Preliminary outcomes 12 months after knee cartilage repair using a tri-layer osseocartilaginous-inducing scaffold and auricular chondroprogenitor cell suspension (AMT):

A CASE SERIES

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UNDER PUBLICATION

INTRODUCTION & OBJECTIVES

Matrix-associated chondrocyte implantation (MACI), closely resembles native hyaline cartilage but involves costly two-stage surgery and potential donor site morbidity. Alternative single-stage treatments **using autologous micrografting technology (AMT)** combined with a cartilage scaffold may provide comparable short-term outcomes while being more accessible and affordable.

The **purpose of this study** was to evaluate the preliminary clinical and radiological outcomes of knee cartilage repair using a tri-layer osseocartilaginous-inducing scaffold combined with a chondroprogenitor suspension of auricular cartilage cells obtained through Mytocel MSK without cell culturing.

METHODS

STEP BY STEP OF THE PROCEDURE

1. 
Biopsy extraction from the auricular concha

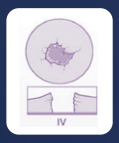
2. 
Mechanical disaggregation with Mytocel MSK to obtain AMT suspension

3. 
The scaffold matrix is press-fitted into the defect and impregnated with the AMT suspension, followed by the application of fibrin glue.

4. 
The remaining AMT suspension (not absorbed by the scaffold) is infiltrated in the joint space (as classical treatment with Mytocel MSK)

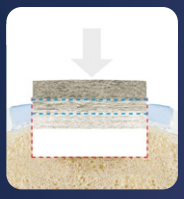
10 patients

Condition: Outerbridge grade IV focal chondral lesions of the knee



The mean defect size was 7.25 cm^2 per patient and 4.04 cm^2 per individual defect

TRI-LAYER SCAFFOLD (MaioRegen Chondro+)



- Multi-layered matrix composed by collagen and hydroxyapatite enriched with magnesium.
- It mimics the chondral and osteochondral tissues.

ASSESSMENTS

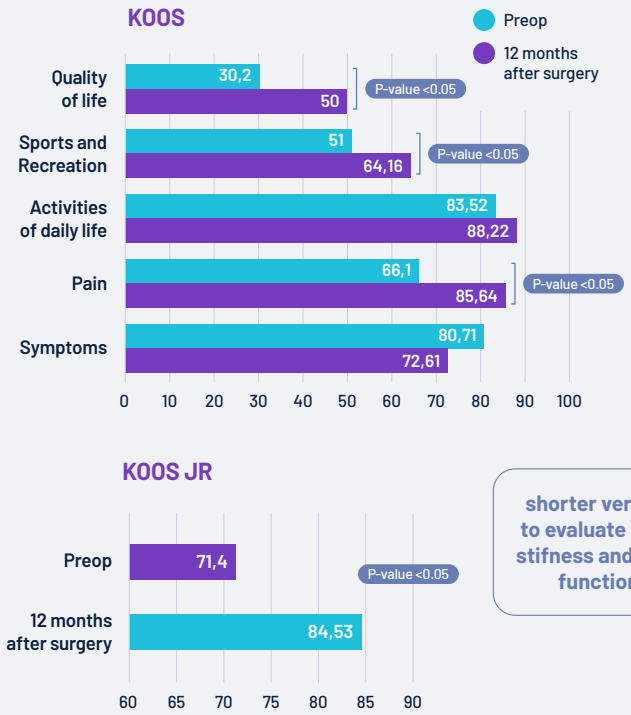
- Patients completed the KOOS, KOOS Jr, and EQ-5D-5L at fixed intervals.
- The MOCART 2.0 score was used to assess cartilage healing on MRI at final follow-up.

mytocel MSK

RESULTS

Clinical outcomes

- 9 patients available for final analysis at a mean follow-up of 14 months.
- Significant **clinical improvement was observed in PROMs and knee function from baseline to 12-month follow-up.**
- The KOOS QoL, KOOS Sports and KOOS Pain showed a significant improvement from preoperatively scores vs 12 months after surgery with up to 20 points of difference. (p-value<0.05)



shorter version to evaluate pain, stifness and joint function

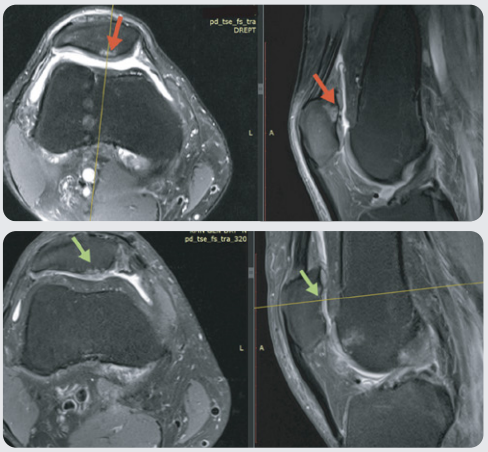
Figure 1: KOOS and KOOS JR results 12 months after surgery

Radiological outcomes

- MRI analysis at **12 months postoperatively demonstrated promising results.**
- Mean **MOCART 2.0 score at 12 months was 70 (range 50–90), demonstrating good defect filling and integration.**
- No scaffold-related adverse events were reported.

Case Study no.2

- 49-year-old male with normal BMI presented with **knee pain of 1-year** duration without antecedent trauma.
- Outerbridge **grade IV** chondral lesions on the patella and trochlea.
- At 9 months postoperatively, **MRI demonstrated satisfactory defect filling**, good integration, and less subchondral edema.
- KOOS, KOOS Jr, and EQ-5D-5L scores **improved significantly**, with range of motion of –2/0/135°.



DISCUSSION & CONCLUSIONS

- Tri-layer scaffold combined with AMT-derived auricular chondroprogenitor cell suspension represents a promising **single-stage alternative** for focal cartilage repair **instead of MACI**.
- **Perichodrium progenitor cells have a higher regenerative and proliferative capacity** than adult chondrocytes from the knee, with more capacity towards hyaline-like cartilage formation.
- Preliminary 12-month outcomes show **favourable clinical improvement** and satisfactory radiological healing.
- **Extended follow-up** with larger cohorts and matched controls is warranted.
- Mytocel MSK + scaffold is **more accesible and easier** than other techniques for focal chondral deffects.