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The Effects of Gong's Mobilization Applied to the Shoulder Joint on Shoulder Medial Rotation

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Abstract. [Purpose] This study's purpose was to verify the effects of Gong's mobilization on shoulder medial rotation range of motion (ROM). [Subjects] This study selected 40 healthy male and female college students and allocated them equationually to either a Gong's mobilization group or an anterior to posterior gliding group (A-P group). [Methods] Gong's mobilization and anterior to posterior gliding were performed repetitively 10–15 times and a goniometer was used to measure shoulder medial rotation ROM. [Results] Both Gong's mobilization and anterior to posterior gliding increased shoulder medial rotation ROM, but Gong's mobilization was more effective. [Conclusion] Gong's mobilization is an end-range mobilization technique in which the shoulder joints are maintained in the normal position. It is applicable as a method for increasing ROM in the clinical field.
Key words: Gong's mobilization, Anterior to posterior gliding, Shoulder medial rotation ROM

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INTRODUCTION

Joint mobilization is performed in order to alleviate pain and increase the joint range of motion (ROM). This technique is used to treat the majority of joint pain problems. Patients either perform it actively by themselves, or with the help of their therapist within the scope of their exercise plan. In a general joint exercise, mobilization techniques are conducted based on Maitland's grades and the force applied is determined in accordance with four different grades reflecting the degree of pain[1)]. Mobilization techniques are performed to enable free joint motion. Methods like distraction, sliding, compression, rolling, and spinning are performed to increase joint ROM by stretching stiff tissues. Aggravation of symptoms is prevented by encouraging normal movement of the damaged joints and smoothly supplying nutrition, and pain is inhibited in a way that proprioceptive senses induce normal nerve firing prior to perception of noxious stimuli through joint movement[2)]. In a common joint mobilization technique, aimed at increasing shoulder medial rotation ROM, anterior to posterior gliding is performed on subjects who are in the supine position[3)]. However, anterior to posterior gliding keeps the humeral head in a normal position in the static state, but it does not keep the humeral head in a normal position during active movement.

Therefore, this study investigated Gong's mobilization, that enables shoulder medial rotation with the humeral head in a normal position against the glenoid cavity of scapula, to verify the effects of Gong's mobilization on shoulder medial rotation ROM.

SUBJECTS AND METHODS

We screened 200 normal college students, and 40 male and female students, whose shoulder medial rotation ROM was limited to 45° or less were selected and randomly and equally allocated to a Gong's mobilization group (Gong's group), the experimental group, or an anterior to posterior gliding group (A-P group), the control group.

Participants who had problems with muscles or the skeletal or nervous systems, who felt pain in the shoulders during their everyday life, or whose ROM was restricted due to burns or postoperative scars were excluded. The study's purpose and information about the experiment as a whole were explained to the subjects and their voluntary consent was obtained.

The mean age, height, and weight of Gong's group were 21.1 ± 3.3 years old, 169.6 ± 7.3 cm, and 62.9 ± 11.3 kg, respectively. The mean age, height, and weight of the A-P group were 22.8 ± 4.6 years old, 167.1 ± 8.1 cm, and 60.0 ± 10.5 kg, respectively. Analysis of gender was made with the chi-square test, and age, height, and weight were analyzed using the independent t-test. There were no statistically significant differences between the two groups for any of the above items ($p>0.05$); therefore, the two groups were considered homogeneous.

The shoulder with shorter shoulder medial rotation ROM was measured and it was then mobilized. The subjects lay in the supine position with the shoulder abducted at 90 degrees, moved their elbow joint about 5 cm out of the bed, and then vertically raised the forearm; the shoulder medial rotation ROM was then measured. Measurements were taken by a

team composed of two examiners. The first examiner held the subject's wrist joint with one hand and aided medial rotation in order to prevent the 90-degree abduction of the shoulder joint from collapsing due to rolling of the humerus during shoulder medial rotation. The first examiner also pulled lightly on the lower part of the elbow joint toward the head, inducing sliding of the humerus so that the 90-degree abduction of the shoulder joint did not collapse. The other examiner placed one hand on the subject's shoulder joint to watch for the humeral head being pulled forward. When the humerus head was pulled forward, the ROM before the humerus head was pulled forward was measured by a goniometer (USA).

When perfoming Gong's mobilization on Gong's group, the bed was set at a height of 10 cm above the therapist's knees, and the subject assumed a side-lying position with the damaged shoulder joint upward. The subject's shoulder was abducted at 90 degrees so that the humerus's vertical position was maintained and the flexed elbow joint was maintained at 90 degrees. The therapist kept the subject's elbow joint at 90 degrees with one hand, placed his elbow below the subject's elbow joint, and pressed the humerus head from anterior to posterior with the other hand. Then the therapist held the vertical axis of the humerus steady by maintaining the shoulder abduction and the elbow at 90 degrees and raised his own body while slightly pulling on the articular capsule of the shoulder joint. This slight pulling of the articular capsule was maintained for 10–15 seconds then relaxed for 5 seconds; this technique maneuver was performed for about 2 to 3 minutes. After extending the articular capsule by slightly pulling it, the therapist used one hand to press the shoulder joint from anterior to posterior in order to prevent vertical pulling of the slightly extended articular capsule and the humerus. He supported the elbow with his other hand and then performed shoulder medial rotation. Then, in order to increase ROM, oscillation at Maitland's grades 3 and 4 was performed followed by sustained stretching at grade 4 for about 7 seconds[4].

Anterior to posterior gliding was performed on the A-P group as follows. The subjects lay on the therapeutic bed in the supine position, with the scapula bone placed on the bed and the humeral head placed out of the bed in a resting position. The therapist stood between the subject's trunk and arm. The therapist held the subject's elbow joint and forearm with one hand and fixed them under his armpit to maintain a mild distraction of the shoulder joint, and used the other hand to press the humeral head smoothly from anterior to posterior using his own weight. Compression from anterior to posterior was repeated at Maitland's mobilization grades 3 and 4 followed by sustained stretching for about 7 seconds at grade 4[5, 6]. Mobilization was repetitively applied to both groups 10 to 15 times, Dr. Gong performed it on the Gong's group and a therapist with 10 years of clinical experience performed it on the A-P group.

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 changes in shoulder medial rotation ROM pre-and post-intervention in each group. The differences between the groups were tested using the independent t-test. The statistical significance level, α, was chosen as 0.05.

Table 1. Pre-and post-intervention comparison of shoulder medial rotation ROM in each group (mean ± SD)

(unit; degree)

Category	pre intervention	post intervention
Gong's group*	34.4 ± 6.5	43.5 ± 6.5
A-P group*	32.0 ± 5.3	38.5 ± 6.7

* $p<0.05$; Gong's group, Gong's mobilization group; A-P group, anterior to posterior gliding group

Table 2. Comparisons of shoulder medial rotation ROM between Gong's group and A-P group (mean ± SD)

(unit; degree)

Category	Gong's group	A-P group
pre intervention	34.4 ± 6.5	32.0 ± 5.3
post intervention*	43.5 ± 6.5	38.5 ± 6.7
Post-intervention change	9.1 ± 5.0	6.5 ± 5.2

* $p<0.05$. See Table 1 for abbreviation Key.

RESULTS

Pre-and post-intervention shoulder medial rotation ROMs were compared in Gong's group and in the A-P group, and there were significant differences in both groups ($p<0.05$) (Table 1). Pre-intervention medial rotation ROMs and their post-intervention changes significantly different between the two groups ($p>0.05$). However, analysis of the post-intervention values revealed significant differences between the two groups ($p<0.05$) (Table 2).

DISCUSSION

Joint mobilization may affect pains and muscle cramps neurophysiologically and mechanically and it may be effectively used to treat reversible joints with low mobility or joints with progressively restricted mobility and functionally fixed joints[7, 8]. Roubal et al.[9] carried out studies on increasing the ROM of shoulder joints and reported that the performance of gliding to gleno-humeral (GH) joints for 8 patients increased joint ROM in bending, abduction, external rotation, and internal rotation positions by 68, 77, 49, and 45 degrees, respectively. Lin et al.[10] noted that the application of end-range mobilization techniques on patients with hypomobile joints due to adhesive capsulitis resulted in increased passive abduction angles and rotational ROM. In the majority of studies, measurement of ROM and end-range mobilization treatments in particular produced a positive outcome of increased abduction and rotational ROM[11, 12].

In both the Gong's group and the A-P group, improved shoulder medial rotation ROM was due to the restriction of shoulder medial rotation by the humerus head's anterior displacement during shoulder medial rotation[13] and posterior compression of the humerus head in both techniques,

which put the humerus head in a normal position. Furthermore, the reason why the Gong's group had better results than the A-P group is that although both techniques created posterior compression of the humerus head, putting the shoulder joint in a normal position, the A-P group had only anterior to posterior gliding. It was the end-range the Gong's mobilization that maintained the shoulder joint in the normal position throughout the anterior to posterior gliding.

In conclusion, Gong's mobilization technique is more effective than anterior to posterior gliding at improving shoulder and it is a technique of end-range mobilization which keeps the shoulder joint in a normal position. Therefore, Gong's mobilization technique may be performed to reduce GH joint's stiffness or improve shoulder joint ROM. Further research comparing this technique with other end-range mobilization techniques is necessary.

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