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EFFICACY OF MAITLAND MOBILIZATION IN FROZEN SHOULDER

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ABSTRACT

Objectives: Efficacy of Maitland Mobilization in Frozen shoulder. **Design:** Randomized Control Trial. **Methodology:** A total of 40 patients were included as per pre defined inclusion and exclusion criteria and randomly assigned into two groups each having 20 patients. Group A was given Maitland mobilization along with Exercises (stretching, strengthening and ROM exercises) while Group B was given Ultrasound therapy along with Exercises (stretching, strengthening and ROM exercises) for thrice a week for four weeks (12 sessions). The patient's outcome measures were assessed by visual analog scale, Shoulder pain and disability index (SPADI) and Goniometry for Shoulder Range of Motion. Pre and post treatment values were recorded for comparison of results. **Results:** Results revealed that means and S.D of both groups were clinically significant but statically the Group of patients treated with Maitland mobilization along with Exercises managed pain (pre=5.27±1.5, post=1.72±0.9), SPADI (pre= 80.27±3.45, post= 35.24±7.27) and range of motion(flexion pre=104.4±36.02, post=151.31±15.83, Abduction pre=92±33.96 ,post=161.5±8.45, lateral rotation =22.31±12.88, post=72.06±6.84 and Medial rotation pre=41.56±9.34, post=66.56±9.25, is better than group of patients treated with Ultrasound therapy along with Exercises in terms of pain (pre=5.35±1.6, post=2.30±0.5), SPADI (pre=81.25±3.21,post=9.12±5.53) and range of motion (flexion pre=99.25±47.13, post=118.38±35.61, Abduction pre=84.56±48.16, post=112.63±37, lateral rotation pre=28±18.83 post=40.94±17.15, Medial rotation pre=41.37±13.80, post=50.81±11.61. **Conclusion:** The result of study suggests that both Maitland Mobilization and Ultrasound improves the symptoms of frozen shoulder. Better improvement was shown by Maitland's group than Ultrasound group. Based on these results Maitland mobilization with Exercise's should be the treatment of choice for frozen shoulder rather than Ultrasound with Exercises.

KEYWORDS: Ultrasound, Shoulder Pain, Maitland's, Exercise.

INTRODUCTION

The name "frozen shoulder" firstly given by Codman in 1934. He described frozen shoulder as a painful shoulder condition of insidious onset that was associated with stiffness in forward elevation, external rotation and difficulty in sleeping on affected side. Naviesar coined term "adhesive capsulitis" in 1945.[1] Adhesive capsulitis, periarthritis, and frozen shoulder are all terms used to describe a painful and stiff glenohumeral joint.[2] Adhesive capsulitis can be defined as a common condition characterized by insidious and gradual inflammation of the glenohumeral joint capsule leading to its contracture and thus resulting in stiffness and loss of shoulder mobility.[3] The prevalence rate has been reported to be 2–5.3%, with individuals commonly affected in the age group between40 to 70 years.[4-8] Usually this condition is self-limiting which may resolve within 2–3 years but it can extend beyond 3 years in up to 40% of patients.[9,10] According to Smita Bhimrao 2014, Frozen Shoulder or Adhesive Capsulitis is reported to affect 3% to 5% of the general population and up to 20% in people with diabetes. The occurrence of Frozen Shoulder in unilateral shoulder increases the risk of contra lateral shoulder involvement by 5% to 34%.[11] It is generally divided in to 3 stages of symptoms lasting for 30 months.

1. Stage I/ freezing stage / painful stage

- As described by Smita Bhimrao.[11] typically lasts for 10 to 36 weeks.
- Patient presents with spontaneous onset of shoulder pain which is more severe at night and with activities, associated with a sense of discomfort that radiates down the arm.

2. Stage II/ Frozen stage /stiffening stage

- It lasts for 4 to 12 months.
- Pain at rest usually diminishes during this stage, leaving the shoulder with restricted motion in all planes.
- Activities of daily living become severely restricted.
- When performing the activities, a sharp, acute discomfort, can occur as the patient reaches the restraint of the tight capsule. Pain at night is a common complaint.

3. Stage III/ thawing stage / resolution stage

- This phase lasts for 5 to 26 months.
- This stage is characterized by gradual recovery of range of motion.

There are two main types of frozen shoulder idiopathic primary frozen shoulder and secondary frozen shoulder corresponds to traumatic capsulitis or if some other medical condition is present alongside.[12]

Goals of treatment for frozen shoulder are pain relief, maintenance of range, and restoring function. Physiotherapy treatment consists of stretching and strengthening exercises, electrotherapy modalities or mobilization which may be applied side by side.[13]

Joint mobilization is a form of passive movement in a broad spectrum of exercise used to treat painful and stiff synovial joints. Several forms of mobilization exist and terminology varies among the authorities. The oscillatory movements will be in the direction of the joint's accessory motions which are small spinning, gliding, rolling, or distractive motions that occur between joint surfaces and are essential for normal mobility. An example of an accessory motion at the shoulder would be movement of the humeral head inferiorly as it moves on the glenoid fossa during normal abduction. This gliding motion is necessary for the greater tuberosity of the humerus to pass under the coracoacromial arch and thereby allow full elevation of the arm. Accessory motions can be demonstrated in normal, synovial joints when an examiner passively moves one articular surface while the other is stabilized.[2] Ultrasound therapy (UST) is used to treat frozen shoulder, increases tissue temperature upto 5 cm deep, causing increased collagen tissue flexibility, pain threshold, and enzymatic activity. UST also affect nerve conduction velocity and contractile activity of the skeletal muscle.[14] Therefore, effective treatment that shortens the duration of symptoms and disability has the potential to be of significant value in terms of reduced morbidity and costs.[15]

MATERIAL AND METHODS

The study was designed as Randomized Control Trial and has two groups. Group A was given Maitland mobilization along with Exercise's (stretching, strengthening and ROM exercises) while Group B was given Ultrasound along with Exercise's (stretching, strengthening and ROM exercises). It was conducted at Physical Therapy Department of Prince Sultan Military Medical City- Riyadh Saudi Arabia.

Inclusion criteria[14,17,18]

- Age 40- 60 yrs.
- Shoulder ROM restriction (external rotation $\geq 60^0$, abduction $\geq 30^0$, internal rotation$\geq 5^0$)
- Shoulder pain more than 3 months.
- Patients with adhesive capsulitis abduction test and external rotation test positive.

Exclusion criteria[19,20,21]

- Diabetes mellitus.
- History of trauma or accidental injuries.
- Neurological involvement (stroke, Parkinsonism, radiating pain to arm).
- History of surgery on particular shoulder.

A total of 40 patients were included as per inclusion criteria. They were randomly assignment into two groups A and B with 20 patients in each group. Baseline assessment using Visual analog Scale (VAS), Shoulder pain and disability index (SPADI) and Goniometry was done respectively for Pain, Function and shoulder range of motion (flexion, abduction, lateral rotation, and medial rotation) for both groups. Treatment was given thrice a week for four weeks (12 sessions).[14,22]

Maitland's Mobilization procedure

Patient was in supine lying with arm abducted to 30 degrees and therapist was in walk standing position holding proximal end of the humerus and maintaining a lateral humeral distraction in its midrange position. Glenohumeral caudal glide mobilization was given at the rate of 2-3 glides per second for 30 seconds for each glide,given for 5 sets (Fig.1) .The technique was applied thrice a week for four weeks (12 sessions).[14, 22]

Fig. 1: Caudal glide position.

Ultrasound Procedure

Patient received pulsed ultrasound for 5 minutes with a device that was operated at a frequency of 1 MHz, and an intensity of 1 W/cm^2. The treating physical therapist applied the transducer head in circular motion over the superior and anterior periarticular regions of the participant's glenohumeral joint and on the shoulder trigger points.[23]

Exercise therapy

Stretching exercises

External rotators and flexors were stretched by stretching in hand-behind the-back. Patients were asked to maintain each stretch for 30 seconds, with 10 sec rest in between and repeat these stretches for 4 times. They were informed to perform stretching exercises at home daily. Self-stretching exercises is give for improving abduction, flexion, external rotation, internal rotation, and horizontal adduction.[24]

Self-Stretching to Increase External (Lateral) Rotation

Patient sitting on the side of a table with the forearm resting on the table and elbow flexed to 90°. Have the patient bend from the waist, bringing the head and shoulder level with the table.[25] (Fig.2).

Fig. 2. Self Stretching.

Strengthening exercises

Strengthening exercises were started with weights, therabands, springs and pushups. The exercise protocol and manual therapy were given to improve coordination, muscle strength and mobility of rotator cuff muscles to unload the subacromial space during active movements.[26]

Range of Motion Exercises Program[14,22,25]

Pulley Exercises

Patient sitting on a chair holding a skipping rope, passing over an iron beam. Patient swing the rope alternatively up and down; this helps improve flexion and extension movements of shoulder. Patients were asked to perform this for 5 to 10 minutes every day(Fig. 3).

Fig. 3. Pulley Exercise.

Finger ladder Exercises: Patient standing facing a ladder which is hanging over a wall. Patients were asking to place the affected hands over the ladder at a low level. Then slowly start an upward climb on the finger ladder until it reached the top and then slowly down back to the starting position (Fig. 4).

Fig. 4. Finger ladder Exercise.

Circumduction Exercises: Patients were asked to lie on prone position on the edge of the bed, hang the affected shoulder out of the bed then slowly rotate the affected shoulder in all the directions in a circular manner. Patients were asked to perform this for 5 to 10 times daily (Fig. 5).

Fig. 5. Circumduction Exercises.

Pendulum Exercises: Patients were asked to bend forward with sound forearm supported on a table or bench, shoulder relaxed, and then gently swings affected side arm forwards and backwards until feel a mild to moderate stretch. Patients were asked to perform this for 5 to 10 times provided the exercise is pain free (Fig. 6).

Fig. 6- Pendulum Exercise.

DATA ANALYSIS

Data was analyzed with SPSS 20. Outcome measures were calculated as mean and standard deviation and compared by using paired and independent sample t-test. P-value of less than 0.05 was taken as significant. Informed consent was taken from all patients before enrollment in the study to assure willingness, confidentiality of information and to aware the patients about all procedure and interventions.

RESULTS

In this study 40 patients participated with a mean age of 47.25±15.30 in group A and 47.10±14.90 in Group B ranging from 40 to 60 years.

Table. 1: Mean and SD of age between group A and B.

1		Group A (N=30) Mean±SD	Group B (N=30) Mean±SD
2	Age (Yrs)	47.25±15.30	47.10±14.90

Mean reduction in VAS: Both groups had clinically significant difference in pre R_x to Post R_X values as p values for group A and B were p=0.005 and p=0.06 respectively.

Table. 2: Mean reduction in VAS values between group A and B. Mean and standard deviation at pre R_X, Post R_X with p values.

1	Groups	Pre R_X	Post R_X	Pre R_x to Post R_X	
				Mean±SD	P value
2	Group A (N=20) Mean±SD	5.27±1.5	1.72±0.9	4.21±1.25	0.005
3	Group B (N=20) Mean±SD	5.35±1.6	2.30±0.5	2.51±0.75	0.06

Shoulder pain and disability index (SPADI)

Table 3: Shoulder pain and disability index.

1	Group	Pre R_X	Post R_X	P value
2	Group A (N=20) Mean±SD	80.27±3.45	35.24±7.27	0.0005
3	Group B (N=20) Mean±SD	81.25±3.21	9.12±5.53	0.10

Mean reduction in ROM

Both groups had significant difference in pre R_x to Post R_X p=0.000 respectively.

Table. 4: Mean reduction in ROM values between group A and B. Mean and standard deviation at pre R_X, Post R_X with p values.

1	ROM	Group A (N=20) (Mean±S.D)		Group B (N=20) (Mean±S.D)		p-value (<0.05)
		Pre R_X	Post R_X	Pre R_X	Post R_X	
2	Flexion	104.4±36.02	151.31±15.83	99.25±47.13	118.38±35.61	0.001
3	Abduction	92±33.96	161.5±8.45	84.56±48.16	112.63±37	0.000
4	lateral rotation	22.31±12.88	72.06±6.84	28±18.83	40.94±17.15	0.000
5	Medial rotation	41.56±9.34	66.56±9.25	41.37±13.80	50.81±11.61	0.002

DISSCUSION

The aim of the study to find out effectiveness of Maitland techniques in frozen shoulder. This study compared the effectiveness of Maitland's mobilization technique against Ultrasound in frozen shoulder along with stretching, strengthening and ROM exercises on numeric pain rating scale, ROM and Shoulder pain and disability index. In a general results shows that subjects

in both the groups improved well. A significant difference was found in both groups clinically. VAS and SPADI scores reduced in both groups, but comparison between groups showed that Group A was better than group B statistically.

Group A receiving Maitland Mobilization showed better improvement on VAS score (4.21) than group B received Ultrasound (2.51) after four weeks of treatment.

Farah shaheen 2017, study shows that use of therapeutic ultrasound decreased pain in frozen shoulder.[26]

Hasan Kerem Alptekin 2016, who found on his study that evaluation of function at visits on the 7th and 12th weeks showed the presence of significant improvement. In all patients not presenting a contraindication to deep or superficial heat application, the treatment protocol included interferential current and hot pack application for 20 min each, ultrasound therapy during 3 min, regular ROM exercises, stretching exercises, strengthening with Theraband in all directions, and the application of post-exercise PNF techniques. Twenty manual stretching exercises were performed, five in each direction.[27]

Do Moon et al. compared the Maitland and Kaltenborn mobilization techniques and found significant differences in pain and the ROM of both internal and external shoulder rotation pre- and post-intervention in the Maitland and Kaltenborn groups; however, there were no significant differences when the groups were compared for outcome measures.[28]

Robertson VJ et. al 2001, reported the usage of ultrasound therapy (UST) clinically in rehabilitation of patients with frozen shoulder. According to them both thermal and non-thermal effects of UST are effective in reducing inflammation and improving tissue flexibility and decreasing pain. Increased tissue extensibility with reduction of inflammation due to thermal effects of UST helps in aggressive mobilization of shoulder with low pain. The non-thermal effects of UST have shown to reduce the recurrence of the symptoms also reducing the in-house rehabilitation duration.[29]

Shahbaz Nawaz Ansari 2012 also found on his study that use of therapeutic ultrasound decreased pain in the treatment of frozen shoulder.[14]

Smita Bhimrao 2014 found on his study that patients receiving Maitland mobilization with conventional therapy have improvement in the functional outcome in frozen shoulder.[11]

Range of motion exercises also contribute in improving joint and soft tissue mobility and decreases risk of adhesions and contracture formation. Stretching exercises given as home Programme were also helpful in breaking the collagen bonds and realignment of the fibres for permanent elongation or increased flexibility and mobility of the soft tissues that have adaptively shortened and become hypo mobile over time in Frozen Shoulder.[12,30,31]

Ketan Bhatikar 2018 in his study also gave Maitland mobilization along with conventionl physiotherapy treatment had a positive effect on pain and joint range of motion.[32]

Abhay 2012 have conducted a clinical study to find the effectiveness of Maitland mobilization technique in the treatment of idiopathic shoulder adhesive capsulitis. The study confirmed that combination of shoulder exercises and Maitland mobilization technique results in relieving pain and improving ROM and shoulder function.[13]

Sengpya Phukon 2017 conducted a study and the results of the study, shows that both Maitland mobilization and METS are effective in improving the ROM and decrease in pain in patient with adhesive capsulitis.[33]

All about study results strongly support our study that Maitland mobilization and Ultrasound along with stretching, strengthening and ROM exercise improve frozen shoulder condition.

CONCLUSION

The results showed that both the interventions resulted in positive outcomes, but comparing the highest level of positive outcome within the interventions the Maitland technique imposed remarkable rate of recovery in regaining pain free range of motion when compared to the Ultrasound and is effective in the treatment of frozen shoulder.

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