The Effect of Maitland Joint Mobilization Combined with Functional Exercise on the Rehabilitation of Scapulohumeral Periarthritis

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Abstract: Objective: to analyze the clinical effect of Maitland joint mobilization combined with functional exercise on scapulohumeral periarthritis. Methods from June 2016 to January 2019, 60 patients with scapulohumeral periarthritis were selected from the fitness center. Among them, 15 patients were treated with Maitland joint mobilization combined with functional exercise, which was group A; 15 patients only used functional exercise, which was group B; 15 patients only used mailtand rehabilitation, which was group C; the other 15 patients were treated with simple stretching and exercise rehabilitation, which was Group D. Before and 6 weeks after treatment, the active range of motion (AROM), pain and functional index (SPADI) of shoulder joint were used to evaluate the effect of each group. Results: after 6 weeks of treatment, the AROM of shoulder joint in the four groups increased significantly ($P < 0.05$ or $P < 0.01$) compared with that before treatment. The pain score of shoulder joint in group A, SPADI < B < C < D ($P < 0.05$), AROM of shoulder joint in group B > C > d ($P < 0.05$). In group A, B and C, except group D, the scores of shoulder pain and SPADI were lower than those before treatment ($P < 0.05$), and the AROM of shoulder was higher than that before treatment ($P < 0.05$). Conclusion: Maitland joint mobilization combined with functional exercise can improve the mobility limitation of shoulder joint in patients with scapulohumeral periarthritis, at the same time, it can reduce the pain degree of shoulder joint and improve its functional status more effectively.

1. Introduction

Periarthritis is also known as periarthritis of the shoulder.It is mainly characterized by shoulder pain and limited mobility of the shoulder joint. Its onset is mainly found in soft tissues such as the joint capsule, muscles and ligaments around the joint. Sterile inflammation caused by degeneration, and later limited shoulder activity [1] [2]. At present, the main clinical treatment methods for arthritis in China are taking anti-inflammatory drugs, acupuncture and physiotherapy, massage, etc., but the effect is not ideal. In recent years, with the increase in patients with periarthritis of the shoulders, 80% of patients have been found to have severe limited range of activities Many researchers recommend rehabilitation therapy through exercise therapy, but in fact the situation of patients undergoing rehabilitation training is not ideal. Because the training of patients with periarthritis of shoulders stays in the “passive exercise” of the affected limbs, it mainly depends on the physical therapist. The patient has poor awareness of active exercise, and does not know the method of active exercise. The lack of active exercise affects the recovery of the patient's limb function [3]. Therefore, how to promote the functional exercise of patients with periarthritis of the shoulder to actively improve the dysfunction, reduce the pain, and improve the ability of daily life activities is an urgent problem to be solved. This study applied safe and comprehensive Maitland joint loosening combined with active and active functional exercise to patients with periarthritis of shoulder, to improve the range of motion of the limbs and promote the functional recovery of the shoulder, and achieved good results. The report is as follows.

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2. Objects and Methods

2.1 Research Object

From June 2016 to January 2019, 60 patients with periarthritis of the shoulder who received post-illness rehabilitation at Beihua University Fitness Center were selected. Patient inclusion criteria [4]: (1) meet the diagnostic criteria for periarthritis of the second national symposium on periarthritis in 1991; (2) have obvious shoulder dysfunction; (3) adduction, abduction The back extension and rotation function are obviously limited; (4) no longer receive any drugs or other related treatments during the treatment period (5) after the acute pain medication period. Exclusion criteria: (1) Those with internal fixation such as shoulder joint and skin contusion of shoulder joint; (2) Serious heart, liver and kidney complications; (3) Patients who cannot cooperate with rehabilitation therapist to complete all treatments; (4) Those who have strong pain when doing shoulder circumference movements.

According to the order of patients, the above patients were randomly divided into Maitland joint mobilization combined with functional exercise rehabilitation group (group A), functional exercise rehabilitation group (group B), Maitland joint mobilization group (group C), simple stretching and sports rehabilitation There were 15 cases in each group (group D). The four groups of patients were compared in terms of gender, age, course of disease, and affected side. The differences were not significant (P> 0.05) and were comparable. See Table 1.

Table 1 Comparison of General Information of Four Groups of Patients

Gr.	Case	Sexual		Age	Course of disease	Affected side	
		Male	Female			Left	Right
A	15	7	8	52.21±6.55	87.23±7.22	8	7
B	15	9	6	50.34±5.61	80.79±9.24	6	10
C	15	8	7	51.23±7.33	85.79±9.51	9	6
D	15	7	8	48.68±7.45	89.23±6.92	8	7

2.2 Rehabilitation Methods

The patients in all 4 groups completed rehabilitation under the guidance of the same rehabilitation therapist. Group A patients were given Maitland joint mobilization and functional exercise. The methods of joint mobilization were as follows [5]: (1) Joint abduction and external rotation of the joint: the patient took a sitting position and placed his hands with five fingers crossed behind his head. The therapist Standing behind the patient, put the knee in the middle of the patient's shoulder blades to fix the body, and at the same time the therapist clasped the patient's two elbows with the weight of the body to pull back and outside (the process should be fixed with the knee Hold the patient's upper body and properly cooperate with both hands to exert force). If the direction of the force is correct, the patient will feel a slight pain in the shoulder joint and a sense of stretch in the shoulder joint and chest cavity. At this time, repeat 5 times, each time 30-40s, intermittent 45s. (2) Joint flexion of shoulder flexion: The patient takes a sitting position, bends his fist against the arm, and raises the elbow forward and upward, similar to the preparation position for playing badminton. The therapist stands behind the patient and puts the knee At the lower corner of the scapula on this side, it has the effect of fixing the body and exerting a reaction force on the joint. At the same time, the therapist holds the patient's wrist with one hand and the patient's elbow with the other hand, and the therapist's arm exerts force toward the middle and back. Slide and pull, repeat 5 times, each time 30-40s, intermittent 45s. (3) Shoulder joint extension, internal rotation and adducted joint loosening: the patient takes a sitting position and performs a hand touching the back to his limit. This action is a compound action, including shoulder extension and internal rotation With adduction, the therapist stands on one side with the back to the patient, hooks the patient's wrist with four fingers with the palm of the hand forward, and lifts the scapula, repeating 5 times, each time 30-40s, intermittent 45s [6].

The functional exercise methods are as follows: (1) Supine straight arm dumbbells around shoulders: Hold 2.5kg dumbbells on both hands on a flat bench with no obstacles around, do

shoulder joint 360 ° rotation, flexion, extension, abduction, adduction , The action range is from small to large, repeat 10 times as a group, repeat 3 groups, intermittent 30-45 seconds. (2) Standing and bending your arms around your shoulders: your feet should be naturally as wide as your shoulders, raise your head and chest to lift your abdomen, make a fist with your hands, the shoulders will drive the forearms and the forearms to do shoulder wraps, and the shoulders will move during the process the range reaches the maximum. 8 circles as a group, repeat 3 groups, intermittent 30-45s. (3) Arm abduction movement: The feet are naturally opened, the body remains neutral, the head is raised and the chest is lifted, and the abdomen is lifted from both sides of the body until the big arm is close to the ear. Straight, fingers together, do not use inertia. 10 times for 1 group, repeat 3 groups, intermittent for 30 seconds. (4) One-sided dumbbell swing arm: the lower limb is in front lunge, the upper body faces forward, one hand pinches the waist to fix the body, and the other hand holds a 2.5kg dumbbell to do the arm swing on the right side of the body, and move the big arm to the back of the ear, After repeating 10 times, change the opposite side of the body and repeat to form a group, a total of 3 groups, the group intermittent 30-45s. (5) Riding dumbbell dumbbell press on the shoulder: body sits on the bench, thighs are clamped on both sides of the bench, and the forefoot is on the ground, taking a riding posture, straightening the upper body, holding a 2.5kg dumbbell on the ear on both sides, the lower body is fixed and the deltoid muscles are exerted. Push the dumbbells in a direction perpendicular to the ground. Properly proceed according to the patient's shoulder ability. It is the best state to fully extend the arms parallel and perpendicular to the ground. Each group was repeated 10 times, a total of 3 groups, intermittent 45-60s. (6) Riding-style Smith shoulder press: Similarly, the lower body is in a riding posture, the upper body is straight, hold the Smith rod, and adjust the grip distance according to the shoulder condition of the patient, which is generally slightly wider than the shoulder. The whole process is from the clavicle to the arm to the full Straighten, and then fall back to restore. During the press, the shoulders and back should be moved back and forth with the movement of the barbell, in order to achieve the effect of an open shoulder pull back. Each group is repeated 12 times, a total of 5 groups, intermittent 60- 90s. (7) Sitting dumbbells around shoulders: Naturally sitting on the wrangler chair, holding 2.5kg dumbbells in front of the chest, palms facing each other, arms and forearms are parallel, the shoulders are forced to do shoulders, according to the patient's shoulders Do your best to wrap around your shoulders. Note that the forearm is always perpendicular to the ground during the whole process. There are 5 groups in 10 circles, and the interval is 60-90s.

The patients in group B were only given the same functional exercise rehabilitation as above, the patients in group C were only given the same joint mobilization rehabilitation as above, and the patients in group D alone performed simple active stretching and training rehabilitation.

2.3 Criteria for Evaluating Efficacy

Before treatment and after 6 weeks of treatment, the single rehabilitation method was used by the same rehabilitation therapist to evaluate the range of motion (ROM), shoulder pain and disability index (SPADI). The ROM, pain and function of the affected shoulder joint were evaluated.

Shoulder ROM evaluation content includes: active flexion, abduction, external rotation, extension, adduction, internal rotation of ROM. Among them, when measuring shoulder flexion and abduction ROM, the patient takes a sitting or standing position; when measuring external rotation ROM, the patient takes a supine position, and the shoulder joint abducts 90 ° posture; measurement of extension, adduction, and internal rotation ROM, The ROM of this compound action was evaluated using hand behind back (HBB) action. It is indicated by the distance between the two thumb fingers on both sides during recording. The smaller the distance, the larger the ROM of the shoulder shoulder HBB movement [7].

SPADI [8] uses a self-assessment scale composed of 13 questions for evaluation, including pain and functional activities [9]. The pain part is composed of 5 questions related to the patient's pain irritability; the functional activity is composed of 8 functional questions related to shoulder joint mobility. 10 points for each question, 10 points means that the extreme pain can not be tolerated or unable to complete the relevant functional activities, and 0 points means very normal, no pain or

completely normal function. SPADI = total score / 130 × 100, full score 100 points, the smaller the score, the lighter the shoulder pain and the level of dysfunction. SPADI has good reliability and effectiveness in evaluating shoulder pain and dysfunction [9].

2.4 Statistical Methods

SPSS 20.0 software was used for statistical analysis. The measurement data was expressed as `x ± s. The comparison of multiple groups was by single factor analysis of variance. The pairwise comparison between groups was by LSD-t test. The comparison before and after treatment within the group was by paired t test; $P < 0.05$ is statistically significant.

3. Results

3.1 Comparison of Evaluation Results of Shoulder Flexion, Abduction and External Rotation rom of Four Groups of Patients Before and after Treatment

Table 2 Comparison of Rom Evaluation Results of Flexion, Abduction and External Rotation of Shoulder Joints Before and after Treatment in Four Groups of Patients [`X ± s, °]

Gr	Case	Shoulder flexion		Shoulder abduction		Shoulder external rotation		P
		Before	After	Before	After	Before	After	
A	15	94.23±3.4	130.22±15.44	72.35±7.74	122.44±13.45	45.61±4.5	70.13±9.09	<0.05
B	15	97.53±9.54	122.22±7.56	70.74±8.66	90.47±10.66	50.77±7.34	61.45±8.91	<0.05
C	15	97.21±8.87	115.25±15.33	67.27±9.3	80.68±12.45	46.54±9.8	56.55±9.61	<0.05
D	15	95.78±8.9	102.43±7.98	69.87±8.72	75.9±10.67	47.46±8.21	50.22±7.34	<0.05
P		>0.05	<0.05	>0.05	<0.05	>0.05	<0.05	>0.05

It can be seen from Table 2 that the difference in AROM (including flexion, abduction, and external rotation) of the shoulder joint before treatment in the 4 groups was not statistically significant; the difference in shoulder AROM after treatment in the 4 groups was statistically significant. Comparison between the two groups, shoulder AROM A group> B group> C group> D group. Within the group comparison, except for group D, the AROM of the shoulder joints after treatment in groups A, B, and C was greater than before treatment.

3.2 Comparison of Evaluation Results of Shoulder Flexion, Abduction and External Rotation rom of Four Groups of Patients before and after Treatment

Table 3 Comparison of Evaluation Results of Shoulder Joint Extension, Adduction and Internal Rotation Before and after Treatment in Four Groups [`X ± s, Cm]

Gr	Case	Before	After	P
A	15	13.55±3.4	6.30±2.45	<0.05
B	15	15.05±4.61	9.45±3.66	<0.05
C	15	14.15±3.55	11.34±3.32	<0.05
D	15	14.67±3.4	12.79±2.56	>0.05
P	15	>0.05	<0.05	

It can be seen from Table 3 that the AROM comparison of shoulder extension, adduction, and internal rotation (composite action HBB) of the 4 groups of patients before treatment was not statistically significant; Comparison between two groups, shoulder AROM A group> B group> C group> D group. Within the group comparison, except for group D, the AROM of the shoulder joints after treatment in groups A, B, and C was greater than before treatment.

4. Discussion

The inflammation around the shoulder joint is also called “frozen shoulder”. The main symptom is shoulder pain, especially at night, the upper arm cannot be abducted, and there are obvious restrictions on the inside and outside. The pathological changes are now very clear. That is, due to lack of movement of the shoulder joint, local metabolic disorders, peripheral circulation of blood and lymph are blocked. As a result, the joints such as the joint capsule, rotator cuff, biceps tendon,

and coracoid brachial ligaments all degenerate Sexual changes, exudate exudate and cell infiltration (like chronic inflammation), followed by fibrosis, the result greatly limits the movement of the shoulder joint. A large number of research data show that the limitation of joint movement is mainly caused by braking, and to some extent, pain leads to braking, which increases the density of loose connective tissue around the joint and reduces the elasticity, resulting in joint dysfunction in the middle and late stages of periarthritis [10]. At present, the rehabilitation treatment of periarthritis of the shoulder at home and abroad mainly includes physical factor therapy, intramuscular patch therapy, sports training, traditional Chinese medicine acupuncture therapy, and surgical treatment. No matter what kind of rehabilitation method, in the end, it is necessary to combine the patient's active movement to achieve the purpose of rehabilitation. The combination of Maitland joint mobilization and functional exercise that the author adopts is to advocate exercise to achieve rehabilitation. Loosening provides a good exercise foundation for functional exercise, and functional exercise can fully restore the muscles, ligaments, nerves and other tissues in the shoulder that have been chronically atrophied. The recovery of periarthritis of the shoulders has made a fundamental recovery.

Maitland arthrosis is a grading vibration technique mainly used for the treatment of arthrosis by Geoffrey D. Maitland in the 1960s. This technology breaks the adhesion around and within the joint through joint physiology, sliding and swinging in the direction of accessory movement, and maintains the ductility of the tissue. It can better improve the accessory movement of the joint, thereby restoring the function of the entire joint, and improving the function of the joint. The athletic ability of joints has extremely important meaning [10]. From March 1991 to April 1994, two teachers, Wang Yulong and Wu Yiwen, took the lead in adopting the arthrodesis technique to treat 168 cases of frozen shoulder, and published the “Use “Maitland Joint Loosening Technique for Treatment of Periarthritis of Shoulder”, a large number of experiments have fully confirmed the effectiveness of arthrodesis in the rehabilitation of periarthritis of shoulder [11]. Immediately after that, Mr. Yan Zhi from the Department of Physical Education of Liaoning Normal University published the article “Improvement of Maliland Joint Loosening Technique in the Treatment of Periarthritis of the Shoulder” in “Chinese Sports Medicine Miscellaneous” Vol. 23, No. 3, page 231 ~ 232; After deeply agreeing with the method in the treatment of periarthritis of the shoulder with MaitIand joint loosening technique written by two comrades Wang Yulong and Wu Yiwen, he proposed a plan for consolidating and improving the effect of medical gymnastics. The author has a single joint in joint loosening combined with gymnastics Maitland's treatment of periarthritis of the shoulder, the patient is only in the position of a passive treatment, and the treatment of periarthritis of shoulder should improve the muscles of ginger contraction and grow the shortened muscle ligaments to effectively prevent the adhesion after local treatment. Miadand joint loosening technology will inevitably affect the curative effect and treatment course, and the patient's active participation and effective medical gymnastics have significantly accelerated the process of improving muscle contraction and growing muscle ligaments, from passive treatment to patient's active active treatment, so the improved Maitland joint loosening technique can treat periarthritis of shoulder with double the effect [12].

The study found that for patients with periarthritis of shoulders, functional exercise has the effect of improving local blood circulation. Functional exercise can accelerate the absorption of exudate by improving blood circulation, so that the muscles can loosen adhesions and promote the repair of tendon ligaments. And restoration of joint function. Functional exercise depends on the patient, and the training level must be gradually increased, not overnight, not slack, perseverance, step-by-step, long-term adherence can loosen the muscle tissue of adhesion, not only can relieve the contracture of shoulder muscles, but also prevent recurrence Adhesion, long-term adherence can play a very good therapeutic effect and achieve the purpose of healing [13]. By searching the literature, most researchers used eight exercise programs promoted by Chinese medicine for rehabilitation of periarthritis of the shoulders, such as hand shake, shoulder bending, shoulder pulling, wall climbing, external rotation exercise, chest raising and arm raising, and shoulders inside and outside. The stretching exercise and the left and right hand-stretching exercise belong to the most traditional

training. Most of the exercise methods are free-hand exercises. Without the use of equipment, the disadvantage is that it is difficult to break through your own ability range, otherwise you cannot improve the overall exercise ability of the shoulder [13]. The author has been engaged in fitness rehabilitation for many years, and has also been using joint loosening combined with active exercise for frozen shoulder. According to the shoulder movement function, anatomical structure characteristics and biomechanical function, this set of exercise methods is arranged in the article. In the movement design, the oblique rotation, flexion and extension, and horizontal rotation are combined and integrated into the core area training to achieve with multi-joint, multi-dimensional, and full-range exercises, the muscle tension maintains a corresponding balance to ensure that the muscles are stimulated in a balanced manner.

In this study, the researchers studied the effects of functional exercise to recover periarthritis, Maitland joint mobilization to recover periarthritis, Maitland joint mobilization combined with functional exercise to recover periarthritis, simple stretching and training to recover periarthritis. It was found that the method of joint mobilization combined with functional exercise is far superior to the other three groups, which can improve the limited mobility of patients with periarthritis of the shoulder, and at the same time reduce the pain of the shoulder joint and improve its functional status. For patients, choose a more reasonable treatment method to provide a basis.

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