Chapter 7

Technical Aspects of Revision ACL Reconstruction

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Case Presentation

History

A 15-year-old female soccer player heard a pop in her right knee as she was struck by another player while her right foot was planted on the field. She was unable to bear weight on the leg and noted immediate swelling of the knee. Physical examination revealed an obvious effusion, a grade IIB Lachman test, and diffuse medial knee tenderness. MRI showed a complete rupture of the anterior cruciate ligament (ACL) and a medial collateral ligament sprain with an intact posterior cruciate ligament (PCL) and intact menisci.

The patient subsequently underwent endoscopic ACL reconstruction by another surgeon, who used a fresh frozen, irradiated bone-patellar tendon-bone allograft.

Current Problem and Treatment

The patient initially did well after surgery but reported atraumatic knee instability with deceleration activities and transient swelling of the knee after cutting or pivoting. Physical examination revealed 0° to 140° of knee flexion, a grade I Lachman test, a grade II anterior drawer test, and a grade I pivot-shift test. KT-1000 arthrometer (MEDmetric Corporation, San Diego, CA) testing revealed a side-to-side difference of 2, 4, and 8 mm, respectively, of anterior translation at 15 lb, 20 lb, and maximum manual testing. Radiographs of the knee demonstrated a posteriorly oriented tibial tunnel and a vertically oriented femoral tunnel (**Figure 1**). A repeat MRI scan revealed an intact ACL with vertical orientation and no other concomitant intra-articular pathology.

The patient was diagnosed with a failed ACL reconstruction resulting from improper tunnel placement. Treatment at this time was to consist of examination under anesthesia and subsequent revision ACL reconstruction with a fresh frozen, nonirradiated bone-patellar tendon-bone allograft, if the examination was consistent with the preoperative diagnosis.

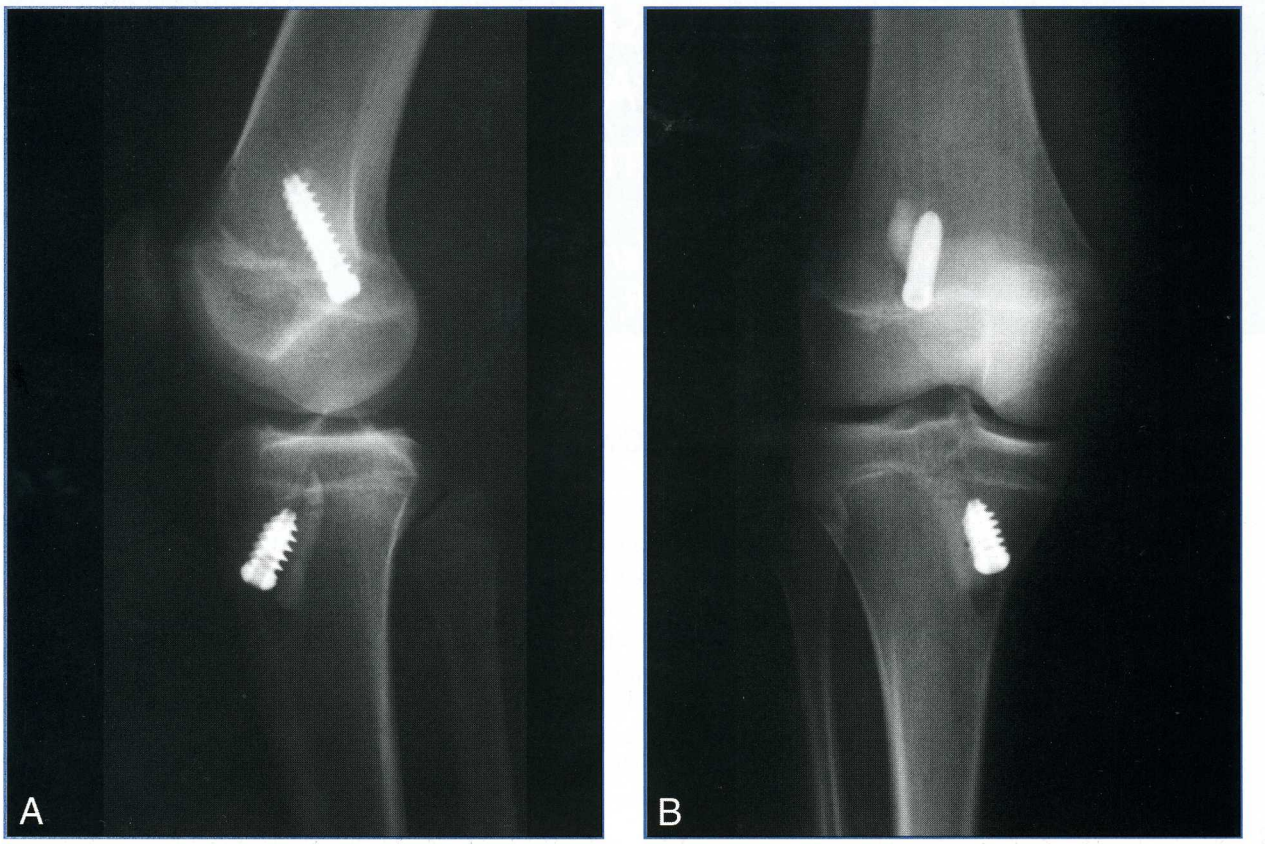

Figure 1 AP view of the right knee **(A)** shows a vertically oriented graft on the femur, and the lateral view **(B)** shows that the orientation of the tibial bone plug is too posterior. These observations are common in endoscopic ACL failure. Note that the femoral placement of the bone plug appears appropriate on the lateral radiograph.

DISCUSSION

Recognizing the Problem

ACL reconstruction is one of the most commonly performed surgeries in orthopaedics; however, the number of failures reported is increasing as more reconstructions are being performed.[1-5] At short- and intermediate-term follow-up, failure rates are reported to range from 10% to 15%.[6-8] For this discussion, failure is defined as a clinically unstable and symptomatic knee secondary to ACL incompetence characterized by an abnormal Lachman test, a positive pivot-shift test, and abnormal side-to-side differences on KT-1000 arthrometer testing.

Assessment of a possible failed ACL reconstruction must begin with identifying the primary cause of failure. A thorough history and physical examination rule out associated knee or concomitant hip or low back pathology, and radiographs often reveal the cause of graft failure. Whether the femoral and tibial tunnels are in an anatomic position, or whether they are expanded should be investigated. Nonanatomic tunnels that do not overlap the anatomic position usually are easily revised, whereas nonanatomic overlapping tunnels may require bone grafting[9] (**Figure 2**). If radiographs show tunnel expansion (**Figure 3**), CT can be obtained to better define the amount of bone loss. Because tunnel expansion occurs more commonly with the use of hamstrings graft, Achilles tendon allograft, and synthetic graft (Gore-Tex [Gore Creative Technologies Worldwide, Newark, DE] or ligament augmentation device), CT should be considered, even if bone loss is not apparent on plain radiographs.[10]