Ultrasound changes after rotator cuff repair – is supraspinatus tendon thickness related to pain?

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Introduction
Surgical repair for rotator cuff tears is common, but little is known about the healing tendon after surgery. The purpose of this study was to determine whether there are changes after rotator cuff repair in tendon thickness, anatomical footprint, tendon vascularity, subacromial bursa, capsular thickness, and whether tendon and bursal thickness correlate with pain.

Methods
Fifty-seven patients completed a validated pain questionnaire and had their shoulders scanned by the same experienced ultrasonographer with a General Electric Logiq E9 (GE Corp, Fairfield, CT) ultrasound machine with a linear ML6-15MHz transducer using a standardised protocol at 1 week, 6 weeks, 3 months and 6 months post arthroscopic rotator cuff repair by a single surgeon. The contralateral shoulders, if uninjured, were also scanned. Data is presented as mean (SD).

Results
Forty-nine of the 57 rotator cuff repairs were intact at 6 months. Four re-tore at 6 weeks, while four re-tore at 3 months. At 6 weeks, the repaired tendon thickness was 4.3 (0.9) mm, and increased to 4.6 (1.0) mm at 3 months (p < 0.05). Tendon thickness was similar to the contralateral side at each follow-up. There was a significant increase in bursal thickness at 1 week [1.9 (0.8) mm] compared with the contralateral shoulder [0.8 (0.4) mm] (p < 0.001); which decreased at each time point so that by 6 months it was 0.7 (0.5) mm (p < 0.001). There was a significant increase in the width of the anatomical footprint, from 7.0 (2.0) mm at 1 week to 9.3 (1.5) mm at 6 months (p < 0.001). Vascularity of the tendon decreased from mild at 1 week, to none at 6 months (p < 0.001). At 1 week there was a significant increase in the ipsilateral posterior capsule thickness 2.3 (0.8) mm, which gradually decreased to 1.3 (0.6) mm at 6 months (p < 0.001). There was no difference in the contralateral posterior capsule thickness, which was 1.1 (0.5) mm at 1 week and 1.3 (0.4) mm at 6 months. The frequency and severity of pain decreased at 6 months, and the patient-ranked overall condition of the shoulder improved (p < 0.001). There was no correlation between tendon thickness or bursal thickness with pain.

Conclusion
This study yielded some novel findings. (1) After supraspinatus repair, the tendon thickness increased only 7% between 6 weeks and 3 months. Many other tendons (eg Achilles) increase several-fold after repair. (2) The width of the anatomical footprint of the repaired supraspinatus was 33% narrower at 1 week and gradually increased over 6 months to be comparable with the contralateral uninjured shoulder. (3) Ipsilateral bursal thickness, tendon vascularity (as per other studies) and posterior capsule thickness increased significantly compared with the contralateral shoulder at 1 week post surgery and then gradually decreased over 6 months. An increase in glenohumeral joint capsule thickness following rotator cuff repair was unexpected and may help explain the shoulder loss of range of motion sometimes seen post shoulder trauma. (4) There was no correlation between tendon thickness and pain.

Significance
Knowledge about the structural changes that occur to the rotator cuff tendon and other structures in humans post repair may help clinicians when making decisions about patients prior to and after rotator cuff repair.