Axillary Ultrasound and Laser Combined With Postisometric Facilitation in Treatment of Shoulder Adhesive Capsulitis: A Randomized Clinical Trial

Haytham M. Elhafez, PhD,[a] and Salam M. Elhafez, PhD Biomechanics[b]

Abstract

Objectives: The purpose of this study was to compare axillary ultrasound, laser, and postisometric facilitation technique with standard care in the management of shoulder adhesive capsulitis.

Methods: This is a randomized clinical trial study. Fifty-nine participants with shoulder adhesive capsulitis were selected and randomly assigned for eligibility. Forty-five participants were assigned into 3 equal groups of 15, and 14 participants were excluded from the study. The participants were blinded to their group allocation. Standard care group (A) received traditional physical therapy treatment in the form of pulsed ultrasound, scanning laser, supervised exercise program, and home exercise program; group B received the same physical therapy program as group A, except that the ultrasound and scanning laser were applied to the axillary region of the painful shoulder; and group C received the same modified physical therapy program as group B plus postisometric facilitation technique to the painful shoulder. All dependent variables were measured by the second author, who was blinded to the participant's intervention group. The first author administered treatment to all 3 groups. All participants received 12 sessions (3 times/wk for 4 weeks). Pain level and shoulder range of motion (ROM; flexion, abduction, and external rotation) were recorded 3 times (pretreatment, immediately posttreatment, and 4 weeks of treatment).

Results: Mixed-design multivariate analysis of variance indicated significant pain reduction with significant ROM increase in all groups posttreatment and after 4 weeks. Post hoc analysis for within groups revealed that shoulder ROM and pain levels improved significantly posttreatment compared with pretreatment ROM in all groups, with the greatest improvement in group C. Between-group analysis revealed that pain-free shoulder flexion, abduction, external rotation, and pain level improved significantly in group C compared with groups A and B immediately after treatment and after 4 weeks of follow-up ($P < .05$). Improvements reported in group B is more than in group A, and C is more than in groups A and B.

Conclusions: Combining axillary ultrasound and laser with postisometric facilitation had a greater effect in reducing pain and improving shoulder ROM in patients with shoulder adhesive capsulitis compared with axillary ultrasound and laser with traditional exercise. (J Manipulative Physiol Ther 2016;39:330-338)

Key Indexing Terms: *Bursitis; Adhesive Capsulitis; Frozen Shoulder*

Adhesive capsulitis (AC), also known as "frozen shoulder," is a common condition involving glenohumeral pain and loss of motion. It is defined by the American Shoulder and Elbow Surgeons as "a condition of uncertain etiology characterized by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder."[1] It is the common cause of shoulder pain which is estimated to affect between 2% and 5% of the general adult population [2] and 10% to 20% of people with diabetes.[3] It is most frequent in women and in patients older than 40 years, with bilateral shoulder involvement occurring in up to 20% to 30% of the patients.[4] It is characterized by a spontaneous onset of pain with progressive stiffness of glenohumeral joint which can lead to a gross loss of function.[2] Adhesive

[a] Professor of Physical Therapy, Basic Sciences Department, Faculty of Physical Therapy, Cairo University, Giza, Egypt.

[b] Professor of Biomechanics and Head of Biomechanics Department, Department of Biomechanics, Faculty of Physical Therapy, Cairo University, Giza, Egypt.

Submit requests for reprints to: Haytham M. Elhafez, PhD, Physical Therapy Basic Sciences–Associate Professor, 7 Ahmed Elzayyat Street, Bein Elsarayat, Giza, Egypt.
(e-mail: *elhafez@yahoo.com*).

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capsulitis is classically described as having 3 stages. Stage I involves pain (freezing or painful stage) and lasts from 3 to 9 months and is characterized by an acute synovitis of the glenohumeral joint. Stage II (frozen or transitional stage) involves pain and restricted movement, and lasts from 4 to 12 months. Finally, stage III (thawing stage) involves painless restriction and lasts from 12 to 42 months.[5,6] Its unclear etiology has led to its poor understanding and unclear opinions on its appropriate treatment,[7] although most authors agree that it involves an aspect of inflammatory change during the initial phase of the disease, followed by restriction of the joint capsule in the later stages. Further arthroscopic studies have shown fibrous contracture of the rotator interval and coracohumeral ligament which account for the marked restriction in range of movement, especially loss of lateral rotation.[2]

Although AC is considered to resolve spontaneously within 1 or 2 years, 50% of patients will experience pain or some mild restriction of movement, whereas 11% will experience some residual disability several years after treatment. Consequently, an appropriate treatment protocol is very important.[7] Treatment regimens for AC include a trial of conservative therapy, followed by more invasive procedures.[1] Many authors report a high level of success with nonoperative physical therapy treatment.[7] Numerous physiotherapeutic techniques have been used to treat AC including mobilization, electrotherapy, acupuncture, and home exercises with patients being referred for a steroid injection if necessary.[2,8] A recent systematic review [9] indicated that treatment of AC included a variety of manual and manipulative therapy (MMT) procedures such as high-velocity low-amplitude manipulation, end-range mobilization (ERM), midrange mobilization, and mobilization with movement (MWM) of the shoulder only and/or of the shoulder girdle. These techniques produced short-term significant improvements in range of motion (ROM), with a smaller effect for decreasing pain, compared with exercise alone.[9]

Several studies[10–13] found significant benefit using MMT. Of these, only Nicholson[10] prescribed exercise that was more intensive than basic. According to Brantingham et al,[9] the greatest change noted with MMT was an increase in ROM and function rather than a decrease in pain. Manual and manipulative therapy procedure can also include postisometric relaxation technique applied to a single or multiple joints with stretching. There is low level of evidence for the treatment of AC using MMT with and without exercise and/or multimodal therapy.

Mobilization with movement (as developed by Mulligan[14,15]) involves sustained pressure to a fixed painful joint while the patient actively performs movement in the same joint. If the active movement is pain-free, the orientation of the joint is considered adequate. The principle for this type of joint mobilization is based on analyzing and correcting minor positional faults within the joint. Combining this technique with kinesiotaping improved the active ROM in the painful shoulders.[16]

Passive stretching of the shoulder capsule and soft tissues by means of ERM techniques has been reported to restore the normal extensibility of shoulder capsule and tight soft tissues.[12,17–19] After anterior-posterior and inferior glide mobilizations close to the end-range of abduction in participants with AC, researchers have reported a significant increase in glenohumeral abduction.[20] Other researchers have also reported the positive effects of ERM on glenohumeral ROM.[12,19] Because adequate humeral elevation and external rotation as well as scapular tipping and upward rotation are related to improvements in AC symptoms, specific mobilization techniques performed close to the glenohumeral end-range of movement may provide additional benefits when using scapular mobilization techniques.[21,22]

A number of different types of interventions have been reported as benefiting shoulder pain. These include ultrasound (US) therapy,[8,23] myofascial (friction massage), and ischemic compression therapy that eliminate trigger points located around the joint.[8,24] Despite reports that manipulation was the preferred therapy for treating shoulder girdle disorders,[25] a recent systematic review of the use of manipulative therapy in treating shoulder pain concluded that there was a low level of evidence to support use of the intervention, adding the recommendation that there is a need for more well-designed trials investigating multimodal management of shoulder pain.[26]

Some providers combine different therapeutic interventions in treating AC. For example, adding scapulothoracic exercises to the glenohumeral ROM exercises contributes to decreasing pain and increasing ROM in patients with AC.[27] The combined soft tissue mobilization with proprioceptive neuromuscular facilitation was reported to improve the glenohumeral external rotation and overhead reach in patients with shoulder disorders.[28] In addition, Wies[5] indicated in his study on 8 patients with frozen shoulder that soft tissue mobilization in combination with home exercise program may be a useful approach for improving soft tissue restrictions.[5] It is widely accepted that physical therapy and stretching should be used in the conservative management of frozen shoulder.[8–13] Simple home exercise programs with analgesia have been shown to be effective, whereas others suggest more intensive supervised physical therapy in the form of passive stretching and manual mobilization. A more invasive procedure such as hydrodilatation (which aims to rupture capsular contractures by distension of the joint with a large amount of normal saline solution) and nerve block has been supported.[1]

Recently, Ma et al[29] compared 2 different treatment approaches in the management of AC: physical therapy that included joint mobilization and whole-body cryotherapy with physical therapy that included joint mobilization. They concluded that when whole-body cryotherapy is added to the treatment intervention, significant improvements occur.[29] The effect of intra-articular hyaluronic acid (HA)