

Biomechanical, Cell Biological and Magnetic Resonance Imaging (MRI) -Morphological Results Comparing Single- and Double-Row Repair

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Summary:

This study confirms that in an acute repair model, double-row repair may enhance the speed of mechanical and histological recovery of the tendon-bone complex when compared with single-row repair in the early postoperative period.

Abstract:

Introduction:

A significant controversy exists regarding the optimal fixation technique in rotator cuff repair. The aim of this study was to compare the time-dependent cell biological and biomechanical properties of a single-row technique using arthroscopic Mason-Allen stitches versus a double-row technique using arthroscopic Mason-Allen stitches (lateral) and mattress stitches (medial) in an in-vivo sheep model.

Materials and Methods:

Thirty-six female mature merino sheep were randomly assigned to either a single-row group using arthroscopic Mason-Allen stitches, or a double-row group using a combination of arthroscopic Mason-Allen and mattress stitches. Each group was analysed at one of six survival points. The integrity of the cuff repair using MRI, biomechanical properties using a mechanical testing machine, and the expression of collagen type I, II, and III using histological, ultrastructural and molecularbiological methods, were evaluated.

Results:

The mean load to failure was significantly higher in the double-row group compared with the single-row group at 6 and 12 weeks. At 26 weeks, the differences were not statistically significant; however, the double-row group achieved a mean load to failure similar to that of a healthy infraspinatus tendon. In contrast, the single-row group reached only 70% of the load of a healthy infraspinatus tendon. No significant differences were observed based on the MRI investigation.

Molecular results show that collagen type III expression remained positive until six weeks postoperatively in the double-row group, whereas it was detectable for 12 weeks in the single-row group. Additionally, collagen Type II expression was increased in the cartilage zone after 12 weeks in the double-row compared to the single-row group.

Conclusion:

This study confirms that in an acute repair model, double-row repair may enhance the speed of mechanical and histological recovery of the tendon-bone complex when compared with single-row repair in the early postoperative period. This phenomenon could be explained due to faster tissue revitalization in using this technique. Conversely, the MRI results show no significant differences using both techniques.