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Case Report

Metal hypersensitivity causing implant migration after anterior cruciate ligament reconstruction

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ABSTRACT

A young female in her early twenties was diagnosed with Anterior cruciate ligament (ACL) deficiency. Operative intervention was advised with ACL reconstruction using a hamstring graft. The procedure was uneventful, and she was discharged on the second day. She was improving as per expectations. Six months later, the patient came with complaints of a discharging sinus which was located at the site of the tibial entry wound which healed with conservative therapy. However, she developed a similar discharge from the same site after one year of surgery. Radiographs showed migration of the implants away from the bone and towards the skin on the femoral and tibial side. The tibial implant was seen lying just beneath the skin through the discharging sinus. Finally, it was decided to remove the implants surgically. After implant removal, regular dressing was done, and the sinuses healed well without any further complications.

Keywords: ACL, Adverse reaction, Metal hypersensitivity

INTRODUCTION

Anterior cruciate ligament (ACL) reconstructions are one of the most performed procedures in orthopedic surgery.[1] The success rate is high, and complications are rare. We present a case of a non-resolving discharging sinus over the knee with a gross migration of implants used for ACL fixation. This clinical picture is interesting because these signs were found around a year after surgery. All blood reports were normal and infection profiles were negative. Conservative measures with antibiotics, dressings and local debridement were ineffective. Finally, a decision to surgically remove the implant complex was taken. The patient healed well after this procedure and there were no further symptoms till the date of writing this article. The article provides an insight into a delayed unexpected complication of ACL surgery. Implant migration due to delayed hypersensitivity should be a considered after ruling out the possibility of technical errors and all signs of infection. The sequential assessment and management of our patient described here will be helpful to the readers in a similar situation.

CASE REPORT

A young female in her early twenties presented with right knee laxity and instability especially while going down staircases and walking on steep slopes from the past 2 years. There was no pain or swelling in the knee. She gave a history suggestive of a non-contact injury to the right knee associated with twisting force 2 years back which was accompanied by immediate swelling and inability to bear weight over right lower limb. She gradually regained her knee range of motion after the swelling subsided and was able to walk comfortably over the next two months. Though her daily activities remained undisturbed, mildly strenuous activities and sudden movements of knee produced instability symptoms. Clinical examination showed a 3+ anterior drawer test, positive Lachman and a pivot shift test. Tests

for other meniscus and ligamentous structures were negative. The knee range of motion was 0-120 degrees and there was a mild wasting of the quadriceps. The patient was diagnosed as a case of ACL deficient knee which was confirmed on an MRI with absence of ACL and buckling of the posterior cruciate ligament. The patient was counseled for ACL reconstruction with a quadruple hamstring graft by an all inside method. Diagnostic arthroscopy of knee done with a routine anterolateral portal. After thorough shaving and debridement of the stump, landmarks for graft placement were identified. Tunnels were made with available instrumentation of all-inside technique. Semitendinosus (semi-t) tendon was harvested. Quadrupled semi-t graft fixed by suspensory mode of fixation with the help of Endobutton® on the femoral and tibial side. After testing the final graft placement, tension and stability, the wound was closed, dressed and a long immobilizer applied. The dressing was checked on second postoperative day which was clean and dry. Quadriceps strengthening was started gradually, and patient discharged with the rehabilitation protocol. Suture removal was done on day 14 with the wound healed well. The patient started to walk comfortably without the brace and jogging was started at 6 weeks. No complaints were raised by the patient. However, 6 months post operatively the patient came for follow up with a discharging sinus of one cm from the tibial entry wound site. There was history of a local swelling in that region from the past two days. The discharge was serous in nature and 10-15 ml in quantity. Expression of all fluid was performed, and a sample was collected for cultures and sensitivity testing. The margins appeared healthy, and the gaping was reduced after expression of fluid. The patient was sent home with advice of dressing on alternate days till the wound healed. Throughout this episode, there was no swelling of the knee or pain. The cultures were noted to be sterile, and the patient recovered.

After one year of surgery once again, the patient returned with a further increase in wound discharge. This time there was a new sinus of two centimeters over the tibial surgical wound site and the wounds showed unhealthy granulation with thickened skin edges with endo-button exposed outside. This was associated with pain during knee flexion of more than 90 degrees. An AP and Lateral radiograph of the right knee (Figure 1) showed a clear migration of the implants away from the femur and tibia bony surface. The femoral endo-button was seen in the subcutaneous plane causing a peri-implant soft tissue reaction. The patient denied any history of allergies or autoimmune reactions in her life. No history of adverse reactions to drugs or during procedures could be elicited. A second sample was sent for cultures and a second-generation cephalosporin was started. Blood investigations showed a total leucocyte count within the normal range with a slight increase in lymphocytes. The sample also tested negative for gram staining. The albumin levels and hemoglobin were at normal levels. A decision to surgically remove the implants was taken. Both the femoral and tibial implants were removed (Figure 2 and 3), a thorough lavage was performed, and the wound was closed.

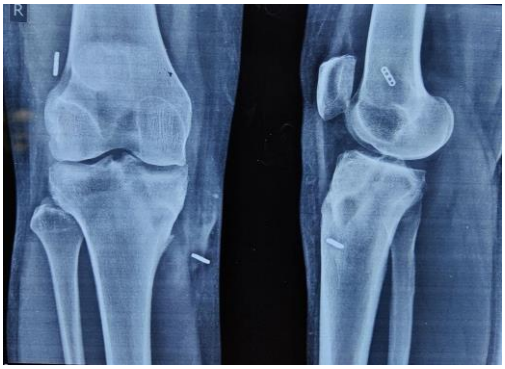

Figure 1: AP and Lateral projections of the right knee showing clear migration of the implants away from the femur and tibia. The tibial implant is seen lying just beneath the skin.

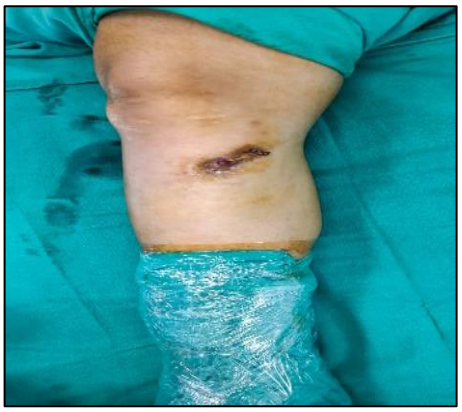

Figure 2: Intraoperative image of the right knee showing removal of the implant complex via the sinus tract on the skin on the tibial side.

Figure 3: The implant complex and sinus tract.

Routine postoperative dressing and antibiotics were given, and the patient was discharged. She remained asymptomatic postoperatively and continued ambulation without support. No new sinuses/ allergic reactions have occurred to date after three years of surgery. There are no other complaints in relation to ambulation.

DISCUSSION

Cortical suspensory fixation is a well-documented and reliable method of ACL reconstruction.[1] Complications associated with this procedure are infrequent and are mostly related to tunnel or graft positioning and tension.[2] There has been a correlation between the soft tissue interposition between the lateral femoral cortex and the endo-button on the immediate postoperative radiograph and the migration of endo-button during future follow up. Interpositions greater than 2 mm have been shown to have a significant increase in the amount of migration as compared to those with interposition of less than 1 mm[3]. However, this was not the case in our patient.

Endo-button hypersensitivity after orthopedic surgery is a poorly understood subject and there is no clear consensus regarding guidelines to be followed for diagnosis and treatment. Most metals placed in biological systems will undergo corrosion. Type 4 hypersensitivity reactions are described which may lead to lymphocytic infiltration causing loosening and failure of the implant. Due to the rare occurrence of such phenomena, predictability of these events is difficult. Nickel has been associated with a higher rate of hypersensitivity followed by cobalt and chromium and the least reactions are seen with titanium implants.[4] There have been reports of metal hypersensitivity to joint arthroplasty implants[5] but reactions to smaller metalwork like suspensory buttons are extremely rare.[6] The endo-button is made of titanium alloy-6AL-4V ELI- With 6% aluminum and 4% vanadium added to improve strength. It has a smooth surface, shows corrosion resistance, and has excellent biocompatibility. Cutaneous manifestations occur with dermal contact leading to erythema, dermatitis, and pruritus. Patch testing seems to the only reliable method to confirm the presence of allergy, but routine testing is not warranted.[7] This increases the importance of including an allergic history in the patient and the nature of such episodes. Patients with pain and cutaneous symptoms in and around the implant site should be assessed to rule out other common causes like infections before arriving at a diagnosis of hypersensitivity. Samples for culture and sensitivity testing, local debridement and lavage and empirical antibiotic therapy should be done. There is a role of NSAIDS and low dose corticosteroids in controlling the extent of inflammation suppressing the symptoms. Prolonged/failed medical management is an indication for surgical intervention. Arthroscopy may be used to obtain a biopsy as well as to remove grossly inflamed synovium and other pathologies. The ultimate treatment is to remove the causative factor, the implant itself.[8] In our patient, we performed clinical testing of the ACL and found adequate strength and integrity. A minor procedure was performed to remove the migrated implants along with the sinus tract. After the procedure patient was doing well without any other complication after three years of surgery.

CONCLUSION

Metal hypersensitivity to ACL implant complex is rare and may present as a delayed complication of surgery in unsuspecting individuals. Any discharge from operative sites after ACL surgery always warrants a thorough investigation for infection and empirical treatment should proceed in the same way. No specific guidelines exist to diagnose or treat this entity; however, a history of metal allergy and a high index of suspicion is necessary. Initial management in the form of dressings, local debridement etc. may suffice in a few patients but if symptoms persist, a surgical removal of the endo-button complex can provide complete cure as it did in our patient.

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