

Original Research Article

To Compare the Effectiveness of Maitland versus Mulligan Mobilisation in Idiopathic Adhesive Capsulitis of Shoulder

R. K. Minerva^{1*}, Nityal Kumar Alagingi^{2**}, Patchava Apparao^{3*}, Chaturvedhi P^{4*}

¹Post Graduate Student, ²Assistant professor, ³Profesor and Principal, ⁴Vice Principal,
*Department Of physiotherapy, ** Orthopedics,
Swatantra Institute of Physiotherapy and Rehabilitation Rajahmundry, Andhra Pradesh.

Corresponding Author: Nityal Kumar Alagingi

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ABSTRACT

Purpose: To compare the effectiveness of Maitland mobilization versus Mulligan mobilization on improving pain and functional ability in subjects with adhesive capsulitis of shoulder.

Methods: 60 subjects diagnosed with adhesive capsulitis of shoulder were recruited and randomly allocated into two groups. In Group A (n=30) subjects were treated with Maitland mobilization technique and common supervised exercises thrice a week for 4 weeks, where as Group B (n=30) subjects were treated with mulligan mobilization and conventional exercises. Outcome used were Shoulder pain and disability index (SPADI) and shoulder range of motion (external rotation and abduction) and recorded after 4 weeks.

Results: Statistical analysis was done using, student t test (two tailed and independent) for difference between groups and student t test (two tailed dependent) for difference within groups. Microsoft word and Excel was used to generate graphs, tables. Analysis of the data revealed that both groups has significant changes within them with p value 0.00 both in SPADI score and abduction and external rotation range of motion and in between groups showing the group which received mulligan mobilization and exercises is effective with p value 0.01 for SPDI and abduction and p value of 0.007 for external rotation.

Conclusion: it was concluded that Mulligan mobilization is more effective than Maitland mobilization in reducing pain and improving shoulder functional ability in subjects with adhesive capsulitis of shoulder.

Key words: Mobilization, Maitland, Mulligan.

INTRODUCTION

Shoulder pain is the third most common disorder of musculoskeletal system affecting 16-20% of the general population. Of these complaints of pain idiopathic adhesive capsulitis or frozen shoulder is most common. ^[1] American Shoulder and Elbow Surgeons Society (1992) has described the Shoulder adhesive capsulitis as a condition of uncertain a etiology characterized by significant restriction of both active and

passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder. ^[2-4]

Clinical symptoms include pain, limited range of motion (ROM), altered scapulohumeral rhythm and muscle weakness due to disuse and movements taking in scaption. ^[5-7] The incidence of Adhesive capsulitis of shoulder is 2 -5% percent in general population and 10-20% in diabetics ^[8] of which females are more affected than males and is usually seen in

age group of 40-60 years. [9,10] Among the effected individuals only 12 % develop the condition bilaterally. [11,12]

A variety of interventions were used by physiotherapists to reduce pain and disability which includes exercise and electrotherapy along with different types of mobilizations. [13-16] But there is unanimous decision in the selection of the treatment patterns and now a days mobilisation has become an integral part of treating Adhesive capsulitis. [17-20]

Mulligan incorporated Kaltenborn's concave convex rule in his mobilizations which are ought to be given in a painless way with an end pressure to restore reduced accessory glides of the joints. In essence, the limited painful physiological movement is performed actively and therapist applies a sustained posterolateral glide to the restricted joint aiming to increase the joint ROM. The accessory movement which takes in the normal physiological range is thought to correct the malalignment in the joint and thus inhibits pain and improves ROM. [21]

The international Maitland Teachers Association (IMTA) defines maitland concept as a processes of examination assessment and treatment of musculoskeletal disorder by manipulative therapy. This concept uses oscillations given to the joint within the physiological range. Grades I and II of Maitland mobilization are primarily given to reduce pain continuous stimulation of mechanoreceptors that block noiceception pathways at the spinal cord level where as grade III and IV are primarily used for stretch. [21]

Joint mobilization techniques are assumed to induce various beneficial effects including neurophysiological, biomechanical and mechanical effects. Pathological changes causes increase in intraarticular pressure and increases joint restriction. The main aim of the manual therapy is to rescue these pathological changes and to improve the joint range. Therefore beneficial effects of manual

therapy can be seen in patients with high pain intensity and reduces ROM. [22]

In the treatment of Adhesive capsulitis, Maitland mobilisation aims in improving the range by breaking down the adhesions and whereas Mulligan mobilizations correct the malalignment and reduces pain. [22,23]

Vermeulen et al concluded that Maitland mobilisation which uses higher grades of mobilization are found to be effective in increasing the ROM and reducing the disability. Syed Abudaheer, et al has conducted a study to investigate the efficacy of Post thermotherapy Maitland mobilizations compared to the active mobilizations exercises in improving the shoulder function and pain in periarthritis shoulder and concluded that the Post thermotherapy Maitland Mobilisation has been proven more effective and beneficial in improving shoulder function in the form of Hand Behind Back and relieving pain over the active mobilisation exercises in Periarthritis. [24]

Abhay Kumar, Suraj Kumar et al, has conducted a study to evaluate the "Effectiveness maitland mobilization in idiopathic adhesive capsulitis of shoulder", and concluded that maitland mobilisation in combination with exercises is effective in relieving pain and improving ROM and hence should form a part of the treatment plan. [25]

Pamela Teys, Leanne Bisset et al. found that there is an initial effects of MWM technique on shoulder ROM in the plane of scapula and Pain Pressure Threshold (PPT) in subjects with anterior shoulder pain and in subjects with painful limitation of shoulder movement. [26] Bang MD, Deyle GD et al. found that supervised exercise combined with manual therapy was better than supervised exercise alone in the treatment of shoulder impingement. [27] Hsu et al. studied on joint position during mobilization on 11 cadavers, found that the application of an anterior-posterior glide towards the end of range of

abduction was effective in improving the range of glenohumeral abduction. [12]

Despite of many studies, there are no studies found in the literature on the superiority of these two techniques along with conventional exercises. There is a need to know the difference in effect of Maitland versus Mulligan mobilisations along with conventional exercises.

Hence the purpose of the study is to find the effect of Maitland mobilisation versus Mulligan mobilisation on pain and shoulder abduction and rotation.

MATERIALS AND METHODS

An experimental study design with two groups Maitlands and Mulligan. Both men and women with age group between 40-60 having unilateral pain and restriction of range more than 50 percent and pain more than 2 months were included. Subjects with systemic diseases, fractures, mental disorders were excluded.

As this study involves human subjects Ethical clearance has been obtained from Swatantra College of Physiotherapy, Rajahmundry as per the ethical guidelines for Bio-medical research on human subjects. The subjects were recruited from GSL medical hospital.

Procedure

Randomization: Individually informed consent was taken from all 60 subjects selected for the study on the basis of inclusion and exclusion criteria. A concealed block randomization was done and finally each group ended up with 30 subjects each.

Maitland's mobilization (group i): Group I was treated with Maitland mobilization techniques and supervised exercises. The initial position for maitland mobilization group was patient in supine position with arm abducted to 30 degrees the therapist in walk standing position holds proximal end of the humerus and maintain a lateral humeral distraction in its mid range position and the glenohumeral caudal glide mobilization was given at the rate of 2-3 glides per second for 30 sec and

every glide was given for 5 sets to improve the abduction. [25]

For giving posteroanterior glide the patient was made to lie in prone position and at end range of abduction and external rotation lateral humeral distraction is given and stretch mobilizations were performed by utilizing the subjects body weight and gravity to generate the mobilizing force, an posteroanterior gliding is given, both the glides were given at the rate of 2-3 glides per second for 30 sec for each glide and every glide was given for 5 sets for improving external rotation. The technique was applied thrice a week for 4 weeks (12 sessions). [25]

Mulligan mobilization (group ii): The MWM technique with belt was performed on the involved shoulder with the subject in a relaxed sitting position, a Mulligan belt was placed around the head of the humerus to glide the humerus head appropriately in the posterolateral direction, as the therapist's hand was used over the appropriate aspect of the head of the humerus. A counter pressure also was applied to the scapula with the therapist's other hand. The glide was sustained during slow active shoulder movements to the end of the pain-free range and released after return to the starting position. The procedure was performed three sets of 10 repetitions, with 30 sec rest between sets. The same procedure was performed 3 sessions in a week for 4 weeks. [25,28]

Without belt the mobilization was given with the participant seated and the therapist stands beside the participant on the opposite side to the affected shoulder. One hand was placed over the scapula posteriorly while the sulcus between thenar and hypothenar eminence of the other hand was placed over the anterior aspect of the head of the humerus. A posterior gliding force was applied to the humeral head. The participant was then asked to raise the affected arm in the plane of the scapula to the point of pain onset while the therapist sustained the gliding force to the humeral head, with care to

avoid the sensitive coracoid process. Three sets of 10 repetitions were applied with a rest interval of 30 s between each set. The therapist endeavored to maintain the glide at right angles to the plane of movement throughout the entire range. [25]

CONVENTIONAL THERAPY FOR BOTH GROUPS (ANNEXURE 1)

Outcome measures: The subject's active and passive ROM shoulder abduction, external rotations were measured in both the groups at baseline and post intervention after 4 weeks where as disability was measured using SPADI.

Statistical analysis: Descriptive statistical analysis has been carried out in the present study, student t test (two tailed and independent) has been used to find out the significance of the study parameter on continuous scale in between groups and student t test (two tailed dependent) has been used to find out the significance within the group.

The statistical software; Microsoft word and Excel have been used to generate graphs, tables Comparison was done both within each group as well as in between the two groups, So as to evaluate the intra group and inter group effectiveness of maitland and mulligan mobilization which are under considerations in the present study.

Table-I: Analysis of Pre and Post Spadi in Group I (Mean Changes in SPADI Score):

Group I	Pre Treatment	Post Treatment	p value	Inference
	Mean	Mean		
S SPADI	67.72367	48.05	0.00	Highly Significant

There was highly significant difference between the SPADI Scores in the subjects in the Maitland group with a $p < 0.00$.

Table-II: Analysis of Pre and Post Spadi in Group II (Mean Changes in SPADI Score)

Group II	Pre Treatment	Post Treatment	p value	Inference
	Mean	Mean		
S SPADI	68.39	45.34	0.00	Highly Significant

There was highly significant difference between the SPADI Scores in the subjects in the Mulligan mobilization group i.e. $P < 0.000$. For within group comparison we used Paired t-test analysis.

Table-III: Analysis Of Pre And Post Spadi In Between Group I And Group II (Mean changes in SPADI Score)

Outcome	Post Treatment Mean (Group I)	Post Treatment Mean (Group II)	p value	Inference
S SPADI	48.05	45.34	0.01	Highly Significant

There was significant difference between the SPADI Scores in the Maitland group and Mulligan group i.e $P < 0.01$. For between group comparison done by Independent t-test analysis.

Outcome Room	Pre Treatment	Post Treatment	p value	Inference
	Mean	Mean		
A ABD	67.83	85.33	0.00	Highly Significant

Table No IV: Mean changes in Shoulder abduction Range of motion – Universal goniometer index (Within Group I):

There was highly significant difference between the ROM Scores in the subjects in the Maitland mobilization group i.e. $P < 0.000$

Table No V: Mean changes in Shoulder external rotation Range of motion –Universal goniometer index (Within Group I):

Outcome Rom	Pre Treatment	Post Treatment	p value	Inference
	Mean	Mean		
E EXT ROT	30.00	41.5	0.00	Highly Significant

There was highly significant difference between the ROM Scores in the subjects in the Maitland mobilization group i.e $P < 0.000$.

Table no VI: Mean changes in Shoulder abduction Range of motion –Universal goniometer index (Within Group II)

Outcome Rom	Pre Treatment	Post Treatment	p value	Inference
	Mean	Mean		
A ABD	67.50	91.00	0.00	Highly Significant

There was highly significant difference between the ROM Scores in the subjects in the Mulligan mobilization group i.e $P < 0.000$.

TABLE no, VII: Mean changes in External Rotation ROM (Group, II)

Outcome Rom	Pre Treatment	Post Treatment	p value	Inference
	Mean	Mean		
E EXT ROT	29.33	46.00	0.00	Highly Significant

There was highly significant difference between the ROM Scores in the subjects in the Mulligan mobilization group i.e. $P < 0.000$.

Table no VIII: Mean changes in Shoulder abduction Range of motion –Universal goniometer index (Between Group I and II):

Outcome Rom	Post Treatment	Post Treatment	p value	Inference
	Mean (Group I)	Mean (Group II)		
A ABD	85.33	91.00	0.01	Significant

There was significant difference between the abduction range of motion Scores in the Maitland group and Mulligan group i.e. $P < 0.01$. For Between group Comparisons we used Independent t-test analysis.

Table IX: Mean changes in Shoulder external rotation Range of motion –Universal goniometer index (Between Group I and II):

Outcome Rom	Post Treatment	Post Treatment	p value	Inference
	Mean (Group I)	Mean (Group II)		
A EXT ROT	41.5	46	0.007	Significant

There was significant difference between the external rotation range of motion Scores in the Maitland group and Mulligan group i.e. $P < 0.007$

For between group comparison we used Independent t-test analysis

DISCUSSION

Aim of this study is to evaluate the effectiveness of Maitland mobilization with exercises Group (A) and Mulligan mobilization with exercises Group(B) on range of motion and shoulder function in subjects with adhesive capsulitis of shoulder.

In this study subjects were assessed for shoulder pain and functional disability using shoulder pain and disability index scale (SPADI) and abduction and external rotation range of motion of shoulder.

While analyzing the outcome measures of this study, it was observed that when inter group comparison was done Group B showed significant improvement than Group A in all parameters though both the groups have shown significant improvement over 4 weeks of therapeutic intervention.

In Maitland mobilization group the analysis of pain functional disability and shoulder range of motion within the group have shown that there was a statistically highly significant change in means of total SPADI score (p values < 0.00). Rationale behind the improvement in SPADI score in Group A in terms of functional capacity might be due to ease in pain and increased range of motion.

A Maitland mobilization oscillatory glide reduces pain by stimulating natural pain relieving substances like endorphins. Oscillatory movements stimulate mechanoreceptors associated with the myelinated alpha beta and alpha delta fibres. The impulses stimulated by mobilization there by block the pain impulse and break the pain cycle by activating the pain gate, which consequently lessened suffering in daily activities, pain with specific tasks, and difficulty in moving arm and lifting actions. When patient's pain decreased, it revealed a reduction in SPADI scores.

The results has similar findings of previous study done by Abhay Kumar et al who concluded that Maitland mobilization is effective in improving range of motion and functional ability in subjects with adhesive capsulitis of shoulder showing significant reduction in post treatment SPADI scores. [25]

There was a significant improvement in range of abduction and external rotation in Group A with p value < 0.00 when analyzed from pre to post intervention within the group The improvement in abduction and external rotation range of motion in Group A is because in Maitland mobilization the passive joint glides applied to the joint,

that accompany the glenohumeral motions helps in restoring translational movement to restore full physiological motion in the shoulder joint, it also allows stretching of the shortened and contracted soft tissues ,increases the capsular extensibility .

This results is similar with the findings of previous study done by Vermeulen et al who compare the effectiveness of high-grade mobilization techniques (HGMT) with that of low-grade mobilization techniques (LGMT) in subjects with adhesive capsulitis of the shoulder and HGMTs appear to be more effective in improving glenohumeral joint mobility and reducing disability than LGMTs. [28,29]

In Mulligan mobilization group the analysis of pain, functional disability and shoulder range of motion within the group have shown that there was a statistically highly significant change in means of total SPADI score (p values <0.00) in pre and post intervention values within the group.

The reason behind reduction in SPADI score in, Mulligan mobilization Group (B) is that this technique helps in reducing pain due to neurophysiologic effects on the stimulation of peripheral mechanoreceptors and the inhibition of nociceptors the activation of apical spinal neurons as a result of peripheral mechanoreceptor by the joint mobilization produces presynaptic inhibition of nociceptive afferent activity. The result has similar findings with the study of Doner G et al, who concluded in his study that there was a significant reduction in SPADI scores in subjects with adhesive capsulitis after 3 weeks of Mulligan mobilization treatment. [28]

There was a significant improvement in range of abduction and external rotation in Mulligan mobilization Group with p value <0.00 when analyzed from pre to post intervention within the group The improvement in abduction and external rotation range of motion in Group B . Due to the cause of positional faults in frozen shoulder it has been suggested that

changes takes place in the shape of articular surfaces, thickness of cartilage, orientation of fibres of ligaments and capsules, or the direction and pull of muscles and tendons. MWMs correct this by repositioning the joint, causing it to track normally. MWM improve the normal extensibility of the shoulder capsule and stretch the tightened soft tissues realigning collagen, or increasing fiber glide when specific movements stress the specific parts of the capsule to induce beneficial effects. Normalization of scapulohumeral rhythm, however, was achieved with MWM techniques in subjects.

Furthermore, improved mobility & functional ability also were observed after MWM treatment in various studies, the results are similar to the findings of the study done by Jing-Ian Yan et al, who found out that Mulligan mobilization with movement and end range mobilization were more effective than mid range mobilization in increasing range of motion and functional ability in adhesive capsulitis. [30]

In the study both Maitland Group and MWM Group have shown statistically and clinically significant improvement in SPADI score and shoulder abduction and external rotation range of motion following 4 weeks of intervention. However subjects in Mulligan Group showed greater reduction in pain and improved functional ability level by a decrease in SPADI SCORE of -29.57% then Maitland Group which shows only -26.24% reduction in SPADI scores. The participant's shoulder abduction PROM was increased by 37.54% in MWM Group and 24.00% in Maitland Group and external rotation range of motion was increased by 23.5% in Mulligan group and 17.5% in Maitland group.

Eventually the difference in improvement seen in between both groups may be due to the fact that the Maitland mobilization technique is a passive form of treatment and it is not under patients control, where as Mulligan mobilization is

an active form of mobilization which is under the patients control moreover mulligan helps in improvement of scapulohumeral rhythm and correction of abnormal tracking through the available and the improved range of motions.

Hence based on the analysis and findings, the present study found that 4 weeks of Mulligan mobilization found better improvement in pain and shoulder mobility for subjects with adhesive capsulitis of shoulder .Therefore the study accepts alternative hypothesis.

CONCLUSION

The results had shown that both Maitland mobilization and Mulligan mobilization group who received 4 weeks of therapy has improved significantly on pre and post values within the group. But when comparing between these two groups Mulligan mobilization group have shown greater statistical significance than mulligan mobilization. So this study concluded that there is significant difference between Mulligan mobilization with exercises and Maitland mobilization with exercises on decreasing pain and improving eg functional of shoulder in subjects with adhesive capsulitis. Thus this technique plus conventional exercise can be use clinically for better results.

Limitations

- The follow up to see the long term effects of these techniques is not done.
- Only I and II stage of adhesive capsulitis were included in the study.
- Follow up not taken in this study

Future Research

- Application of this technique in other stages of Adhesive capsulitis is recommended.
- Other conventional physiotherapy like electrotherapy along with manual therapy can be applied to find out the long term benefits.

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ANNEXURE I

Conventional Exercise Protocol: Shoulder Mobilization Exercises:

1. Pulley Exercises: Over an iron beam pass a skipping rope. Holding the two ends of the rope on either side, swing the rope alternatively up and down; this helps improve the flexion and extension movements of the shoulder. Do this for 5 to 10 minutes every day.



2. Back Climbing Exercises: In the standing position, bringing both the hands over the back. It is difficult to place the affected hand over the back in case of frozen shoulder. Now slowly climb your hands upwards alternatively with the normal and affected hand. Do this 5- to 10 times.

3. Finger ladder Exercises: Stand facing a ladder hanging on the wall Place the affected hands over the ladder at a low level. Now slowly start an

upward climb over the ladder until it reached the top and then slowly lower it down back to the starting position.



4. Circumduction Exercises: Stand at the edge of a table or cot. Slightly bend forwards and support the table with the normal hand. Now slowly rotate

the stiff shoulder in all the directions in a circular manner. Repeat this for 5 to 10 times.

5. Pendulum Exercises: In the same position mentioned above, swing the suspended stiff Upper limbs like a pendulum to and fro. ^[13,18]



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