ASSESSMENT OF MENISCUS WITH QUANTITATIVE MRI: ADIABATIC T₁ρ AND T₂ρ IN ASYMPTOMATIC SUBJECTS AND PATIENTS WITH EARLY OSTEOARTHRITIS


Research Unit of Medical Imaging, Physics and Technology, POB 50, 90029 University of Oulu
email: abdul.kajabi@oulu.fi

OBJECTIVE: To evaluate meniscal degeneration in asymptomatic subjects and patients with early osteoarthritis (OA) using adiabatic T₁ρ (Ad T₁ρ) and T₂ρ (Ad T₂ρ).

METHODS: Quantitative assessment of meniscus was performed with AdT₁ρ and AdT₂ρ mapping [1] on sagittal knee images acquired using a 3 T clinical MRI system in 17 asymptomatic volunteers and 17 patients with early radiographic OA (KL = 1,2). The cohorts were matched for sex and age. MR images of all the subjects were separately assessed by an experienced radiologist and scored using MRI OA Knee Score (MOAKS) [2]. AdT₁ρ and AdT₂ρ values were calculated in four different regions of interests (ROIs) of meniscus: anterior horn medial (AHMED), posterior horn medial (PHMED), anterior horn lateral (AHLAT), and posterior horn lateral (PHLAT) (Fig.1). Then the calculated data was used to assess (i) meniscal degeneration in volunteers and patients and (ii) meniscus lesion in subjects based on MOAKS independent of their symptoms and KL.

RESULTS: Both AdT₁ρ and AdT₂ρ in PHMED of patients were significantly longer than their respective asymptomatic compartments (p = 0.007 for AdT₁ρ, p = 0.005 for AdT₂ρ). Similarly, both AdT₁ρ and AdT₂ρ of PHMED with lesion were significantly longer than their relevant compartments with no lesion (p < 0.001 for AdT₁ρ, p = 0.011 for AdT₂ρ). The longer values of AdT₁ρ and AdT₂ρ for patients and subjects with lesion indicate the severity of meniscal degeneration in PHMED, which is consistent with the findings of previous studies [3]. Our findings also indicate that AdT₁ρ and AdT₂ρ measurements could not only distinguish meniscal degeneration in subjects with clinical symptoms but could also distinguish the lesion in subjects clinically assessed by radiologists.

CONCLUSIONS: This study reports that AdT₁ρ and AdT₂ρ relaxation measurements can provide a non-invasive means of detecting and monitoring the degenerative changes in the meniscus, which are associated with progression of OA.