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Temporal Changes in Power Doppler Ultrasonography After Manipulation Under Cervical Nerve Root Block in Frozen Shoulder

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Introduction and Background

Hypervascularity around the glenohumeral joint has been reported to correlate with pain in frozen shoulder. Clinically, pain often improves rapidly after manipulation under cervical nerve root block (MUC); however, it remains unclear whether this improvement reflects normalization of the vascularity. This study aimed to clarify the temporal relationship between vascular changes and clinical improvement after MUC.

Material and Method

Twenty-eight patients with frozen shoulder who underwent MUC between April 2024 and September 2025 were included. Ultrasonography with power Doppler was performed preoperatively and at 2 weeks, 6 weeks, and 3 months postoperatively. Peritendinous blood flow around the long head of biceps tendon (LHBT) was graded according to the classification of Yamaguchi et al. Peak systolic velocity (PSV) of the ascending branch of anterior humeral circumflex artery accompanying the LHBT was measured on both the affected and contralateral sides, and the affected-to-contralateral PSV ratio was calculated. Clinical outcomes included range of motion (forward flexion, external rotation, internal rotation) and pain evaluated by the Numerical Rating Scale (NRS). Statistical analyses were performed using the Friedman test followed by the Wilcoxon signed-rank test with Holm correction.

Results

Peritendinous blood flow grade and absolute PSV on the affected side showed a decreasing trend after MUC, but no significant differences were observed between time points. In contrast, the affected-to-contralateral PSV ratio decreased stepwise and showed significant reductions between preoperatively and 6 weeks and 3 months postoperatively, as well as between 2 and 6 weeks and between 2 weeks and 3 months ($p < 0.05$). Range of motion and NRS significantly improved within 2 weeks after MUC.

Conclusions

Early pain relief after MUC occurred before the reduction in peritendinous blood flow around the LHBT, suggesting that early pain relief was not directly related to vascular improvement.