

Effects of anterior versus posterior end range mobilizations on shoulder pain in subjects with adhesive capsulitis stage II - A comparative study

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Abstract

Background: Adhesive capsulitis is characterized by a spontaneous onset of shoulder pain accompanied by progressive limitation of both active and passive glenohumeral joint movements.

Aim: This study was done to compare the effectiveness of anterior end range mobilizations to posterior end range mobilizations on shoulder pain in subjects with adhesive capsulitis stage II.

Methods: This study was conducted in 56 participants with clinical diagnosis of adhesive capsulitis stage II were randomly allocated in two groups (group A&B). Group 'A' received Therapeutic Ultrasound, Anterior end range mobilization and pre set of prescribed home exercises and Group 'B' received Therapeutic Ultrasound, Posterior end range mobilization and pre set of prescribed home exercises. The outcome measure was assessed in terms of Visual Analogue Scale (VAS) for Pain. After collecting data, results were analyzed by using wilcoxon matched pairs test.

Results: The result shows both anterior end range mobilization (50%) and posterior end range mobilization (47.45%) are significantly (p value >0.05) effective in reducing shoulder pain in adhesive capsulitis stage II.

Conclusion: Applications of anterior and posterior end range mobilization are equally effective in reducing pain in adhesive capsulitis stage II.

Key words: Adhesive capsulitis Stage II, End range Mobilization (kaltenborn), Pain, ROM.

Introduction

Adhesive capsulitis is an insidious onset of painful stiffness of the glenohumeral joint.

It is also known as frozen shoulder, scapulohumeral periarthritis, periarthritis of Dupley, periarthritis of shoulder, and check-rein shoulder.^[1]

Adhesive capsulitis has a prevalence of 2-5% in the normal population. In diabetic patients this is increased, with a prevalence of 10% in type I and 22% in type II. It is more common between the ages of 40 and 60years.^[2,3]

Reeves has described 3 stages of adhesive capsulitis,^[4]

1. Stage I it is mainly characterized by pain usually lasting 2-9 months.

2. Stage II (frozen stage); pain gradually subsides but stiffness is marked lasting 4-12 months.

3. Stage III (thawing phase); pain resolves and improvement in range of motion appears.

Many treatments have been employed in the management of shoulder disorders; few have been proven to be effective in randomised controlled trials. Non steroidal anti-inflammatory drugs, local anaesthetic and corticosteroid injections into the glenohumeral joint, calcitonin and antidepressants, distension arthrography, closed manipulation, physical therapy modalities and exercises are showed to be effective in management of shoulder disorders.^[5]

Physical therapy is commonly prescribed for this condition. Rehabilitation programs consisting of

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exercise, massage, and modalities have been shown to reduce pain and improve shoulder ROM in all planes. Joint mobilization is a form of passive movement used to treat painful and stiff synovial joints. The optimal directions of force and movement application for the Joint mobilization techniques are assumed to induce various beneficial effects.^[6,7] Kaltenborn's mobilization of extremity joints consists of two passive rectilinear movements traction/separation and translatory gliding, called joint play, and depends on concave convex rule.^[8]

In addition to manual therapy, therapeutic ultrasound can be used as an adjunct treatment in order to help the subjects regain ROM and restore function to the affected shoulder.^[9] The rationale for achieving therapeutic goals through deep heating is to alter the viscoelastic properties of the connective tissues and maximize the effectiveness of the stretch mobilizations to follow. Studies have shown that a significant drop in tensile stress occurs with a rise in the temperature of soft tissues by 3°C to 4°C, which is deemed adequate to alter the viscoelastic properties of connective tissues^[10]

In order to measure the pain Visual Analogue Scale (VAS) is a good and reliable tool in clinical research. The pain can be measured using this scale. The VAS is a well studied method for measuring both acute and chronic pain, and its usefulness has been validated by several investigators.^[11]

Materials and Methods

After obtaining the institutional ethical clearance, the study was carried out in 56 patients with adhesive capsulitis (stage II) of age between 40-60 years of either gender^[1,3] diagnosed by Orthopedician and who were referred to department of physiotherapy for 2 years. Subsequently after briefing about the study, written consent was obtained were screened. Then their demographic data, along with the routine evaluation with emphasis on pain using VAS were collected.

56 patients were divided into 2 groups; in each group 28 subjects were allocated randomly.

Group A- subjects received Therapeutic Ultrasound, Anterior (Postero-Anterior) end range mobilization and pre set of prescribed home exercises.

Group B- subjects received Therapeutic Ultrasound, Posterior (Anterio-Posterior) end range mobilization and pre set of prescribed home exercises.

We included the patients of unilateral conditions suffering from Idiopathic or primary adhesive capsulitis

stage II. We excluded patients of Malignancy, History of fracture /dislocation, Hypermobility, Inflammation/ infection, Shoulder girdle motor control deficit associated with neurological disorders (eg, stroke, or Parkinson's disease etc.), and Cortico steroid injection preceding 3 months which are contraindicated for end range mobilization.^[2]

Before starting the procedure to obtain VAS score, a horizontal line (10cm long) was drawn on a paper and participants were asked to mark a point on the line that best defined the present pain level, where "0" indicated no pain and "10" indicated severe pain.

The targeted capsule was preheated^[12] by the use of thermal ultrasound. The intention was to alter the viscoelastic properties of the connective tissue and maximize the effectiveness of the stretch mobilizations to follow.^[10] Ultrasound was administered to the anterior capsule of those in the AM group and to the posterior capsule of those in the PM group, all ultrasound treatments were applied at 1.5 W/cm² continuously for 10 minutes. Joint mobilization followed the ultrasound treatment as, Kaltenborn grade III mobilizations, which apply force "after the slack of the joint has been taken up," to stretch tissues crossing the joint.^[8] The end range position of the mobilization was held for at least 1 minute. No oscillatory motions were performed. Then rest period of half minute was given. Same stretch mobilization was repeated so that a total of 15 minutes of sustained stretch was performed at each treatment session.

Codman's pendular, Wall bar for flexion and abduction, shoulder protraction and retraction keeping the arm at the side of the body were then taught and made to do in the department and advised to follow the same as home programme exercise. Each subject was treated for 6 sessions. The subjects were asked to schedule therapy sessions 3 times per week.

Anterior end range mobilization group (group A):

In the beginning subject was positioned in supine for the AM group.^[8] Subject was brought to the side of the couch and maintaining the shoulder in neutral rotation, the affected arm was abducted to the maximum available ROM and therapist stood between the subject's trunk and arm. In this position, the therapist obtained a lateral humeral distraction in its midrange position then the anterior stretch mobilization was performed to end range. As the subject was able to tolerate a stronger stretching force, he/she was positioned prone (with arm resting position over the edge of the mobilization table and

stabilizing acromion with padding) to allow the therapist to utilize the subject's body weight and gravity to generate the mobilization force in a similar combined fashion of distraction to midrange and anterior glide to end range.

Posterior end range mobilization group (group B):

Here subject was positioned in supine and was brought at the side of the couch and maintaining the shoulder in neutral rotation (scapula stabilizing with padding), the affected arm was abducted to the maximum available ROM. Therapist stood between the subject's trunk and arm. In this position, the therapist obtained a lateral humeral distraction in its midrange position then the posterior stretch mobilization was performed to end range. The position chosen for the progression of the posterior mobilization took the humerus into flexion, with the intent to provide a greater stretch to the posterior capsule.

After intervention we have advised home exercise programme, like -

1. Codman's exercises were demonstrated initially to the patient. In which patient bent forward at the hips approximately 90° and the knees were slightly bent to allow greater hip flexion and minimize stress to the low back. The patient placed the hand not being used in the exercise on a firm surface. That permitted relaxed movement and concentration on the indicated movement of the involved shoulder. The involved arm dangled freely. The patient maintained the spine in neutral

to prevent excessive scapular movement. The arm was allowed to swing in sagittal, frontal and transverse planes of motion.^[13]

2. Wall bar exercises.

3. Shoulder protraction and retraction exercise.

The patient was asked to perform preset of exercises twice daily at home after ascertaining the appropriateness of the exercises. Data was analyzed by wilcoxon matched pair test by using VAS score.

Results

As per Table 1 Comparison of group A and group B with respect to pre, post treatment VAS scores for pain- In group A mean pre and post treatment VAS scores are 5.0 (SD=1.15) and 2.5 (SD=0.83) respectively. The percentage of change in VAS scores is 50. In group B mean pre and post treatment VAS scores are 4.89 (SD=0.88) and 2.57 (SD=0.92) respectively. The percentage of change in VAS scores is 47.45.

After data analysis we have found that in post treatment there is significant decrease in VAS scores for pain in both the groups A and B.

The result shows both anterior end range mobilization and posterior end range mobilization are more or less equally effective in reducing pain shoulder with 50% and 47.5% (Table 1) respectively in patients with adhesive capsulitis stage II.

Data was analyzed on VAS scoring basis by using Wilcoxon matched pair test (Table 1) which shows p value <0.05 which is statistically significant.

Table 1: Comparison of pre and post treatment with respect to VAS scores in Group A and B by Wilcoxon matched pairs test

Group	Treatment	Mean	SD	Mean Diff.	SD diff	% of change	T-value	Z-value	P-value
A	Pre	5.0000	1.1547	2.5000	0.8819	50.0000	0.0000	4.6226	0.0000*
	Post	2.5000	0.8389						
B	Pre	4.89	0.88	2.32	0.72	47.45	0.0000	4.6226	0.0000*
	Post	2.57	0.92						

*p<0.05, Significant

Discussion

According to Garvice G^[7] in 1985 conducted a study on 20 patients with painful glenohumeral restrictions were randomly placed in one of two group ie experimental group and control group, pain scores decreased more in the mobilization group which is similar to our study. Younghoon kim (2017)^[14] in his case report suggest that AJM, which is rotational joint mobilization with joint axis shift, may be an effective intervention for

improving shoulder pain, ROM, and disability in individuals with adhesive capsulitis.

According to Surabhi Agarwa^[15] clinical use of the reverse distraction technique as a mobilization method alternative to conventionally used techniques aimed at decreasing pain and improving ROM and functional scores in patients with adhesive capsulitis.

Joint mobilization, including Maitland's oscillatory techniques and Kaltenborn's sustained stretch

technique, is used clinically to treat adhesive capsulitis. The purpose of the mobilizing exercise therapy for a frozen shoulder is primarily to increase shoulder movement by stretching the glenohumeral joint capsule. Research has shown that Maitland's and Kaltenborn's techniques are similarly effective in reducing pain and improving ROM in adhesive capsulitis patients.

According to Judy F Chen^[16], the addition of passive joint mobilisation of shoulder region joints is not more effective than advice and exercise alone for shoulder pain and stiffness.

Conclusion

We conclude that both anterior and posterior end range mobilization can be preferred in reducing pain of adhesive capsulitis stage II of the shoulder.

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