CASE REPORT

Chronic Osteomyelitis in the Femoral Midshaft Following Arthroscopic ACL Reconstruction

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Abstract

A 25 year-old man presented with pain, swelling, and intermittent drainage from distal lateral aspect of his left knee three months after undergoing isolated ACL reconstruction with arthroscopic hamstring autograft and endobottom technique. His surgeon at that time tried to eliminate the pathology through arthroscopic wash out in two attempts. However, the pain, edema, and discharge recurred after a year of being symptom free. The patient underwent imaging assessment and anteroposterior and lateral radiographs demonstrated a sclerotic area beneath the femoral condoyle in femoral tunnel and a fusiform sclerotic area in the lateral aspect of femoral midshaft. Magnetic Resonance Imaging revealed necrotic tissue with bone edema consistent with the sclerotic area in radiographs indicating micro abscesses and osteomyelitis. A diagnosis of femoral chronic osteomyelitis was made and the patient underwent arthroscopic drainage and washout, followed by open surgery for diaphysial femoral osteomyelitis. Rehabilitation was started and after six months the patient returned to his work.

Key words: ACL, ACL Reconstruction, Infection, Osteomyelitis

Introduction

Anterior cruciate ligament (ACL) reconstruction is the most common ligament surgery of the knee. The patients always expect improvement after surgery but some complications can seriously impact the outcome. Infection followed by ACL reconstruction is an uncommon but a serious complication that is estimated to happen in 0.1 to 0.9% of the patients. It may results in greater hospital costs and reduced postoperative activity level secondary to arthrofibrosis, cartilage damage or post-infectious meniscal tears (3,4,7).

In the present case report we describe progression of chronic septic arthritis and femoral osteomyelitis in a young non-immunosuppressed patient after arthroscopic ACL reconstruction, which not only affected the distal femur, but also progressed to involve a secondary site in the mid shaft, preventing complete eradication of infection.

Case report

A 25 year- old man presented to our knee clinic at Ghaem Hospital, Mashhad University of Medical Sciences, Mashhad, Iran, complaining of vague pain, swelling, and intermittent drainage from distal lateral left knee. The patient had a history of isolated ACL rupture as a consequence of a previous fall. His ACL had been reconstructed six months after the injury (three and half years prior to current presentation) via arthroscopic hamstring autograft and endobottom technique. After reconstruction, he had continued to complain of a vague pain especially in distal femoral part. His range of motion was restricted and he experienced pain with movement. Magnetic resonance imaging at that time did not reveal any pathologic abnormalities. Three months later his knee became swollen and erythematous, so his surgeon at that time tried to eliminate the pathology through arthroscopic wash out in two attempts, but both attempts failed. In first attempt, the patient was symptom free for six weeks, and in second attempt the graft and screw were both removed and the joint was drained and debrided. However, after one year of relief, the pain, edema, and discharge recurred. He was referred to our knee surgery clinic for diagnosis and management.

Laboratory data at the time of admission were significant for a white blood cell (WBC) count of 8500, erythrocyte sedimentation rate (ESR) of 55, and a positive C-Reactive protein (CRP). The patient

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Figure 1. AP and lateral views of the femoral osteomyelitis secondary to ACL reconstruction. There are two infection sites: A sclerotic area beneath the femoral condoyle in femoral tunnel and a secondary fusiform sclerotic area in the lateral aspect of femoral mid shaft.

underwent imaging and anteroposterior, and lateral radiographs and the CT scans demonstrated a sclerotic area beneath the femoral condoyle in femoral tunnel, and a fusiform sclerotic area in the lateral aspect of femoral midshaft [Figure 1; 2]. Magnetic resonance Imaging without contrast revealed necrotic tissue with bone edema compatible with sclerotic area seen in the plain radiographs, indicating micro abscesses and osteomyelitis [Figure 3]. Technetium 99 Bone Scan showed increased uptake in both lateral femoral condoyle and femoral diaphysis [Figure 4].

Based on the aforementioned data chronic osteomyelitis was diagnosed. The patient underwent arthroscopic drainag, synovectomy, and washout of his knee, followed by an open debridement and washout of distal and diaphysial femoral osteomyelitis. A cortical window was opened in the midshaft of femur and drainage and

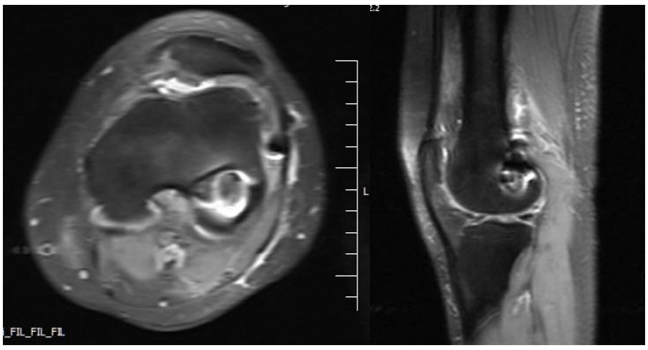

Figure 3. Non-contrast MRI of femoral osteomyelitis secondary to ACL reconstruction. Images reveal necrotic tissue with bone edema, indicating micro abscesses and osteomyelitis.

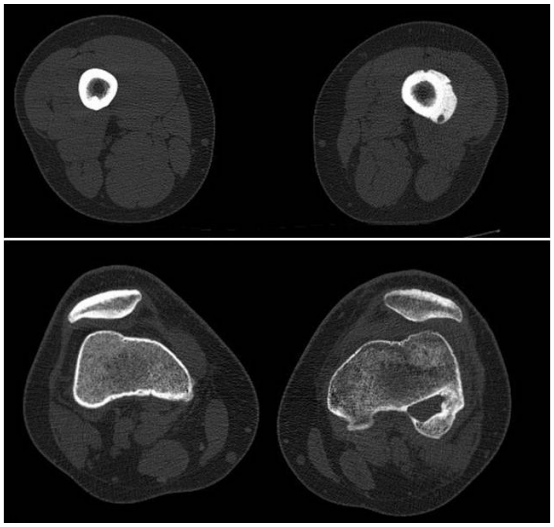

Figure 2. Non-contrast CT scans of femoral osteomyelitis secondary to ACL reconstruction. Sclerotic reaction is seen at both mid shaft (up) and distal femoral sites.

wash out was performed and specimens for culture and pathologic studies were obtained. The femoral tunnel was completely curettaged and the specimens were sent for microscopic assessment and culture. A drain was placed and the wound was closed in routine manner. Empirical antibiotic therapy was subsequently started.

Pathology report was significant for bone tissue with fibrotic area filled with lymphocytes and histiocytes accompanied with giant cells and necrotic bone tissue, which is consistent with chronic granulomatous osteomyelitis in the shaft and distal femur specimens.

The wound healed two weeks after operation. Rehabilitation was started and the patient returned to work after six months of rehab. At six-month follow up he had no complaints of pain with full extension and 120 degrees flexion, and only reported frequent giving way. ESR was 20, CRP was negative, and WBC count was

Figure 4. Technetium 99 Bone Scan of femoral osteomyelitis secondary to ACL reconstruction shows increased uptake in both lateral femoral condoyle and femoral diaphysis.

6200. He refused further revision of ACL reconstruction.

Discussion

Deep infection is a relatively rare complication following ACL reconstruction, with a cumulative incidence of 0.1–0.9% (4,9,10,12). Septic arthritis and osteomyelitis are different infectious conditions, with the latter occurring less frequently following ACL reconstruction. We only found a few cases of osteomyelitis with terrible bone destruction after ACL reconstruction reported in the literature (1,2,5,8,11). The interesting point regarding our patient was a secondary site of osteomyelitis in the proximal femoral midshaft, which prevented the complete resolution of the infection.

Diagnosis of osteomyelitis secondary to ACL reconstruction is difficult. During the initial phase of osteomyelitis, knee swelling, inflammation, and stiffness in the early postoperative period may be interpreted as normal postsurgical reaction; therefore, the diagnosis is usually not made until substantial bone destruction takes place. Fever, chills, erythema, and drainage are not consistently present. Magnetic resonance imaging only shows bone marrow edema, which is thought to represent postsurgical changes after ACL reconstruction not definitive bone infection (8).

Septic arthritis and deep venous thrombosis have been reported as frequent misdiagnoses in previous case reports (2,8). The course of osteomyelitis is different from that of septic arthritis, in that the patient's symptoms do not subside after empiric antibiotic therapy, arthroscopic debridement, or continuous irrigation–suction drainage. Moreover, synovial fluid cultures main remain negative despite ongoing infection (1,2,8). In several recent case reports, the infectious etiology was identified through microscopic examination of pathological specimens, not by positive cultures (1,2,8). Therefore, one way to improve the possibility of making a correct diagnosis is by microscopic examination of the specimens and culture of the bone tissues conducted at the same time (8).

Since in the majority of cases the patient was not immune-compromised, a culture for fungal infections was not obtained. Burke et al. and Sun et al. have reported two cases of fungal infection following ACL reconstruction (1,8). According to their reports, the diagnosis of fungal osteomyelitis was made based on the presence of hyphae in bony tissue seen under microscopic examination of the specimens.

In osteomyelitis secondary to ACL reconstruction, there was remarkable elevation of the ESR, CRP, and fibrinogen. Our patient's laboratory findings were consistent with this. In our patient there was no obvious elevation of WBC count. Although the primary MRI images showed unspecific bone marrow edema, which could be interpreted as a usual postoperative changes following ACL reconstruction, after about one month, imaging showed bone destruction in the distal femur (8). Contrast enhanced MRI may have expedited the correct diagnosis of osteomyelitis, as the advantages of contrast-enhanced MRI scanning as a safe and valuable tool to detect osteolysis and bone infection has been previously reported (6).

The goals of treatment of deep infection after ACL procedures are control of the infection, as well as protecting the articular cartilage with preservation of the graft as much as possible (3). There is no doubt that early diagnosis and prompt treatment is necessary for infection control even though it is at times difficult to distinguish an infection from a postoperative inflammation. At the beginning, our patient underwent arthroscopic drainage twice for diagnosis of septic arthritis. However, this was not adequate to control the infection. This is consistent with findings of other case reports (1,2,8).

Even without any positive cultures, our patient underwent adjuvant systemic and oral antibiotic treatment. For this reason, we suggest that it is imperative to obtain bone tissue early for pathological diagnosis and fungal cultures in the patients suspected of post ACL reconstruction osteomyelitis.

In our case, the infection resolved with a radical curettage and debridement of both suspected sites. Burke and Zych used the same approach to control the infection. However, they did not think that extensive bone resection was indicated and only recommend radical debridement and systemic antibiotic therapy (1).

Because of its low incidence, there is poor evidence on the effective management of osteomyelitis following ACL reconstruction. Several questions remain to be addressed such as graft retention, the extent of bone resection, and the need for systemic antibiotic therapy. In our patient, existence of a secondary infectious site was another confusing situation. There are no strict criteria to diagnose osteomyelitis following ACL reconstruction. However, chronic osteomyelitis should be suspected in any patient with chronic signs and symptoms of infection. Furthermore, we should not only expect osteomyelitis in the affected site, but also in adjacent sites like mid shaft of femur. In most cases the responsible agent is not found by conventional microbiological cultures; therefore providing both culture and pathological specimens are essential.

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