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Physiotherapy of adhesive capsulitis: A review

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Abstract

Adhesive capsulitis and frozen shoulder syndrome (FSS) are two terms that have been used to describe a painful and stiff shoulder. The current consensus definition of a frozen shoulder by the American Shoulder and Elbow Surgeons is "a condition of uncertain etiology characterized by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder." The American Academy of Orthopaedic Surgeons defines this condition as: "A condition of varying severity characterized by the gradual development of global limitation of active and passive shoulder motion where radiographic findings other than osteopenia are absent. The loss of passive range of motion (ROM) is a critical element in establishing the diagnosis of a true frozen shoulder. Although conditions such as sub acromial bursitis, calcifying tendinitis, and partial rotator cuff tears can be associated with significant pain and loss of active ROM, passive ROM is preserved. There is no consensus on how the best way best to manage patients with this condition, so I want to provide an evidence-based overview regarding the effectiveness of shoulder mobilization, electrotherapy and exercise therapy in physiotherapy to treat adhesive capsulitis.

Keywords: Physiotherapy, adhesive capsulitis, frozen shoulder

1. Introduction

Adhesive capsulitis and frozen shoulder syndrome (FSS) are two terms that have been used to describe a painful and stiff shoulder. The current consensus definition of a frozen shoulder by the American Shoulder and Elbow Surgeons is "a condition of uncertain etiology characterized by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder [1]."

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The loss of passive range of motion (ROM) is a critical element in establishing the diagnosis of a true frozen shoulder. Although conditions such as subacromial bursitis, calcifying tendinitis, and partial rotator cuff tears can be associated with significant pain and loss of active ROM, passive ROM is preserved [2].

There is no consensus on how the best way best to manage patients with this condition, so I want to provide an evidence-based overview regarding the effectiveness of shoulder mobilization, electrotherapy and exercise therapy in physiotherapy to treat adhesive capsulitis.

2. Materials and methods

Adhesive capsulitis is characterized by a marked loss active and passive shoulder motion caused by inflammation and adherence of the capsule to the anatomic neck of the humerus and to itself at the inferior axillary fold. Joint volume is decreased to less than 10 to 12 ml (normal is 20 ml). The criteria for diagnosis of a "frozen shoulder" are not universally accepted, but the following general criteria are applicable:

1. Decreased glenohumeral motion and loss of synchronous shoulder girdle motion,
2. Restricted elevation (less than 135 or 90 degrees depending on the author),
3. External rotation 50% to 60% of normal,
4. Arthrogram findings 5 to 10 cc volume with obliteration of normal axillary fold [3].

Primary adhesive capsulitis (AC) is a shoulder condition characterized by a gradual and painful loss of both active and passive range-of-motion (ROM) in all planes of glenohumeral

joint, especially external rotation, resulting from progressive fibrosis and contracture of the glenohumeral joint capsule [4].

Duplay [5] in 1872 was the first author who described this condition as “peri-arthritis”. In 1934 Codman [6] used the term “Frozen shoulder” to define a gradually developing condition, characterized by pain near the deltoid insertion, inability to sleep on the affected side, painful and restricted elevation and external rotation and a normal radiological appearance. In 1945 Neviaser defined this condition “Adhesive capsulitis” in order to underline the inflammatory pathogenesis and fibrosis [4]. Later histologic studies confirmed the presence of fibroblasts and chronic inflammatory cells which seep in joint capsule of the shoulder [7]. The current consensus definition of the American Shoulder and Elbow Surgeons is: “condition of uncertain etiology characterized by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder” [8,9].

AC occurs in 2% to 5% of the population [9]. It is more frequent in women aged between 40 and 60 years and in about 20–30% of cases this condition is bilateral [11].

Frozen shoulder may be considered primary, or idiopathic, when it develops spontaneously, and is considered secondary when an underlying, precipitating pathologic condition is present (e.g fracture).

Primary frozen shoulder is a unique condition that typically is unilateral and rarely recurs in the same shoulder. Subsequent involvement of the contra lateral shoulder occurs in up to 20% of patients. Three classic stages in clinical course of primary (idiopathic) frozen shoulder have been described: [12]

How the best way best to manage patients with adhesive capsulitis?

Intervention

There are so many methods of physiotherapy for adhesive capsulitis. Shoulder mobilization, electrotherapy and exercise therapy can be used as treatment. Although the goal of each treatment is to reduce pain and increase joint R.O.M. Binder *et al.* found that 50% of patients with frozen shoulders received no advice from their primary care physicians about the need for early shoulder motion [13].

Shoulder mobilization

Shoulder mobilization techniques are graded oscillatory techniques widely used in A.C to reduce pain & to increase joint R.O.M. There are different schools of thought; among them Maitland’s mobilization technique is quite popular.

M.J. Page *et al.* performed 32 RCTs with various combinations of mobilization, electrotherapy, exercise therapy and glucocorticoid injections in patients with AC. They concluded that a combination of manual therapy and exercise may not be as effective as glucocorticoid injection in the short-term. It is unclear whether a combination of manual therapy, exercise and electrotherapy is an effective adjunct to glucocorticoid injection or oral NSAID. They also commented that high-quality RCTs are needed to establish the benefits and harms of manual therapy and exercise interventions that reflect actual practice, compared with placebo, no intervention and active interventions with evidence of benefit [14].

In another study, Anthony Ewald, MD, stated in his research article “Adhesive Capsulitis: A Review” that Physical therapy in conjunction with corticosteroid injections is more effective than physical therapy alone. Aggressive physical therapy can exacerbate pain and diminish adherence to the treatment plan; therefore, caution should be used in patients who have a high

degree of pain and stiffness. Initial therapy typically includes gentle range-of-motion exercises, although evidence is lacking. Other therapies, such as ultrasound, massage, iontophoresis, and phonophoresis, have not been proven effective for adhesive capsulitis [15].

D. Y. Bulgen *et al.* In a RCT “Frozen shoulder: prospective clinical study with an evaluation of three treatment regimens” randomly divided 42 patients in to four groups. First group (11 patients) received Methyl prednisolone acetate 20 mg and 1% lignocaine hydrochloride 0-5 ml, second group (11 patients) received Maitland’s mobilization, third group (12 patients) received ice & P.N.F technique and the fourth group (8 patients), the no treatment group were taught pendular exercises & instructed to continue every hourly. Their study has shown that there is little long-term advantage in any of the treatment regimens over no treatment, but that steroid injections may benefit pain and range of movement in the early stages. There appears to be little place for physiotherapy alone, and, if used, it should not be continued for more than four weeks [16].

In another study Vermeulen *et al* found that high-grade mobilization technique was more effective than low-grade mobilization technique (within the pain limits) in increasing mobility and functional ability [17].

Johnson *et al.* compared anterior versus posterior glide mobilization. They concluded that a posteriorly directed joint mobilization technique was more effective than an anteriorly directed mobilization technique for improving external rotation after three treatment sessions [18].

Exercise Therapy

Different exercises are prescribed to the patients with A.C in different phases to increase joint R.O.M, maintain R.O.M, increase strength of muscles.

In a retrospective cohort study by Jewell. D.V. *et al*, 2370 patients with A.C were given physiotherapy and it has been found out that both manual shoulder mobilization techniques and self-exercise like stretching and home programs are effective for the treatment of AC [19].

In another study by Tanaka K. *et al*, Self-exercises twice daily appeared instead superior than shoulder mobilization by a physiotherapist twice a week [20].

Page M.J. *et al*, in their RCT “Manual therapy and exercise for adhesive capsulitis (frozen shoulder)” found out that a combination of manual therapy and exercise may not be as effective as glucocorticoid injection in the short-term. Though they have also commented that “High-quality RCTs are needed to establish the benefits and harms of manual therapy and exercise interventions that reflect actual practice, compared with placebo, no intervention and active interventions with evidence of benefit (e.g. glucocorticoid injection)” [21].

Joshua Cleland *et al*, in review said that many patients treated with physical therapy benefited from reduced symptoms, increased mobility, and/or functional improvement. However, poor standardization of terminology, methodology, and outcome measurements in these investigations undermines their validity and clinical application [22].

Positive results have been found out in a case report by Kathryn H. Blundell. She concluded that a treatment plan including comprehensive massage therapy and therapeutic exercise was effective in providing relief for the symptoms of chronic adhesive capsulitis. This study provides support for the effectiveness of massage therapy in treating decreased mobility in the glenohumeral joint. She recommended further

research to clarify the relative contributions of the various components of massage therapy in treatment of this condition [23].

In a RCT by Kingkaew Pajareya, MD, got better results in the group of patients received combination of physiotherapy & Ibuprofen than the group received only Ibuprofen [24].

In another study by Fusun Guler-Uysal, the group of patients treated with Cyriax approach of deep friction massage & mobilization, got better results that the group received hotpack & S.W.D as treatment [25].

Electro Therapy

Electrotherapy modalities like U.S.T, I.F.T, T.E.N.S, Laser, S.W.D, are commonly used in A.C to reduce pain & inflammation, increase joint R.O.M, increase strength of muscles. Different studies reveal their importance in the treatment of "Frozen shoulder".

In a study by Green S., L.L.L.T has been found to be effective than placebo [26]. Page M.J used L.L.L.T & P.E.M.F on more than twelve hundred patients selected randomly into groups & laser therapy has been found very effective as a treatment [27].

Jewell D.V. *et al.* in a retrospective cohort study used ultrasound, phonophoresis, iontophoresis, mobilization, exercises in more than two thousand patients with A.C & patients received mobilization & exercises showed better improvement than the other group of patients [28].

Rizk. T. E. *et al* demonstrated better results with use of T.E.N.S & pulley traction than use of therapeutic exercises & rhythmic stabilization manipulation techniques [29].

In a comparative study by Shahbaz Nawaz Ansari between U.S.T & end range mobilization and cryotherapy & end range mobilizations in frozen shoulder patients, the group of patients received U.S.T shows better results than the other group [30].

Leung *et al.* conducted a RCT which demonstrate that addition of deep heating to stretching exercises produces a greater improvement in pain relief, and leads to improved performance in daily living activities and in range of motion, more than superficial heating [31].

J Hamer *et al* suggested use of ultrasonic therapy & cryotherapy is useful in treatment of frozen shoulder as these techniques can improve the painful stage of the condition & in conjunction with specific exercises, can hasten the recovery of range of shoulder movement [32].

Recent Advances

In a review on frozen shoulder Wong P.L.K has mentioned use of eletroacupuncture combined with shoulder exercises for treatment of frozen shoulder [33].

In another study by C. Melzer, combination of manipulation under anaesthesia & shoulder mobilization proved to be beneficial [34].

J. Vas *et al.* in a R.C.T got better results in the experimental group received acupuncture than control group received mock T.E.N.S while both groups received physiotherapy [35].

Pamela Teys & Leanne Bisset in a double blind randomized control trial, applied Mulligan's movement with mobilization technique (MWM) in 24 patients (13 male & 11 female). They have found improvement in both R.O.M & pressure pain threshold (PPT) after application of MWM [36].

Pil Seong Koh *et al* in a randomized control trial treated patients with frozen shoulder with Bee venom acupuncture (BVA) with other conventional methods of physiotherapy (group 1 & 2) & the third group received normal saline with other conventional methods of physiotherapy. Shoulder pain

and disability index (SPADI), pain visual analogue scale (VAS), and 3) active/passive range of motion (ROM) were measured before treatment and at 2, 4, 8, and 12 weeks after the treatment. They have found that BVA in combination with PT can be more effective in improving pain and function than PT alone in AC [37].

Emad S Tukmachi has applied Chinese acupuncture therapy in 31 patients with frozen shoulder who previously received western treatments including physiotherapy in a pilot study. He has found that acupuncture therapy in frozen shoulder offers rapid and effective analgesia and reduction of shoulder stiffness [38].

3. Results & Discussion

Results

It is difficult to draw conclusion about the best physiotherapy methods in the treatment of adhesive capsulitis of shoulder as there are few evidences. Physiotherapy can be applied depending upon the stage of the disease & symptoms of the condition. In the early stage when pain & inflammation is more, main objective should be to reduce inflammation which eventually reduce pain & improve the functional status of the patient. Here electrotherapy plays an important role. In later stages of the condition where joint stiffness dominates mobilization & manipulation, exercises should be used to improve the range. Overall the need of continuation home exercise programme, lifestyle modification should be explained by the physiotherapist & the patient must include those in their daily routine as "MUST DO".

Discussion

The aim of the study was to provide an evidence based overview regarding effectiveness of shoulder mobilization, exercise therapy, electro therapy as treatment of adhesive capsulitis of shoulder joint. I have also overviewed recent advances in the treatment of frozen shoulder.

Shoulder mobilization techniques are quite popular techniques used as treatment for frozen shoulder. Few researchers used shoulder mobilization in combination with glucocorticoid injections, they concluded that combination of shoulder mobilization, exercise & electrotherapy may not be useful without glucocorticoids or NSAIDS. However they recommended high quality trials to prove the hypothesis. In another study it has been recommended that aggressive physiotherapy can increase pain & stiffness of shoulder, so precautions should be taken before applying these techniques. Few of the researchers concluded that shoulder mobilization techniques should not be continued for more than four weeks. In few studies researchers got positive results after using shoulder mobilization techniques like high grade mobilization & posterior directed joint mobilizing techniques in frozen shoulder.

In my view in these studies, researchers depended mostly on drugs for controlling pain & stiffness. They have not used any standardized physiotherapy protocol as treatment of AC. Many of them used combinations of mobilization, exercise & electro therapy with drugs. So I think high quality RCTs needed using a standardized physiotherapy protocol without using pharmacotherapy for longer period of time & in large number of patients. In different studies exercises are used to improve the joint R.O.M, decrease joint stiffness, increase muscle strength. Home exercise programme with stretching shows good results in AC. Some studies show self exercises like Codman's exercise, capsular self-stretching improved the condition better than mobilization.

Glucocorticoid injections with exercises proved to be beneficial in controlling pain & inflammation in short term courses, but high quality RCTs needed to prove impact of exercise & mobilization on AC. Many of the researchers used physiotherapy as a supportive treatment, but they have not maintained standardized methodology.

Massage showed positive results over other conventional mode of physiotherapy in one of the study. Further research recommended clarifying the relative contributions of the various components of massage therapy in treatment of this condition. In one of the studies Cyriax approach of deep friction massage & mobilization showed better improvement over electrotherapy in frozen shoulder patients.

Electrotherapy modalities are widely used in case of frozen shoulder to control pain & inflammation, to increase joint R.O.M. During comparison, electrotherapy found to be effective more than exercise therapy for pain modulation in frozen shoulder patients [39]. In a control trial Morgan *et al* found TENS was well tolerated by the patients with AC.⁴⁰ Some researchers got better results in patients those are treated with TENS & pulley traction. In some studies deep heat with stretching showed positive results compared to superficial heating. Cryotherapy in combination with U.S.T was able to decrease pain & inflammation in AC.

3.1 Tables

Table 1: Stages of Adhesive Capsulitis.

Stages	Duration	Symptoms
Painful or freezing phase	2-9 months	Gradual onset of diffuse shoulder pain, gradual loss of glenohumeral motion.
Stiffening or frozen phase	4-12 months	Shoulder movement often restricted in characteristic pattern, with loss of ER, IR, abduction.
Thawing phase	Variable time course	Gradual regaining of shoulder motion.

4. Conclusions

In my opinion these modalities should be chosen depending upon the stage & symptoms of the condition. So these modalities can specifically produce optimum therapeutic effect.

There are quite a few researches which use different & new techniques other than conventional method in physiotherapy for treatment of adhesive capsulitis of shoulder joint. Though some of them recommended standardized research should be done on bigger sample. By understanding the published evidence related to the rehabilitation of patients with adhesive capsulitis, both therapists and patients will benefit from an integrated, multi-faceted, evidence-based approach to intervention [41].

Chinese acupuncture has been used in treatment of AC either in combination of electro or exercise therapy or alone. It showed positive results in the patients. Bee Venom Acupuncture has been used by Pil Seong in combination of physiotherapy produced better pain relief & function in SPADI & VAS.

Mulligan's movement with mobilization or MWM has relieved pain & improved shoulder R.O.M in some of the studies.

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