Case Report

Complications Following Hamstring Anterior Cruciate Ligament Reconstruction With Femoral Cross-Pin Fixation

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Abstract: Cross-pin fixation of hamstring grafts for anterior cruciate ligament reconstruction was developed with hopes of improving on potential problems associated with interference screw and button fixation methods. However, cross-pins are a relatively new method of graft fixation and there are limited data on this technique. We report 2 cases in which reoperation was necessary after complications associated with cross-pin fixation. In one case, the cross-pin was left too proud and in the other it penetrated the medial side of the femur and was prominent. Surgeons who use cross-pin fixation should pay close attention so as not to leave the cross-pin proud laterally or medially to avoid the necessity of reoperation for hardware removal. **Key Words:** ACL reconstruction—Cross-pin—Hamstring—Femoral.

Current techniques in anterior cruciate ligament (ACL) reconstruction include a variety of autograft and allograft tissues to replace the native ligament.[1-11] Reconstruction of the ACL with a hamstring (semitendinosus and gracilis) tendon autograft is a standard method of reconstruction.[1,2,5-10,12-15] Hamstring grafts, when compared with bone–patellar tendon–bone autografts, offer potential advantages including decreased extensor mechanism morbidity and favorable biomechanical properties. The strength of the quadrupled semitendinosus and gracilis construct has been shown to be equal to or greater than the strength of a bone–patellar tendon–bone graft of similar dimension at time zero[16] and with cyclical loading.[17]

Graft fixation has been considered the weak link following ACL reconstruction with hamstring tendons. The demands for accelerated rehabilitation after ACL reconstruction require optimal fixation properties.[18,19] The current options for fixation of soft tissue to bone include the use of an interference screw, a button, and cross-pin fixation. Interference screw fixation for quadrupled hamstring grafts has failure strengths that may not be adequate for daily activities and a progressive rehabilitation program.[20] One problem that can potentially develop from button fixation at a distance from the joint line is the so-called "bungee effect."[21,22]

Cross-pin fixation techniques were introduced with hopes of improving on the potential problems associated with interference screw and button fixation methods. Within the femoral tunnel, the pins either penetrate the 4-strand graft or the 2 strands of the hamstring and wrap 180° around the pin to create a quadrupled graft.[20] However, cross-pins are a relatively new method of fixation and there are limited data on this technique.

As with all new technology, there is the potential for a learning curve and early complications. We present 2 cases of complications in which different bioabsorbable cross-pins were used by the initial surgeon who performed the ACL reconstruction. In one case the cross-pin was left too proud and in the other

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Figure 1. Coronal magnetic resonance imaging view of the knee showing the cross-pin that is proud laterally (arrow).

it penetrated the medial side of the femur and was prominent.

CASE 1

A 25-year-old male actor underwent left ACL reconstruction with semitendinosus and gracilis autograft tendons. Four months later, he presented for evaluation by the senior author (R.G.M.) with discomfort at the lateral femur when walking. He was found to have a prominent cross-pin at the lateral distal femur (Figs 1 and 2). He had full range of motion, no effusion, and negative Lachman and pivot-shift tests.

The patient was taken to the operating room and the site of the lateral cross-pin was exposed. The cross-pin was 4 mm prominent and it was impacted using a punch. Postoperatively, the patient had no difficulty and his lateral pain resolved. The subsequent postoperative course was uneventful and the pain was eliminated by 6 months after surgery with return to all activities.

CASE 2

A 21-year-old female university student had undergone ACL reconstruction with patellar tendon autograft 4 years previously. She developed laxity and knee instability 2 years after her initial surgery and underwent revision with ipsilateral semitendinosus and gracilis autograft with cross-pin fixation. She presented to the senior author 5 months postoperatively complaining of pain on the medial side of her knee. On physical examination, she had full range of motion with a stable knee. There was a prominence over the distal femur just proximal to the superomedial aspect of the patella. The prominence was painful to palpation and corresponded to the medial tip of the cross-pin on magnetic resonance imaging (Fig 3). The cross-pin was seen to be intra-articular and arthroscopy was recommended to remove the tip of the pin.

The patient was taken to the operating room and the tip of the pin was visualized at arthroscopy. It measured approximately 7 mm in length and was removed using a shaver. The postoperative course was uneventful, the pain was gone by the 6-month follow-up, and she was able to return to all sporting activities.

DISCUSSION

Femoral cross-pins can provide rigid fixation for ACL reconstruction with soft-tissue grafts. However, as with all new technologies, there are potential pitfalls. This report outlines 2 cases of complications using cross-pin fixation with 2 different implants. Both required reoperation, one where the cross-pin was left proud and the other where it penetrated the medial cortex of the femur. In both cases, the promi-

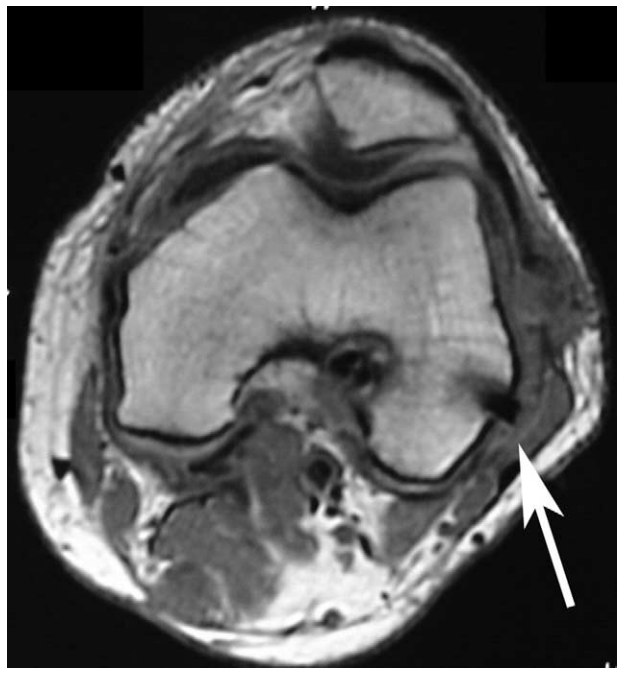

Figure 2. Axial magnetic resonance imaging view of the distal femur showing the femoral cross-pin left proud laterally (arrow), requiring reoperation for lateral knee pain.

FIGURE 3. Axial magnetic resonance imaging view of the distal femur showing the intra-articular cross-pin medially (arrow), requiring arthroscopy for debridement of the tip of the pin due to pain.

nent cross-pin led to symptoms requiring surgery and in both cases the symptoms resolved once the problem was corrected. Surgeons who use cross-pin fixation should pay close attention so as not to leave the cross-pin proud laterally or medially to avoid the necessity of reoperation for hardware removal.

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