# Positional Release Versus Muscle Energy Techniques on Functional Ability of Shoulder in Chronic Adhesive Capsulitis

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***Abstract:***

**Background:** Adhesive capsulitis is a condition of the shoulder of unknown etiology. It is characterized by pain, loss of function and restriction of both passive and active range of motion (ROM). Both positional release and muscle energy techniques considered effective manual therapy techniques in treatment of many musculoskeletal conditions. Till now the difference in efficacy between both techniques is not known. **Objectives:** The purpose of this study was to compare between the efficacy of positional release and muscle energy techniques on functional ability of the shoulder in adhesive capsulitis. **Methods:** Thirty patients from outpatient clinic of Bolak Eldakror hospital had participated in this study; they were randomly assigned in two groups (group A& B). Group A consisted of 15 patient (5males and 10 females) with mean age 50.80±6.48 years, received positional release technique and conventional physical therapy program. Group B consisted of 15 patients (6males, 9 females) with mean age 51.13±5.77 years, received muscle energy technique and conventional physical therapy program. **Results:** The results revealed that there was a significant difference in the post treatment values ($P<0.05$) where the t-value was (7.22) and p-value was (0.0001) between Group A and Group B in favor of group B. **Conclusion:** Both positional release and muscle energy techniques were shown to be effective in improving functional ability of shoulder in Adhesive Capsulitis, but muscle energy technique was better than positional release technique.

**Key Wards**: Positional release, muscle energy, adhesive capsulitis

## Introduction

Adhesive capsulitis is characterized by a painful, gradual loss of both active and passive glenohumeral motion resulting from progressive fibrosis and ultimate contracture of the glenohumeral joint capsule**.** The term “frozen shoulder” was first introduced by Codman in 1934**[1]**. He described frozen shoulder as a painful shoulder condition of insidious onset that was associated with stiffness and difficulty in sleeping on the affected side. Codman1934 also identified the marked reduction in forward elevation and external rotation that are the hallmarks of the disease **[2].** Duplay first describes the symptoms in 1872 **[3]** using the term

'periarthrite scapulohumerale'. Neviaser 1945**[4]** coined the term 'adhesive capsulitis' after open surgery in affected shoulders. He observed sound like adhesive tape being pulled off when he manipulated the adhesive capsule of the shoulder**.** The incidence of frozen shoulder is slightly higher in women than in men. This condition most frequently affects persons aged 40 to 60 years and rarely occurs in persons younger than 40 years of age. Frozen shoulder might affect both shoulders in up to 16% of patients; however, a relapse is uncommon. An increased incidence of frozen shoulder has been noticed in patients with hyperthyroidism and hypertriglyceridemia **[5].** Prevalence rate in the general population is 2-5% and 10–20% in diabetics **[6].** Patients with frozen shoulder syndrom have difficulties in everyday activities (dressing, grooming, and performing overhead reaching activities and so on for a period of several months to several years) and shoulder pain disturbing sleep at night on the affected side, which is a key diagnostic sign **[7, 8].**Muscle energy technique **(*MET*)** is unique in its application as the client provides the initial effort while the practitioner facilitates the process. One of the main uses of this method is to normalize joint range, rather than increase flexibility, and techniques can be used on any joints with restricted range of motion (ROM) identified during the passive assessment. The main effects of MET can be explained by two distinct physiological processes: Post Isometric Relaxation (PIR) and Reciprocal Inhibition (RI) **[9].**

Positional release technique ( PRT), originally termed strain–counterstrain**,(10)** is a therapeutic technique that uses tender points (TPs) and a position of comfort (POC) to resolve the associated dysfunction. Essentially, PRT is the opposite of stretching. For example, if a patient had a tight, tender area on the calf, the clinician would dorsiflex the foot to stretch the calf in an effort to reduce the tightness and pain. Unfortunately, this might lead to muscle guarding and increased pain. Using the same example, a clinician who employs PRT would place the tender point in the position of greatest comfort (plantar flexion), shortening the muscle in an effort to relax the tissues and decrease the TP**.(11-13)**. Dr. Lawrence H. Jones, an osteopathic physician, was the first to publish a map of TP locations and their associated treatment positions**.**Jones1964**(10)**proposed that when a muscle is strained by a sudden unexpected force, its antagonist attempts to stabilize the joint, resulting in a counterstrain of the muscle in a resting or shortened position. Before the antagonist is counterstrained, gamma neural activity is heightened as a result of its shortened position, making the spindle more sensitive—propagating development of restriction, sustained contraction, and TP development**.(10)**The application of PRT relaxes the muscle-spindle mechanism (5), decreasing abberent gamma andalpha neuronal activity, thereby breaking the

sustainedcontraction.**(13-18)**The prevailing theory underlying PRT involvesplacing tissues in a relaxed shortened state, or POC,for a period of time (≈90 s) to decrease gamma gain in order to facilitate restoration of normal tissue length and tension**.(10,17-21)**

The purpose of the study was to compare between the efficacy of muscle energy technique and positional release technique on pain and functional activities in patients with adhesive capsulitis.

## Patients and methods

## Design of study

Pre- post- treatment design was used. Thirty patients from both sexes with adhesive capsulitis were randomly assigned into two groups with fifteen patients in each one.

## Patients

Thirty patientshad been diagnosed as adhesive capsulitis. Their age ranges from 40 to 60 years and they are randomly assigned into: -

**Group (A)**included 15 patients received positional release technique and conventional physical therapy exercise program in the form of (Ultrasound Therapy, Hot pack, Codman‟s exercises, Pulley exercises and active assisted exercises).

**Group (B)**included15 patients received muscle energy technique (MET) for shoulder flexion, abduction, and external rotation in addition to the same conventional physical therapy program like group A.

Each patient received 12 sessions (3 sessions/week) over four week's period.

## Inclusion criteria:

1- Age between 40 to 60 years old.

2 -Suffering from adhesive capsulitis based on a referral from orthopedic surgeon

## Exclusion Criteria

1- Patients with Rotator cuff tear

2- Patients with any systemic disorder like diabetes mellitus

3- Patients with any neurological disorder like hemiplegia

4- Fracture in and around shoulder

## Patient evaluation

## 1- Shoulder pain and disability index:

The SPADIis a self-report questionnaire developed to measure the pain and disability associated with shoulder pathology in people with shoulder pain of musculoskeletal,

neurogenic, or undetermined origin. The index is divided into 2 main scales; pain scale and disability scale. The detailed index calculation was the summation of the results of the two scales as follow **( 22).**

## Treatment procedures

## Group A

Fifteen subjects in this group received positional release technique for shoulder external rotators and abductors which commonly are affected in frozen shoulder patients .according to Tender point's body chart (23).

### *The procedure for applying PRT is as follows:*

- Palpate surrounding and opposing tissues to locate tender point for both shoulder abduction and external rotation.
- Use one or two finger pads to monitor fasciculation and TP.
- Fine-tune position with rotation.
- Hold the POC (position of comfort) until fasciculation decreases significantly or ceases.
- Average positions hold time while pressure is 90 s to 3 min.
- Transient periods of brief tingling, numbness, and
- Temperature changes might occur.
- Release tissue or joint slowly and reassess.
- Continue with two or three treatments a week for
- 6 weeks (on rest days or after physical activity)

**Fig.(1): positional release technique**

## ***Group B***

Fifteen subjects in this group received MET in form of"Spencer technique" for shoulder external rotation and abduction range of motion **(24).**

**Spencer technique** is aiming to increase the external rotation: Circumduction with compression technique: The subject's elbow was flexed and shoulder was abducted to 90 degree. Subject's elbow was used as a pivot to rotate humerus clockwise and anti-clockwise. Slight compression was applied on the glenohumeral joint. The concentricity of the circles was performed to the maximum tolerance of the subject. The procedure was repeated 8-10 times in clockwise and anticlockwise direction (25).figure (1)

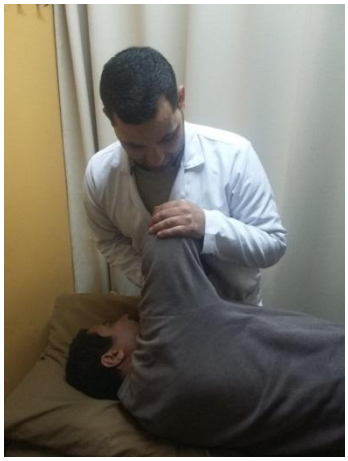

**Fig.(2): Circumduction with compression technique**

**Circumduction with traction technique:**

The subject's elbow was flexed and shoulder was maintained in abducted position. Traction force was applied on glenohumeral joint while rotating the humerus in clock wise and counter clock wise circles. The concentricity of the circles was performed to the maximum tolerance of the subject. This technique can also be done with elbow in extension position. The therapist held the subject's shoulder with his caudal hand and move the subject's arm in the same progressive concentric circles. The procedure was repeated 8-10 times in clockwise and anticlockwise direction figure (2).

**Starting position** **End position**

**Fig.(3): Circumduction with traction**

**To increase the shoulder abduction technique**: The subject's elbow was flexed and the shoulder was abducted to 90 degree . Therapist held the elbow of the subject with one hand and shoulder with the other hand and exerted upward or cehalic pressure on elbow to increase abduction till the end range is felt and then the arm was brought back to the neutral position. The procedure was repeated for 8 to10 times (25). (Figure 3)

**Starting position** **End position**

**Fig.(4): Shoulder abduction technique**

## RESULTS

## Patients demographic data:

In this study, 30 patients with chronic adhesive capsulitis were assigned randomly into two groups.

### Group (A) :( PRT)

Fifteen patients were included in this group. Table (1) represented their mean age (50.80 ±6.48)years, mean weight (75.46±8.05) kilograms (Kg), and mean height (160.6±3.33) centimeters (cm).

## Group (B) (MET):

Fifteen patients were included in this group. The data in table (1) represented their mean age(51.13±5.77) years, mean weight (76.6±5.62) kilograms (Kg), and mean height (161.26±4.41) centimeters (cm).

There was no significant difference between both groups in their ages, weights, and heights where their P-values were (0.34), (0.65), and (0.64) respectively.

**Table (1):Patients demographic data in both groups (A&B).**

| General characteristic | Group A | | Group B | | Comparison | | |
|---|---|---|---|---|---|---|---|
| | Mean | ±SD | Mean | ±SD | t-value | P-value | S |
| **Age (years)** | 50.80 | ±6.48 | 51.13 | ±5.77 | **0.96** | **0.34** | **NS** |
| **Weight (Kg)** | 75.46 | ±8.05 | 76.6 | ±5.62 | **0.44** | **0.65** | **NS** |
| **Height (cm)** | 160.6 | ±3.33 | 161.26 | ±4.41 | **0.46** | **0.64** | **NS** |

**Comparison between both groups (A&B) pre and post treatment**

**Group (A):**

Figure (4) demonstrated the Shoulder pain and disability index (SPADI) pre and post treatment for group (A). There was a significant difference in the paired t-test between pre and post treatment shoulder pain and disability index (SPADI) as the mean value of pre treatment shoulder pain and disability index (SPADI) was (70.08± 5.42) and for post treatment shoulder pain and disability index (SPADI) was (55.41±9.19) where the t-value was (6.57) and P-value was (0.0001). The percentage of improvement was 20.91 %.

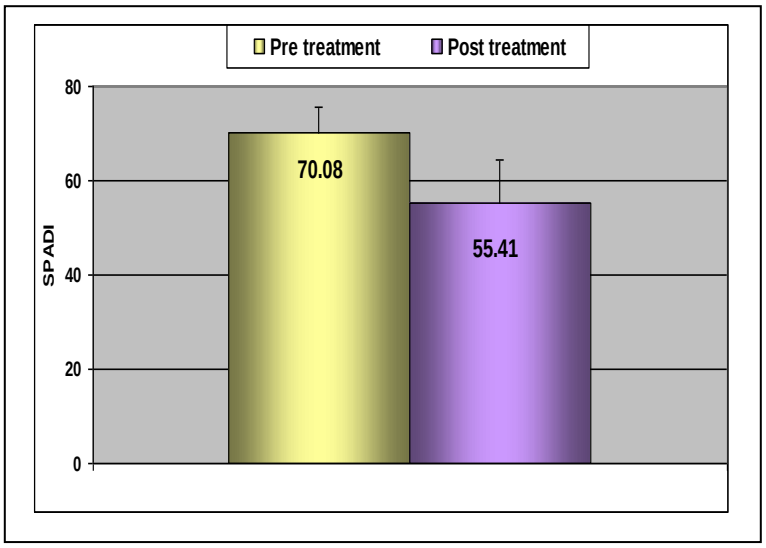

**Fig.(5): Comparison pre and post treatment for group (A)**

## Group (B):

Figure (5) demonstrated the Shoulder pain and disability index (SPADI) pre and post treatment for group (B). There was a significant difference in the paired t-test between pre and post treatment Shoulder pain and disability index (SPADI) as the mean value of pre treatment Shoulder pain and disability index (SPADI) was (68.54± 4.78) and for post treatment Shoulder pain and disability index (SPADI) was (34.87±6.06) where the t-value was (23.13) and P-value was (0.0001). The percentage of improvement was 49.12 %.

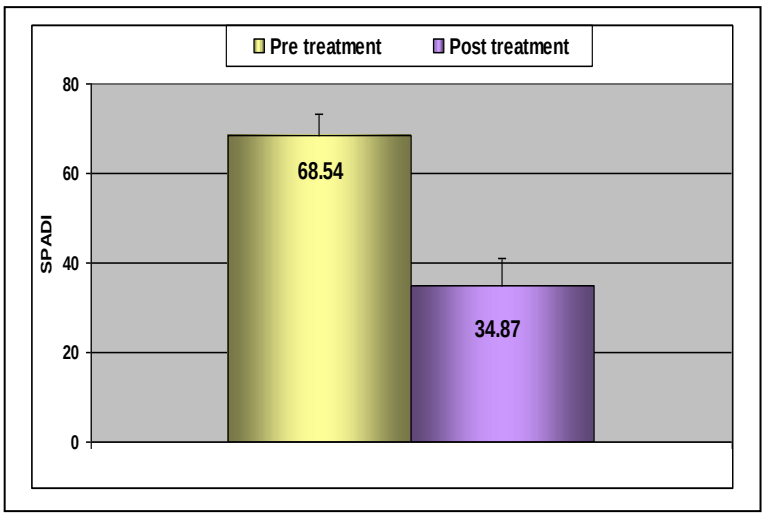


**Fig.(6): Comparison pre and post treatment for group (B)**

## Comparison of SPADI pre and post treatment for group (A&B).

**Revealed the independent t-test results for the Shoulder pain and disability index (SPADI) pre and post treatment between groups A and B. There**

Was no significant difference in pre treatment values where the t-value was (0.82) and p-value was (0.41), But there was a significant difference in the post treatment values ($P<0.05$) where the t-value was (7.22) and p-value was (0.0001).

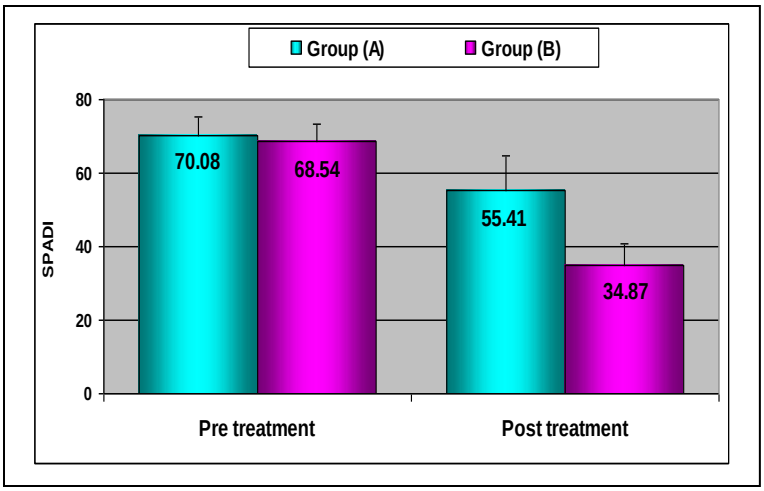


**Fig.(7): Comparison of shoulder SPADI pre and post treatment between groups (A) and (B).**

## Discussion

## Group (A) (positional release group):

Fifteen patients were included in this group. There was a significant difference in the paired t-test between pre and post treatment shoulder and the percentage of improvement was 20.91 %.

Positional release technique decreases joint and muscle pain, decreases joint swelling and stiffness and so increase mobility and a quality of life (23) the improvement in functional ability for (CLBD) patients in this study could be attributed to analgesic effect of PRT which lead to decrease pain and improve function.This result was in agreement with (27) and (28) .

## Group (B) (MET group):

Fifteen patients were included in this group. There was a significant difference in the paired t-test between pre and post treatment shoulder function and the percentage of improvements were 49.12 % respectively.

Group B showed significant changes may be due to the application of MET that relaxes and improve biomechanics and thus results in improved functional ability. (23) These exercises also stimulate tonically depressed joint mechanoreceptors, alleviate pain secondary to muscle ischemia or prevent collagen cross bridging (29). Muscle energy techniques have been increasingly used in clinics to treat low back pain (30) .

The MET has an effect on functional ability in patient with adhesive Capsulitis. This is also supported by the study of (31), (23) .these results are on the same line with (29). Who showed that low level laser and muscle energy technique are both equally effective in decreasing the neck and shoulder pain and disability in patients with myofascial trigger points in trapezius and levator scapula muscle .These results of study are also supported by the study (32) in their study on physical therapy management of the shoulder

## Between groups

Subject in the present study have similar baseline values of all dependent variables suggesting that both groups had similar distribution of patients. Statistical analysis reveals that there are significant changes in the base values. (improvement in the Disability score) analysis revealed that percentage of improvement in SPADI score was more in shoulder MET group (B) which further showed more improvement than PRT group(A)

## Conclusion

This study was conducted to investigate the effect of positional release versus muscle energy technique on shoulder functional disability level on chronic adhesive capsulitis. There was a significant difference between pre and post treatment on shoulder functional disability within groups. While between groups MET was better than PRT.

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# الانفراج الموضعى مقابل طاقة العضلات فى علاج الالتهاب المزمن اللاصق لمحفظه مفصل الكتف

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## المستخلص

يهدف هذا البحث إلى دراسة تقنية الانفراج الموضعى مقابل تقنية طاقة العضلات فى علاج التهاب المحفظه اللاصق لمفصل الكتف وقد أجريت هذه الدراسة على 30 مريض تم تقسيمهم عشوائيا" إلى مجموعتين متساويتين وهما المجموعة الاولى(أ) وتضم 15 مريض وقد تلقت برنامج علاجى مكون من تقنية الانفراج الموضعى بالإضافة إلى برنامج العلاج الطبيعى التقليدى لمثل هذة الحالات والمجموعة الثانية(ب) اشتملت على 15 مريض والتى تلقت العلاج بتقنية طاقة العضلات بالاضافة إلى نفس برنامج العلاج الطبيعى التقليدى لمثل هذه الحالات وقد أجريت القياسات لهاتين المجموعتين قبل وبعد الفترة العلاجية والتى إمتدت لمدة 4 اسابيع وقد اوضحت النتائج وجود تحسن واضح فى وظيفة الكتف فى كل مجموعة على حدة (أ) و(ب) ولكن حينما قورنت نتائج المجموعتين كان هناك فرق إحصائى لصالح المجموعه (ب)

**الكلمات الدالة :- الانفراج الموضعى - طاقه العضلات – مفصل الكتف**