PREDICTIVE FACTORS FOR NEW ONSET OR PROGRESSION OF OSTEOARTHRITIS IN THE KNEE JOINT ONE YEAR AFTER KNEE TRAUMA

I.M. Koster1, E.H. Oel1, J.-H.J. Hensen2, S.S. Boks3, H.P. Wagenmakers1, B.W. Koes1, D. Vroegindeweij2, M.G. Hunink1, S.M. Bierna-Zeinstra1
1Erasmus MC, Univ. Med. Ctr., Rotterdam, Netherlands; 2Maasstad Hosp., Rotterdam, Netherlands; 3Diaconessen Hosp., Meppel, Netherlands

Purpose: Knee trauma maybe is the strongest risk factor for knee osteoarthritis (OA) but the exact pathogenesis and etiology is still not fully understood. With magnetic resonance imaging (MRI) it is possible to separately evaluate bone, cartilage, ligaments, meniscus and soft-tissue lesions, as well as to assess degenerative processes in the joint more closely than with an indirect radiographic projection of intra-articular damage.

Further, the extent to which traumatic knee abnormalities predict the development of OA within the first years after trauma has only been sparsely documented. We performed a study to prospectively evaluate prognostic factors (baseline MRI lesions included) for new onset or progression of degenerative change on follow-up MRI one year after traumatic knee injury.

Methods: In 2003 we consecutively included patients aged 18-65 years consulting the general practitioner because of an acute knee trauma within the preceding 5 weeks. Patients were excluded in case of severe injury requiring immediate hospital referral, or if a fracture was demonstrated. These patients underwent initial knee MRI 3-6 weeks after acute trauma, and follow-up MRI after one year (1.0 Tesla whole-body MRI unit and a dedicated knee coil). Degenerative femorotibial change on both MRI examinations was graded using a MRI-adapted 0-4 Kellgren and Lawrence scale. We used univariable and multivariable logistic regression analysis to analyze the prognostic value of demographics, trauma mechanism, pain score, Lysholm functional knee score, and initial MRI findings on development of new degenerative change or progression of pre-existing OA (one degree increase on MRI-adapted K&L scale). Further we univariably assessed the association of progression and new onset of degenerative change with clinical outcome, as reflected by non-recovery (complete recovery or strong improvement versus some improvement, or unchanged or deteriorated symptoms), one year after the injury.

Results: We included 134 patients and of them 117 patients were available for follow-up one year later (mean age 41 years, 43% women). At baseline on MRI in the index knee, 21 patients showed an ACL rupture, 95 a meniscal tear (43 patients with degenerative tears excluded), and 67 bone marrow edema. Further, 84 patients showed no, 19 doubtful, and 5 mild, 6 moderate, and 3 severe features of OA. At follow-up the distribution of these OA features was 62, 34, 10, 6 and 5 patients, respectively. In the univariable analysis, age above 50 years, body mass index greater than 25 kg/m2, and bone marrow edema were significant predictors of new or progressive degenerative change (p < 0.10). The only significant prognostic variable in multivariable analysis was bone marrow edema on initial MRI (OR 5.29, p = 0.005). Further, a significant association between new or progressive degenerative change and clinical outcome (non-recovery) was found (OR 4.7, p = 0.003).

Conclusions: Presence of bone marrow edema on MRI for acute knee injury is strongly predictive for new onset or progression of degenerative change of the femorotibial joint on follow-up MRI one year after trauma, which on its turn is reflected in non-recovery of knee symptoms.