

Systematic review and extended application of exercise therapy for scapulohumeral periarthritis

Sichang Peng

Peking University School of Nursing, Peking University, Beijing, 100871, China

2210108314@bjmu.edu.cn

Abstract. Scapulohumeral periarthritis, commonly known as “fifty shoulders”, is a common shoulder joint movement disorder and one of the chronic degenerative diseases frequently occurring in middle-aged and elderly people. Patients all have pain around the shoulder joint, tenderness around the shoulder joint to varying degrees and limited shoulder joint movement. Scapulohumeral periarthritis generally includes three stages: freezing, frozen and thawing. After the attack, it has a significant negative impact on patients’ lives. At present, the clinical treatment of scapulohumeral periarthritis mainly chooses conservative treatment to restore the joint range of motion, improve muscle strength and relieve pain. Exercise therapy has unique therapeutic characteristics and advantages, obvious effect, small side effects and high compliance of patients. In recent years, it has gradually aroused people’s awareness. This article will review the related literatures in recent years, integrate the corresponding exercise therapy in different stages of scapulohumeral periarthritis, and further expand the discussion on the curative effect of some interesting exercises on scapulohumeral periarthritis rehabilitation for reference.

Keywords: Scapulohumeral Periarthritis, Exercise Therapy, Review.

1. Introduction

Scapulohumeral periarthritis is a common chronic degenerative disease, which occurs frequently in middle-aged and elderly people aged 40~70 years. The incidence rate in general population is 3%~5%, and it is more common in women [1]. Affected by modern lifestyle, the incidence of diseases tends to be slightly younger in recent years. As a self-limiting disease, the symptoms of the disease usually subside within 1~3 years, but studies have shown that 20%~50% of patients may continue to have persistent symptoms [1]. Common clinical symptoms such as shoulder joint movement restriction and pain have a long course of disease and are easy to recur, which seriously affects patients’ lives. The prevention and treatment of scapulohumeral periarthritis should cause people’s attention.

At present, conservative treatment is still the most important treatment for scapulohumeral periarthritis. The main purpose of treatment is to relieve pain and shorten the course of disease and accelerate the patient’s return to normal life. Conservative treatment mainly includes drug therapy, physical therapy intervention and exercise therapy, among which exercise therapy is a common clinical suggestion used in most treatments. Exercise such as Scapular stabilization exercise has been proved to be an effective treatment measure to relieve pain and improve shoulder joint function [2]. Compared with other treatment measures, sports rehabilitation training can be completed by patients themselves, which is convenient and economical, and is worth popularizing as a conservative treatment. Apart from

the therapeutic exercise rehabilitation training means, there are some popular and interesting exercises that are in line with the exercise to promote the recovery of scapulohumeral periarthritis. At present, many literatures have mentioned that exercise therapy can effectively promote the recovery of scapulohumeral periarthritis, but there are few separate explanations on it, and there is a lack of systematic cognition on the specific mechanism. Therefore, this paper summarizes the existing research results from the perspective of the mechanism of sports rehabilitation training affecting the recovery of scapulohumeral periarthritis in order to provide theoretical basis for patients to choose exercise to promote the recovery of scapulohumeral periarthritis.

2. General situation of treatment

The main clinical treatment of scapulohumeral periarthritis can be divided into surgical treatment and non-surgical treatment. In non-surgical treatment, it can be mainly divided into drug treatment and physical therapy. For patients with scapulohumeral periarthritis, the indications for surgical treatment are limited, the risk is relatively large, and the follow-up rehabilitation takes a long time and the cost is high. Considering its degeneration, general patients will not choose surgical treatment [3]. More than 90% of patients with scapulohumeral periarthritis can be cured or restored to normal life by conservative treatment. At present, western medicine mainly includes the use of non-steroidal anti-inflammatory drugs (NSAIDs), intra-articular injection or oral steroids to relieve pain, but studies have shown that these drug interventions may not change the course of disease, and the overall curative effect is not satisfactory [4].

Compared with the simple Western medicine intervention, the supplementary replacement therapy based on traditional Chinese medicine, such as acupuncture, cupping and needle knife therapy, has long curative effect and less side effects [5]. But most TCM physiotherapy must rely on physiotherapists. It takes a long time to treat and needs to receive treatment many times to ensure the curative effect, which has a great influence on patients' life schedule.

Exercise therapy for scapulohumeral periarthritis mainly aims at eliminating pain and restoring shoulder joint function, which can effectively improve and promote the blood lymphatic circulation of the affected part, strengthen metabolism and reduce it, help eliminate aseptic inflammation, relieve joint capsule adhesion, expand the range of motion of the affected shoulder joint and prevent atrophy [6]. In addition, it also has a certain relieving effect on patients' anxiety. At the same time, Fu Shaofeng, a Chinese medicine scholar, put forward that Chinese medicine guidance (that is, a kind of exercise therapy based on Chinese exercise) is generally recognized in the prevention and treatment of scapulohumeral periarthritis. Adding guidance exercise to routine clinical treatment can significantly improve the clinical efficacy and effective recurrence rate [7]. It can be seen that whether the treatment of traditional Chinese and western medicine is supplemented by exercise therapy, the curative effect can be improved.

Exercise therapy is easier for patients to learn, free in time, and relatively mild in pain. It can be done by patients themselves. And there are a lot of evidence-based evidence to prove that exercise therapy has a significant effect on promoting the recovery of scapulohumeral periarthritis.

3. Stages and corresponding exercise therapy

Exercise therapy is not only an important auxiliary measure to other clinical therapies, but also one of the important rehabilitation methods when used alone. According to the different stages of scapulohumeral periarthritis, the recommended corresponding exercise treatment behaviors are also different.

Scapulohumeral periarthritis generally includes three stages: freezing, frozen and thawing. The characteristics of each stage are shown in Table 1.

Table 1. Stages of frozen shoulder and characteristics of each stage [8].

	Freezing	Frozen	Thawing
Duration	2-9 mth	4-12mth	5-26mth
Typical symptoms	Gradual onset of diffuse, severe shoulder pain that worsens at night	Pain begins to subside but there is a characteristic progressive loss of range in motion	Gradual return of range of motion

Throughout the disease, the pain is the most significant during the freezing phase. At this time, the range of motion of the shoulder joint is not greatly affected, but the sense of restriction gradually worsens. During the frozen phase, the pain is felt somewhat, and the shoulder joint motion is obviously limited. The limitation of joint movement is mainly severe during abduction, external rotation, internal rotation and extension. During the thawing period, pain and stiffness decrease to basically disappear. However, some patients may not be able to fully return to the state before the onset of the disease, and may have dull pain in their shoulders or feel difficulty moving for several years.

3.1. Freezing phase

Patients at this stage often experience significant pain due to underlying capsular-ligament-synovial inflammation. Therefore, the main purpose of treatment at this stage is to relieve pain. In clinical practice, anti-inflammatory drugs and analgesics are often used to suppress inflammation and pain reactions or to perform heat/ice compresses relieve joint pain, while supplementing treatment with appropriate exercise [9]. For example, the application of moist heat combined with stretching has been shown to improve stretch [10]. Mobility measures should be avoided at this stage. Studies have shown that high-intensity exercise training can cause an increase in the concentration of some pro-inflammatory factors and interferons in the blood, which is not conducive to the relief of inflammation and increases pain levels [11]. Since the main characteristics of the freezing phase are intense pain and joint mobility that is not yet obvious, the main purpose of exercise therapy during this period is to relieve pain and preserve joint flexibility to prevent the aggravation of adhesive capsulitis. At this stage, it is recommended to perform pendulum exercises, gymnastic stick exercises, and pulley exercises that do not cause severe pain [8].

Pendulum exercise: Bend the body forward so that the arm on the affected side naturally droops until there is sufficient room for movement. Relax the shoulders and do circles or internal and external exercises until the fingertips feel slightly swollen.

Gymnastics stick exercise: With the help of gymnastics stick equipment, hold the stick body with both hands at the same time, use the healthy side arm to drive the affected side arm to complete the lift, place it behind the head, and place it on the side of the body, etc., to assist the affected side shoulder joint to complete external rotation Actions such as back extension, internal rotation, and adduction [12].

Pulley exercise: With the help of a pulley device, put a rope across the pulley and hold a section of it with each hand, so that the unaffected arm drives the affected side to move. The principle is similar to gymnastic stick exercises.

3.2. Frozen phase

The main characteristics of the frozen phase are gradual relief of pain, worsening of adhesive capsulitis, the shoulder mobility was significantly reduced and the shoulder movement was further limited. If the movement is restricted for a long time, it may cause shoulder atrophy. The main purpose of exercise treatment at this stage is to loosen shoulder joints, adhesions, and restore normal joint mobility. Since pain relief takes a long time, when the pain is still significant, you can use anti-inflammatory drugs, analgesics, or hot and cold compresses to reduce the pain in the affected area, and then perform stretching exercises within the tolerable range of pain, such as wall climbing exercises, Hanging horizontal bar exercises and scapula retraction, as well as appropriate static muscle strength exercises,

in order to restore and strengthen shoulder function [12]. Otherwise, previous exercise workouts can still be used.

Wall-climbing exercise: The patient turns sideways with the affected shoulder facing the wall or facing the wall, and uses the strength of the fingers to raise and stretch the arm on the wall. Within the tolerance range for a period of time, the patient can expand the ability of the shoulder to extend forward and abduct.

scapular retraction: The back of the shoulder exerts force to drive the shoulder blades on both sides closer to the middle, driving the shoulder joint backward while enhancing shoulder strength [8].

Suspension therapy: The patient kneels under the training device, holding the sling with his hands. The height of the sling is at the level of the wrist. The body is vertical first, then leans forward until the shoulder is flexed 90°. The body is lowered by flexion of the elbow, and the body is returned to the starting position by extension the elbow [13]. Yao Hongjie's team has confirmed through clinical trials that the treatment rate of the treatment group (therapy + suspension therapy) is 88%, higher than the 50% rate of the control group (therapy only) [13].

Static muscle strength exercises: Droop or raise your arms to a certain angle, and hold a dumbbell or water bottle of the proper weight for a period of time to enhance or restore the strength of the shoulder deltoid muscles.

3.3. *Thawing phase*

In the thawing phase, the patient's pain and symptoms of limited shoulder joint movement are reduced. The main purpose of exercise treatment in this stage is to restore normal function of the shoulder joint as soon as possible, further eliminate adhesive capsulitis, and at the same time enhance shoulder muscle strength and daily joint activity habits, maintain regular joint activity, to avoid recurrence. Exercise therapy in the first two stages is mainly used as an auxiliary treatment method for drug treatment or physical therapy, while rehabilitation treatment in this stage is mainly exercise. At this stage, the exercises from the first two stages can be used, and the time and stretching range should be increased appropriately. In addition, resistance exercises such as resistance bands, dumbbells, or machines can be used to further enhance shoulder activity and strength [14].

It is worth noting that patients should be reminded during and after treatment to avoid further strain on the shoulder joint and damage caused by incorrect use of the shoulder joint, such as sitting still for a long time, blowing cold wind or exercising for a long time, incorrect exercise posture, etc. . Correct and moderate exercise can help recover from frozen shoulder, but excessive use of the shoulder joint is likely to cause damage to the shoulder's ligaments and joint capsule again [15].

4. **Effects of different exercises on the recovery of scapulohumeral periarthritis**

Although scapulohumeral periarthritis is more common among middle-aged and elderly people, due to modern life, the patient population has become younger in recent years, and patients' demand for diverse choices of rehabilitation exercises is also increasing. Literature shows that in addition to the classic functional exercises and traditional Chinese medicine guidance techniques such as Tai Chi mentioned above, yoga and some more popular ball sports can also promote the recovery of frozen shoulder within an appropriate range. This paragraph mainly focuses on the discussion of the needs of different exercises and rehabilitation of frozen shoulder in the later stage of rehabilitation of scapulohumeral periarthritis.

4.1. *Tai Chi*

Tai Chi, as a national intangible cultural heritage, is a fitness boxing method characterized by looseness, naturalness, uniformity, softness and strength. It integrates Chinese martial arts, traditional Chinese medicine, meridian science and other related theories and practices. Adherence to Tai Chi exercise has a good regulating effect on various systems of the human body, and also plays an important role in enhancing joint function. Through investigation, Xie Feng selected the typical movements of Chen Style Tai Chi that are mainly related to shoulder joint activities and can significantly enhance shoulder movements, including cloud hands, holding clothes, white crane spreading wings, reverse curling of the

humerus, three changes of palms, and back Lean back, hold the sparrow's tail, cover your hands and beat with your humerus, single push hand flat circle, vertical circle, figure eight and double push hands. The 30 people in the experimental group received physical therapy + Tai Chi exercise, and the 30 people in the control group received physical therapy + functional exercise for 12 weeks. The final experimental results showed that after treatment, the experimental group had higher pain index, anxiety index, and improved number than the control group, while the number of recurrences was less than that of the control group, but the shoulder joint mobility score was lower than that of the control group [16].

4.2. Yoga

Yoga is a three-in-one exercise of breathing, postures and meditation. It can coordinate the whole body, joints and nerves of the human body. It can improve one's own physique through exercises that combine the body and mind, so as to achieve the effects of cultivating the body and strengthening the body. Zhu Qiying used a group of 12 patients with scapulohumeral periarthritis who underwent 12 weeks of Iyengar yoga intervention exercise (once every other day, each warm-up + asana practice + relaxation for a total of one hour) as the experimental group, and a group of 12 patients who underwent functional exercise as the experimental group patients with frozen shoulder were used as a control group for a comparative experiment. The experimental results showed that compared with the control group, the total score of shoulder joint function in the yoga treatment group (29.34) was higher than that of the control group (24.02), the degree of pain was obvious, and the shoulder joint mobility score (27.19) was higher than the control group (23.71), and the anxiety index (41.2) was lower than the control group (56.07), but the improvement in muscle strength was not as good as the control group [17].

4.3. Basketball

Basketball itself is a relatively complete sport that is diverse, confrontational and interesting. Basketball exercises designed based on basketball technical characteristics and fitness concepts are relatively low-intensity and can exercise human body functions and joint flexibility and the function of strengthening body coordination and control. Based on the principle of functional exercise, Li Yan designed a set of basketball exercises suitable for patients with scapulohumeral periarthritis to exercise their shoulder joints, including pushing the ball with both hands in front of the body, pulling the ball back and forth with one hand on the side of the body, pushing the rolling ball alternately with both hands, throwing and catching the ball with both hands, 8 A series of actions such as word circling. Patients in the experimental group performed basketball exercises for three months, and patients in the control group performed functional exercises. The final experimental data showed that the shoulder joint activity score of the experimental group (47) was higher than that of the control group (46.2), and the shoulder function index (SPADI) of the experimental group (120.51) was lower than that of the control group (121.94), the improvement of shoulder muscle strength was better than that of the control group, and the emotional level was higher than that of the control group [18].

4.4. Others

In addition, some journals pointed out that some badminton movements, such as picking, pushing, diving, and lofting, can also move the shoulder joints and exercise the shoulders. However, since there is no effective clinical data to verify it, it remains to be clinically further exploration and research.

It can be seen that the use of exercise to promote the rehabilitation of frozen shoulder is better than functional exercise in relieving pain, restoring shoulder joint function, preventing recurrence, and improving patient anxiety. However, different exercises are not as effective as functional exercise. Where appropriate, rehabilitation exercises can be supplemented with appropriate special exercises. It should be noted that the exercises mentioned here have all been modified from the original ones to make them suitable for rehabilitation exercises. It is not recommended to carry out intense confrontational exercises to avoid the impact of exercise on the shoulder joint, causing secondary damage. During rehabilitation exercises, patients should have a certain understanding in the recovery and exercise of their shoulder joints.

5. Conclusion

In summary, exercise therapy is very important in the freezing, frozen and thawing phase of scapulohumeral periarthritis. Based on the effects of conventional clinical treatment and supplemented by exercise therapy, it can effectively improve treatment and disease parameters and promote patient recovery. In addition to its efficacy, the low cost and high fun of exercise therapy are also its major advantages as a treatment for scapulohumeral periarthritis. Therefore, it is recommended that patients with scapulohumeral periarthritis actively choose exercise therapy and exercise based on the doctor's advice to promote their own recovery. This article emphasizes the importance of exercise therapy in the treatment of frozen shoulder, reviews the functional exercises and key points applicable to different disease stages, and provides some exercises that can be used as a reference for extended rehabilitation training, which will help subsequent researchers to further In-depth systematic research on the treatment of frozen shoulder with exercise therapy. Finally, because there is no authoritative unified exercise for scapulohumeral periarthritis, there is still little clinical data on the impact of various types of exercise on the recovery of scapulohumeral periarthritis. In the future, a more systematic and comprehensive clinical research can be carried out on the specific effects of different exercises on the treatment of frozen shoulder.

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