

Are we managing acute knee effusion well?

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ABSTRACT

Background: Non-traumatic knee effusion is a common referral to the on-call Orthopaedic team. The two most common causes of this presentation are septic and crystal arthritis. Crystal-induced arthritis can easily be overlooked or misdiagnosed as septic arthritis resulting in patients having unnecessary antibiotic therapy and surgical procedures.

Objectives: To review our management of patients with hot swollen knees, especially those due to crystal arthritis.

Materials and methods: We performed a retrospective study of patients presenting to the emergency department with acute non-traumatic knee effusion. A total of 180 patients were identified; 60 patients were included in the study.

Results: All joints were aspirated and samples were sent for microscopy, culture and antibiotic sensitivity, and polarized light microscopy. Twenty six patients were admitted and received antibiotic therapy based on clinical suspicion of infection, arthroscopic washout was performed on eight. Four patients showed positive microscopic growth while eight had crystals identified on polarized light microscopy of joint aspirate. Only two (25%) patients with crystal arthropathy received appropriate treatment and a rheumatology referral. Seven patients developed complications during their hospital stay.

Conclusion: Crystal arthritis is a common and serious cause of acute painful knee that can lead to joint damage if not treated properly. We should always remember to follow up the results of polarized light microscopy of joint aspirates. Prompt diagnosis can avoid unnecessary antibiotic therapy and surgical intervention. All patients with confirmed crystal arthritis should receive a rheumatology referral for further management and follow up.

KEYWORDS: Crystal arthritis, gout, hot swollen knee, Pseudogout, polarized light microscopy

Introduction

Acute non-traumatic knee effusion is a common condition presenting to the Orthopaedic department which can be caused by a wide variety of diseases (Table 1). Septic arthritis is the most common and serious etiology. It can involve any joint; the knee is the most frequently affected. Accurate and swift diagnosis of septic arthritis in the acute setting is vital to prevent joint destruction, since cartilage loss occurs within hours of onset^{1,2}. Inpatient mortality due to septic arthritis has been reported as between 7-15%, despite improvement in antibiotic therapy^{3,4}. Crystal arthritis (Gout/Pseudogout) is the second most common differential diagnosis. It is often under-diagnosed and subsequently patients do not receive rheumatology referral for appropriate treatment and follow-up. In addition, some patients are misdiagnosed and treated as septic arthritis with inappropriate antibiotics. Untreated crystal-induced arthropathy has been shown to cause degenerative joint disease and disability leading to a considerable health economic burden.^{6,7}

When the patient is systemically unwell, it is common practice to start empirical antibiotic treatment after joint aspiration for the fear of septic arthritis. This aims to minimize the risk of joint destruction while awaiting gram stain microscopy and microbiological culture results. In a persistent painful swollen knee with negative gram stain and culture, antibiotic therapy can be continued with or without arthroscopic knee washout based on clinical suspicion of infection⁸.

We have therefore undertaken a retrospective study to review our management of patients with non-traumatic hot swollen knees and in particular patients with crystal-induced arthritis.

Materials and methods:

We performed a retrospective review of 180 patients presenting consecutively with acute non-traumatic knee effusion referred to the on-call Orthopaedic team in the hospital of study between November 2008 and November 2011. Sixty patients were included in the study (Table 2). There were 43 males and 17 females, with a mean age of 36 years (range, 23- 93 years).

Patient demographics, clinical presentation, co-morbidities, current medications and body temperature were recorded. The results of blood inflammatory markers (WBC, CRP), blood cultures, synovial fluid microscopy, culture and polarized microscopy were also collected. Subsequent treatment (e.g. antibiotics, surgical intervention), complications, and mortality rates were reviewed.

Results:

On presentation, a decreased range of movement was evident in all patients. Associated knee pain was reported by 55 patients (92%), and 24 patients (40%) had fever (temperature $\geq 37.5^{\circ}$). All joints were aspirated prior to starting antibiotics and samples were sent for gram stain microscopy, culture and antibiotic sensitivity, and polarized light microscopy.

Of the 60-patient cohort, 26 were admitted and started on intravenous antibiotics based on clinical suspicion of infection (Table 3). The median duration of inpatient admission was 4 days (range, 2 to 14 days). The median duration of antibiotic

therapy was 6 days (range, 2 to 25 days). Eighteen patients were treated non-operatively by means of antibiotics and anti-inflammatory medications. Arthroscopic washout was performed in the remaining eight knees. In this group of patients, leucocyte count in the joint aspirate ranged from 0-3 leucocyte/mm³, blood leucocyte count ranged from 4-20 leucocyte/mm³, while mean CRP was 37.8 mg/l (range, 1-275 mg/l).

Review of laboratory results revealed that four patients had positive microscopic growth on gram stained films. Two samples showed staphylococcus aureus growth and two grew beta haemolytic streptococci. Eight patients had crystals identified on polarized light microscopy of joint aspirate. Three showed monosodium urate (MSU) crystals while five had calcium pyrophosphate (CPP) crystals. They received antibiotic therapy for a mean duration of 10 days (range, 1-30 days). Two patients were taken to theatre for arthroscopic lavage. Only two patients received rheumatology referral.

Seven patients developed complications during their hospital stay. Four contracted diarrhoea; three of which had negative stool cultures but one was positive for clostridium difficile, developed toxic megacolon and died. One patient with known ischemic heart disease had a myocardial infarction and died. Two further patients acquired urinary tract infections.

Discussion:

Acute monoarthritis of the knee joint can be a manifestation of infection, crystal deposits, osteoarthritis and a variety of systemic diseases. Arriving at a correct diagnosis is crucial for appropriate treatment⁹. Septic arthritis, the most common etiology, develops as a result of haematogenous seeding, direct introduction, or extension from a contiguous focus of infection. Joint infection is a medical emergency that can lead to significant morbidity and mortality. Mainstay of treatment comprises appropriate antimicrobial therapy and joint drainage^{10,11}. Literature reveals the knee is the most commonly affected joint (55%) followed by shoulder (14%) in the septic joint population¹²⁻¹³.

The second most common differential diagnosis is crystal-induced monoarthritis. Gout and pseudogout are the two most common pathologies¹⁴. They are debilitating illnesses in which recurrent episodes of pain and joint inflammation are caused by the formation of crystals within the joint space and deposition of crystals in soft tissue. Gout is caused by monosodium urate (MSU) crystals, while pseudogout is inflammation caused by calcium pyrophosphate (CPP) crystals, sometimes referred to as calcium pyrophosphate disease (CPPD)^{15,16}. Misdiagnosis of crystals arthritis or delay in treatment can gradually lead to degenerative joint disease and disability in addition to renal damage and failure⁵. The clinical picture of acute crystal-induced arthritis can sometimes be difficult to differentiate from acute septic arthritis. It is manifested by fever, malaise,

raised peripheral WBC, CRP and other acute phase reactants. Synovial fluid aspirate can be turbid secondary to an increase in peripheral polymorphonuclear cells. Diagnosis can be challenging and therefore crystal identification on polarized microscopy is considered the gold standard^{17,18,19}. Rest, ice and topical analgesia may be helpful but systemic non-steroidal anti-inflammatory medications are the treatment of choice for acute attacks provided there are no contraindications²⁰.

In this study, all joints were aspirated and samples were sent for microscopy, culture and sensitivity, and polarized microscopy for crystals in-line with the British Society of Rheumatology and British Orthopaedic Association guidelines⁸. Aspiration not only helps diagnosis but in addition reduces the pain caused by joint swelling. Twenty six patients were admitted, on clinical and biochemical suspicion of septic arthritis. They presented with acute phase response manifested by malaise, fever and raised inflammatory markers and were treated with antibiotic therapy and non steroidal anti-inflammatory medications while awaiting the results of microbiology and polarized light microscopy. Four of these patients developed complications secondary to antibiotic therapy including death due to clostridium difficile infection and subsequent toxic megacolon.

Infection was confirmed to be underlying cause in four patients (6%) who showed positive microscopic growth on gram stained films. They underwent arthroscopic washout and continued antibiotic therapy according to the result of culture and sensitivity of their knee aspirate till their symptoms and blood markers were normal. Arthroscopic washout was required for four patients with negative microscopic growth due to persistent symptoms despite antibiotic treatment, as recommended by the British Society of Rheumatology and the British Orthopaedic Association⁸. Two patients showed calcium pyrophosphate crystals on polarized microscopy and two had no bacterial growth or crystals.

We retrospectively reviewed laboratory results and found that eight patients (13%) were confirmed to have crystal arthritis as crystals (MSU/CPP) were identified in their knee aspirates by means of polarized microscopy. However, only two patients (25%) received this diagnosis whilst in hospital. In both cases, antibiotic therapy was discontinued and they were referred to a rheumatologist for appropriate treatment and follow up. The remaining six patients continued to receive antibiotics and two of them were taken to theatre for arthroscopic lavage on clinical suspicion of infection as symptoms did not improve significantly with medications.

Our study shows that crystal-induced arthritis can easily be overlooked or misdiagnosed as septic arthritis. This results in patients having unnecessary antibiotic therapy, developing serious complications and undergoing surgical procedures, all of which can be avoided. Moreover, they were not referred to a rheumatologist.

Acute knee effusion is a common presentation to the Orthopaedic department and although we seem to be providing a good service for septic arthritis, patients with crystal arthropathy are still slipping through the net. Clinicians should always remember that crystal arthritis is almost as common as septic arthritis and will eventually lead to joint damage if not managed appropriately. It must be excluded as a cause of hot swollen joints by routine analysis of joint aspirate using polarized light microscopy. If crystal arthritis is proved to be the underlying pathology, patients must be treated accordingly and receive a prompt rheumatology referral for further management.

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Competing Interests

None declared

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