

Use of High Grade Mobilization Technique versus Cyriax Manipulation in Improving Abduction & External Rotation in Frozen Shoulder

Shashank Kumar¹, Niraj Kumar², Jyoti Sharma³

Abstract

Introduction: Shoulder pain is a common problem it is the third most common musculoskeletal complaint in the general population, and accounts for 5% of all general practitioner musculoskeletal consultation [1]. Frozen shoulder is a common cause of shoulder pain affecting 2-5% of the general population [2]. The term "frozen shoulder" was first coined by Codman and was subsequently defined as an idiopathic condition of the shoulder characterized by the spontaneous onset of pain in the shoulder with restriction of mobility at the glenohumeral joint in every direction [3,4]. Mobilization techniques can be performed as physiologic movements or accessory movements. In Maitland classification system, a concept of management in which accessory and physiologic passive movements of the joint are applied at various grades of intensity depending on a subject's pain and joint stiffness [7]. Massage has been used for alternatives therapy on musculoskeletal system a modern systematic and clinical technique called friction massage was employed by Cyriax [10]. *Need of Study:* To best of our knowledge no studies have been done on comparison of high grade mobilization and cyriax manipulation in subjects with frozen shoulder. *Methodology:* Each subject was assigned into two groups by random sampling one Group A treated with High grade mobilization technique grade III & IV) with ultrasound and Group B receives Cyriax manipulation with ultrasound. *Conclusion:* The study could be concluded as "There is no significant difference produced between the High grade mobilization technique and cyriax manipulation in reducing pain & increasing shoulder abduction and external rotation in frozen shoulder". *Limitation:* 1. The follow-up to see the long term effects of training is not done. 2. There is need to make an specific inclusion criteria to be developed that can identify which patients will most benefit from the HGMT. 3. This study has not taken into consideration of other than grade III & IV of Maitland mobilization grades. HGMT is not suitable for all kinds of patients. 4. Our sample size was small, and data were collected at only one hospital. 5. No control group. *Future Research:* 1. Future Studies should investigate whether HGMTs is effective in earlier stages of frozen shoulder in decreasing pain and improving ROM. 2. The duration of benefits from the cyriax manipulation may also be an important area for future study. 3. Sample size can be increased with inclusion of more number of subjects to generalize the effect in larger population. 4. Future study should consists of Randomized control TRAIL needed to know the long term effects of Cyriax over Maitland grade III and IV mobilization in frozen shoulder.

Keywords: High Grade Mobilization Technique; Cyriax Manipulation; Therapeutic Ultrasound Machine; Universal Goniometry; Visual Analogue Scale & Ultra-Sonic Gel.

Introduction

Shoulder pain is a common problem it is the third most common musculoskeletal complaint in the general population, and accounts for 5% of all general practitioner musculoskeletal consultation [1].

Frozen shoulder is a common cause of shoulder pain affecting 2-5% of the general population [2]. The term "frozen shoulder" was first coined by Codman and was subsequently defined as an idiopathic condition of the shoulder characterized by the spontaneous onset of pain in the shoulder with restriction of mobility at the glenohumeral joint in every direction [3,4].

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The exact pathophysiology of idiopathic frozen shoulder is poorly understood [5].

Owens-Burkhart 1987 in her review of the subjects arrives at a definition that it is a glenohumeral stiffness resulting from capsular restrictions [6].

In Maitland classification system, a concept of management in which accessory and physiologic passive movements of the joint are applied at various grades of intensity depending on a subject's pain and joint stiffness.

The aim of this technique is to restore motion of spin, glide, and roll between joint surfaces and the intensity of the mobilization techniques with rhythmic oscillatory movements usually is categorized according to the 5-grade classification system of Maitland.

Grade I: Small amplitude at the beginning of the range of motion (ROM)

Grade II: Large amplitude not reaching the end of the ROM

Grade III: Large amplitude reaching the limited ROM

Grade IV: Small amplitude at the end of the limited ROM

Grade V: Small amplitude and high velocity at the end of the limited ROM (manipulation or thrust).

Grade 3 and 4 mobilization of Maitland is useful in stage 2 and 3 of frozen shoulder as this grade helps in reducing pain breaking down adhesions within the joints. Grade 3 mobilization also helps to lessen the treatment soreness [7].

Cyriax Manipulation

Massage is a human technique with kneading, squeezing and pressing muscles, has been developed with different techniques from different countries for a long time. Although massage has been used for alternatives therapy on musculoskeletal system a modern systematic and clinical technique called 'friction massage', was employed by Cyriax.

His original massage technique was only focused on transverse movement of connective tissue by deep friction but current friction massages are performed both longitudinally and transversely.

In these days the deep friction massage, employed by James Cyriax, has been considered as one of the therapeutic modality for musculoskeletal conditions

in sports medicine and physical therapy in united states [10].

Aims of the Study

To compare the use of high grade mobilization and cyriax manipulation in subjects with frozen shoulder.

Need of Study

To best of our knowledge no studies have been done on comparison of high grade mobilization and cyriax manipulation in subjects with frozen shoulder.

Hypothesis

Null Hypothesis (H0)

There will not be any significant difference between cyriax manipulation and high grade mobilization in improving shoulder abduction and external rotation in frozen shoulder.

Experimental Hypothesis (H1)

There will be significant difference between high grade mobilization than cyriax manipulation and in improving shoulder abduction and external rotation in frozen shoulder.

Operational Definition

Frozen Shoulder

It is a painful restriction of both active and passive shoulder movements due to causes within the shoulder joint. The term "frozen shoulder" was first coined by Codman and was subsequently defined as an idiopathic condition of the shoulder characterized by the spontaneous onset of pain in the shoulder with restriction of mobility at the glenohumeral joint in every direction [3-4].

High grade mobilization

Mobilization techniques can be performed as physiologic movements or accessory movements. Grade 3 and 4 mobilization of Maitland is a high grade mobilization useful in stage 2 and 3 of frozen shoulder as this grade helps in reducing pain breaking down adhesions within the joints. Grade 3 mobilization also helps to lessen the treatment soreness. In Grade IV: Small amplitude at the end of

the limited ROM and in Grade V: Small amplitude and high velocity at the end of the limited ROM (manipulation or thrust) [7].

Cyriax Manipulation

Cyriax manipulation is a technique of massage in which with kneading, squeezing and pressing muscles, has been developed with different technique for a long time. Although massage has been used for alternatives therapy on musculoskeletal system a modern systematic and clinical technique called 'friction massage', was employed by Cyriax. His original massage technique was only focused on transverse movement of connective tissue by deep friction but current friction massages are performed both longitudinally and transversely.

Goniometer

A goniometer is a device used in physical therapy to measure the range of motion around a joint in the body. The word goniometer is derived from the Greek terms gonia and metron, which mean angle and measure, respectively.

Review of Literature

Jing-lan Yang, Chein-wei Chang, et al. (2007) conducted a study to compare the use of 3 mobilization techniques end-range mobilization, mid-range mobilization, and mobilization with movement in the management of subjects with frozen shoulder syndrome. Result shows that in subjects with frozen shoulder syndrome, end-range mobilization and mobilization with movement were more effective than mid-range mobilization in increasing mobility and functional ability [12].

Henricus M Vermeulen et al. (2006), conducted a study to compare the effectiveness of high-grade mobilization techniques with that of low-grade mobilization techniques in subjects with adhesive capsulitis of the shoulder. Concluded that In subjects with adhesive capsulitis of the shoulder, HGMTs appear to be more effective in improving glenohumeral joint mobility and reducing disability than LGMTs, with the overall differences between the 2 interventions being small [14].

Joyce CR, Zutshi DW et al. (1975), conducted a study to compare visual analogue scale (VAS) and a 4-point scale (FPS) in patients suffering from prolonged constant pain due to chronic inflammatory or degenerative arthropathy. The VAS was accurate, as

reliable as and more sensitive than the FPS in registering the intensity of chronic pain. In this study, the VAS appeared to be more satisfactory than the FPS for patient self-rating of pain intensity [15].

Polly E. Bijur, Wendy Silver et al. (2001), Reliable and valid measures of pain are needed to advance research initiatives on appropriate and effective use of analgesia in the emergency department. Reliability of the VAS for acute pain measurement as assessed by the Intraclass correlation coefficients appears to be high. Ninety percent of the pain ratings were reproducible within 9 mm. These data suggest that the VAS is sufficiently reliable to be used to assess acute pain [16].

Anatomy

The bones that form the shoulder are the clavicle, humerus, and scapula, the latter providing the glenoid fossa, acromion and coracoid processes. These three bones create a ball-and-socket glenohumeral joint, that give the shoulder its wide range of motion in three different planes. In order for this joint to be operational, ligaments, muscles, and tendons must support the bone and maintain the relationship of one to another. Joints are formed by the ligamentous connection between two adjacent bones (Figure 1).

Biomechanics of Shoulder Joint

The movements of the glenohumeral joint include forward lifting of the arm (flexion), backward lifting of the arm (extension), inward

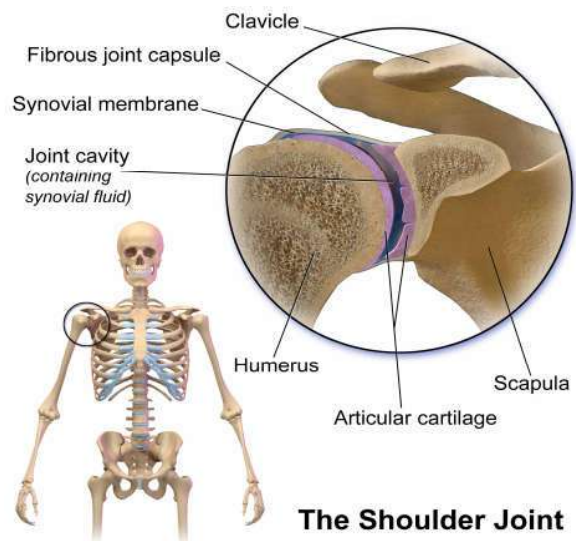


Fig. 1: Shoulder Joint

(internal) rotation, outward (external) rotation, movement of the arm away from the body (abduction) and movement of the arm towards the body (adduction).

Movement at the glenohumeral joint requires motion at the other joints of the shoulder complex. The coordinated movement of these joints during arm movement is referred to as the scapulo-humeral rhythm.

Pathomechanics

Frozen shoulder or adhesive capsulitis is a commonly occurring condition characterized by a capsular pathology associated with pain and progressive loss of passive and active movement. The hallmarks of frozen shoulder syndrome were first described by Duplay in 1872 [18]. He felt the pain and stiffness noted in these patients was not due to arthritis, but rather, was due to soft tissue pathology of the periarticular structures. In 1934, Codman [19] first proposed the term frozen shoulder. He described a slow onset of pain felt near the insertion of deltoid, inability to sleep on the affected side, painful and restricted elevation and external rotation, with a normal radiological appearance. Codman was, however, unable to explain the pathology. It can follow fractures or dislocations about the shoulder, shoulder, cervical or thoracic surgery or immobilization following any upper limb surgery.

Methodology

Sample

Thirty (30) subjects were included in this study. Each subject was assigned into two groups by random sampling one group treated with high grade mobilization technique and another group receives Cyriax for 4 weeks. All the subjects participated in the study after signing the informed consent. The study was conducted in the Department of Physiotherapy, Shri Mahant Indires Hospital. Subjects selected were randomly assigned into two group. Inclusion criteria, Patient between ages of 40-60yrs, Having a limited ROM, Patients suffering from frozen shoulder in stage 2 & 3 & Primary idiopathic frozen shoulder. Exclusion criteria subjects were excluded Rotator cuff tears, History of Rheumatoid arthritis, osteoarthritis and malignancies in the shoulder region, Adhesive capsulitis secondary to shoulder dislocation, fractures and reflex sympathetic dystrophy, and Frozen shoulder

secondary to neurological disorders. Paired t- test is a way to test for comparing two related samples, involving small values of n that does not require the variances of the two populations to be equal, but the assumption that the two populations are normal must continue to apply.

Instrumentation for data collection includes therapeutic Ultrasound machine, Universal goniometry, Visual analogue scale, Couch, Pillow, Cotton and Ultra-sonic Gel.

Procedure

The subjects were assigned into group A and group B by simple random sampling. Group A high grade mobilization technique; group B received cyriax manipulation. Ultrasound therapy and shoulder mobility exercises will be given as a conventional therapy for both the groups. A subjective assessment of pain was done using the 10cm Visual Analog scale (VAS). The shoulder abduction and external rotation ROM measurement was taken by Goniometer in supine-lying.

Group A

- Ultrasound therapy will be given as a conventional therapy.
 - Followed by high grade mobilization technique will be given with intensity according to Maitland's grade-III and grade-IV.
 - *Ultrasound Therapy:* 1.5W/CM² For 6 to 7 minutes.
 - *High Grade Mobilization Technique:*
1. Inferior glide- aimed at improvement of the extensibility of the axillary recess.
 - Patient positioned in supine lying. Both hands are held close to the humeral head to work with a short-lever arm. Oscillatory movements in the caudal, lateral, and anterior directions will be given.
 2. Posterior glide-patient positioned in supine lying. Hand will be placed on the anterior part of the shoulder, and the applied force will be in the posterior and lateral directions.
 - Distraction of the humeral head with respect to the glenoid will be performed by pulling the humeral head in the superior, lateral, and anterior directions with a firm grip of both hands close to the humeral head and pushing the scapula on the table.
 - In addition, shoulder joint mobility exercise will be given to obtain maximal relaxation of the shoulder muscles [Figure 2].

Group B

- Ultrasound therapy will be given as a conventional therapy.
- Followed by deep friction massage will be given based on cyriax principles along with shoulder joint mobility exercises.
- Acromioclavicular joint-Patient position in half lying or sitting posture.
- Therapist index finger will be placed on the joint and horizontal to and fro friction movement of the whole hand will be given in the sagittal plane.
- Deep friction massage to infraspinatus tendon, supraspinatus tendon will be given.
- Interventions are given for thrice a week for two weeks.
- At the completion of six physical therapy sessions outcome measures will be evaluated and pre and post scores are compared [Figure 3].



Fig. 3: Cyriax manipulation

Data Analysis

Statistical Analysis

The appropriate statistical analyses were conducted using the Statistical Package for Social

Sciences 11.0. All data were entered into SPSS files from a standardized data form at the time of data collection. Prior to analysis, all entries were verified by comparing the recorded data in each file to a printed copy of the data files entered into SPSS. All results were presented as mean standard deviation. All significant p values (~ 0.05) were indicated in bold type. Frequencies were used to test the data for normality around the mean (data not shown).

Results

Table 1 illustrate analysis of high grade mobilization in frozen shoulder to improve abduction and external rotation before and after intervention.

Firstly, the mean value of age was 47.9, VAS was 5.9 AROM 65.3degree, PROM 72.6 degree IN ABDUCTION And AROM Of external rotation was 40.5degree and PROM was 47.5 degree, while, after intervention VAS score was decreases and reached to 4.53 and AROM of abduction was increased by 25 and PROM by 27 and also the AROM of external rotation was rises and reached upto 49 while PROM Hiked by 5.67 .

Table 2 in cyriax manipulation the mean value of age was 53.40 and before intervention the VAS score was 6.00 and AROM of abduction was 82.40 degree and PROM 89.53 degree while, AROM In external rotation was 31.33 degree and PROM was 37.86



Fig. 2: High grade mobilization

Table 1: Statistics of group a- high grade mobilization

	Age	Statistics of group a- high grade mobilization									
		Vas	Before Intervention				Vas	After Intervention			
			Abduction		External Rotation			Abduction		External Rotation	
		A Rom	P Rom	A Rom	P Rom		A Rom	P Rom	A Rom	P Rom	
Mean	47.93	5.93	65.33	72.66	40.53	47.53	4.53	90.33	99.66	49.00	53.20
Std. Error Of Mean	1.67	.3002	4.377	4.75	2.853	2.87	.3361	4.89	5.17	2.72	4.26
Std. Deviation	6.47	1.162	16.95	18.40	11.05	11.141	1.302	18.94	20.04	10.55	16.51
Variance	41.92	1.35	287.38	338.81	122.12	124.12	1.69	358.81	401.66	111.42	272.88
Range	22.00	4.00	60.00	65.00	40.00	40.00	4.00	70.00	75.00	35.00	68.00
Sum	719.00	89.00	980.00	1090.00	608.00	713.00	68.00	1355.00	1495.00	735.00	798.00

Table 2: Statistics of Group B- Cyriax Manipulation

	Age	Statistics of Group B- Cyriax Manipulation									
		VAS	Before Intervention				VAS	After Intervention			
			Abduction		External Rotation			Abduction		External Rotation	
		A Rom	P Rom	A Rom	P Rom		A Rom	P Rom	A Rom	P Rom	
Mean	53.40	6.00	82.40	89.53	31.33	37.86	4.13	101.33	107.00	43.66	52.00
Std. Error of Mean	1.83	.308	4.29	4.50	3.69	3.87	.336	3.43	3.51	4.12	4.01
Std. Deviation	7.11	1.19	16.64	17.43	14.32	14.98	1.302	13.29	13.60	15.97	15.59
Variance	50.68	1.42	277.11	303.98	205.23	224.69	1.69	176.66	185.00	255.23	242.14
Range	24.00	4.00	55.00	60.00	40.00	50.00	4.00	40.00	40.00	50.00	50.00
Sum	801.00	90.00	1236.00	1343.00	470.00	568.00	62.00	1520.00	1605.00	655.00	780.00

degree but after intervention VAS score decreased by 2 point and AROM in abduction was increased by 19 degree and PROM by 18 degree in addition, AROM in external rotation was raised to 43.66 degree and PROM raised to 52 degree.

Discussion

In this study comparing the effectiveness of 2 treatment strategies including mobilization and manipulation techniques in subjects with frozen shoulder, it appeared that high grade mobilization technique is not effective than cyriax manipulation in decreasing VAS and increasing abduction and external rotation range of motion. However, the differences were small overall, and with both treatment strategies, subjects showed clinically significant improvement.

Randomized studies describing the effectiveness of mobilization techniques as a single intervention in subjects with adhesive capsulitis of the shoulder are scarce, and their results are conflicting. The comparison of present results with those of other randomized studies concerning the application of mobilization techniques in adhesive capsulitis is hampered by an insufficient description of the mobilization techniques in the majority of the available trials [17,18,19] and, except for ROM, the use of different outcome measures to evaluate treatment effects [8-11,17].

The results of this study add support to the effects of high grade mobilization technique in improving ROM in patients with frozen shoulder. Although more favorable effects of High grade mobilization technique than of Cyriax manipulation were seen in improving ROM in the present study, we cannot comment on the effectiveness of Cyriax manipulation in improving ROM.

But Cyriax manipulation showed ore reduction in VAS score than high grade mobilization technique: Fusun Guler-Uysal [13] reported the application of cyriax manipulation in frozen shoulder to reduce pain and increase ROM; on comparing their results with the present study, it is supported that VAS reduction occurs with cyriax manipulation.

Winters [20] showed that a combination of exercise, massage and physical applications was less successful in reducing shoulder pain than either steroid injection or mobilization of the joints of the shoulder complex, cervical and thoracic spine. However, specific details of what exercise and massage carried out in this study were not provided by Winters [20].

In this study, over all percentage change in VAS in cyriax manipulation is 32.6%, was superior to High grade mobilization technique, 26.9% in reduction of VAS pain score, Pain relief in cyriax group during and after treatment may be due to modulation of the nociceptive impulses at the level of the spinal cord, the "gate control theory".

Limitation

1. The follow-up to see the long term effects of training is not done
2. There is need to make an specific inclusion criteria to be developed that can identify which patients will most benefit from the HGMT.
3. This study has not taken into consideration of other than grade III & IV of Maitland mobilization grades. HGMT is not suitable for all kinds of patients.
4. Our sample size was small, and data were collected at only one hospital.
5. No control group.

Recommendations

1. Future Studies should investigate whether HGMTs is effective in earlier stages of frozen shoulder in decreasing pain and improving ROM.
2. The duration of benefits from the cyriax manipulation may also be an important area for future study.
3. The study can be done to compare the effects of grade I and II mobilization of Maitland's, and other manual therapy with cyriax manipulation in frozen shoulder patients
4. Sample size can be increased with inclusion of more number of subjects to generalize the effect in larger population.
5. Future study should consists of Randomized control TRAIL needed to know the long term effects of Cyriax over Maitland grade III and IV mobilization in frozen shoulder.

Conclusion

It can be assumed that both high grade mobilization technique and cyriax manipulation in decreasing pain and improving ROM. Supporting evidence from the literature though seem to be controversial in certain areas, the outcome of this study with no significant statistical changes will lead us to the conclusion of accepting the null hypothesis which could be stated as high grade mobilization technique (grade III & IV) is not effective in reducing pain & increasing shoulder abduction and external rotation than cyriax manipulation.

As there is no significant difference between high grade mobilization technique and cyriax

manipulation groups the null hypothesis is accepted and the alternative hypothesis can be rejected. The study could be concluded as "There is no significant difference produced between the grade mobilization technique and cyriax manipulation in reducing pain & increasing shoulder abduction and external rotation in frozen shoulder".

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