Successful repair after arthroscopic rotator cuff repair is important for recovery of fatty infiltration over 2 years follow up using MRI IDEAL technique

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The Iterative Decomposition of Water and Fat with Echo Asymmetry and Least-Squares Estimation (IDEAL) method is an advanced MRI imaging technique that enables highly accurate quantitative evaluation by effectively separating water and fat. The purpose of this study was longitudinally assessing the fatty infiltration of the supraspinatus and infraspinatus muscles following arthroscopic rotator cuff repair (ARCR) using the MRI IDEAL method to clarify the progression or deterioration of muscle fatty infiltration over time after ARCR.

METHODS:

The study included 208 shoulders from 208 patients (116 males and 92 females) with an average age of 65.9±8.1 years, who underwent ARCR at our hospital. Postoperative MRI IDEAL imaging was conducted for all subjects. The fat content in the supraspinatus and infraspinatus muscles was quantitatively evaluated at baseline (immediately postoperative) and at 1 and 2 years postoperatively. The measurements were performed on oblique sagittal images where the scapular Yview was visible, with regions of interest (ROIs) manually delineated for the supraspinatus and infraspinatus muscles. The signal intensities from the In Phase (combining water and fat signals) and Fat Phase (fat-only signals) sequences of the IDEAL method were measured to calculate the percentage of fat content. Additionally, re-tear was defined based on Sugava's classification types 4 and 5 in follow-up MRIs, and comparisons were made between re-tear and healed groups. **RESULTS:**

All 208 shoulders were successfully evaluated immediately postoperatively, at 1 year, and at 2 years. The incidence of retear was observed in 41 shoulders (19.7%) at 1 year and in 50 shoulders (24.0%) at 2 years postoperatively. In the group with well healed outcomes, the average fatty infiltration of the supraspinatus muscle was 27.2% immediately postoperatively, 25.5% at 1 year, and 23.9% at 2 years, showing a significant improvement in 2 years compared to the immediate postoperative period (p=0.03). Conversely, in the re-tear group showed that fatty infiltration was 34.5% immediately postoperatively, increased to 40.1% at 1 year, and further deterioration to 44.5% at 2 years, demonstrating significant worsening over time (p=0.02, p<0.01). In the re-tear group after one year post-surgery, the rates were 32.4% immediately after surgery, 29.6% at one year post-surgery, and 38.5% at two years post-surgery. This indicates a worsening of fatty degeneration from one year to two years post-surgery. In the infraspinatus muscle, the average fatty infiltration in the well-healed group was 23.1% immediately after surgery, 22.3% at 1 year post-surgery, and 22.2% at 2 years post-surgery, showing improvement compared to immediately after surgery. In the re-tear group at 1 year postsurgery, the average fatty infiltration was 34.1% immediately after surgery, 37.7% at 1 year post-surgery, and 40.3% at 2 years post-surgery, showing deterioration compared to immediately after surgery. In the re-tear group after 1 year, the average fatty infiltration was 24.7% immediately after surgery, 23.6% at 1 year post-surgery, and 30.9% at 2 years postsurgery, showing deterioration of fatty infiltration from 1 year to 2years post-surgery. Although similar trends were observed in the supraspinatus muscle, no significant differences were noted in the infraspinatus muscle. DISCUSSION AND CONCLUSION:

ARCR appeared to have a positive impact on recovering muscle fatty infiltration over a 2-year postoperative period with well healed after ARCR. This finding suggested that the surgical repair of the rotator cuff can potentially reverse some of the fatty infiltrative changes in the muscles. However, in cases with a re-tear postoperatively, there was a notable deterioration of muscle fatty infiltration over time. This underscores the importance of successful initial repair and the rotator cuff











muscle.