CHANGE IN CARTILAGE THICKNESS IN THE FEMOROPATELLATAR JOINT AFTER ACUTE ANTERIOR CRUCIATE LIGAMENT TEAR – LONG TERM FOLLOW-UP

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Purpose: Patellofemoral joint (PFJ) osteoarthritis (OA) is a prevalent disease affecting young and elderly individuals and is recognized as a potent source of knee symptoms. Using quantitative MR image analysis it was reported that the femoral trochlea undergoes cartilage thinning within the first two years after an ACL tear. It is however unknown whether these changes continue (and if yes, at which magnitude) over longer follow-up periods. Thus, the purpose of the present work was to study the rate of change in cartilage thickness in the PFJbetween baseline and 2 years and 2-5years after ACL tear and to explore differences between treatment groups and graft-type used during surgery.

Methods: 121 young active adults (32 women, 26.0±4.9 years) with an acute ACL tear were included in a randomized control trial (the KANON-trial) comparing a surgical and a non-surgical treatment strategy. 107 of 121 participants had a complete set of MR images at BL, 2 and 5 year follow up. From those, 58 were treated with rehab + early ACL reconstruction (ACLR), 25 received rehab + delayed ACLR and 24 were treated with rehab alone. From those who received an ACLR (n=83), 44 had hamstrings- and 39 bone-patellatendon-bone autografts. Mean cartilage thickness was assessed by manual segmentation in the patella and femoral trochlea with blinding to time point and treatment group. Statistical testing was performed to explore the magnitude of cartilage loss between baseline (BL, within 4 weeks from ACL tear)-2years and 2-5years in the patella and the femoral trochlea within treatment groups and between groups with different graft type.

Results: For the entire sample, change in cartilage thickness in patella and trochlea was -8.9µm/[-26.4, 8.5] and -44.9µm/[-67.0, -22.8] (mean/[95% CI]) over the first 2 years and -3.8µm/[-22.1, 14.6] and -1.0µm/[-15.6, 13.5] over the period between 2-5 years after injury, respectively. Data on change in cartilage thickness in the different treatment groups is presented in the table. No significant differences in cartilage thickness change were found between the treatment groups (p>0.28) or between graft types in those who had ACLR (p>0.63) after adjustment for age, gender, BMI and time between injury to surgery.

Conclusions: Our results suggest that cartilage loss in the femoral trochlea but not in the patella may be an early and temporary event occurring within the first 2 years after ACL tear. This effect, however, did not seem to be different between those treated with early or delayed ACLR or rehab alone, or between the two grafts used at ACLR. These results do not support that an ACLR, performed early or at later stages, alters the structural change (i.e. cartilage loss) in the femoropatellar joint after an ACL tear.

Table: Change in cartilage thickness between BL-2 years and 2-5 years. P-values highlighted in bold indicate significances between BL-2Y or 2-5Y.

Rehabilitation alone (n=24)		**Mean/µm**	**SEM**	**Lower 95% CI**	**Upper 95% CI**	**p (2-tailed)**
	Patella	-3.46	15.33	-35.174	28.249	0.823
ACL tear -> 2 years	Trochlea	-28.83	14.18	-58.171	0.513	0.054
	Patella	8.30	12.99	-18.57	35.161	0.529
2 -> 5 years	Trochlea	11.42	12.04	-13.496	36.328	0.353
Rehabilitation plus early ACL-repair (n=58)		**Mean/µm**	**SEM**	**Lower 95% CI**	**Upper 95% CI**	**p (2-tailed)**
	Patella	-25.44	13.13	-51.733	0.85	0.058
ACL tear -> 2 years	Trochlea	-62.88	18.27	-99.465	-26.288	**0.001**
	Patella	-12.75	13.08	-38.938	13.431	0.334
2 -> 5 years	Trochlea	-8.98	10.46	-29.936	11.974	0.394
Rehabilitation plus delayed ACL-repair (n=25)		**Mean/µm**	**SEM**	**Lower 95% CI**	**Upper 95% CI**	**p (2-tailed)**
	Patella	24.10	15.13	-7.133	55.333	0.124
ACL tear -> 2 years	Trochlea	-18.58	15.82	-51.221	14.064	0.252
	Patella	5.51	22.60	-41.137	52.153	0.81
2 -> 5 years	Trochlea	5.46	16.26	-28.103	39.02	0.74