게시일시 및 장소 : 10 월 18 일(금) 08:30-12:20 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 10:00-10:45 Room G(3F)

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Ultrasound Microflow imaging for Diagnosis of Adhesive Capsulitis of the Shoulder

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Background
Ultrasonography has higher resolution than standard MRI and other imaging studies and can perform a real-time dynamic study. Several ultrasonographic findings have been reported to be helpful in diagnosis of adhesive capsulitis. Microflow imaging (MF) is a recently developed Doppler ultrasound imaging technique. It is useful for the diagnosis of disorder of the tendons and earlier detection of active inflammation in arthritis.

Objective
To assess diagnostic accuracy of MF by detecting vascular flow at subcoracoid fat triangle for diagnosis of adhesive capsulitis of the shoulder compared to power Doppler imaging (PD), and investigate whether vascular flow on MF is correlated with clinical features such as range of motion, pain intensity and duration of symptom.

Materials and Methods
This study included 39 patients with adhesive capsulitis and 35 patients with normal shoulder as control. Vascular flow in subcoracoid fat triangle was evaluated using MF and PD. Area of vascular flow in MF and PD (MF and PD area) were analyzed. Echogenicity in rotator interval and coracohumeral ligament thickness were also evaluated. To evaluate diagnostic accuracy, ROC analysis was performed. Correlations of US findings with range of motion, pain intensity, and duration of symptom were also evaluated.

Results
MF area in the adhesive capsulitis group was higher than that in the control group (2.95 vs. 0 mm2, $p < 0.01$). Vascular flow in MF was significantly higher than that in PD in all patients (0.64 vs. 0 mm2, $p < 0.01$). The presence of vascular flow was also significant different between MF and PD ($p < 0.01$). The vascular flow was only detected with MF, but not with PD, in 15 of 74 (20.27%) patients. MF area were only useful findings for diagnosis, as more than 1.95 mm2, in six (17.14%) patients of the adhesive capsulitis group. In ROC analysis, MF area showed higher diagnostic performance with an AUC of

0.90 than the other US findings. MF area was also negatively correlated with external rotation and forward flexion ($p < 0.05$) in adhesive capsulitis group.

Conclusion

Measurement of vascular flow at subcoracoid fat triangle using MF was useful in diagnosis of adhesive capsulitis, and it can detect vascularity with improved resolution and sensitivity compared to PD. It also showed correlation with limitation of range of motion in the shoulder joint.

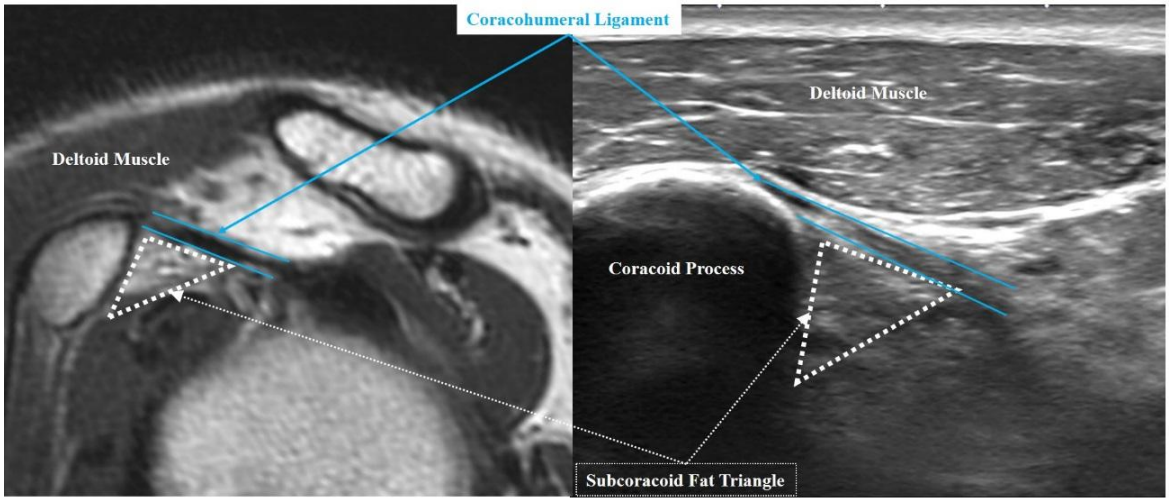

Fig. 1. Anatomy and US examination of the subcoracoid fat triangle. Oblique sagittal MRI (left column) and US images (right column) of subcoracoid fat triangle (dotted triangle). Subcoradcoid fat triangle is the triangular space between the coracohumeral ligament and the coracoid process, showing high echogenicity

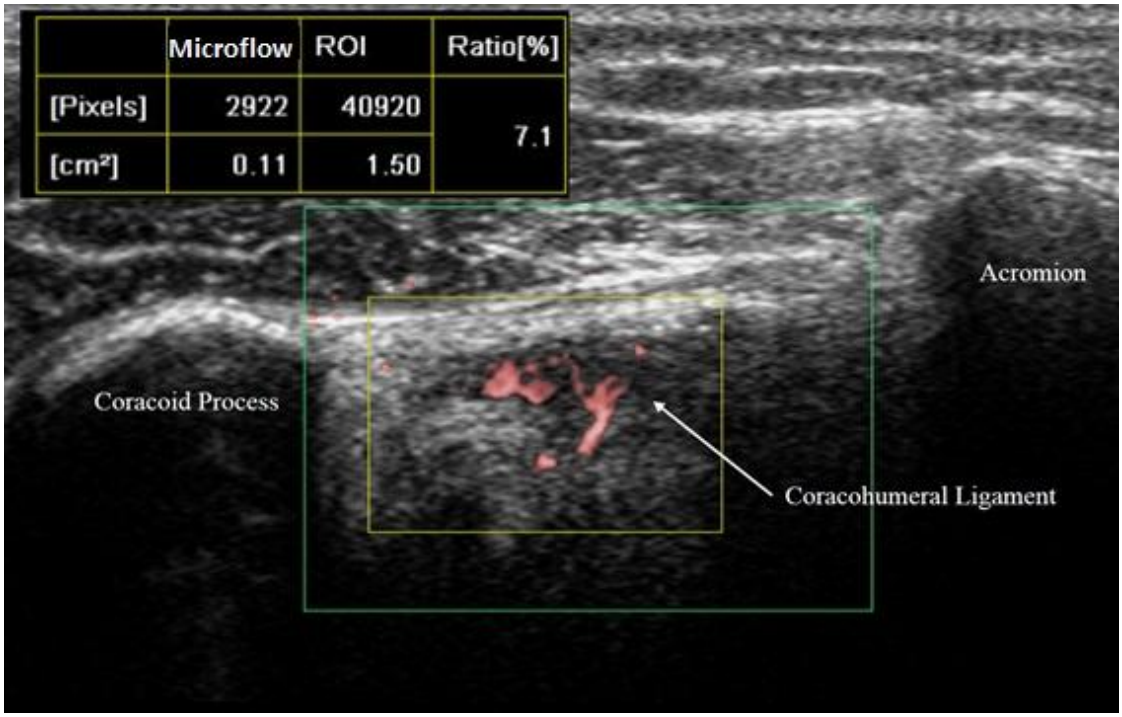

Fig 2. Measurement of vascular flow using microflow imaging. Area of vascular flow measured by microflow imaging was automatically calculated.

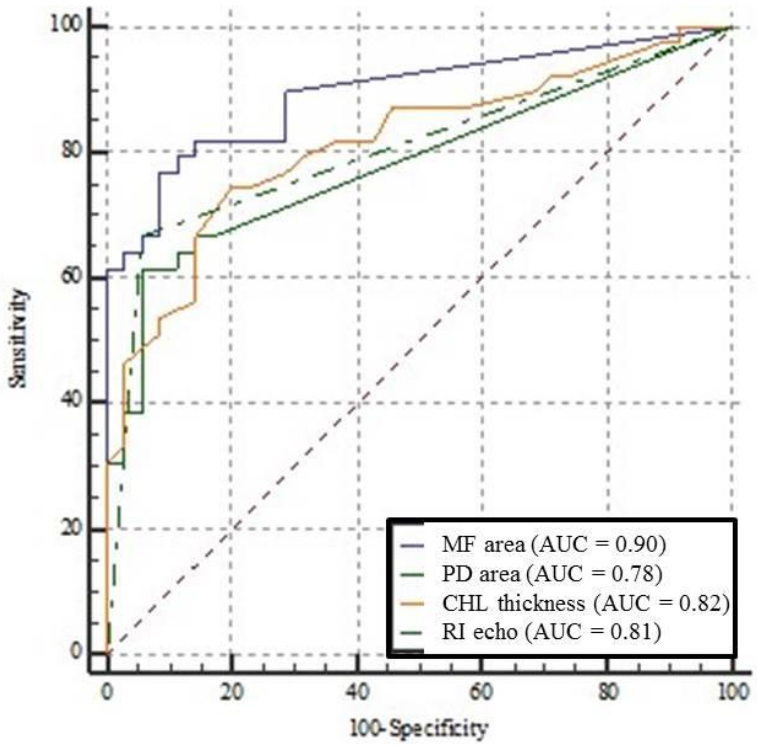

Fig. 3. Receiver operating characteristic (ROC) analysis of US parameters. MF, Microflow imaging; PD, power Doppler imaging; CHL, coracohumeral ligament; RI echo, rotator interval hypoechogenicity