

Effects of Gong's Mobilization in the Side-lying Position on Shoulder Abduction

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Abstract. [Purpose] This purpose of this study was to verify the effects on shoulder abduction ROM of Gong's mobilization applied to patients in the sitting position and in the side-lying position. [Subjects] This study recruited male and female adults whose shoulder abduction range of motion (ROM) was 120 degrees or less and separated them into Gong's Mobilization in the side-lying position group (side-lying group, n=20) and Gong's Mobilization in the sitting position group (sitting group, n=20). [Methods] Gong's mobilization was applied repetitively about 10–15 times on each individual in both the side-lying and sitting groups. A goniometer was used to measure the shoulder abduction ROM. [Results] In both the side-lying group and the sitting group shoulder abduction ROM increased, and the increase of ROM in the side-lying group was greater. [Conclusion] The treatment effect of Gong's mobilization applied to patients in the side-lying position was greater than that of Gong's mobilization applied to patients in the sitting position; thus, the side-lying position is the proper therapeutic position for Gong's mobilization for patients whose abduction hypomobility.

Key words: Gong's mobilization, Shoulder abduction, Side-lying

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INTRODUCTION

Manual therapy, electrotherapy, and exercise therapy are methods which are used to treat shoulder joint disorders. The purpose of manual therapy, which includes massage and joint mobilization and manipulation, is to increase the joint range of motion (ROM) and reduce pain¹⁾. In particular, joint mobilization techniques aim to recover normal rolling and gliding, and traction and gliding are used to stretch tendons, ligaments, and capsules and enhance their movement²⁾. In addition, anterior-posterior gliding improves the abduction and external rotation range of glenohumeral joints³⁾.

According to the results of a previous study, Gong's mobilization was more effective than anterior to posterior gliding at improving shoulder abduction ROM⁴⁾. However, its effectiveness was limited because the mobilization was applied to subjects in the sitting position, and this posture is inappropriate for utilizing gravity and applying acceleration at the same time. In particular, acceleration is necessary for simultaneous rolling and gliding, and the subjects are also required to perform shoulder abduction muscle contraction. Therefore, the disadvantage of Gong's mobilization in this position is that the subjects' degree of understanding and participation in addition to the therapist's skill determine the success or failure of the treatment. Accordingly, this study verified the effect of Gong's mobilization with subjects in the side-lying position, in which gravity and acceleration

can be applied simultaneously. Moreover, in the side-lying position, the subjects are in a stable and comfortable position, and the therapist can easily adjust the timing of the treatment.

SUBJECTS AND METHODS

Forty males and females whose shoulder abduction ROM was 120 degrees or less were recruited from among 130 healthy adults. They were allocated randomly to either the side-lying group (10 male, 10 female; Right: 11, Left: 9) or the sitting group (10 male 10 female; Right: 12, Left: 8). Those who had problems with the musculoskeletal system or the nervous system, felt pain during shoulder abduction, or whose ROM was restricted due to burns or postoperative scars were excluded. We sufficiently explained the purpose of this study and the details of the experiment to the subjects and received their voluntary consent to participation.

The mean±SD age, height, and weight of the side-lying group were 21.15±3.99 years old, 168.30±8.13 cm, 59.30±9.62 kg, respectively. The mean±SD age, height, and weight of sitting group were 21.80±3.44 years old, 167.80±7.73 cm, and 65.40±10.67 kg, respectively. Analysis of gender was performed with the chi-square test, and age, height, and weight were analyzed using the independent t-test. As there were no statistically significant differences found in these analyses ($p>0.05$), the homogeneity of the

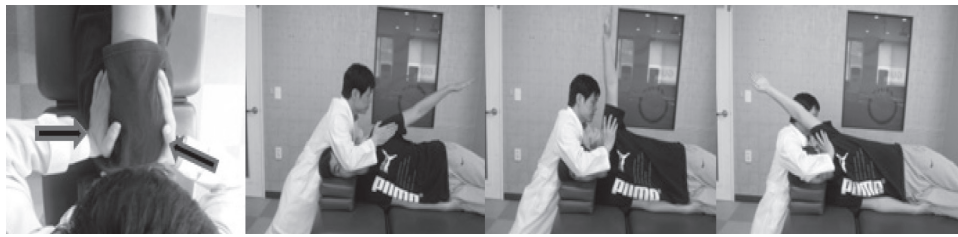


Fig. 1. Gong's mobilization with side-lying



Fig. 2. Gong's mobilization with sitting

Table 1. Comparison of shoulder abduction ROM at pre- and post-intervention in each group

(mean \pm SD)	(unit: degree)	
Category	pre intervention	post intervention
Side-lying group*	90.1 \pm 16.7	114.8 \pm 16.3
Sitting group*	93.4 \pm 16.6	111.7 \pm 13.6

* $p < 0.05$

Table 2. Comparison of shoulder abduction ROM between the side-lying group and sitting group

(mean \pm SD)	(unit: degree)	
Category	Side-lying group	Sitting group
Pre-intervention	90.1 \pm 16.7	93.4 \pm 16.6
post-intervention	114.8 \pm 16.3	111.7 \pm 13.6
difference between pre- and post-intervention	24.7 \pm 14.1	18.3 \pm 15.1

* $p < 0.05$

two groups was established.

For each subject, measurements were taken of the shoulders, and the side with smaller shoulder abduction ROM was mobilized. The subjects were asked to stand against a wide, flat wall surface while maintaining elbow joint extension during shoulder abduction, to restrict excessive elevation of lateral trunk flexion and the scapula. Then, they abducted the shoulder with the forearm and the fifth finger's ulnar side on the wall surface. The ROM was measured with a goniometer (USA)⁴⁾.

Gong's mobilization with the subjects in the side-lying position was applied as follows. Subjects adopted the side-lying position with the affected side upward on a manual bed whose height could be adjusted. The subject's head was supported by a pillow and aligned with the bed's edge.

With one hand, the therapist pushed the affected side's scapula posterior to anterior from above the head. With the other hand, the therapist pushed the humeral head anterior to posterior, thereby correcting the humeral head pushed out of the normal position. With the subject's palm medial and the back of the hand lateral, the subject abducted the shoulder quickly and powerfully in the coronal plane without external rotation and elbow flexion. At this time, the therapist's hand maintained pressure on the humeral head and aligned the palm's long axis with the humerus long axis. The therapist then performed distraction while the subject abducted the shoulder, and followed all the same speed. The therapist added acceleration while still pressing the humeral head with the subject's abduction at 90 degrees to the end range—in other words, within the range at the time when the gravitational force was applied (Fig. 1). When Gong's mobilization was applied to subjects in the sitting position, subjects were seated on a chair at knee height. The subject's vertebrae were placed in a neutral position with the arms hanging down comfortably. The therapist stood on the opposite side of the subject's affected side and with one hand pulled the affected side's scapula posterior to anterior and with the other hand pushed the humeral head anterior to posterior in a direction parallel to the joint plane, so that the humeral head pushed forward to the normal position. With the palm medial and the back of the hand lateral, the subject was required to swiftly and strongly abduct the shoulder in the coronal plane without external rotation or elbow flexion. At the same time, the therapist pressed the humeral head with one hand and aligned the palm's long axis with the humerus' long axis. Then, when the subject abducted his or her shoulder, the therapist maintained a slight distraction and followed at the same speed, adding acceleration at the end range (Fig. 2)⁴⁾. Gong's mobilization was repeated about 10 to 15 times for each subject in both groups. One therapist with clinical experience of 10 years or longer performed Gong's mobilization on all subjects.

The experimental results were statistically analyzed using SPSS 12.0 KO (SPSS, Chicago, IL, USA). After the general characteristics of the subjects were determined, the paired t-test was used to compare the shoulder abduction ROM between the pre- and post-intervention in each group. The differences between the two groups were tested using the independent t-test. The statistical significance level, α , was chosen as 0.05.

RESULTS

Comparison of the shoulder abduction ROM before and after the experiment in the side-lying group and the sitting-group showed there were statistically significant differences in both groups ($p < 0.05$) (Table 1). The independent t-test showed there were no statistically significant differences between the groups in shoulder abduction ROM before and after the intervention or in the pre- and post-intervention differences ($p > 0.05$). However, analysis of differences before and after the intervention showed that mobilization for subjects in the side-lying position was more effective than that in the sitting position (Table 2).

DISCUSSION

Joint mobilization techniques improve the mobility of joints and soft tissues⁵⁾. Kaltenborn proposed a direction in accessory joint gliding²⁾, and Maitland explained the theory of additional joint mobilization techniques using force, amplitude, direction, and duration of mobilization⁶⁾. Mulligan's new concept was to simultaneously apply patients' active movement and joint mobilization techniques provided by a therapist⁷⁾.

In a study of a technique that increased shoulder joint ROM, Tanaka et al. demonstrated that a group with shoulder adhesive capsulitis, for which Maitland's anterior to posterior mobilization techniques and exercise treatment were applied together, showed a better outcome than one in which only exercise treatment was applied⁸⁾. Vermeulen et al. applied mobilization to shoulder adhesive capsulitis patients at the end range, and their abduction, flexion, and external rotation increased from 91 to 151 degrees, from 113 to 147 degrees, and from 113 to 147 degrees, respectively. After 9 months, a follow-up study showed that most of the patients had maintained their mobility⁹⁾. Tyler et al. applied stretching and Maitland's grade IV posterior gliding for 11 patients who were diagnosed with internal impingement syndrome, and their ranges of internal and external rotation increased¹⁰⁾. They also applied Mulligan's mobilizations with movements (MWM) for patients with pain in their anterior shoulder in order to increase their shoulder joint ROM, and their ROM increased by 15.3% and pain decreased by 20.17%¹¹⁾.

In this study, Gong's mobilization was applied to the subjects in the sitting and side-lying positions. The shoulder abduction ROM of both groups increased significantly after the experiment. This is because both groups received Gong's mobilization in which they abducted the shoulder with humeral head in the normal position against the scapula glenoid cavity. In this study, the differences between

measurements of the two groups before and after the intervention were not statistically significant. However, analysis of the differences between the measurements taken before and after the intervention showed that mobilization in the side-lying position was more effective than that in the sitting position. The side-lying position has the advantage of being able to more stably correct glenohumeral joint malalignment than the sitting position. In particular, the side-lying position can induce proper acceleration during treatment. Because mobilization in the side-lying position can easily create acceleration utilizing gravity within a range of shoulder abduction of 90 degrees or over, we consider it produces a more effective result than in the sitting position.

In summary, Gong's mobilization is effective in both the sitting and side-lying positions. Although Gong's mobilization in the sitting position has the disadvantages that it requires the active participation of subjects and it cannot utilize gravity, it only requires a chair. It may be easily at a workplace or in a treatment room. For the side-lying position, Gong's mobilization needs a bed the height of which can be adjusted manually. However, this position has the advantage that it can utilize gravity and the patient can receive treatment in a comfortable position. Also the active understanding and participation of patients are not necessary. Accordingly, the effect of Gong's mobilization on patients in the side-lying position is better than that in the sitting position. Furthermore, we suggest the side-lying position is the proper treatment position for patients with severe abduction hypomobility.

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