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Hypervascularity in the Bicipital Groove is Responsible for Painful Rotator Cuff Tear

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Summary:
The cross-sectional area and vascularity of the long head of the biceps in the bicipital groove were evaluated in patients with symptomatic and asymptomatic rotator cuff tears. Hypertrophy and hypervascularity of the biceps tendon are observed in patients with rotator cuff tears. The hypervascularity is directly correlated with the symptoms from the rotator cuff tear.

Abstract:
INTRODUCTION
Although the presence of asymptomatic rotator cuff tears is increased with age, difference of the pathology between the asymptomatic and symptomatic rotator cuff tears is not fully understood. We hypothesized that the biceps tendon could cause a pain source in patients with symptomatic rotator cuff tears. The purpose of this study was to compare the pathologies of the biceps tendon between symptomatic and asymptomatic rotator cuff tears.

METHODS
Between 2012 and 2013, preoperative ultrasounds were performed in both shoulders on 352 patients with unilateral symptomatic rotator cuff tears. Patients with a torn biceps tendon and patients who underwent prior rotator cuff surgery in either shoulder were excluded. Therefore, subjects consisted of 640 shoulders in 321 patients, comprised of 174 males and 147 females with an average age of 62.4±10.1 years old. Preoperative ultrasound revealed 154 asymptomatic rotator cuff tears in contralateral shoulders. The rest of the contralateral shoulders (165 shoulders) were utilized as a no rotator cuff tear group. The cross-sectional area (CSA) of the biceps tendon in the groove was measured and vascularity in the bicipital groove was graded into four categories using power Doppler ultrasonography: Grade 0, normal (no signal or presence of a signal of the anterior circumflex artery (ACA)); Grade 1, single vessel signal other than ACA; Grade 2, integration of signals occupying less than half of the CSA of the biceps; Grade 3, integration of signals occupying more than half of the CSA of the biceps. The multiple comparisons using Scheffe's F test and Steel-Dwass test were applied for symptomatic rotator cuff tears, asymptomatic rotator cuff tears and no rotator cuff tear groups.

RESULTS
The average CSA was 21.0±11.9 mm2 in symptomatic rotator cuff tears, 19.9±11.9 mm2 in asymptomatic rotator cuff tears and 14.1±5.9 mm2 in no rotator cuff tears. The CSA in both symptomatic and asymptomatic rotator cuff tears were significantly larger than that in no rotator cuff tear groups ($p<0.01$). Significantly a higher grade of the vascularity was observed in patients with symptomatic and asymptomatic rotator cuff tear when compared with the vascularity in no rotator cuff tears. The highest grade of the vascularity was observed in patients with symptomatic rotator cuff tears (fig.1).

DISCUSSION & CONCLUSION

According to the present study, significant hypertrophy of the biceps tendon was observed regardless of the symptoms. However, significant hypervascularity in the bicipital groove was observed in patients with symptomatic rotator cuff tears. A signal of the vascularity is clinically utilized as a scale of the synovial inflammation in rheumatoid arthritis. Our results suggested that significant increase of the vascularity in the bicipital groove reflected the inflammation in symptomatic shoulders. As the hypertrophy and hypervascularity in the biceps tendon were observed in patients with asymptomatic rotator cuff tears when compared to those with no rotator cuff tear, it might progress into symptomatic rotator cuff tears afterward. In conclusion, the characteristic finding of the biceps tendon in symptomatic rotator cuff tears is hypervascularity in the bicipital groove.