

Cartilage Status in Relation to Return to Sports After Anterior Cruciate Ligament Reconstruction

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Summary:

Six months after isolated ACL reconstruction, knee cartilage shows inferior quality and diminished cushioning properties that are proposed being a potential danger in case of full return to sports, especially in patients who received early surgery.

Abstract:

Background:

Osteoarthritis following ACL reconstruction receives much attention in orthopedic science. ACL reconstruction is related to increased joint fluid volumes, bone marrow edema, and cartilage biochemical and morphological changes believed to cause precarious joint conditions. These joint conditions may not be able to adequately counter the imposed loads during sports.

Hypothesis:

At 6 months after surgery, knee cartilage displays inferior quality in ACL-reconstructed patients when compared with controls. This inferior quality is influenced by timing of return to sport and/or by timing of surgery.

Study Design:

Case-control

Methods:

At 6 months after surgery, 15 patients treated with isolated ACL reconstruction (hamstrings autografts) were compared to 15 matched-controls. In all subjects, a 3T MRI cartilage evaluation was performed entailing morphology (3D volume/thickness), biochemical composition (T2/T2star mapping), function (following a 30-minute run: in vivo deformation including recovery). Non-parametric statistics were executed reporting medians(95% CI).

Results:

No volume and thickness between-groups differences existed. In patients, medial femur T2 was higher (45.44 ms (40.64,51.49) vs 37.19 ms (34.67,40.39), $P=0.028$), whereas T2star was lower in the medial femur (21.81 ms (19.89, 22.74) vs 24.29 ms (22.70,26.26), $P=0.004$), medial tibia (13.81 ms (10.26,16.78) vs 17.98 ms (15.95,18.90), $P=0.016$) and lateral tibia (14.69 ms (11.71,16.72) vs 18.62 ms (17.85,22.04), $P<0.001$). After a 30-minute run, patients showed diminished recovery at 30 minutes post-exercise in the medial femur (-1.60% (-4.82,-0.13) vs 0.01% (-0.34,1.23), $P=0.040$), and at 30 (-3.76% (-9.29,-1.78) vs 0.04% (-1.52,-0.72), $P=0.004$) and 45 minutes post-exercise (-1.86% (-4.66,-0.40) vs 0.43% (-0.91,0.77), $P=0.024$) in the lateral tibia. Eight patients returned to sports at 6 months or earlier. Return before 5 months (3/8 patients) was associated with increased cartilage morphology, deformation and delayed recovery whereas surgery within 10 weeks (9/15 patients) was associated with delayed cartilage recovery following running. Median surgical delay was 10 weeks(5-17).

Conclusions:

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At 6 months after surgery, cartilage in patients with ACL-reconstruction shows diminished quality and in vivo resiliency compared with controls. Caution is advised in an early return to sports especially when dealing with patients who received prompt surgery. Possibly, high impacts on this qualitatively diminished cartilage might play a role in the development of OA in ACL reconstruction. Replication in larger samples and follow-up are warranted.