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Paper #40

High Tibial Osteotomy with Matrix Induced Autologous Chondrocyte Implantation Versus High Tibial Osteotomy Alone: A Non-Randomized, Prospective Clinical Trial Using Quantitative MRI

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Summary:
The clinical benefit observed in patients that underwent osteotomy with MACI may be largely attributed to the osteotomy itself.

Abstract:
INTRODUCTION
Management of medial compartment osteoarthritis of the knee remains a challenging problem in younger patients. Joint preservation surgery with lower limb re-alignment may be preferred as it retains the biological joint structures and delays the need for joint replacement. It is less clear whether there is an effective treatment for the cartilage lesions that remain in the medial compartment. Matrix Induced Autologous Chondrocyte Implantation (MACI) is a third generation cell therapy where autologous chondrocytes are seeded onto a bio-absorbable collagen scaffold and fixed in place with fibrin glue. This technique has been reported to be an effective treatment for symptomatic cartilage defects within the knee joint. The purpose of this study was to examine the efficacy of MACI in combination with HTO in the surgical management of cartilage lesions of the medial compartment of the knee associated with varus malalignment of the lower limb.

METHODS
Between 2003 and 2012 thirty-one patients undergoing medial opening wedge high tibial osteotomy (MOWHTO) were recruited. All had confirmed symptomatic medial compartment osteoarthritis with associated varus malalignment. Two consecutive series of MOWHTO were studied: HTO with a simultaneous MACI procedure (n=14); HTO without MACI (n=17). Patients were followed up for a period of 12-months post-operatively with a Knee Injury and Osteoarthritis Outcome Score (KOOS), as well as quantitative Delayed Gadolinium Enhanced MRI of cartilage (dGEMRIC) and semi-quantitative Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) scoring system assessments.

RESULTS
Both groups showed significant ($p<0.05$) improvements in KOOS scores (43-150%) at 12-month follow up. The HTO +MACI group demonstrated greater ($p<0.05$) improvement in the symptoms sub-scale of KOOS compared to the HTO group. dGEMRIC indices improved significantly in a greater proportion of the HTO+MACI group compared to HTO group (43% vs 26.7%), while a smaller proportion of the HTO+MACI group worsened (28.5% vs 53.3%). Despite improved dGEMRIC indices, the MOCART scores of the HTO+MACI patients confirmed complete defect filling in just 15.4%, full integration to adjacent cartilage in 23.1%, a fully intact MACI surface in 15.4% and intact subchondral lamina in 84%. Patients with good to excellent MOCART results did not necessarily display significantly improved

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dGEMRIC.

CONCLUSION
All 31 patients showed significant clinical improvement one-year post-operatively regardless of treatment group. Addition of MACI may afford marginal additional clinical benefit in self-reported symptoms although the poor structure of the repaired tissue seen radiologically in many cases, and the lack of significant difference with HTO-only patients, would suggest that the majority of the clinical benefit relates to the HTO.