Research Report

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Influences of Self-Myofascial Release Using a Massage Ball on the Glenohumeral Internal Rotation Range of Motion

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Background Myofascial release has been recommended for increasing joint range of motion (ROM). However, no study has identified the effects of self-myofascial release using a massage ball during stretching exercises.

Purpose This study investigated the effects of self-myofascial release on glenohumeral internal rotation and horizontal adduction ROM using a massage ball during cross-body stretching.

Study design Case series study

Methods Overall, 18 adults with reduced glenohumeral internal rotation ROM performed self-myofascial release using a massage ball during cross-body stretching. Glenohumeral internal rotation and horizontal adduction ROM were measured pre- and post-intervention. Changes in ROM were analyzed using the paired *t*-test.

Results Glenohumeral internal rotation and horizontal adduction ROM significantly increased after intervention ($p<0.05$).

Conclusions The findings indicate that a combination of myofascial release using a massage ball and stretching improves the glenohumeral joint ROM effectively.

Key words Glenohumeral joint; Internal rotation; Myofascial release; Range of motion; Stretching.

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INTRODUCTION

The shoulder joint complex, consisting of the glenohumeral, acromioclavicular, sternoclavicular, and scapulothoracic joints, is vulnerable to injury.[1,2] Reportedly, majority of people experience shoulder injury or pain at least once in their lifetime.[3] Changes in glenohumeral joint mobility cause shoulder damage and pain.[4,5] In particular, the decrease in the internal rotation range of motion (ROM) of the glenohumeral joint compared with opposite side (i.e., glenohumeral internal rotation deficit) is majorly observed in athletes performing overhead throwing motions,[6,7] and decreased glenohumeral internal rotation ROM may be associated with shoulder injuries, including superior labrum anterior-to-posterior lesions and shoulder impingement.[4–6]

Stiffness of the posterior joint capsule or the rotator cuff muscles primarily decreases internal rotation ROM of the glenohumeral joint.[7,8] Therefore, stretching exercises are prominently used to increase internal rotation ROM of the glenohumeral joint, of which cross-body stretching a representative stretching exercise.[9,10] Previous study has revealed an increase in internal rotation ROM of the glenohumeral joint after cross-body stretching.[9]

Myofascial release or massage is an intervention prevalently used in the clinical field to reduce shoulder pain and stiffness.[11] It is believed that the external load applied

during myofascial release techniques stimulates various mechanoreceptors in soft tissues, ultimately causing muscle relaxation.[12] Previous systematic reviews have concluded that massage therapy is effective in reducing shoulder pain and increasing shoulder joint ROM.[13,14] Recently, a self-myofascial release method using a massage ball, as well as massage/myofascial release provided by the therapist's manual, has been proposed.[12,15–17] Previous studies revealed significantly increased internal rotation ROM of the glenohumeral joint after applying self-myofascial release using a massage ball to the rotator cuff.[14,16]

Previous studies have confirmed the effectiveness of self-myofascial release using massage balls,[14,16] but no study has reported the effects of applying self-myofascial release and stretching simultaneously. However, studies reported that the simultaneous application of two different interventions is more effective in increasing joint ROM than the application of a single intervention.[18,19] Verifying the effectiveness of interventions combining stretching and self-myofascial release using a massage ball would provide clinicians with new intervention strategies to increase glenohumeral joint ROM. Also, it could provide information on effective exercise methods even when a therapist is unavailable. Therefore, this study aimed to verify the effect of self-myofascial release using a massage ball on the internal rotation and horizontal adduction ROM of the glenohumeral joint during cross-body stretching.

METHODS

Participants

This study included 18 adults (mean age: 21.56±1.25 years; mean height: 166.33±9.41 cm; mean weight: 63.94±15.06 kg) with reduced internal rotation ROM of >10° in the glenohumeral joint compared with the contralateral glenohumeral joint.[18] Participants who diagnosed with shoulder injury, shoulder joint surgery, or current shoulder pain were excluded.[14] Sample size was determined using power analysis with statistical power of 80%, α-value of 0.05, and effect size of 0.8. The Catholic University of Pusan Institutional Review Board approved the study protocol, and written informed consent was obtained by all participants.

Measurements of the glenohumeral joint range of motion

Participants performed 90° shoulder abduction and 90° elbow flexion on the testing side in the supine position. An examiner stabilized the coracoid process and then rotated the forearm of the participant for glenohumeral internal rotation.[20] Another examiner placed the smartphone on the forearm and measured the glenohumeral internal rotation ROM using the application.

Participants were positioned the same as in the measurement of glenohumeral internal rotation ROM to measure glenohumeral horizontal adduction ROM. An examiner stabilized the scapular lateral border and then pulled the humerus across the body of the participant.[18] Another examiner placed the smartphone on the humerus and measured the glenohumeral horizontal adduction ROM using the application.

Pre-intervention measurements were taken immediately before the first session of self-myofascial release, and post-intervention measurements were conducted immediately following the final session on the same day to assess immediate effects. No long-term intervention period (e.g., over several weeks) was included in this study's design. All measures were repeated thrice before and immediately after intervention, and the mean value was used for data analysis.

Cross-body stretching with self-myofascial release using a massage ball

Participants were placed in an oblique position in front of a wall at approximately 45° angle to the wall so that the intervening shoulder touched the wall. The massage ball was placed by the examiner in the tender area between the wall and the infraspinatus on the intervention side.[14] The participants supported their weight on the massage ball and applied pressure to the infraspinatus muscle within their tolerable range. Simultaneously, the participants performed cross-body stretching (maximum horizontal adduction of the intervening shoulder using the contralateral hand) and maintained end-range for 30 s (Figure 1). The intervention was repeated thrice.[18] A 30-s rest time was provided between interventions.

Statistical analysis

Changes in glenohumeral internal rotation and horizontal adduction ROM after intervention were analyzed using paired *t*-tests with IBM Statistical Package for the Social Sciences Statistics (version 26.0; IBM Corp., Armonk, USA). The α-level was set at 0.05.

RESULTS

Glenohumeral internal rotation (mean difference: –7.43°, confidence intervals: –9.35 to –5.50, $p<0.001$) and horizontal adduction (mean difference: –3.26°, confidence intervals: –5.43 to –1.09, $p=0.003$) ROM significantly increased after

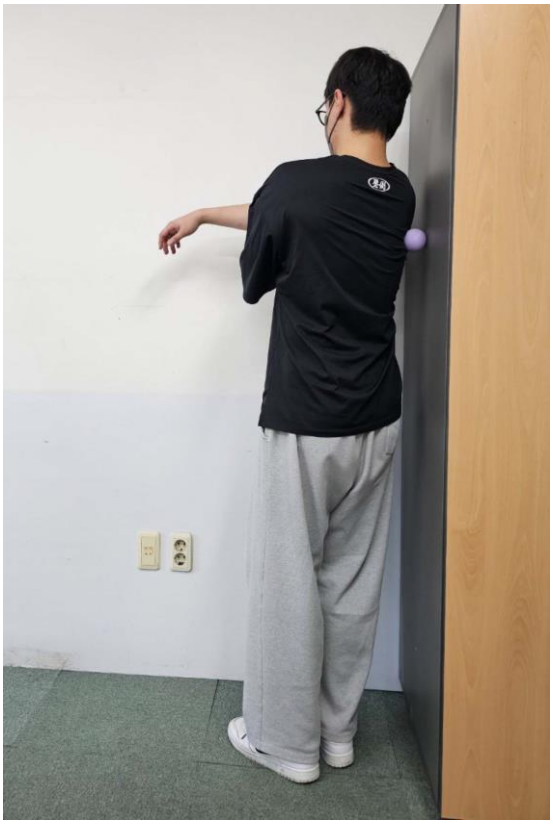

Figure 1. Self-myofascial release using a ball during cross-body stretching.

intervention (Table 1).

DISCUSSION

The results of this study revealed that cross-body stretching with self-myofascial release using a massage ball effectively increased glenohumeral joint ROM. Significant increase in glenohumeral internal rotation ROM was seen after cross-body stretching with self-myofascial release using a massage ball (p<0.001). Additionally, the amount of increase in glenohumeral internal rotation ROM was approximately 7°, which is relatively small increase compared with approximately 15° in cross-body stretching or approximately 11° in self-myofascial release using a massage ball.[9,16] However, the difference between the results of the present and previous studies might be due to the difference in total intervention time. Le Gal et al.[16] revealed an increased glenohumeral internal rotation ROM by approximately 11° after performing myofascial release for the infraspinatus and pectoralis minor using a tennis ball for 5 weeks for a total of 90 min. Manske et al.[10] showed an approximately 15° increase in glenohumeral internal rotation ROM after performing general cross-body stretching for 4 weeks for a total of approximately 37 min. In contrast, in this study, cross-body stretching with self-myofascial release using a massage ball was performed for 1 min and 30 s. Therefore, a relatively small increase in glenohumeral internal rotation ROM was induced by the difference in intervention time in this study. However, the increased glenohumeral internal rotation ROM after intervention demonstrated an effect size (d=0.79) close to the large effect size (d=0.8). Cross-body stretching with self-myofascial release using a massage ball is a clinically effective intervention for increasing glenohumeral internal rotation ROM, considering the effect size.

Similar to the present study, a previous study confirmed the effect of an intervention that applied both stretching and myofascial release.[14] A previous study performed 2 min of stretching (cross-body stretching and sleeper stretching) and 3 min of myofascial release using a massage ball for infraspinatus and revealed increased glenohumeral internal rotation ROM by approximately 10° after intervention.[14] However, while the previous study conducted two interventions separately, this study applied both interventions simultaneously. Additionally, the previous study demonstrated a longer intervention time of 3 min and 30 s than our study. Regarding time efficiency, the exercise method of this study, in which two interventions are applied together, can be useful. However, further research will be required to determine which intervention is more effective between the interventions that apply both stretching and myofascial release simultaneously and the interventions that are applied separately.

Table 1. Changes in glenohumeral joint range of motion after intervention

Range of motion	Pre-intervention	Post-intervention	*P* value
Glenohumeral internal rotation (°)	51.70±9.35	59.13±9.46	<0.001*
Glenohumeral horizontal adduction (°)	53.52±5.48	56.78±4.76	0.003*

Data are expressed as mean±standard deviation.
*p<0.05.

Previous studies have confirmed no changes in glenohumeral horizontal adduction ROM after cross-body stretching or myofascial release.[10,14,16] Glenohumeral horizontal adduction is a representative movement that is restricted together with glenohumeral internal rotation in individuals with posterior shoulder tightness.[21] Posterior shoulder tightness causes abnormal anterior and superior humeral head translation, thereby limiting glenohumeral internal rotation and horizontal adduction.[22,23] In this study, glenohumeral horizontal adduction ROM significantly increased with glenohumeral internal rotation ROM after intervention (p=0.003). The present study did not confirm changes in the posteroinferior translation of the humeral head after intervention, but cross-body stretching with self-myofascial release using a massage ball effectively improved posterior shoulder tightness because glenohumeral internal rotation and horizontal adduction ROMs were increased after intervention.

Based on our findings, cross-body stretching with self-myofascial release using a massage ball could be a useful intervention strategy to increase glenohumeral joint ROM and to prevent further shoulder injuries in individuals with limited glenohumeral internal rotation ROM.

This study has some limitations. This study focused on the immediate effects of self-myofascial release using a massage ball on the glenohumeral internal rotation and horizontal adduction ROM, without assessing the longevity of these effects over a more extended period. As such, one limitation of our research is the lack of longitudinal data to determine whether the improvements in ROM are maintained over time or if repeated interventions are necessary to sustain or further enhance these benefits. Future studies should consider incorporating a follow-up assessment to evaluate the persistence of the intervention's effects and to ascertain if a single session provides temporary relief or contributes to a longer-term adaptation in joint mobility. Second, this study did not compare interventions that applied stretching and myofascial release with those that were applied separately.

CONCLUSIONS

Self-myofascial release using a massage ball during cross-body stretching increased glenohumeral internal rotation and horizontal ROM. These results indicate that self-myofascial release using a massage ball could be an effective strategy for improving glenohumeral joint ROM during stretching exercises. Future study needs to verify the long-term effects of cross-body stretching with self-myofascial release using a massage ball on glenohumeral joint ROM.

Key Points

Question Is self-myofascial release using a massage ball an effective strategy for increasing the glenohumeral joint range of motion during cross-body stretching?

Findings Self-myofascial release using a massage ball during cross-body stretching improves glenohumeral internal rotation and horizontal adduction range of motion.

Meaning Self-myofascial release using a massage ball is an effective strategy for improving glenohumeral internal rotation and horizontal adduction range of motion.

Article information

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Author contributions

Conceptualization: MH Kang.
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Design of the work: MH Kang.
Data analysis: MH Kang.
Project administration: MH Kang.
Interpretation of data: MH Kang.
Writing – original draft: MH Kang.
Writing–review&editing: MH Kang.

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