

## Risk Factors for Intracellular Fatty Accumulation in Rotator Cuff Muscle: A Histological Analysis

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**INTRODUCTION:** Fatty accumulation in rotator cuff muscles has been associated with shoulder dysfunction, risk of repair failure, and poor postoperative outcomes. This study sought to assess risk factors associated with true fatty accumulation based on histological analysis and determine if preoperative function directly correlated with this fatty rotator cuff accumulation.

**METHODS:** Supraspinatus muscle biopsies obtained prospectively from patients undergoing arthroscopic rotator cuff repair were stained to quantify lipid accumulation. Two-step cluster analysis with Goutallier classification was used to define fatty and non-fatty rotator cuff groups. We further performed a receiver operating curve analysis to confirm the group cut-off values.

**RESULTS:** Fifty-one patients ( $60.1 \pm 10.5$  years) were included. There were 19 high grade partial, 10 small, 7 medium, 10 large, and 5 massive tears. Both cluster and ROC analysis yielded a cutoff value of 30 %Stain/DAPI separating the fatty vs. non-fatty groups. In the univariate analysis, patients with fatty rotator cuffs were 63.2 years-old on average compared to 59.7 years-old in the non-fatty group ( $p = 0.038$ ). Females made up 57.1% of the fatty cohort, which was statistically higher than the non-fatty group ( $p = 0.042$ ). Massive and large tears were more likely to occur in the fatty group ( $p = 0.005$ ). In the multivariate analysis, full tendon tears had the largest predictive status of falling in the fatty group (odds ratio: 15.4,  $p = 0.008$ ), followed by female sex (odds ratio: 4.9,  $p = 0.036$ ). Patients in the fatty group had significantly higher ASES scores ( $p = 0.048$ ) and lower VAS scores ( $p = 0.002$ ).

**DISCUSSION AND CONCLUSION:** This prospective histological assessment revealed that full thickness rotator cuff tears and female sex were the largest risk factors for intracellular lipid accumulation. While tear size correlated to fatty accumulation, the sex disparity is a noteworthy finding that warrants further research. Given the relationship between fatty accumulation and poor functional outcomes, our results could help clinicians identify patients at higher risk of impaired postoperative recovery.

