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To Compare the Effectiveness of Cyriax Deep Friction Massage and End Range Mobilization Technique in Adhesive Capsulitis

Dobhal Ashish[1], Khurana Barkha[2], Agarwal Vaibhav[3]

Abstract

Introduction: Adhesive capsulitis is one of the most common cause of shoulder pain and disability in general population. Reeves described three stages of the disease: Stage 1 is freezing phase which is mainly characterized by pain Stage 2 is frozen phase, in which pain gradually subsides, but the stiffness is marked Stage 3 is thawing phase, in which pain resolves and improvement in range of motion (ROM) appears.

Need of Study: There are various studies that shows effectiveness of Cyriax Deep Friction Massage and effectiveness of End Range Mobilization in adhesive capsulitis, but there is no literature available comparison of these two techniques.So the present study is intended to compare these two techniques

Methodology: It is comparative in nature. *Sampling:* Randomized sampling technique was adopted in the present study. *Sample Size:* Total of 60 subjects with adhesive capsulitis were included in the study and then they were grouped into two groups A and B with 30 in each group.

Result: The result of the study suggests that 't' value is highly significant in each pair of both Group A and Group B. Both the groups, Group A and Group B improved in VAS, Active ROM mainly abduction, external and internal rotation of the shoulder joint and SPADI, which reveals that the treatments given to the subjects of both groups are effective.

Discussion: On comparing the result of both the groups, it was found that changes in VAS, SPADI Pain, SPADI Disability and SPADI Total and active range of motion of abduction, external rotation and internal rotation were more significant in Group B than that of Group A. This shows that the treatment given to Group B is more effective than that of Group A. Thus null hypothesis is rejected and alternative hypothesis is accepted.

Conclusion: This study shows that end range mobilization with hot packs provide better results as compared to Cyriax deep friction massage with hot packs.

Keywords: Cyriax Deep Friction Massage; End Range Mobilization Technique; Adhesive Capsulitis.

Introduction

Adhesive capsulitis is one of the most common cause of shoulder pain and disability in general population.

Adhesive capsulitis is also called, frozen shoulder syndrome, periarticular adhesions, pericapsulitis, irritative capsulitis, periarthritis of the shoulder, periarthritis scapulo-humerale, humero scapular fibrositis, bursitis calcerea, Duplay's syndrome, shoulder portion of sholder -hand syndrome and painful and stiff shoulder.

It is a syndrome defined in its purest sense as idiopathic painful restriction of shoulder movements that results in global restriction of the glenohumeral joint. It has also been described as a condition of "unknown etiology" characterized by gradual, progressive painful restriction of all shoulder motion with spontaneous restoration of partial or complete motion over months to years.

Author Affiliation: [1]Lecturer [2]Sr. Lecturer, Department of Physiotherapy, Sai College of Paramedical Science, Dehradun, Uttarakhand 248001, India. [3]Assistant Professor, Department of Physiotherapy, Swami Rama Himalayan University, Jolly Grant, Dehradun, Uttarakhand 248016, India.

Reprint Request: Dr Ashish Dobhal, Lecturer, Department of Physiotherapy, Sai College of Paramedical Science, Dehradun, Uttarakhand 248001, India.
E-mail: ashishdobhal1970@gmail.com

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It is a common disorder with an estimated incidence of 3% to 5% of the general population. It is the main cause of shoulder pain and dysfunction in middle aged and elderly population [3]. Adhesive capsulitis was first described by Duplay in 1872 as "periarthritis scapulo-humerale". He termed the clinical entity of frozen shoulder as "periarthritis scapulo-humerale" theorizing the pathologic condition was in periarticular structures.

J.S. Neviaser in 1945 first introduced the term "Adhesive Capsulitis" due to capsular thickening and contracture. He described the condition as a contracted thickened joint capsule that seemed to be drawn tightly around the humeral head with a relative loss of synovial fluid and chronic inflammatory changes within the synovial layer of the capsule.

Reeves described three stages of the disease: Stage 1 is freezing phase which is mainly characterized by pain usually lasting 2-9 months. Stage 2 is frozen phase, in which pain gradually subsides, but the stiffness is marked lasting 4-12 months. Stage 3 is thawing phase, in which pain resolves and improvement in range of motion (ROM) appears.These movements are restricted in capsular pattern with proportionally greater loss of external rotation than abduction and internal rotation.

However, most of the notable loss of ROM is caused by disease in structures outside the synovial capsule of glenohumeral joint, such as the coracohumeral ligament, soft tissues in the rotator interval, the subscapularis muscle and the subacromial bursa.

Cyriax Deep Transverse Friction Massage is a type of connective tissue massage developed in an empirical way by Cyriax. It is applied by the finger (s) directly to the lesion and transverse to the direction of the fibers. Friction is slower in effect but leads to a physically more fundamental resolution, resulting in more permanent cure and less recurrence.

According to Cyriax, Friction also leads to increased destruction of pain provoking metabolites, such as Lewis's substances. This metabolite, if present in too high a concentration, provokes ischemia and pain. According to Cynthia Liesdek et al in 1997, showed good improvement in adhesive capsulitis and stated that it should be applied in every day practice by physiotherapists.

Passive Joint Mobilization is passive skilled manual therapy technique applied to joints and related soft tissues at varying speeds and amplitudes using physiologic or accessory motion for therapeutic purposes. The Deep Friction applies therapeutic movement over only a very small area. The movement is more effective for being so concentrated. Indeed, greater movement may easily be imparted locally by the physiotherapist's finger than could ever have been obtained by any amount of the most strenuous exercises and it moves those very tissues on which manipulation has no effect. On account of its purely local action, deep friction must be applied to the exact site of the lesion.

The principles of Cyriax Deep Friction Massage are as follows:

a. The right spot must be found.
b. The physiotherapist's finger and patient's skin must move as one.
c. The friction must be given across the fibers composing the affected structures.
d. The friction must be given with sufficient sweep.
e. The friction must reach deeply enough.
f. Suitable position for patient.
g. Muscles must be kept relaxed.
h. Tendons sheath must be taut.

Joint glide (mobilization) stretching procedures, as when the translatoric slide component of the bones is used to stretch a tight capsule, are safer.

Joint motion provides sensory input relative to:

- Static position and sense of speed of movement (type I found in superficial joint capsule)
- Change of speed of movement (type II receptors found in deep layers of the joint capsule and articular fat pads)
- Sense of direction of movement (type I and III receptors; type III found in joint ligaments)
- Regulation of muscle tone (type I, II, and III receptors)
- Nociceptive stimuli (type IV receptors found in the fibrous capsule, ligaments, articular fat pads, periosteum, and walls of blood vessels)

Need of Study

There are various studies that show effectiveness of Cyriax Deep Friction Massage and effectiveness of End Range Mobilization in adhesive capsulitis, but there is no literature available comparison of these two techniques. So, the present study is intended to compare the effectiveness of the Cyriax Deep Friction Massage versus End Range Mobilization Technique in Adhesive Capsulitis.

Objectives

1. To evaluate the effectiveness of Cyriax deep friction massage in relation to pain, range of motion and functional activity in adhesive capsulitis.
2. To evaluate the effectiveness of the end range mobilization techniques in relation to pain, range of motion and functional activity in adhesive capsulitis.
3. To compare the effectiveness of Cyriax deep friction massage and end range mobilization in relation to pain, range of motion and functional activity in adhesive capsulitis.

Hypothesis

Null hypothesis

There will be no significant difference between the effectiveness of Cyriax deep friction massage and end range mobilization techniques on pain, range of motion and functional activity in adhesive capsulitis.

Experimental Hypothesis

There will be significant difference between the effectiveness of Cyriax deep friction massage and end range mobilization technique on pain, range of motion and functional activity in adhesive capsulitis.

Methodology

Study Design

It is comparative in nature.

Study Setting

The study was conducted at Dolphin health centre Prayatna physiotherapy and rehabilitation centre, (Dehradun)

Sampling

Randomized sampling technique was adopted in the present study.

Sample Size

Total of 60 subjects with adhesive capsulitis were included in the study and then they were grouped into two groups A and B with 30 in each group.

Inclusion Criteria

1. Age 40 – 60 years, both genders
2. Idiopathic and unilateral adhesive capsulitis cases.
3. Normal radiographic findings.
4. Having painful stiff shoulder for at least 3 months of duration.
5. Having restriction of more than 50% in passive shoulder flexion, abduction and external rotation compared with the opposite side.
6. Subject not received any treatments or exercises for previous 1 month.

Exclusion Criteria

1. Diabetic patients.
2. Painful stiff shoulder after a major trauma.
3. Any neurological deficits affecting shoulder function in activities of daily living.
4. Adhesive capsulitis secondary to shoulder dislocation, fracture, previous surgery on affected shoulder, reflex sympathetic dystrophy, rotator cuff tears and any tumors.
5. Patients refused to stop using NSAID's and corticosteroids throughout treatment.
6. Un co - operative patients.

Instrumentation: Universal Goniometer, hot packs, couch, stool, pillow, towels.

Variables of the Study

Independent Variables

1. Cyriax Deep Friction Massage.
2. End Range Mobilization.

Dependent Variables

1. Pain
2. Range of motion
3. SPADI questionnaire.

Procedure

Group A received Cyriax deep friction massage with hot packs thrice a week for three weeks.

Group B received end range mobilization with hot packs thrice a week for three weeks.

Pre test and post test was done to assess pain, range of motion and functional ability.

Outcome Measures

1. Pain was measured by VAS score.
2. Range of motion was measured by universal goniometer.
3. Functional activity was measured by SPADI questionnaire.

Group A

Before starting the treatment examination of the patient was done, and data was recorded.

Hot Packs

The subject was placed in supine position and then moist heat therapy was given to the affected shoulder wrapped in a towel for 20 minutes.

Cyriax Deep Friction Massage

The friction massage was achieved by frictioning over the surface with the practioner's index finger. Cyriax deep friction massage was given to supraspinatus tendon, infraspinatus tendon, subscapularis tendon, pectoralis major muscle for 20 minutes. The subjects were treated three times a week on alternate days for 3 weeks.

Deep Friction Massage for Supraspinatus Tendon

Patient's posture: The patient bends her elbow to a right angle and puts her forearm behind her back, her elbow well into her side. She then leans back in the half lying position, thus fixing her arm in adduction and medial rotation. In this position of the arm the supraspinatus tendon is bent through a right – angle and lies in the sagittal plane, passing from the base of the coracoid process directly forwards over the head of the humerus to the greater tuberosity, emerging under the anterior edge of the acromian.

Technique: If the patient's right shoulder is to be treated, the physiotherapist must use his right hand; if left shoulder, than left hand. He sits facing shoulder and makes sure that the patient's arm has not moved from the adducted position. He places the tip of his index finger on the patient's tendon, flexing it at the distal joint but keeping it extended at the proximal interphalangeal joint. He reinforces with the middle finger. His thumb is used for counter pressure; in order that it shall be well placed for this purpose, it must be applied as far down the patient's arm as the physiotherapist's span will allow, i.e. as nearly opposite his index finger as possible.

While this posture is held, the anterior edge of the tendon is easily palpable. The physiotherapist finds the right spot, not on the bone of the greater tuberosity, but directly posterior to this point. His finger is made to traverse the tendon from side to side by his alternately flexing and extending wrist, using the thumb both as a fulcrum and to maintain pressure. The sweep is 2 cm from one edge of the tendon to the other.

Deep Friction Massage for Infraspinatus Tendon

Patient's Posture: The lies face downwards, propping herself up on her elbows. The weight of her thorax acting downwards ensures that her scapula lies at right – angles to the humerus; in this position the acromian is drawn away from the greater tuberosity, uncovering it. Slight lateral rotation is maintained by the patient's holding on to the edge of the couch. This combination of flexion and slight lateral rotation brings the tuberosity downwards. The arm is now pushed into slight adduction, which brings the humeral tuberosity out from under the acromian. Running along, just below the most lateral extent of the spine of the scapula, the infraspinatus tendon is easy to feel on its course towards the head of the humerus.

Technique: The physiotherapist sits facing the patient's head and places his fingers on the front of her shoulder. He feels for the tendon with his thumb which he flexes until good pressure is obtained. Alternate abduction and adduction of the thumb now draw it to and fro across the tendon. At the extreme of the adduction movement, he feels the tip of his thumb engage against the posterior acromial edge.

Deep Friction Massage for Subscapularis Tendon

Patient's Posture: The patient adopts the half – lying position on the couch. She holds her arm close to her side and bends her elbow, putting her hand on her thigh.

Technique: The physiotherapist sits at the patient's side facing her. He puts his thumb on the head of her humerus and identifies the bicipital groove, rotating her arm to and fro using the forearm as a lever, to identify the two edges. Immediately medial to the inner edge of the groove lies the subscapular tendon, but it cannot be palpated: it feels as hard as bone. He notes the spot. He then bends his thumb to a right – angle and hooks it round the medial edge of the upper part of the deltoid muscle, and draws the belly laterally, letting the short head of the biceps slip under his finger. He can now apply his thumb to the subscapular tendon without the intervening mass of deltoid belly. He now moves his thumb vertically up and down, applying counter – pressure with his fingers at the back of the shoulder. In this way the transverse friction can be given to the upper or lower part of the tendon.

Deep Friction Massage for Pectoralis Major Muscle

Patient's posture: The patient adopts the half – lying position on the couch. She abducts her arm

somewhat so as to bring the muscle into prominence; her hand may suitably rest on her hip.

Technique: The physiotherapist sits by the patient's side, facing her. He grasps the edge of the muscle, which would otherwise be apt to move as a whole with the physiotherapist's hand. By maintaining his grip and pulling his hand bodily towards himself, he imparts the required friction.

Fig. 1: Ventral Gliding

Fig. 2: Caudal Gliding

Group B

Hot Packs

The subject was placed in supine position and then moist heat therapy was given to the affected shoulder wrapped in a towel for 20 minutes.

End Range Mobilization

Shoulder of the affected extremity was abducted to the available end range and then distraction, anterior, posterior and caudal glides were given as described by Maitland. Three sets of Maitland Mobilization are given and each set consist of 10 – 15 repetitions with 1 minute interval with total duration of 20 minutes. Subjects were treated three times in a week on alternate days for 3 weeks.

GH Joint Distraction

Patient position: Supine with arm in resting position, i.e. 55 degrees of abduction, 30 degrees of horizontal adduction and rotated so that the forearm is in the horizontal plane. Physiotherapist supports the forearm between his trunk and elbow.

Hand placement: Physiotherapist use his hand nearer the part being treated and place it in the patient's axilla with his thumb just distal to the joint margin anteriorly and fingers posteriorly.

Mobilizing force: Physiotherapist move the humerus laterally with the hand in the patient's axilla.

GH Caudal Glide

Patient position: Supine with arm in resting position, i.e. 55 degrees of abduction, 30 degrees of horizontal adduction and rotated so that the forearm is in the horizontal plane. Physiotherapist supports the forearm between his trunk and elbow.

Hand placement: Physiotherapist place one hand in the patient's axilla to provide the grade I distraction. The web space of the physiotherapists other hand is placed just distal to the acromian process.

Mobilizing force: With the superiorly placed hand, physiotherapist glides the humerus in an inferior direction.

GH Joint Anterior Glide

Patient position: prone, with the arm in resting position over the edge of the treatment table, supported on physiotherapist's thigh. Physiotherapist stabilizes the acromian with padding.

Therapist position and hand placement: Physiotherapist stand facing the top of the table with the leg closer to the table in a forward stride position. Physiotherapist supports the patient's arm against his thigh with his outside hand; the arm positioned on physiotherapist's thigh provides a grade I distraction. Physiotherapist places the ulnar border

of his other hand just distal to the posterior angle of the acromian process, with his fingers pointing superiorly; this hand gives the mobilizing force.

Mobilizing force: Physiotherapist glide the humeral head in an anterior and slightly medial direction. Physiotherapist bends his both knees so that the entire arm moves anteriorly.

GH Joint Posterior Glide

Patient position: Supine with the arm in resting position. Therapist position and hand placement: Physiotherapist stands his back to the patient, between the patient's trunk and arm. Physiotherapist supports the arm against his trunk, grasping the distal humerus with his lateral hand. This position provides grade I distraction to the joint.

Physiotherapist places the lateral border of his top hand just distal to the anterior margin of the joint, with his fingers pointing superiorly. This hand gives the mobilizing force.

Mobilizing force: Physiotherapist glide the humeral head posteriorly by moving the entire arm as he bends his knees.

Data Analysis

Statistics were performed by using SPSS 13. Results were calculated by using 0.05 level of significance's, t –test was used

Results

Table 1: Total subjects divided in Group A and Group B

Total Subjects	→ 60
Group A	→ 30
Males	→ 11
Females	→ 19
Group B	→ 30
Males	→ 13
Females	→ 17

Table 2: Comparison of mean value for VAS at Pre and Post interval within Group A and B

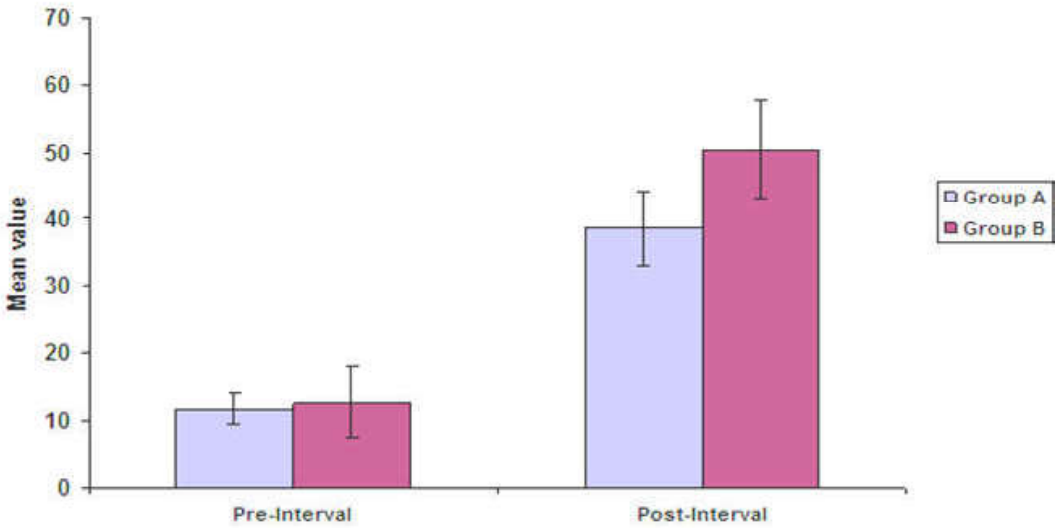
VAS	Group A		Group B	
	t value	P value	t value	P value
PRE Vs Post	27.48	P < 0.05	38.45	P < 0.05

The above table 2 describes paired t test of VAS within (both the Groups) Group A and Group B.

The t values for Group A and Group B are 27.48 ($p < 0.05$) and 38.45 ($p < 0.05$) respectively.

Table 3: Comparison of mean value for Abduction at Pre and Post interval within Group A and B

Abduction	Group A		Group B	
	t value	P value	t value	P value
PRE Vs POST	-54.52	P < 0.05	-31.95	P < 0.05



Graph 1:

The above graph 1 describes mean, the mean difference and standard deviation for group.

Table 4: Mean and SD of Internal Rotation at Pre, Post and Mean diff. (Pre-Post) interval for the subjects of Group A and Group B

Internal Rotation	Group A		Group B	
	Mean	SD	Mean	SD
Pre	25.86	7.47	24.23	5.98
Post	57.50	8.36	64.53	5.40
MD (Pre-Post)	31.63	2.77	40.30	4.33

Table 5: Comparison of mean value for Internal Rotation at Pre and Post interval within Group A and Group B

Internal Rotation	Group A		Group B	
	t value	P value	t value	P value
Pre Vs Post	-62.48	P < 0.05	-50.95	P < 0.05

Comparison between Groups

Table 6: Comparison of mean value for PADI (Total) at Pre, Post and Mean diff. (Pre-Post) interval between Group A and Group B

SPADI (Total)	Group A Vs Group B	
	t value	P value
PRE	0.546	P > 0.05
POST	4.689	P < 0.05
MD (PRE-POST)	-7.517	P < 0.05

Table 7: Comparison of mean value for VAS at Pre, Post and Mean diff. (Pre-Post) interval between Group A and Group B

VAS	Group A Vs Group B	
	t value	P value
Pre	-0.139	P > 0.05
Post	8.077	P < 0.05
MD (PRE-POST)	-11.728	P < 0.05

Table 8: Comparison of mean value for Abduction at Pre, Post and Mean diff. (Pre-Post) interval between Group A and Group B

Abduction	Group A Vs group B	
	t value	P value
Pre	1.120	P > 0.05
Post	-3.169	P < 0.05
MD (PRE-POST)	-8.248	P < 0.05

The above table 7 describes the unpaired t test of VAS between Group A and Group B. The t values are – 0.139 (p > 0.05) and 8.077 (p < 0.05) respectively. The mean difference of VAS between Group A and Group B is – 11.728 (p < 0.05) respectively.

Discussion

The mean and standard deviation of age for Group A was 50.26±7.02 and for Group B was 52.90± 7.15 respectively. In Group A there were 63% of females and 37% of males and in Group B there were 57% of females and 43% of males respectively.

The t value of VAS at pre test between Group A and Group B was – 0.139 (p > 0.05). This shows that there was no significant difference between the subjects of both the groups and the subjects in both groups were homogenous.

The t value of Abduction at pre test between Group A and Group B was 1.120 (p > 0.05). This shows that there was no significant difference between the subjects of both the groups and the subjects in both groups were homogenous.

The t value of External Rotation at pre test between Group A and Group B was – 0.972 (p > 0.05). This shows that there was no significant difference between the subjects of both the groups and the subjects of both groups were homogenous.

The t value of Internal rotation at pre test between Group A and Group B was 0.934 (p > 0.05). This reveals that there was no significant difference between the subjects of both the groups and the subjects of both the groups were homogenous.

The t value of SPADI Pain at pre test between Group A and Group B was – 0.276 (p > 0.05). This reveals that there was no significant difference between the subjects of both the groups and the subjects in both the groups were homogenous.

The t value of SPADI Disability at pre test between Group A and Group B was 1.212 (p > 0.05). This reveals that there was no significant difference between the subjects of both the groups and the subjects in both the groups were homogenous.

The t value of SPADI Total at pre test between Group A and Group B was 0.546 (p > 0.05). This shows that there was no significant difference between the subjects of both the groups and the subjects of both groups were homogenous.

The mean value of VAS for Group A was 2.86± 0.57. The mean values of SPADI Pain, SPADI Disability and SPADI Total for Group A were 19.13± 1.40, 30.13±3.27 and 37.89±2.66 respectively. The mean values of active range of motion of abduction,

external rotation and internal rotation for Group A were 32.80±3.29, 26.83±4.16 and 31.63±2.77 respectively. The t value of VAS for Group A was 27.48 (P < 0.05). The t values of active range of motion of abduction, external rotation and internal rotation were – 54.42 (p < 0.05), – 35.31 (p < 0.05) and – 62.48 (p < 0.05) respectively. The t values of SPADI pain, SPADI Disability and SPADI Total for Group A were 74.46 (p < 0, 05), 50.36 (p < 0.05) and 77.93 (p < 0.05) respectively.

Within Group A, VAS, Active ROM of abduction, external rotation and internal rotation of the shoulder joint and SPADI score in patients with adhesive capsulitis were found to be significant (p < 0.05). The possible explanation could be attributed to the study of Fusun Guler et al in 2004. Cyriax Deep Friction Massage works on the basis of modulation of nociceptive impulses at the spinal cord level. (A system of Orthopaedic Medicine, James Cyriax). Deep Transverse Friction (DTF) leads to destruction of pain provoking metabolites such as lewi's substances.

These Findings are Supported by:

Cynthia Liesdek et al in 1997 found that Cyriax Deep Friction Massage was effective reducing pain in Adhesive capsulitis and inter observer reliability according to Cyriax method might be good under controlled conditions. Deep Friction Massage, Exercise therapy and passive mobilizations were the most frequently applied treatment.

The mean value of VAS for Group B was 4.76± 0.67. The mean values of active range of motion of abduction, external rotation and internal rotation for Group B were 45.56±7.81, 37.76±7.23 and 40.30± 4.33 respectively. The mean values of SPADI Pain, SPADI Disability and SPADI Total for Group B were 22.10± 1.60, 34.80±3.93 and 44.09±3.64 respectively. The t value of VAS for Group B was 38.45 (p < 0.05). The t values of active range of motion of abduction, external rotation and internal rotation were – 31.95 (p<0.05), –28.59 (p<0.05) and – 50.95 (p<0.05) respectively.

Within Group B, SPADI, VAS and AROM of abduction, external rotation and internal rotation of shoulder joint in patients with adhesive capsulitis were found to be significant (p < 0.05). The possible explanation could be attributed to the study of Henricus M Vermulen.

The biomechanical effect of End Range Mobilization technique induces various effects when force is directed towards the tissue resistance. The mechanical changes may include breaking up of adhesions, realigning of collagen or increasing fiber glide, when specific movements stress the specific of the capsular tissue.

Henricus M Vermulen in 2000 "End Range Mobilization technique in adhesive capsulitis of the shoulder joint" found that End Range Mobilization Technique was effective in increasing the ROM of shoulder joint in patients of adhesive capsulitis.

The result of the study suggests that t value is highly significant in each pair of both Group A and Group B. Both the groups, Group A and Group B improved in VAS, Active ROM mainly abduction, external and internal rotation of the shoulder joint and SPADI, which reveals that the treatments given to the subjects of both groups are effective. There is significant improvement in both groups, Group A (Cyriax Deep Friction Massage) and Group B (End Range Mobilization).

On comparing the result of both the groups, it was found that changes in VAS, SPADI Pain, SPADI Disability and SPADI Total and active range of motion of abduction, external rotation and internal rotation were more significant in Group B than that of Group A. This shows that the treatment given to Group B is more effective than that of Group A. Thus null hypothesis is rejected and alternative hypothesis is accepted.

Limitation

1. Study was conducted over a short period of time.
2. Sample size was small.
3. There was no follow up of the patients.
4. Availability of patients.

Conclusion

This study shows that end range mobilization with hot packs provide better results as compared to Cyriax deep friction massage with hot packs for treating adhesive capsulitis in terms of pain reduction and improvement in active range of motion and functional ability.

Future Study

1. Same study can be done with adequate follow up and large sample size.
2. Further study can also be done in case of secondary adhesive capsulitis.
3. Further studies can be done to see the time course of the effect of the treatment techniques used.

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