Influence of Shoulder Abduction Position on Biomechanical Properties of Repaired Rotator Cuff Tendon

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INTRODUCTION:
Maintaining rotator cuff integrity is correlated with functional outcome, however, a relatively high rate of recurrent tear after open and arthroscopic rotator cuff repair has been reported. This suggests that advances in repair techniques are needed to optimize the healing environment. One of the factors is thought to be initial fixation strength. Optimizing initial fixation strength allows for early post-operative rehabilitation while maintaining repair integrity.

Several studies have compared initial fixation strengths of the repaired rotator cuff tendon in various techniques. To our knowledge, there has been no report which investigated the influence of shoulder abduction position on initial strength of the repaired rotator cuff tendon although the shoulder is immobilized in various abduction positions after surgery. We assessed the effect of shoulder abduction position on tensile strength and gap formation at a repaired rotator cuff footprint among three types of double-row technique.

METHODS:
Forty eight fresh frozen porcine shoulders of 6-month-old were used. They were thawed for 24 hours at room temperature before dissection. All soft tissues except for the infraspinatus tendon were carefully dissected from the humerus. The infraspinatus tendon was sharply released from its insertion. The distal 8 mm of the infraspinatus tendon was resected from the lateral edge of the tendon to simulate a rotator cuff tear.

The simulated rotator cuff tear was repaired with three types of double-row repair technique: (1) conventional double-row repair (double-row without bridging sutures, DR); (2) a combination of conventional double-row and bridging sutures (compression double-row, CDR); and (3) transosseous-equivalent repair (TE) (Fig.1).

**DISCUSSION:**
The effect of bridging sutures on the biomechanical properties of the repaired rotator cuff tendon is greater at a low abduction angle, whereas the effect of four-point fixation by the conventional double-row technique is greater at a high abduction angle. These results suggested that the biomechanical properties of the repaired rotator cuff tendon change with abduction position after rotator cuff repair, and the better biomechanical properties of repaired tendon at both low and high abduction angles can be obtained by the use of the combined technique of conventional double-row and bridging sutures.