Quantitative 3D MRI reveals limited intra-lesional bony overgrowth at 1 year after microfracture-based cartilage repair

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Abstract

Objective: Intra-lesional bony overgrowth (BO) identified during or following cartilage repair treatment is being frequently described through subjective reports focusing primarily on incidence. Our objective was to quantify the exact volume of intra-lesional BO at 12 months post-cartilage repair treatment, to determine if a correlation exists between the extent of BO and clinical outcomes, and to visualize and characterize the BO.

Design: MRI scans were systematically obtained during a randomized clinical trial for cartilage repair (Stanish et al., 2013) that compared two microfracture-based treatments in 78 patients. Semi-automated morphological segmentation of pre-treatment, 1 and 12 months post-treatment scans utilizing a programmed anatomical atlas for all knee bone and cartilage structures permitted three-dimensional reconstruction, quantitative analysis, as well as qualitative characterization and artistic visualization of BO.

Results: Limited intra-lesional BO representing only 5.8±5.7% of the original debrided cartilage lesion volume was found in 78 patients with available MRIs at 12 months. The majority (80%) of patients had very little BO (<10%). Most occurrences of BO carried either spotty (56.4%) or planar (6.4%) morphological features, and the remaining balance (37.2%) was qualitatively unobservable by eye. Pre-existing BO recurred at 12 months in the same intra-lesional location in 36% of patients. No statistical correlations were found between BO and clinical outcomes. Conclusions: Intra-lesional BO following microfracture-based treatments may not be as severe as previously believed, its incidence is partly explained by pre-existing conditions, and no relationship to clinical outcomes exists at 12 months. Morphologically, observable BO was categorized as comprising either spotty or planar bone. © 2014 Osteoarthritis Research Society International.

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