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History of Prior Surgery Negatively Affects Cell Culture Identity in Patients Undergoing Autologous Chondrocyte Implantation

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Summary:
History of prior surgery negatively affects cell culture identity in patients undergoing autologous chondrocyte implantation (ACI)

Abstract:

Background

The quality of cell-based products for autologous chondrocyte implantation (ACI) potentially influences treatment outcomes. There have been concerns over cell de-differentiation during the culture process. Recently, an assay has been introduced to evaluate the identity of cultured chondrocytes prior to implantation. However, no data are available regarding pre-operative patient and joint specific factors that potentially influence the results of this assay. We therefore sought to identify the influence of several factors on cell identity and viability. It was hypothesized that previous surgery on the index knee is associated with inferior cell product quality.

Methods

A total of 187 ACI patients with complete information on chondrocyte viability, cell identity scores and biopsy weight were included in this study. Patient and lesion characteristics, chondrocyte viability, cell identity and biopsy weight were recorded for each patient. Assessing cell identity score and chondrocyte viability, patient scores were stratified into two groups, respectively, based on whether the individual score was above or below the cohort's mean score. A binomial logistic regression model was utilized to determine patient-specific predictive factors for cell product quality.

Results

The implanted ACI cell products showed a chondrocyte viability averaging 93% (SD, 2.4; range 84 - 98) with an average identity score of 5.8 (SD, 2.1; range, -0.08 – 9.46). Patients with multiple previous surgeries on the index knee had significantly lower cell identity scores compared to patients without previous surgeries (odds ratio ?OR? = 0.31; 95% CI, 0.16-0.59; $p < 0.001$). Patients without surgical history presented with significantly higher cell identity scores compared to patients with one, and 2 or more previous surgeries on the index knee (6.32 vs 5.32 vs 5.05; $p = 0.006$ and $p < 0.001$, respectively). Chondrocyte viability was not predicted by any preoperative variable ($p > 0.05$). Cell identity and chondrocyte viability were not associated with one another or biopsy weight ($p > 0.05$).

Conclusion

Cartilage biopsies from patients with one or multiple previous surgeries resulted in implants with lower identity

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scores when compared to patients without previous operations. None of the other factors were similarly correlated, specifically biopsy weight.