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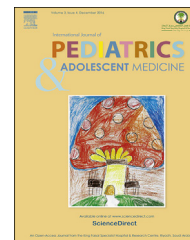


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Case Report

Postoperative septic arthritis with *Eikenella corrodens* and *Streptococcus mitis* following arthroscopic anterior cruciate ligament reconstruction in an adolescent: A case report and review of the literature



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Streptococcus mitis

Abstract We present a case of postoperative septic arthritis with *Eikenella corrodens* and *Streptococcus mitis* following an arthroscopic anterior cruciate ligament reconstruction in an adolescent male with no pertinent medical history. The patient presented to the emergency department nine days after the operation with fever, an elevated white blood cell count, knee pain, and effusion. Arthrocentesis of the knee yielded purulent fluid that tested positive for *S. mitis*. Repeat intraoperative cultures revealed *E. corrodens*. In addition to antibiotics, the patient's treatment course included arthroscopic irrigation and debridement in the operating room as well as removal of graft material and fixation devices. To our knowledge, this is the first case of a polymicrobial infection of *E. corrodens* and *S. mitis* causing septic arthritis in a teenager following arthroscopic anterior cruciate ligament reconstruction.

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1. Introduction

Arthroscopic anterior cruciate ligament (ACL) reconstruction is an effective procedure for restoring knee stability following an ACL injury. Postoperative septic arthritis of the knee following arthroscopic ACL reconstruction is a devastating but rare occurrence. The typical pathogens found with septic knee arthritis include *Staphylococcus*, *Enterobacter*, and *Streptococcus* species. We submit a case report of multi-organism septic arthritis following arthroscopic ACL reconstruction in an adolescent patient at nine days postoperative, with cultures growing *Eikenella corrodens* and *Streptococcus mitis*. The authors obtained the informed written consent of the patient's guardian for the publication of this case report.

2. Case report

A fourteen-year-old male presented to the pediatric orthopedic surgery clinic with a three-month history of knee instability following an injury that he incurred while playing football. At the time of his initial injury, the patient stated that he heard a pop after describing a valgus force to his knee. He had an immediate effusion, but he was able to bear weight on his knee. His complaint of instability, and the physical exam findings were consistent with injury to the ACL and possible meniscal injury. Magnetic resonance imaging of the knee demonstrated both an ACL disruption and medial meniscus tear.

An ACL reconstruction with a hamstring autograft and medial meniscus repair was indicated. After an uneventful surgery, the patient was seen on postoperative day seven with a complaint of a knee effusion but no systemic signs of illness. He then presented to the Emergency Department on postoperative day nine with a fever of 103.7 °F and increasing knee pain with effusion. Laboratory evaluations showed an elevated erythrocyte sedimentation rate of 88 mm/h (hospital normal <20 mm/h), C-reactive protein of 38.02 mg/dL (hospital normal <0.5 mg/dL), and an elevated white blood cell count of 10.4×10^3 , with a differential of 71.4% neutrophils, 16% lymphocytes, 11.6% monocytes. An arthrocentesis revealed a negative gram stain, a white blood cell count of 75,575 nucleated cells with 80% monocytes, and 20% neutrophils; this fluid was sent for culture analysis. Based on his clinical presentation and the supporting laboratory values, irrigation and debridement were performed, and empiric intravenous vancomycin was given.

Cultures from the initial arthrocentesis grew *S. mitis* from the viridans streptococci group.

Due to persistent signs and symptoms of infection, a repeat irrigation and debridement were performed on hospital day (HD) three, and antibiotics were changed to clindamycin based on known sensitivity data. During this repeat surgery, the hamstring autograft was debrided, as it was found to have been damaged by the infection, and the femoral metal suspensory fixation was removed from the lateral femoral cortex. Repeat cultures from this second surgery grew *E. corrodens*. He was taken to the operating

room for a third time on HD six (postoperative day fifteen); the tibial tunnel graft was debrided and the intracortical polyetheretherketone (PEEK) biomaterial fixation was removed. At this time, intravenous ceftriaxone was added to his regimen based on his additional identified pathogen.

Fortunately, the patient improved clinically and was discharged on HD twelve to complete a four-week course of a two-antibiotic regimen consisting initially of intravenous ceftriaxone and clindamycin. Once his CRP levels normalized (0.18 mg/dL), approximately two weeks following hospital discharge, intravenous ceftriaxone was discontinued, and he completed oral therapy with cefpodoxime and clindamycin. Seventeen months after his index procedure, he underwent revision ACL reconstruction with a bone-patellar tendon-bone autograft and had an uncomplicated operative and postoperative course. As of the latest follow up at nine months postoperative, he has resumed sporting related activities with no reported pain with activities although his radiographs do show degenerative changes along the medial compartment.

3. Discussion

Septic arthritis following arthroscopic ACL reconstruction is uncommon, with a reported incidence among all patients between 0.1% and 1.7% [1–10]. Risk factors for the development of septic arthritis following a knee arthroscopy include previous use of long-acting intra-articular steroids, increased surgical times, prior knee procedures, concurrent soft-tissue procedures, and being a professional athlete [11,12].

The most frequently isolated organisms in septic arthritis following arthroscopic ACL reconstruction are *Staphylococcus* species, specifically *Streptococcus aureus* and coagulase-negative species, followed by *Enterobacter* and *Streptococcus* species [1–3]. Our patient was previously healthy with none of the above listed risk factors. Thus, his infection was unusual, especially given the organisms identified.

Both *E. corrodens* and *S. mitis* are commonly found in the human oropharynx. *E. corrodens* is a slow-growing, gram-negative, non-motile, facultative anaerobic bacillus commonly associated with human bite infections. *S. mitis*, part of the alpha-hemolytic species of *Streptococcus*, is facultative, anaerobic, gram-positive coccus that, although not considered highly virulent, is known to cause infectious endocarditis and other invasive diseases. Both organisms are commonly considered to contribute to polymicrobial infections and have been postulated to have synergism in cases of osteomyelitis [13].

Outside of known contamination of wounds with human saliva, there are few reports of septic arthritis caused by either of these two organisms [13–16]. Additionally, *E. corrodens* has been isolated in conjunction with alpha hemolytic *Streptococcus* in two reported cases of septic arthritis. In one case, infective arthritis of the knee in a patient with frequent instrumentation, the *Streptococcus* was not further specified. In the other case, a healthy 66-year-old patient without known risk factors, *Streptococcus*

intermedius, another viridans *Streptococcus*, was identified [16]. Our patient is the first to have these two species identified from an intra-articular source. While culture contamination was a consideration with the isolation of these unusual organisms, the patient's clinical course suggested an ongoing infection despite targeting the initially identified pathogen.

It is easy to overlook *E. corrodens* in a polymicrobial culture as it is easily missed in favor of aerobic organisms. Our patient's first two antibiotic regimens, vancomycin followed by clindamycin to target *S. mitis*, did not provide activity targeting *E. corrodens* and likely contributed to the ability to isolate it on subsequent culture. Although *E. corrodens* is a rare cause of bone and joint infections, it is important to consider it, especially in the presence of other oral flora such as viridans streptococci, as this may influence treatment decisions.

A polymicrobial knee joint infection with oral flora is difficult to explain in our patient. He denied recent dental cleaning or procedures, had no contamination of his wound with saliva, had no other identified source of infection on investigation, and had a surgical team that followed routine infection prevention procedures to include wearing masks during his procedure. However, we cannot exclude the possibility that his infection may have been acquired intraoperatively at his index procedure.

Multi-organism intra-articular infections, especially in healthy adolescents, are a rare occurrence. We present the first case of *E. corrodens* and *S. mitis* causing septic arthritis in a teenager following arthroscopic anterior cruciate reconstruction. This case highlights the importance of aggressively pursuing a microbiological diagnosis of postoperative intra-articular infections, as well as considering the possibility of polymicrobial infections. As prolonged infections can lead to devastating complications, it is imperative to tailor the antibiotic regimen to all possible contributing organisms to maximize long term outcomes.

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Conflict of interest

The authors have no conflict of interest to report.

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