

# Effectiveness of Maitland Mobilization Technique in Comparison with Mulligan Mobilization Technique in the Management of Frozen Shoulder

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## ABSTRACT

**Background:** Frozen shoulder refers to a common shoulder condition characterized by a general limitation of shoulder range of motion in the capsular model. The capsular pattern of the shoulder is characterized by the greatest limitation of passive lateral rotation and abduction. Physiotherapy is the most important part of the conservative treatment of frozen shoulder.

**Aim:** To find the role of Maitland mobilization technique in treatment of frozen shoulder with Mulligan's mobilization techniques and its possible effects in early gaining of ROM and pain management.

**Methods:** This was a comparative study conducted at the Department of Physical Therapy and Orthopedic Surgery I, King Edward Medical College/Mayo Hospital, Lahore. Subjects were conveniently divided into her two groups, each group containing her 40 patients. In group A, patients were treated with Maitland manipulative therapy. In group B, patients were treated with mulligan mobilization and movement techniques. Patients in both groups were followed for up to 6 weeks and improvements in motor parameters were recorded at each patient's follow-up visit. SPSS was used for data entry and analysis.

**Result:** A total of 50 patients participated in this study. The mean age of patients in group A was 46.23 years and the mean age of group B was 45.23 years at the onset of the disease at 6 weeks, 11 patients at 10 weeks, and 2 patients at 12-year intervals. Patients had an onset duration of 6 weeks, 10 patients had an onset duration of 10 weeks, and 6 patients had an onset duration of 12 weeks. Abduction was observed to be significantly improved in patients treated with the Mulligan method compared with those treated with the Maitland mobilization method.

**Practical implication:** More specifically, the study will be focused on the examining the shoulder active and passive ROMs and pain reduction before and after the treatment. All measured characteristics of FS patients will be compared with those of the subjects with asymptomatic shoulders.

**Conclusion:** In comparison with Mulligan mobilization technique, Maitland mobilization technique is more effective in the management of frozen shoulder.

**Keywords:** Adhesive capsulitis /Frozen shoulder, Mulligan mobilization technique, Maitland mobilization technique.

## INTRODUCTION

Adhesive Capsulitis (AC) is defined by glenohumeral joint capsular tightening that limits both passive and active ranges of motion. The exact etiology of adhesive capsulitis /frozen shoulder is not fully defined but current literature has identified a number of risk factors responsible for this condition. Trauma, diabetes, prolonged immobilisation, thyroid disease, stroke, myocardial infarction, autoimmune diseases, and following a minor injury such as a glenohumeral strain/sprain are all risk factors<sup>1</sup>.

According to Travell and Simons, primary symptoms are shoulder pain and limited range of motion. Trigger points, tendinitis and subsequent fibrosis in all rotator cuff muscles refer pain into the shoulder area and limit movement<sup>2</sup>. Frozen Shoulder (FS) or adhesive capsulitis or shoulder peri-arthritis affects 2-5% of the population and is most common in the age range of 40-60 years<sup>3</sup>. Frozen shoulder is characterized by gradual and progressive loss of active and passive range of motion of the glenohumeral joint due to joint capsular contracture<sup>4</sup>. Frozen shoulders lead to a gradual loss of shoulder range of motion (ROM) and surrounding muscle strength. Patients use nearby muscles to enhance scapular rotation in an effort to make up for the lost range of motion (ROM), but this causes the surrounding muscles to become overworked and painful<sup>5</sup>. Despite intensive measurements, the etiology and pathogenesis of frozen shoulder remain enigmatic<sup>5</sup>. Frequent or sustained shoulder elevation at or above 60° in any plane during occupational tasks has been identified as a risk factor for the development of shoulder traumatic injuries, non-specific shoulder pain and FS<sup>6</sup>.

Pain in the shoulder region often prevents patients with frozen shoulder from performing activities of daily living (ADLs), which is one of the main reasons for decreased shoulder strength

and endurance<sup>7</sup>. Many FS patients cannot sleep properly and lie on the affected side because of pain<sup>8</sup>. The limited shoulder range of motion and strength of the shoulder muscles are the key factors for physical disability<sup>9</sup>. Various methods of treatment are available for adhesive capsulitis which includes: Heating<sup>10</sup> stretching exercises by physiotherapist or auto stretching by patients<sup>10</sup> and scapular setting exercises along with the pendulum exercises<sup>10</sup> which helps in maintaining and improving strength of shoulder girdle muscles and improve Function. Joint mobilization is the treatment of choice to restore and improve synovial shoulder joint mobility<sup>11</sup>. Various schools of manual therapy have been advocated for the treatment of frozen shoulder<sup>12</sup>.

Various grades of mobilizations such as mid-range and end range mobilizations are suggested by Maitland and Kaltenborn to improve joint mobility and reduce pain<sup>13</sup>.

Similarly Mulligan's mobilization with movement (MWM) has shown convincing results in improving pain and mobility of different joints in which it was administered<sup>14</sup>.

Physical therapy is the most important part of conservative treatment of frozen shoulder. Both Maitland and Mulligan techniques have been found effective. It is a comparative study to find the effectiveness of both these techniques in frozen shoulder rehabilitation. There are few data identifying specific interventions for frozen shoulder rehabilitation. More specifically, this study focuses on therapeutic interventions to maintain active and passive shoulder range of motion and reduce pain.

## MATERIALS AND METHODS

**Study design:** Interventional study

**Settings:** Data will be collected from Mayo Hospital OPD Physiotherapy Department

**Study duration:** Study will be completed in 6 months after the approval of synopses.

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**Sample size:** Total 40 patients will be taken for this study, and will be divided in to two groups equally.

Male and female both were included.

**Group A:** Treated with Maitland graded oscillation techniques

**Group B:** Treated with Mulligan’s mobilization with movemen. (MWM)

Each treatment session lasts for 30 minutes with 6 months follow up. After 6 weeks pre and post results were compared.

## RESULTS

Data was entered and analyzed through SPSS (statistical package for social sciences) version 21. All qualitative variables were presented in the form of frequency tables and percentages; bar charts. Paired t-test was used to evaluate the results before and after treatment. Prior and post intervention active ranges were also analyze to see the improvement in both treatment groups. P-value <0.05 was taken as significant.

Table 1: Duration of onset of pain :

Interventions applied		Frequency	Percent	Valid Percent	Cumulative Percent
Maitland mobilization technique	Valid	6 weeks	7	35.0	35.0
		10 weeks	11	55.0	90.0
		12 weeks	2	10.0	100.0
		Total	20	100.0	100.0
mulligan MWM technique	Valid	6 weeks	4	20.0	20.0
		10 weeks	10	50.0	70.0
		12 weeks	6	30.0	100.0
		Total	20	100.0	100.0

In Maitland group 7 patients were presented with duration of onset of 6 weeks, 11 patients with 10 weeks duration and 2 with 12 weeks duration. In mulligan group, 4 patients were with 6 weeks durations, 10 with 10 weeks and 6 weeks 12 weeks duration.

Table 2: Analysis showing mode of pain in patients of both treatment groups.

Interventions applied		Frequency	Percent	Valid Percent	Cumulative Percent
Maitland mobilization technique	Valid	night pain	9	45.0	45.0
		rest pain	5	25.0	70.0
		motion pain	6	30.0	100.0
		Total	20	100.0	100.0
Mulligan MWM technique	Valid	night pain	3	15.0	15.0
		rest pain	3	15.0	30.0
		motion pain	14	70.0	100.0
		Total	20	100.0	100.0

In Maitland group, 9 patients with night pain, 5 with rest pain and 6 patients with motion pain were observed

In mulligan group, 3 patients with night pain, 3 patients with rest pain and 14 patients with motion pain were observed.

Table 3: Analysis showing severity of a pain among patients of both groups

Interventions applied		Frequency	Percent	Valid Percent	Cumulative Percent
Maitland mobilization technique	Valid	Mild pain	9	45.0	45.0
		Moderate pain	8	40.0	85.0
		Severe pain	3	15.0	100.0
		Total	20	100.0	100.0
Mulligan MWM technique	Valid	Mild pain	3	15.0	15.0
		Moderate pain	16	80.0	95.0
		Severe pain	1	5.0	100.0
		Total	20	100.0	100.0

Maitland groups include 9 patients with mild pain, 8 patients with moderate pain and 3 patients with severe pain.

Mulligan group include 3 patients with mild pain, 16 patients with moderate pain and 1 patient with severe pain.

Table 4: Cross tabulation between pre intervention active abduction and interventions applied

Interventions applied	Pre intervention active abduction								Total
	20	40	50	55	60	65	70	75	
Maitland mobilization technique	0	1	3	1	6	5	3	1	20
mulligan MWM technique	1	1	0	1	4	7	6	0	20
Total	1	2	3	2	10	12	9	1	40

In Maitland group, minimum active abduction was 40 and maximum active abduction was 75

In mulligan group, minimum active abduction was 20 and maximum was 75

Table 5: Cross tabulation between post intervention active abduction and interventions applied

Interventions applied	Post intervention active abduction													Total
	95	100	105	110	115	120	125	130	135	140	145	150	160	
Maitland mobilization technique	1	4	4	5	2	2	1	0	0	1	0	0	0	20
mulligan MWM technique	0	0	0	0	0	4	1	6	1	3	2	2	1	20
Total	1	4	4	5	2	6	2	6	1	4	2	2	1	40

In Maitland group, out of 20 patients, minimum post intervention active abduction was 95 and maximum was 140

In mulligan group, minimum post intervention active abduction was 120 and maximum was 160

Table 6: Cross tabulation between pre intervention active flexion and interventions applied

Interventions applied	Pre intervention active flexion								Total
	50	51	55	60	65	70	75	80	
Maitland mobilization technique	2	1	1	4	4	5	2	1	20
mulligan MWM technique	0	0	0	3	4	8	5	0	20
Total	2	1	1	7	8	13	7	1	40

In Maitland group, minimum pre intervention active flexion was 50 and maximum was 80.

In mulligan group minimum pre intervention active flexion was 60 and maximum was 75

Table 7: Cross tabulation between post intervention active flexion and interventions applied

Interventions applied	Post intervention active flexion											Total
	85	100	105	110	115	120	125	130	135	140	145	
Maitland mobilization technique	1	3	5	5	3	3	0	0	0	0	0	20
Mulligan MWM technique	0	0	1	1	0	2	4	7	2	2	1	20
Total	1	3	6	6	3	5	4	7	2	2	1	40

In Maitland group minimum post intervention active flexion was 85 and maximum was 120

In mulligan group minimum post intervention active flexion was 105 and maximum was 145

Table 8: Cross tabulation between pre intervention active extension and interventions applied

Interventions applied	Pre intervention active extension						Total
	15	17	20	25	30	40	
Maitland mobilization technique	5	1	5	7	2	0	20
Mulligan MWM technique	2	0	9	8	0	1	20
Total	7	1	14	15	2	1	40

In Maitland group minimum pre intervention active extension was 15 and maximum was 30

In mulligan group minimum pre intervention active extension was 15 and maximum was 40

Table 9: Cross tabulation between post intervention active extension and interventions applied

Interventions applied	Post intervention active extension				Total
	45	50	55	60	
Maitland mobilization technique	3	9	6	2	20
Mulligan MWM technique	2	12	6	0	20
Total	5	21	12	2	40

In Maitland group, minimum post intervention active extension was 45 and maximum was 60

In mulligan group. Minimum post intervention active extension was 45 and maximum was 55

Table 10: Cross tabulation between pre intervention active medial rotation and interventions applied

Interventions applied	Post intervention active medial rotation				Total
	30	35	40	45	
Maitland mobilization technique	2	9	6	3	20
Mulligan MWM technique	2	12	6	0	20
Total	4	21	12	3	40

In Maitland group minimum pre intervention active medial rotation was 30 and maximum was 45

In mulligan group minimum pre intervention active medial rotation was 30 and maximum was 40

Table 12: Cross tabulation between post intervention active lateral rotation and interventions applied

Interventions applied	Pre intervention active lateral rotation					Total
	30	35	40	45	50	
Maitland mobilization technique	2	2	3	8	5	20
Mulligan MWM technique	1	4	5	10	0	20
Total	3	6	8	18	5	40

In Maitland group minimum pre intervention active lateral rotation was 30 and maximum was 50

In mulligan group minimum pre intervention active lateral rotation was 30 and maximum was 45

Table 13: Cross tabulation between post intervention active lateral rotation and interventions applied

Interventions applied	Post intervention active lateral rotation				Total
	65	70	75	80	
Maitland mobilization technique	2	4	9	5	20
Mulligan MWM technique	1	4	12	3	20
Total	3	8	21	8	40

In maitland group minimum post intervention active lateral rotation was 65 and maximum was 80

In mulligan group minimum post intervention active lateral rotation was 65 and maximum was 80

## DISCUSSION

Among Physical Therapy treatment, thermotherapy (superficial and deep), analgesic modalities and exercise are the conventionally used physical therapy regimens in adhesive capsulitis<sup>15</sup>. Adhesive capsulitis has been researched repeatedly over the years and Patients with adhesive capsulitis have been treated with many different interventions. Capsulitis, also known as frozen shoulder, is a common shoulder condition characterized by a capsular pattern of global restriction in shoulder range of motion. The capsular pattern is distinguished by the restriction of passive lateral rotation and abduction<sup>16</sup>. The purpose of this study was to know the effectiveness of Maitland's gradual oscillation techniques and Mulligan's technique. Sympathetic involvement could be responsible in part for the production and maintenance of pain associated with AC which does not respond readily to standard treatment (Sympathetically Maintained Pain)<sup>12</sup>.

In the thorax, the sympathetic trunks lie on or just lateral to the cost vertebral joints. These sympathetic chains appear to undergo mechanical deformation during trunk and body movement. Because of their location, the sympathetic trunk is vulnerable to mechanical interference from pathological changes in interfacing tissue<sup>12</sup>.

An assessment of thoracic and cervical posture could help find a possible dysfunction in this area which might be contributing to adhesive capsulitis which is not responding to "traditional treatment". Studies have shown that chiropractic adjustments to the cervical and thoracic spine have had positive outcomes measured, with increase ranges of motion and reduced pain in cases of AC and complex Regional Pain Syndrome of the arm. (A sympathetic maintained condition)<sup>13</sup>. Other modalities which have been shown to effectively treat dysfunction in these areas are Muscle Energy Techniques and Positional Release Technique<sup>5,6</sup>. Literature regularly refers to the importance of trying conservative therapy first, and frequently identifies physical therapy or

therapeutic exercise as an essential part of the conservative therapy<sup>13</sup>. It would be prudent to choose a modality which has shown to be fast and effective as well as safe and free of side effects if possible.

The presence of capsular pattern is necessary for the diagnosis of frozen shoulder. The natural course of the condition is longer than generally stated and not always completed, that is, not all get full recovery. The present study was designed to know the effectiveness of Maitland graded oscillation techniques and mulligan's MWM technique.

While analyzing the outcome measures of the study, it was observed that both the groups have shown significant improvement over time. Statistical analysis of the data in pre and post intervention score regarding range of motion, disability and pain parameters show decreasing trends in both groups. Though both groups have significantly improved the parameters, the difference was found in favor of mulligan group (group –B) in between group comparison

Mobilization reduces 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 mechanoreceptors by the joint mobilization produces presynaptic inhibition of nociceptive afferent activity<sup>17</sup>.

Mechanical force during mobilization may include breaking up of adhesions, realigning collagen, or increasing fiber glide when specific movements stress the specific parts of the capsule. Furthermore mobilization techniques are supposed to increase or maintain joint mobility by inducing biological changes in synovial fluid, enhanced exchange<sup>17</sup>.

Statistical analysis of range of motion, disability and pain parameters before and after the intervention shows a downward trend in both groups. Although both groups significantly improved the parameters, a difference in favor of the mulligan group (group - B) was observed in the intergroup comparison.

## CONCLUSION

The Mulligan technique is more effective in treating frozen shoulder than the Maitland technique. Patients treated with Mulligan's technique improved significantly more in abduction and flexion, but improvement in extension, lateral rotation, and medial rotation was statistically equal in both treatment groups.

**Recommendations:** Mobilization techniques greatly affect the ROM and modulate pain. These methods are non-invasive, effective and require fewer hospital/ clinic visits for a sufficient early response.

**Ethical permission:** This study was approved by Ethical Review Committee of the institution.

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