

## **Biology and Biomechanics Behind the Tears**

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### **Mechanism of Tear**

The rotator cuff tendon tear usually initiates at the supraspinatus tendon.(1) The mechanism of tendon tear is multifactorial. As an intrinsic factor, age-related tendon degeneration and weakening is observed mainly on the articular side of the supraspinatus tendon near its insertion to the greater tuberosity.(2) This site also coincides with the location of stress concentration during arm elevation.(3) Recently, the critical shoulder angle is reported to be related to cuff tear.(4) With a large critical shoulder angle, the shoulder requires more force from the supraspinatus to stabilize the humeral head and elevate the arm.(5) The constant higher force requirement is related to mechanical stress to the tendon, which in turn causes tendon degeneration. As an extrinsic factor, contact between the surface of the rotator cuff tendon and the coracoacromial arch plays an essential role. The contact pressure under the acromion is much higher than under the coracoacromial ligament.(6) The presence of subacromial spur is known to be related to a rotator cuff tear.(7) The sagittal location of the acromion is also known to be related to rotator cuff tears.(8)

### **Tendon Healing**

The tendon attachment to the bone has four zones: tendon - uncalcified fibrocartilage - calcified fibrocartilage - bone. Tendon healing to the bone is characterized by fibrovascular scar formation rather than regenerating normal tendon tissue. The scar tissue is much weaker biomechanically than the normal tendon tissue.

### **Biomechanics of Repair**

New repair techniques focus on restoring the footprint of the rotator cuff tendon. Systematic reviews showed that there was better healing in large tears with double row repair than single row repair, but no difference in clinical outcome.(9, 10)

## References

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