

Effectiveness of Muscle Energy Technique versus Capsular Stretching Among Patients with Adhesive Capsulitis

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ABSTRACT

Introduction: Adhesive capsulitis is characterized by a painful, gradual loss of both active and passive glenohumeral motion resulting from progressive fibrosis and ultimate contracture of the glenohumeral joint capsule. Patients with Adhesive capsulitis have difficulties in everyday activities and shoulder pain disturbing sleep at night on the affected side. Different treatment approaches have been advocated for adhesive capsulitis, but there is not much scientific evidence to support the standard treatment. The purpose of this study is to establish best and efficient protocol for treatment of idiopathic adhesive capsulitis.

Subjects: Total 30 subjects diagnosed as adhesive capsulitis.

Methodology: 30 subjects including both sexes between 40-60 years, Diagnosed adhesive capsulitis were selected and were assigned in two groups (A or B) with 15 subjects each. Group A received Muscle Energy Technique and conventional. Group B received capsular stretching and conventional. Both the groups were treated 6 times a week for 3 weeks. All the subjects were measured for pain by NPRS, for all shoulder movements by goniometer and SPADI on first day before starting treatment and after 3 week of treatment.

Results: Statistical analysis was done using paired -t test and unpaired-t test. The outcome measures used were VAS, ROM, SPADI. The statistical analysis for both the groups was done by Paired t test within group and between groups. The statistical analysis showed extreme significance after the treatment for consecutive 3weeks with 5 sessions per week.

There was a significant level of improvement in Range of Movement (ROM) NPRS and SPADI in group A when compared to group B. This implies that muscle energy techniques are more beneficial in improving ROM and decreasing functional disabilities.

Conclusion: The Muscle Energy Technique is more effective in increasing Range Of Motion in patients with adhesive capsulitis along with conventional treatment in comparison to capsular stretching

Keywords: MET, Capsular Stretching, Adhesive Capsulitis, SPADI, ROM, NPRS

INTRODUCTION

The expression “If you don’t use it you lose it” applies perfectly to diseases of the shoulder because any voluntary or involuntary guarding of the shoulder may result in loss of mobility^{1,3}

Frozen shoulder is a pathology of often unknown aetiology characterized by painful and gradually progressive restriction of active and passive glenohumeral joint motion. Approximately 2-3% of adults aged between 40 and 70 years develop frozen shoulder with a greater occurrence in women⁴. Adhesive capsulitis results in stiffness and pain. It occurs in three distinct stages. The first stages is called freezing stage. As the symptoms progress, the pain worsens and ROM becomes more restricted. This phase lasts for 3 to 9 months and is characterized by an acute synovitis of the glenohumeral joint.⁷ The second stage is called the frozen or transitional stage.

During this stage, the use of the arm may be limited. The frozen stage lasts from 4 to 12 months, the capsular pattern is reduced, external shoulder rotation followed by shoulder flexion and internal rotation.⁷

The third stage begins when ROM begins to improve and is known as thawing stage. This stage lasts for 12 to 42 months and is defined by a gradual return of shoulder mobility.⁷

The diagnosis of idiopathic frozen shoulder is made when other causes of pain and motion loss are eliminated. Night pain and resting pain are common in the early presentation.² The physical examination helps to identify secondary causes of frozen shoulder and other diagnosis that may mimic symptoms suggesting frozen shoulder and to document shoulder range of motion.² The examination should include measurements of forward elevation, external rotation to the side, external and internal rotation in abduction (preferably at 90° of abduction or maximal abduction if the patient cannot reach 90 degrees), internal rotation up the back, and cross-body adduction.

A limitation of external rotation with the arm in abduction typically is associated with an anteroinferior capsular restriction, whereas limited internal rotation and cross-body adduction are associated with a posterior capsular restriction.²

The primary mode of treatment for frozen shoulder is prevention. Avoiding prolonged immobilization of the shoulder after trauma or when shoulder pain develops is the key. Other than the importance of prevention, there is poor agreement on an optimal treatment protocol. The overall goal of treatment is to relieve pain, restore motion, and to restore function.²

Although frozen shoulder is generally considered to be a self-limiting condition that can be treated with physical therapy, the best treatment has been the subject of extensive investigation. A variety of different treatments have been recommended, and numerous studies have demonstrated successful results.

Conservative treatment includes various exercises method and physical therapy modalities such as a hot therapy, transcutaneous electrical nerve stimulation (TENS), Ultrasound (US), Acupuncture and LASER (Light Amplification by Stimulated Emission of Radiation).

Identifying the stage of frozen shoulder in which a patient is presenting is important to determine the appropriate treatment regimen. Exercise is the key to any treatment protocol for frozen shoulder.² Exercise programs consists of active and passive ROM Exercises, stretching exercises guided by a physiotherapist, Self Stretching, Manipulation and Mobilization techniques, Strengthening exercises, Patient education and home exercises.⁸

Passive stretching is a therapeutic maneuver designed to lengthen pathologically shortened soft tissue by using external force, applied either manually or mechanically for about 30 seconds and there by facilitate increase in range of motion⁹. Capsular stretching also causes significant reduction in pain and improvement in function in patients with adhesive capsulitis.¹⁰

MET is unique in its application as the client provides the initial effort while the practitioner facilitates the process. One of the main uses of this method is to normalize joint range, rather than increase flexibility and technique can be used on any joints with restricted range of motion (ROM).⁸

There is a lack of evidence on the role of exercise in reducing either the symptoms or the incidence of Adhesive capsulitis.

Few studies have evaluated treatments that aim to improve ROM, function and Reduction in pain. Therefore, this study aimed to evaluate the effect of muscle energy technique versus capsular stretching among patients with adhesive capsulitis

MATERIALS AND METHODS

STUDY DESIGN:

Experimental study

SAMPLE DESIGN: Convenient sampling method

STUDY POPULATION: Subjects diagnosed with adhesive capsulitis

STUDY SETTING

Hospitals of Vadodara

STUDY DURATION:

One year

METHODOLOGY:

INCLUSION CRITERIA:

- Subject with age group 40-60 years
- Both male and female
- Subject with 2nd and 3rd stage of adhesive capsulitis
- Patients with or without diabetes.
- Patient Willing to participate in study

EXCLUSION CRITERIA:

- Rotator cuff rupture
- Secondary adhesive capsulitis
- Painful stiff shoulder after a serious trauma
- Fracture of the shoulder complex
- Inflammatory diseases such as rheumatoid arthritis
- Tendon calcification

OUTCOME MEASURES

The shoulder pain and disability index (SPADI)

NPRS – numeric pain rating scale

ROM (Range of Motion)

PROCEDURE:

After checking the inclusion and exclusion criteria, 30 adhesive capsulitis subjects were selected randomly and assigned into 2 groups with 15 subjects in each group.

The Group 1 comprised of adhesive Capsulitis subjects, to be treated with capsular stretching and conventional therapy.

Group 2 comprised of adhesive Capsulitis subject, to be treated with muscle energy technique (MET) therapy and conventional therapy.

Conventional therapy included use of hot pack (moist heat), Codman's exercise, pulley and rope exercise, finger ladder exercise, ultrasound.

GROUP 1:

CAPSULAR STRETCH: Subject first received hot pack for 10 mints before starting the capsular stretching. Capsular stretching was given for the anterior, inferior, posterior capsules of the shoulder.

To stretch the anterior capsule the subject was positioned either in side lying with the affected arm upward or in the high sitting and the shoulder and arm was brought backwards into extension and this stretch was maintained for a minimum 30 seconds and maximum duration up to the point of pain experienced by the patient.

To stretch the posterior capsule stretching was performed with the subject in supine position and therapist performed cross body adduction and this stretch was maintained for minimum 30 seconds.

To stretch the antero-inferior capsule the subject was in supine lying position. The affected arm was taken towards the extreme of attainable elevation and counter pressure was maintained at the patient's sternum to prevent spinal extension this stretch was maintained for 30 seconds.

Each stress was gentle but firm and it was not released until pain rather than discomfort was experienced.

MUSCLE ENERGY TECHNIQUE:

MET FOR SHOULDER FLEXION RESTRICTION:

Patient position: Supine lying position

Therapist Position: Standing at the side of the table. Stabilizing the scapula and clavicle with one hand and other hand holding the patients forearm.

Therapist maintained the patients upper most shoulder into flexion passively then the patient was instructed to pull the elbow towards the feet, utilizing not more than 20% of available strength. This effort was firmly resisted for 7-10 seconds then patient was instructed to relax and on an exhalation,

the practitioner moved the shoulder further into flexion.

MET FOR SHOULDER ABDUCTION RESTRICTION:

Patient position: supine lying position
 Therapist Position: standing at the side of the table. Stabilizing the scapula and clavicle with one hand and other hand holding the patients forearm.
 Therapist bring the patients shoulder into abduction passively then the patient is instructed to pull the body, utilizing no more than 20% of available strength. This effort is firmly resisted, for 7-10 seconds the patient is instructed to relax, and on an exhalation, the practitioner, using his contact on the elbow, moves the shoulder further into abduction.

MET FOR SHOULDER EXTERNAL ROTATION RESTRICTION:

Patient position: supine lying position
 Therapist Position : standing at the side of the table. Stabilizing the scapula and clavicle with one hand and other hand holding the patients forearm. The patient was in supine lying with the arm abducted to 90°, the elbow flexed to 90°, and the forearm in external rotation, palm upwards.¹⁰The whole arm was resting at the restriction barrier, with gravity as its counterweight. The patient raised the forearm slightly, against minimal resistance from the practitioner, for 7-10 seconds, following relaxation, gravity or slight assistance from the operator takes the arm into greater external rotation, through the barrier, where it was held for 30 seconds.

MET FOR SHOULDER INTERNAL ROTATION RESTRICTION:

Patient position: Supine lying position

Therapist position: Standing at the side of the table. Stabilizing the scapula and clavicle with one hand and other hand holding the patients forearm.

The patient is supine, upper arm at right angles to the trunk, elbow flexed so that lower arm is parallel to the trunk, pointing caudally, with the palm downwards.

This brings the arm into internal rotation and places infraspinatus at stretch.

The patient slowly and gently lifts the dorsum of the wrist towards the ceiling, against resistance from the practitioner for 7-10 seconds then the patient is instructed to relax, and on exhalation, the forearm was taken towards the floor.

CONVENTIONAL THERAPY:

- Hot pack (moist heat) for 10 minutes.
- Codman’s exercises
- Rope and pulley exercises
- Finger ladder exercises
- 5 rep. per set
- 3 set per session
- 3weeks (5days /week)
- Once in a day.

RESULT

Total 30 patients were divided randomly into Group A and Group B.
 Data analysis was done using SPSS Version 16.0.

Since the data was normal in distribution, parametric tests were used to analyze the data within group using paired t test and between group was analyzed using unpaired t test.

Table 1 illustrates the descriptive characteristics of all variables. There was significant difference found in demographic variables but no significant difference was found in outcome measures at the pre-intervention (pretest) level.

TABLE1

	MEAN Group A	MEAN Group B	CHI –SQUARE / t Value	Significance
AGE	52.33 (6.433)	51.40 (6.86)	25.54	0.000
GENDER	(3/12)	(5/10)	366.57	0.000
FLEXION	89.67(15.40)	88(18.30)	0.270	0.781
ABDUCTION	83.33(10.46)	82(12.64)	0.315	0.755
INTERNAL ROTATION	21.67(6.23)	22.67(9.03)	-0.322	0.750
EXTERNAL ROTATION	15.67(6.23)	21(7.31)	-2.141	0.041
SPADI	86.53(11.11)	82.13(12.61)	1.013	0.320
NPRS	6.80(0.94)	6.67(1.17)	0.340	0.734

Table 2 and Table 3 show within group comparison. For group A there was an increase in shoulder ROM. Shoulder abduction 83.33 (10.46) showed highest increase in ROM, among the other ROM of shoulder same scenario seen in group B where shoulder abduction 82 (12.64) and these difference is statistically significant ($p < 0.05$). In both groups, SPADI and NPRS decreased after the intervention and it is statistically significant ($p < 0.05$). Graph 1 and graph 2 show the difference in outcome measures within group.

TABLE 2

Outcome measures	Group A				t value	P value
	Pre test		Post test			
	Mean	SD	Mean	SD		
Flexion	89.67	15.40	158.66	17.26	12.207	0.00
Abduction	83.33	10.465	165.66	13.21	25.772	0.00
Internal rotation	21.67	7.94	61.00	9.67	12.312	0.00
External rotation	15.67	6.23	59	9.48	13.926	0.00
SPADI	86.53	11.11	23.47	10.26	-14.982	0.00
NPRS	6.80	0.94	2.26	1.03	-11.311	0.00

Table 3 shows comparison between two groups. Group A showed more improvement in shoulder range post intervention compared to group B. The difference in shoulder range between both groups were statistically significant ($p < 0.05$). Between group comparison for shoulder flexion in group A 158.66 (12.207) showed more increment than group B 21.89(11.59) ($p < 0.05$), whereas shoulder abduction, internal rotation 82% and external rotation also showed marked increment in Group A as compared to group B ($p < 0.05$).

TABLE 3

Outcome measures	Group B				t value	P value
	Pre test		Post test			
	Mean	SD	Mean	SD		
Flexion	88	18.30	121.33	14.07	11.31	0.00
Abduction	82	12.64	122	12.64	20.49	0.00
Internal rotation	22.67	9.03	39	6.03	8.801	0.00
External rotation	21	7.36	34	5.73	15.92	0.00
SPADI	82.13	12.61	55.12	14.35	-15.32	0.00
NPRS	6.67	1.17	4.4	0.910	-9.93	0.00

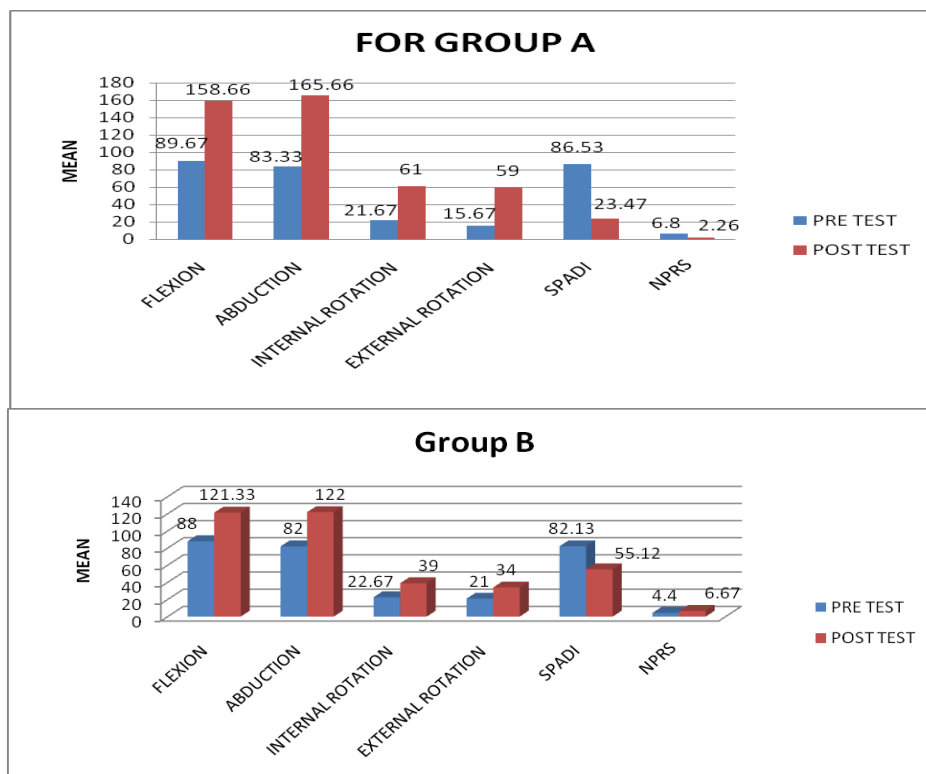


Figure 1

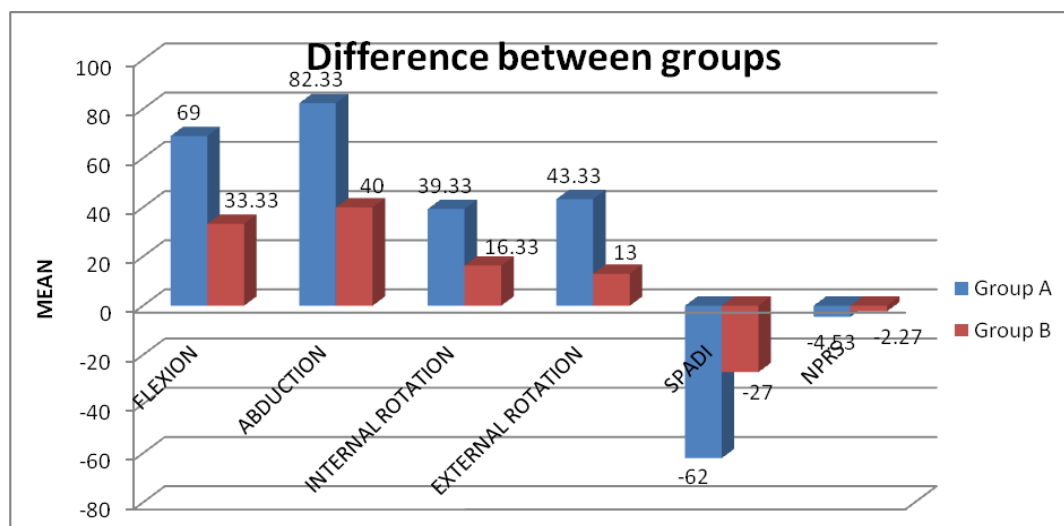


Figure 2

DISCUSSION

Frozen Shoulder is characterized by painful stiffness of shoulder that may persist for several years. It is a common disorder, with an estimated annual incidence of 3% to 5% in the general population. Advocated treatments include rest and analgesics, corticosteroid injections, acupuncture, physical therapy, manipulation under anaesthesia, and arthroscopic or open surgery. There is no general acceptance of one standard treatment (Green et al 2000).

Frozen shoulder is a contracture of the capsule and depending on how severe the contracture is (for it varies in intensity from patient to patient) the treatment is decided.⁸ The first objective in the treatment of patients with frozen shoulder syndrome is pain relief. This is essential, for it permits patients to readily participate in an exercise program aimed at restoring motion and recovering function.³

Muscle Energy Technique has shown to alleviate pain, improve ROM and functional ability in adhesive capsulitis patients. There have been numerous studies performed to implicate the effectiveness of MET in treating adhesive capsulitis. Stephanie et al., 2011 performed a study on the application of MET in a cohort study of 61 basketball players and observed that treatment for glenohumeral joint abduction using MET resulted in improvement of

horizontal abduction and internal range of motion. Patil et al., 2010 recruited 40 patients suffering from acute low back pain to compare the effectiveness of interferential therapy and interferential therapy coupled with MET. It was observed that interferential therapy combined with MET was significantly better in improving the ROM and decreasing the disability than interferential therapy alone. Narayan et al., 2014 also states the efficacy of MET in improving the functional ability of shoulder in patients with frozen shoulder syndrome. There are numerous studies implicating the efficacy of mobilization techniques and MET in treating adhesive capsulitis.

Implementation of muscle energy techniques along with conventional therapy, demonstrated a significant decrease in pain and improved ROM and functional disability in the present study which supports the alternate hypothesis. Both the groups receiving treatment had an improvement in gleno-humeral joint motion with a decreased pain and disability score. The analysis also showed that MET with conventional treatment had earlier effect on the joint with a better outcome measure. There were better results of increase in ROM and decrease in pain and disability in Group A when compared to Group B.

Ian Johnson et al stated that there is an evidence of increase in ROM and decrease in disability and pain achieved in elderly patients by post-isometric muscle relaxation. The reasons for this improvements implies that the effects of post isometric muscle relaxation is said to be mediated by afferent input from the golgi-tendon organs when the muscle is held in an isometric contraction, the afferent feedback leads to inhibition of the given muscle, which is thought to result in relaxation of the muscle when the contraction is released.

The significance and efficiency of MET over conventional treatment is due to the difference in the rationale. The rationale is that loosening tight muscles in the region of joint restriction will result in a more comfortable, successful and easily administered adjustment. The muscle stretching is considered a preparatory procedure for primary intervention, the adjustment unfortunately situations exist where joint hypo-mobility and/or pain can interfere with the performance of muscle stretching.²³

There is evidence that MET procedures actually result in increased myoelectric activity of the target muscle. The clinical benefit derived from MET stretching may be due to patients feeling more involved or confident in the procedure and willing to tolerate the discomfort of the stretch rather than any neurologic muscular relaxation. Thus, MET are interventions that can reduce pain and muscle rigidity, lengthen muscle fibers and increase ROM necessary for motor behavior.²³

In the past research, it was demonstrated that a single application of MET for the GHJ horizontal abductors results in greater post treatment GHJ horizontal adduction and internal rotation ROM immediately following treatment. Alternatively a single application of MET applied to the GHJ external rotators did not lead to a significant increase in horizontal adduction or internal rotation (*Stephanie D. Moore et al 2014*).³⁴

According to Lean Chaitow the physiological mechanisms behind the changes in muscle extensibility produced by MET are reflex relaxation, viscoelastic or muscle property change, and changes to stretch tolerance - a change to tolerance to stretching is most supported by the scientific literature. These mechanisms bring about a change in muscle physiology and hence lead to increased ROM at the joint³⁸.

The present study are similar as found by Gupta S, Jaiswal, P. (2008) suggesting that Post isometric relaxation is more effective in decreasing pain and disability and improving cervical range of motion as compared to isometric exercises over a period of three weeks in patients having non-specific neck pain. In Muscle Energy Technique, mechanical changes may include breaking up of adhesions, realigning collagen, or increasing fibre glide when specific movements stress the specific parts of the capsular tissue.³⁹

Sonakshi Sehgal et al. demonstrated that an application of MET on GHJ external rotators increases the ROM and strength of internal rotators. This increase in ROM and strength of glenohumeral internal rotators was due to change in the muscle extensibility followed by relaxation of the muscle. The isometric contraction of the muscle is thought to increase the strength of the muscles. On the other hand, the group which was treated with stretching of the external rotators did not show a significant increase in the GHJ internal rotators ROM and strength. Stretching is thought to increase the flexibility at the joint, as proved in many of the past researches.⁴⁰

Though literature says that capsular stretching is effective in improving the ROM at the joint, but in the present study it is non-significant when compared to the MET. This may be, because the protocol was given 5 days in week, which may not be able to bring effective outcomes. As a result the present study proved that MET is effective in increasing the ROM, function and reduction in pain. Flexibility is

considered to be a valuable component for functional activity, so the subjects involved with adhesive capsulitis can be treated with MET to improve the flexibility, ROM, and pain.

CONCLUSION

Both Capsular stretching and Muscle Energy Technique are effective treatment techniques in the treatment of frozen shoulder. Further Muscle Energy Technique is more effective in increasing the range of motion and function in Adhesive capsulitis.

Limitations

Small sample size

No long term follow up was taken in the study

Control group was not taken in the study due to ethical reasons

Recommendations for future study are

1. The same techniques applied for a longer duration say 4 weeks
2. On effectiveness of other exercise programmes.
3. The same study can be done with a longer follow-up

Conflict of interest: Nil

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