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Does Change in Femorotibial Cartilage Thickness Differ Between Acutely Anterior-Cruciate Ligament Injured Knees Treated with and without Reconstructive Surgery

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2749 (max 2750)

Background/Purpose: An ACL tear is a serious knee injury, involving chronic alterations in joint biomechanics. The risk of developing knee OA after an ACL tear is elevated, but the driving mechanisms are not known. We tested the hypothesis that surgical reconstruction of an acute ACL tear would influence change in femorotibial cartilage thickness over the first five years after injury.

Methods: In a treatment RCT (the KANON-trial), 121 young (32 women, mean age 26.1 years) active adults with an acute ACL tear in a previously un-injured knee received similar rehabilitation. Baseline sagittal MR images were available for 117 participants, with year 2 and year 5 follow-up for each 112 of the 121 participants. 59 of those underwent an early ACL reconstruction (ACLR), 29 had a delayed ACLR, and 29 were treated with rehab alone. Cartilage thickness (ThC) was measured manually with blinding to time point and treatment using a dedicated software (Chondrometrics GmbH, Ainring, Germany). Primary outcome was the mean change in ThC for the entire femorotibial joint (FTJ); secondary outcomes were mean change in ThC for the medial and the lateral femorotibial compartments (MFTC/LFTC), the subregion with the largest ThC loss (ordered value 1 = OV1) and gain (OV16). ThC changes were analyzed using the t-test (crude differences) and analysis of covariance (differences with adjustment for age, sex & BMI).

Results: The cartilage thickness change over 5 years in the FTJ did not differ significantly between knees treated with early ACLR (+148µm, 95%CI: [+38, +258]µm), with delayed ACLR (+174 [+42, +306]µm), or with rehabilitation alone (+121 [-3,+246]µm, crude/adjusted p≥0.56/0.65). In addition, no significant differences were found for the periods between BL→Y2 and Y2→Y5. The change in FTJ ThC was largely driven by change in MFTC ThC (early ACLR: +132 [+77, +187] µm, delayed ACLR: +128 [+40, +216] µm, rehab alone: +82 [+19, +146] µm), but without significant differences between treatment groups over the entire 5 year period (p≥0.28/0.20) or for the sub-periods (p≥0.19/0.20). Smaller changes, not significantly different between treatment groups (p≥0.60/0.70), were observed in LFTC (early ACLR: +16 [-53, +85] µm, delayed ACLR: +46[-25, +116] µm, rehab alone: +39 [-46, +124] µm).
OV 1 was significantly more negative and OV 16 was significantly more positive over 5 years in knees treated with early ACLR than in knees treated with rehab alone (OV1: p=0.04/0.03; OV16: p=0.02/0.01). These differences were predominantly driven by changes occurring between BL→Y2 with OV1 being significantly more negative in knees with early (p=0.01/0.01) or delayed ACLR (p=0.04/0.04) compared to knees treated with rehab alone. No other significant differences were found for any period.

Conclusion: Change in mean femorotibial cartilage thickness over a five year period after acute ACL injury did not differ between knees treated with early or delayed ACL reconstruction or knees treated with rehabilitation alone. An early ACL reconstruction may induce greater magnitudes of subregional cartilage thickness change as compared to knees treated with rehabilitation alone but the clinical relevance of such change remains to be determined.

Disclosures: FE and WW are co-owners of Chondrometrics GmbH. FE, MH and WW are part time employees of Chondrometrics GmbH. FE provides consulting services to MerckSerono and Abbvie.