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Diagnostic Value of Shear Wave Elastography in Myofascial Pain Syndrome

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Introduction

Myofascial pain syndrome (MPS), one of the most common causes of muscle pain, is diagnosed by muscle palpation to identify muscle stiffness or so-called “taut band”. The diagnostic criteria of MPS are entirely based on clinical examination, and there is no objective finding to assist in diagnosis of MPS. Shear wave elastography can show objective data in muscle tightness by measuring shear wave elasticity (SWE) or shear wave velocity (SWV). The aim of this study was to compare SWEs according to different factors and to identify taut bands by the highest points of SWE.

Materials and Methods

Patients were recruited from the outpatient clinic of the Department of Physical and Rehabilitation Medicine in Samsung Medical Center from December 2018 to April 2019. McGill pain questionnaires were assessed for evaluation of pain severity. Muscle thickness at the tenderest point in the symptomatic side of the upper trapezius muscle was measured in longitudinal and axial views by a linear probe using an ultrasound machine (RS85 version 1.03, Samsung Medison Co., Ltd., Republic of Korea). The thickness at the same point in the asymptomatic side was measured with B-mode images. Shear wave elastography was performed at both upper trapezius muscles in the same area with measurement of muscle thickness. To identify correlation of SWE with age, sex, symptom duration, involved side, or McGill pain questionnaire, Spearman correlation analyses were conducted for continuous variables and independent t-tests were conducted for categorical variables. To identify differences in SWE between affected and intact sides, a paired t-test was conducted.

Results

A total of 30 patients (9 men and 21 women) with unilateral MPS in the trapezius muscle were recruited in our study. Thickness of the trapezius muscle in the longitudinal and axial directions was 9.4±2.2 mm and 9.5±2.4 mm in the affected side and 8.4±3.0 mm and 9.1±2.3 mm in the intact side. These values were not significantly different (P-values

were 0.071 and 0.162 by paired t-test, respectively). Mean values of SWE at 10 areas in the longitudinal and axial directions were 38.5 kPa and 56.8 kPa in the affected side and 36.6 kPa and 57.6 kPa in the intact side. These values were not significantly different (P-values are 0.36 and 0.78 by paired t-test, respectively). Spearman correlation analyses showed a significant negative correlation between SWE in the impaired side in the longitudinal direction and the McGill pain questionnaire (P=0.013).

Conclusion

Our study showed that SWE in the longitudinal direction of the muscle decreased as pain severity increased, and a specific area showing the highest SWE in the longitudinal direction was present in measured areas. Decreased SWE with severe pain was related to more severe muscle disruption, and specific areas showing the highest SWE might be taut bands in MPS.

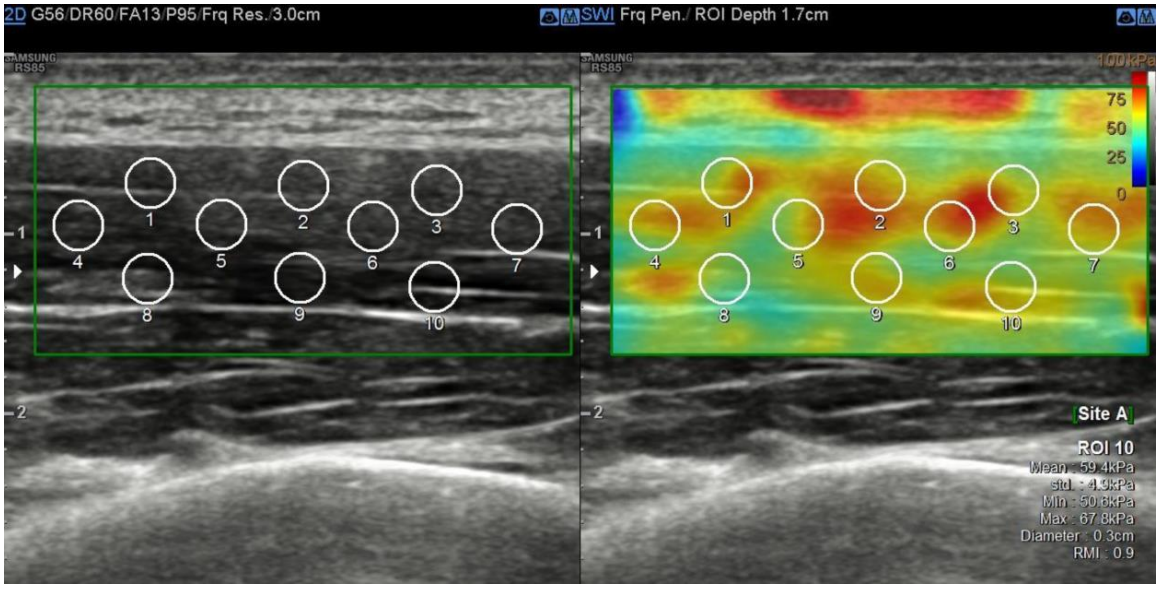

Figure 1. Shear Wave Elasticity of Patients with Myofascial Pain Syndrome. SWE was measured at 10 circular ranges of interest with diameter of 3 mm, the center of which was designated as the tenderest point.

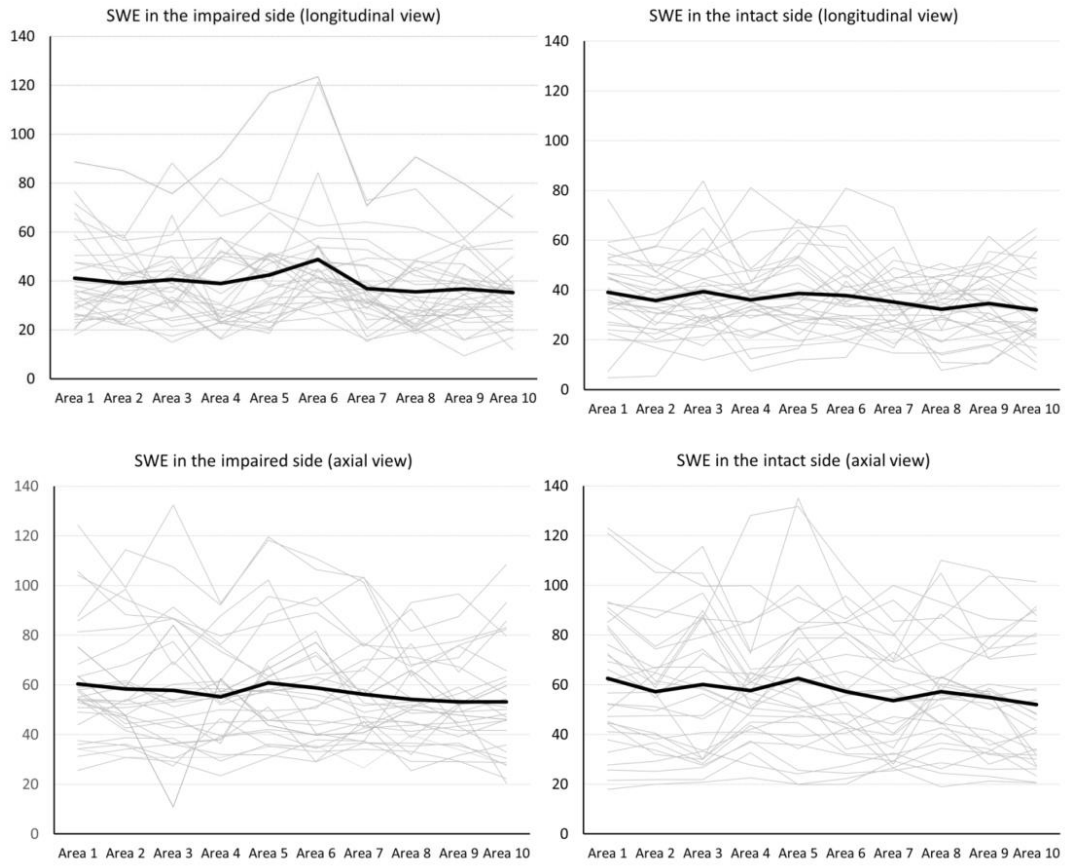

Figure 2. Distribution of Shear Wave Elasticity. Area 6 in the affected side showed higher SWE than other areas in the longitudinal view while the intact side did not show any significant differences compared to other areas.

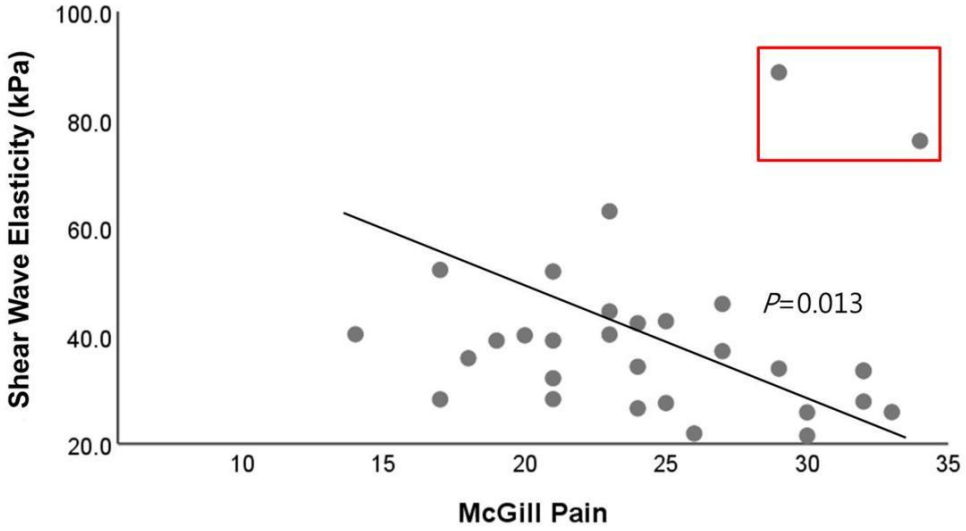

Figure 3. Spearman Correlation between Shear Wave Elasticity and McGill Pain Questionnaire. There is a significant negative correlation between SWE in the impaired side in the longitudinal direction and the McGill pain questionnaire (P=0.013). Two points in the red box show the highest shear wave elasticity which suggests taut band.