococcal infectious arthritis, usually a monoarticular disease, affects multiple joints in about 10% of patients and is a new form of septic arthritis. Without treatment, it can progress rapidly and cause irreversible damage to the joints. The overall incidence of bacterial arthritis is 2 to 6 per 100,000, depending on the presence of risk factors. Bacterial arthritis is more common in children than in adults. The incidence of septic arthritis peaks between the ages of 2 and 3 and is predominantly male (2: 1). Most septic joints develop as a result of hematogenous dissemination of the vascular synovium due to bacterial episodes. Osteoarthritis, rheumatoid arthritis, and corticosteroid therapy are the most common predisposing conditions. Typical symptoms of acute septic arthritis without gonorrhea include recent fever, malaise, and local findings of pain, warmth, swelling, and restricted mobility of the affected joint. Accurate history and assessment of risk factors can provide important clues for diagnosis. Careful assessment of risk factors can significantly change the likelihood of a provider developing septic arthritis prior to testing. Laboratory findings, diagnostic imaging, and synovial fluid assessment are all useful for diagnosis. Management components include early detection and treatment with joint aspiration, antibiotics, and orthopedic advice for possible surgical management. Widespread antibiotics are often needed due to the potential for rapid joint destruction. A combination of cefepime or anti-Pseudomonas aeruginosa beta-lactams and vancomycin is recommended to cover both Gram-negative and MRSA bacteria.

Keywords: Septic arthritis; joint inflammation; infectious etiology; monoarticular.

1. INTRODUCTION

Bacterial arthritis is an inflammation of the joints caused by an infectious etiology, usually bacterial, but can also be a fungus, mycobacteria, virus, or other rare pathogen.

Bacterial arthritis is usually a single joint and affects large joints such as the hip and knee. However, polyarticular septic arthritis with multiple or smaller joints can also occur [1]. In rare cases, septic arthritis is an emergency that can cause serious joint damage and leads to increased morbidity and mortality. Acute septic arthritis without gonorrhea is an emergency medical treatment that can lead to significant morbidity and mortality. Early diagnosis and treatment are essential to maintain joint function. A 2009-2012 study of the health burden of septic arthritis in the United States found that total costs of septic arthritis increased by 26% and hospitalization costs increased by 24%, but there was a temporal trend in length of stay and outcome of hospitalization. Was not seen. Long-term mortality in older patients with septic arthritis is increased by an increased predisposition to coexist [2].

Nongonococcal infectious arthritis is an acute or subacute disease with potentially significant morbidity and mortality. It can be caused by bacteria, mycobacteria, or fungi. Both healthy and predisposed people can be infected. Nongonococcal infectious arthritis is usually a monoarticular disease, but it affects multiple joints in about 10% of patients [3].

Bacterial arthritis is an emergency. Without treatment, it can progress rapidly and cause irreversible damage to the joints.] Staphylococcus aureus is the leading cause of nongonococcal septic arthritis, accounting for about 50% of all cases.

2. EPIDEMIOLOGY

The overall incidence of bacterial arthritis is 2 to 6 per 100,000, depending on the presence of risk factors. Bacterial arthritis is more common in children than in adults. The incidence of septic arthritis peaks between the ages of 2 and 3 and is predominantly male (2: 1). High-risk children's subgroups include newborns, hemophilia with intra-articular hemorrhage, immunodeficiency (eg [4] adult risk factors include age 80 and older, true diabetes, rheumatoid arthritis, recent joint surgery, Artificial joints, previous intra-articular injections, skin infections, including skin ulcers, human immunodeficiency virus, osteoarthritis, sexual activity (especially if adenitis septic arthritis is suspected)), Other causes of septicemia[5].

2.1 Source of Infection

Most septic joints develop as a result of hematogenous dissemination of the vascular synovium due to bacterial episodes. Although rare, acute septic arthritis can also occur as a result of joint aspiration or topical injection of corticosteroids into the joint. In addition, bacterial arthritis can be secondary to penetrating trauma

(such as a human or animal bite or nail puncture) or trauma to a joint without obvious skin damage [6]. Direct introduction of bacteria during joint surgery is a cause of increased bacterial arthritis, especially in relation to knee and hip arthroplasty. Joint infections can also develop when bone infections invade the intracapsular area through the outer cortex, especially in children. In infants, small capillaries cross the epiphyseal growth plate, allowing the infection to spread to the epiphyses and joint space. In children over 1 year of age, osteomyelitis infection is more likely to begin in the sinusoidal vein at the metaphysis and is usually found in the growth plate [7]. As long as the metaphysis is not within the capsule, the joint is preserved. The infection spreads laterally, breaking through the cortex and lifting the loose periosteum to form a subperiosteal abscess. In adults, the growth plate is reabsorbed and the infection can spread to the joint space again. For children; overall, Staphylococcus aureus is the most common bacterial pathogen. Some pathogens are associated with certain age groups and underlying illnesses.

Kingella Kingae is the most common cause of Gram-negative bacteria in children under the age of 2-3. Group B streptococci, Staphylococcus aureus, and Gram-negative bacilli are common in newborns. Gonorrhea is a problem in sexually active adolescents [8].

Salmonella infection is associated with sickle cell anemia. Patients receiving long-term antibiotic therapy are at risk for fungal infections. Puncture wounds and the use of injections are associated with Pseudomonas aeruginosa joint infections. The hip joint is most commonly affected by children [9]. In adults; Staphylococcus aureus is the most common infectious agent in adults. Streptococcal pneumonia is less common, but it is still an important source of infection in adults. Other special situations are as described above (Salmonella in patients with sickle cell disease, Pseudomonas in trauma / puncture wounds) [10]. Fungal and mycobacterial organisms are insidious and can be more difficult to diagnose. Synovial fluid smears of acid-fast bacilli are often negative, but synovial biopsies have a 95% chance of being positive. The knee joint is the most commonly affected joint in adults, followed by the hip joint.

Polymicrobial joint infections occur in about 5% of patients as a result of trauma or abdominal infection. Infection of the sternoclavicular and sacroiliac joint often occur in patients with IV drug abuse and usually involve serratia and pseudomonas. Individuals with leukemia are highly susceptible to Aeromonas infections [11].

Joints previously damaged especially in patients with rheumatoid arthritis are highly susceptible to infection. The organisms damage the articular cartilage along the lateral edges of the joint. Effusions are common and often associated with pain.

2.2 Risk Factors

Osteoarthritis, rheumatoid arthritis, and corticosteroid therapy are the most common predisposing conditions. Patients with rheumatoid arthritis, in particular, have about 10 times the incidence of septic arthritis in the general population. Patients with diabetes mellitus, leukemia, liver cirrhosis, granulomatosis, cancer, hypogammaglobulinemia, intravenous substance abuse, or renal disease, and those receiving cytotoxic chemotherapy also have a higher incidence of septic arthritis. Become [12]. The total internal prosthesis is susceptible to intraoperative or hematogenous dissemination and subsequent infection of the joint prosthesis. HIV-infected patients have a higher prevalence of musculoskeletal infections than the general population (about 60 or 2-10 cases per 100,000 population per year), but this high incidence is a common risk factor for septic arthritis. It is unknown whether it is due to. Intravenous substance abuse and multiple transfusions in this patient population [13].

2.3 Clinical Presentation

Typical symptoms of acute septic arthritis without gonorrhea include recent fever, malaise, and local findings of pain, warmth, swelling, and restricted mobility of the affected joint. A significant number of patients have mild fever and may not have local fever or erythema around the affected joints. Physicians should obtain a detailed medical history with particular emphasis on determining the presence of the above risk factors. However, the diagnosis of infectious arthritis is based on the isolation of the pathogen from synovial fluid [14].

Any joint can be infected, but the most commonly affected joints in nongonococcal septic arthritis are the knees and hips, followed by the shoulders and ankles. The hip may be more

frequently involved in children. Also, infectious nongonococcal arthritis is monoarticular in 80 to 90% of cases. Atypical joint infection, including the sternoclavicular, costochondral, and sacroiliac joints, may be common in intravenous drug users. Also, penetrating trauma, including human or animal bites, and local corticosteroid therapy may cause septic arthritis in atypical joints. Polyarticular septic arthritis is usually accompanied by a number of risk factors [15].

2.4 Diagnosis

Nongonococcal septic arthritis is an emergency medical treatment that can lead to serious sequelae and death. Therefore, rapid detection and treatment are important for a good prognosis. Accurate history and assessment of risk factors can provide important clues for diagnosis. Careful assessment of risk factors can significantly change the likelihood of a provider developing septic arthritis prior to testing [16]. Test results of 4,444; White blood cell count in peripheral blood usually increases in children, but is often in the normal range in adults. Most patients display elevated Creactive protein levels and erythrocyte sedimentation rates [17]. Synovial fluid analysis is also very important and usually reveals turbid, lowviscosity fluid with leukocyte counts usually in excess of 50,000/mm3. However, nonbacterial inflammatory processes, such as acute crystalline joint disease or reactive arthritis, may have counts above this level while gonococcal and granulomatous arthritis may have counts below 50,000/mm3. In nongonococcal arthritis, the fraction of polymorphonuclear leukocytes approaches 90%. Even though low joint fluid glucose levels (<40 mg/dl or less than half the serum glucose concentration) and high lactate levels are nonspecific, they are suspicious for bacterial arthritis [18]. Normal glucose and lactate levels in the joints are usually found in patients with viral arthritis. Adult synovial fluid with monoarthritis is examined for negative birefringence (uric acid) and positive birefringence (calcium pyrophosphate dihydrate) crystals by compensatory polarizing microscopy to rule out crystalline joint disease. is needed. However, co-bacterial infections and crystalline diseases have been reported. Gram stain of synovial fluid is useful in diagnosing septic arthritis [19]. In addition, it can distinguish between infections from Gram-positive and Gram-negative bacteria, thereby directing the first antibacterial therapy before obtaining antibiotic-sensitive results. Synovial fluid should be fed to aerobic, anaerobic, mycobacterial and fungal cultures before starting antibacterial therapy. Antibiotic susceptibility also needs to be determined. In nongonococcal arthritis, culture is positive with a probability of about 90%, but Gram stain is only effective in 50% of cases. These cultures can be negative in patients who have already started treatment [20].

Once collected, joint samples should be rapidly transported to clinical microbiology and should not be left untreated or cultured for extended periods of time. One study found that by inoculating an aspirated sample directly into a blood culture tube, a very small amount of viable bacteria could be detected in the infected liquid [21]. However, this approach can also lead to increased false positives due to generalized skin or other contaminants. If the liquid culture is sterile but suspected of having septic arthritis persists, synovial tissue samples can also be cultured for microbial isolation and identification. Sputum, urine, and blood cultures are also often required. About half of all patients with nongonococcal arthritis are positive for blood cultures [22].

Imaging; X-rays of the affected joints are usually taken, which may reveal soft tissue swelling and joint effusions. Chronic bone changes and calcifications are seen in the later stages of septic arthritis. Modern diagnostic imaging, including computed tomography and magnetic resonance imaging, is of little use in acute diagnosis, but is more sensitive and specific than simple radiography. Ultrasound helps determine the presence of intra-articular exudate and identify the optimal suction site [23].

Synovial fluid; Synovial fluid is the gold standard for excluding septic arthritis in patients with high clinical suspicion [24]. The results of aspiration also help determine the etiology of joint effusion. However, some of these results may overlap between categories. The numbers in this table are from several meta-analyses and are provided here in one place [25].

2.5 Management

Rapid diagnosis and treatment reduce the risk of significant morbidity and mortality. Risk factors associated with increased risk of joint destruction include age > 65 years, diabetes, and beta-hemolytic streptococci infection, while risk factors for mortality include age > 65 years, confusion at time of initial presentation, and polyarticular

involvement [26]. Components of management include early recognition and treatment with joint aspiration, antibiotics, and orthopedic surgery consultation for possible operative management [27].

Due to the potential for rapid joint destruction, broad-spectrum antibiotics are often needed. In patients with strong concern for septic arthritis or in those who are critically ill, both Gram-negative and MRSA coverage is recommended with a combination of cefepime or an antipseudomonal beta-lactam agent and vancomycin, respectively. If the patient is allergic to vancomycin, daptomycin, clindamycin, or linezolid may be utilized instead. [28] Once the specific organism is determined, antibiotic therapy should be narrowed. There is currently no role for intra-articular antibiotics or intra-articular corticosteroids for these patients in the emergency department setting [29].

While many patients may be managed with antibiotics alone, it is important to involve orthopedic surgery, as some patients may require arthroscopy, serial arthrocentesis, or arthrotomy in addition to the antibiotics. Arthrocentesis removes bacteria and toxins, decompresses the joint space, and improves blood flow, which may improve recovery [30]. Arthrocentesis is typically repeated on a daily basis until cultures are negative and effusions resolve. In cases that fail to respond to serial arthrocentesis, soft tissue infections that extend outside of the joint or involvement of the hip joint, surgical drainage is often indicated. Septic arthritis involving the shoulder may be managed with surgical or radiologically-guided techniques. Some joints, such as the sternoclavicular joint, do not respond well to antibiotics alone. In these cases, cardiothoracic surgical consultation is recommended [31].

Prompt diagnosis and treatment reduces the risk of significant morbidity and mortality. Risk factors associated with an increased risk of joint destruction include age 65 and older, diabetes, and beta-hemolytic streptococcal infection, and risk factors for death include age 65 and older, confusion at first visit, and polyarthritis. Includes lesions [26]. Management components include early detection and treatment with arthrocentesis, antibiotics, and orthopedic advice for possible surgical management [27].

Widespread antibiotics are often needed because joints can be destroyed rapidly. Cefepime or anti-Pseudomonas aeruginosa beta-lactams in combination with vancomycin are recommended for both Gram-negative and MRSA in patients with or severely ill patients with severe septic arthritis. If the patient is allergic to vancomycin, daptomycin, clindamycin, or linezolid can be used instead. (28) Once a particular organism has been identified, antibiotic therapy should be restricted. Currently, intra-articular antibiotics or intra-articular corticosteroids do not play a role in patients in these emergency rooms. [29].

Many patients can be treated with antibiotics alone, but it is important to include orthopedic surgery as some patients require arthroscopy, continuous arthrocentesis, or arthrotomy in addition to antibiotics. is. Arthrocentesis removes bacteria and toxins, decompresses the joint space, and improves blood circulation. This will improve recovery. [30] Arthrocentesis is usually repeated daily until the culture is negative and the exudate subsides. Surgical drainage is often indicated when there is no response to continuous arthrocentesis, extra-articular soft tissue infection, or hip lesions. Bacterial arthritis that affects the shoulders can be treated with surgical or radiographic techniques. Some joints, such as the sternoclavicular joint, do not respond well to antibiotics alone. In these cases, cardiothoracic surgery advice is recommended [31].

3. CONCLUSION

Bacterial arthritis is an inflammation of the joints due to an infectious etiology and is usually bacterial. It is more common in children than in adults. Typical symptoms of acute septic arthritis without gonorrhea include recent fever, malaise, and local findings of pain, warmth, swelling, and limited mobility of the affected joint. Accurate medical history and careful assessment of risk factors, laboratory findings, imaging, and synovial fluid assessment can help make a diagnosis. Management components include early detection and treatment with arthrocentesis, antibiotics, and orthopedic advice for possible surgical management. Widespread antibiotics are often needed due to the potential for rapid joint destruction. It is recommended to cover both Gram-negative and MRSA bacteria.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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