

# **Mesenchymal stem cell implantation in osteoarthritic knees: is fibrin glue effective as a scaffold?.**

Authors: Kim YS, Choi YJ, Suh DS, Heo DB, Kim YI, Ryu JS, Koh YG

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## **Abstract:**

**BACKGROUND:** The cell-based tissue engineering approach that uses mesenchymal stem cells (MSCs) has addressed the issue of articular cartilage repair in osteoarthritic (OA) knees. However, to improve outcomes, an advanced surgical procedure with tissue-engineered scaffolds may be needed to treat patients with large cartilage lesions.

**PURPOSE:** To investigate the clinical and second-look arthroscopic outcomes of the implantation of MSCs loaded in fibrin glue as a scaffold in patients with OA knees and to compare these outcomes with those of MSC implantation without a scaffold.

**STUDY DESIGN:** Cohort study; Level of evidence, 3.

**METHODS:** This study retrospectively evaluated 54 patients (56 knees) who were examined with second-look arthroscopy after MSC implantation for cartilage lesions in their OA knees. Patients were divided into 2 groups: 37 patients (39 knees) were treated with MSC implantation without a scaffold (group 1), and 17 patients (17 knees) underwent implantation of MSCs loaded in fibrin glue as a scaffold (group 2). Clinical outcomes were evaluated according to the International Knee Documentation Committee (IKDC) score and the Tegner activity scale, and cartilage repair was assessed with the International Cartilage Repair Society (ICRS) grade. Statistical analyses were performed to identify various prognostic factors associated with the clinical and second-look

arthroscopic outcomes.

**RESULTS:** At final follow-up (mean, 28.6 months; range, 24-34 months), the mean IKDC score and Tegner activity scale in each group significantly improved: group 1, from 38.1 $\pm$ 7.7 to 62.0 $\pm$ 11.7 (IKDC) and from 2.5 $\pm$ 0.9 to 3.5 $\pm$ 0.8 (Tegner); group 2, from 36.1 $\pm$ 6.2 to 64.4 $\pm$ 11.5 (IKDC) and from 2.2 $\pm$ 0.8 to 3.8 $\pm$ 0.8 (Tegner) ( $P<.001$  for all). According to the overall ICRS cartilage repair grades, 9 of the 39 lesions (23%) in group 1 and 12 of the 17 lesions (58%) in group 2 achieved a grade of I or II. There was a significant difference in ICRS grades between the groups ( $P=.028$ ). Overweight (body mass index $\geq$ 27.5 kg/m<sup>2</sup>) and large lesion size ( $\geq$ 5.7 cm<sup>2</sup>) were significant predictors of poor clinical and arthroscopic outcomes in group 1 ( $P<.05$  for both). There was a similar trend in group 2, but the differences were not significant, possibly owing to the smaller sample size.

**CONCLUSION:** Clinical and arthroscopic outcomes of MSC implantation were encouraging for OA knees in both groups, although there were no significant differences in outcome scores between groups. However, at second-look arthroscopy, there were better ICRS grades in group 2.

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