JBR–BTR, 2012, 95: 370.

IMAGES IN CLINICAL RADIOLOGY

Tunnel enlargement and recurrent graft tear after ACL reconstruction

K. Petrovic[1], F.M. Vanhoenacker[2,3,4], O. Nikolic[1], P. Vandenberk[5]

A 24-year-old soccer player presented with right knee instability after a pivot shift trauma during soccer game. His past medical history included multiple Anterior Cruciate Ligament (ACL) reconstructions (three times). Last revision was one year previously using allografts. Meticulous analysis of the plain radiographs demonstrates widening of the tibial bone tunnel and less marked widening of the femoral tunnel (Fig. A). Magnetic Resonance Imaging (MRI) was performed for further evaluation. Coronal fatsuppressed T2-Weighted Imaging (WI) (Fig. B) and sagittal T1-WI (Fig. C) confirmed tunnel enlargement, particularly of the tibial tunnel (black arrows). Furthermore, no residual intact graft fibers could be visualized, in keeping with graft tear.

Based on the imaging findings, the diagnosis of tunnel expansion and recurrent ACL graft tear was made. The patient was treated with an Achilles-tendon bone allograft, in which the calcaneus bone plug was anchored into the tibial tunnel. The postoperative recovery was uneventful.

Comment

Reconstruction of a torn anterior cruciate ligament (ACL) using allografts or autografts is a routine procedure in most orthopedic institutions. Although several possible donor site exist, the two most commonly used are bone-patellar tendon-bone and hamstring autografts. The rate of unsatisfactory results of ACL reconstruction ranges from 10%-25% depending on evaluation criteria used. Many factors responsible for graft failure, such as inappropriate tunnel placement, graft fixation, rehabilitation and timing of surgery, have been identified. Although conventional radiography offers an easy and cost-effective way for the routine evaluation of the knee after ACL reconstruction, its role is limited and evaluation of the postoperative knee by MRI is standard of care.

Tunnel enlargement is a specific postoperative complication of ACL reconstruction, characterized by widening of bone tunnels as seen on post-operative radiographs. It is measured as a distance between the two sclerotic margins of the bone tunnel at its widest dimension perpendicular to the longitudinal axis of the tunnel. The measurements are corrected for magnification and compared to the diameters drilled at surgery. On MRI, an increase in tunnel diameter is often associated with increased T2 signal within the tunnel due to fluid or granulation tissue. The etiology of bone tunnel enlargement is unclear, and probably multifactorial. Mechanical and immunological theories have been proposed. Tunnel expansion may result in an inadequate incorporation of the graft, which may cause graft failure. The presence of large tunnels often severely complicates revision ACL surgery, often requiring a two-stage revision with bone grafting of the tunnels followed by graft revision. If only the tibial or femoral tunnel is enlarged -like in our case- an Achilles-tendon bone allograft placement as a one stage procedure may suffice.

Reference

1. Wilson T.C., Kantaras A., Atay A., Johnson D.L.: Tunnel enlargement after anterior cruciate ligament surgery. *Am J Sports Med*, 2004, 32(2): 543-549.

1. Center of Radiology, Clinical Center of Vojvodina, Hajduk Veljkova 1-9, 21000 Novi Sad, Serbia, 2, Department of Radiology and 5. Orthopedic Surgery, AZ Sint-Maarten Duffel-Mechelen, Leopoldstraat, 2, B-2800 Mechelen, 3. Department of Radiology, Antwerp University Hospital, Wilrijkstraat 10, B-2650 Edegem, 4. University of Ghent, Faculty of Medicine and Health sciences, De Pintelaan 185, B-9000 Ghent.