



Effectiveness Of Extracorporeal Shock Wave Therapy On Pain And Functional Disability Among Frozen Shoulder Patients :A Narrative Review

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Abstract

Background:

This review article assess the effectiveness of extracorporeal shock wave therapy among Frozen Shoulder Patients. Methods: Online collections of Chinese Biomedical Literature Database, Allied and Complementary Medicine Database, Web of Science, the Comprehensive Index to Nursing and Allied Health Literature, google scholar and Medline was used for searching the articles. Conclusion -Extracorporeal shockwave Therapy treatment have beneficial effects in treating frozen shoulder issues, according to the research findings.

Keywords: Frozen Shoulder, Adhesive Capsulitis, Extracorporeal Shock wave therapy, Pain, Range of motion

Introduction

Frozen shoulder, referred to as periarthritis shoulder or Adhesive capsulitis. It is an inflammatory condition of the shoulder presented by lessen range of shoulder joint and pain. It root is unknown and patient presents with severe stiffness with pain that progresses overtime resulting in decrease of range of motion at all plains. Frozen shoulder is more common between the ages of 40-65 widespread in females as compared to males. The main factors which are responsible for the cause of frozen shoulder are diabetes mellitus, immobilization, thyroid disorders such as hypothyroidism and hyperthyroidism, autoimmune disorders, any trauma including surgeries, history of cervical disc disease and most typical cause is advanced age. The pain worsens during night (awakens from sleep) specifically when lying towards the affected shoulder. Difficulties in day-to-day tasks for instance shirt tucked in, hooking a brasier, teasing hair are typical presentation. Frozen shoulder has 3 stages: Freezing (pain) phase which takes place from

2-9 months. There is an insidious pain that gradually loses mobility and starts out slowly, Frozen (stiffness/adhesion stage) and persists between 4-12 months, There is pain with progressive loss of motion of AC joint, clavicle and the buildup of scar tissues which restricts movement inside the shoulder capsule joint, resulting in pain and severely limiting motion of scapula and Glenohumeral joint, Thawing (resolution) phase that takes place in about 6-9 months. There is pain resolution and complete range of motion is gradually attained after 1-3 yrs.

Pathology Of The Disease

Every joint is composed of a capsule lined by synovium, which is it's lining. Inflammation of the synovium (synovitis) is the initial cause of pain. Fibrosis, in the process of tissue repair brings about the reduced range of motion. Many techniques, medications and procedures was use in management of frozen shoulder including shock wave therapy

which involves the passing of electrical shock wave to the joint in order to aid healing process.

Extracorporeal shock wave therapy (ESWT) was initially used in hospital settings in 1982 to treat urinary stones. It was thereafter studied in orthopedic conditions which has positive impact especially plantar fasciitis. Shockwaves are a form of sound wave with medicinal properties. They are distinguished by unique physical characteristics such as nonlinearity in a high peak pressures low tensile amplitude, quick rising time, and a brief duration (around 10 ms). The goal of this comprehensive evaluation is to evaluate ESWT's efficacy and safety in alleviating frozen shoulder as it is used to treat a variety of orthopaedic problems. When assessing the effect of shockwaves, it is important to take into account their capacity to enter tissues without endangering the skin, circulatory system, or nerves. This review aims to provide insights into the efficacy and safety of ESWT as a treatment option for patients with frozen shoulder. Once they arrive at the injured area, they create mechanical stimulation that triggers several biological responses, including the production of prostaglandins that aid in tissue repair, increased local blood flow, and an elevation in nitric oxide concentration, which helps to alleviate pain.

Years after the initial shoulder's symptoms started, the opposite side begins to exhibit them, although only one shoulder is affected at a time Extracorporeal shockwave treatment (ESWT) has demonstrated successful and safe outcomes in the management of various painful conditions such as frozen shoulder, chronic rotator cuff the condition of tendon Myofascial pain syndrome, and chronic pelvic discomfort syndrome. Patients suffering from these conditions often experience limitations in their range of motion, causing pain and impacting both their active and passive movements. ESWT has been found to effectively address these symptoms and improve the range of motion, providing relief and enhancing the overall functional abilities of the patients.

The purpose of this review article to assess the effectiveness of ESWT in Frozen shoulder.

Methodology-

Between the time of creation and November 2020, searches were made for significant and pertinent

research in the following databases: PubMed, which is EMBASE, the Scopus database, Central Library VIP information databases, the Chinese Nationwide Knowledge Infrastructure (CNKI) etc. RCTs for frozen shoulder that essentially contrasted extracorporeal shock wave treatments with conventional treatments and safeguards were included.

Inclusion Criteria-

1. The inclusion criteria are as follows-
2. Research studies.
3. Patients who had a frozen shoulder diagnose and were in unease or experienced a restricted range of motion.
4. The control groups received routine therapies, the experimental groups received ESWT as an adjunct to those treatments, and the conventional pharmaceuticals were the identical for both groups.
5. There were no limitations on the length of therapy, the specific type of ESWT, or the degree of urgency of symptoms, and the patient's tolerance governed the energy intensity.
6. Chinese and English were the only languages available.
7. There was no restriction on exerting a blinded proximity.
8. They hired at least single of the externally rotated range of motion (ERRM), constant merely score (CMS), and visual analogue scale (VAS) indices.
9. Exercise, electrotherapy, mobilisation, acupuncture, physical therapy, manual therapy, education, and rehabilitation were each included for intervention.

Exclusion Criteria-

- 1) Patients with any of the conditions that might cause adhesive capsulitis, like rotator cuff sickness, fractures, hardening tendinitis, Glenohumeral arthrosis, painful Myofascial joints syndrome, a condition or additional ailments.
- 2) Different types of extracorporeal shock waves are compared with each other.

Application of ESWT in Frozen Shoulder

Zhang et al. (2022), in this article Extracorporeal laser energy therapy (ESWT) was examined using a meta-analyses and systematic reviews as a continuation of treatment for frozen shoulder. Through evaluation of numerous medical databases, the authors identified eight randomized controlled studies that met the predefined inclusion criteria. The meta-analysis's data showed that ESWT considerably improved patients with frozen shoulder's pain relief, functioning, and range of motion. The study's results indicate that ESWT serves as a safe and effective adjunctive therapy for treating frozen shoulder^[3].

Vahdatpour et al (2014) This article evaluates whether extracorporeal shock wave treatment (ESWT) does in alleviating frozen shoulder. In the authors' controlled clinical experiment, forty participants with shoulder frozen were divided into two groups at random; one group got the ESWT while another group received a placebo. The findings showed that ESWT significantly reduce pain and improved function and Range of Motion in those with frozen shoulder when compared to the placebo group. The results of the investigation show that ESWT is a successful technique for treating frozen shoulder^[4].

Whelton C et. al (2018) conducted a study in which it examined diabetic frozen shoulder, a condition that frequently develops in people with diabetes mellitus. The authors go into the pathogenesis, clinical manifestation, epidemiology, and available treatments for diabetic frozen shoulder. The study emphasizes the significance of early diagnosis and care to stop the disease's progression and suggests a multidisciplinary approach to treatment that includes physical therapy, medication and when necessary, surgical intervention^[5].

Cho ch et. al (2018) conducted a study on a common problem in people with diabetes mellitus; diabetic frozen shoulder is reviewed in this article. The authors talk about the clinical manifestation, pathogenesis, epidemiology, and available treatments for diabetic frozen shoulder. In order to stop the course of the condition, the study emphasizes the significance of early diagnosis and management. It also suggests a multidisciplinary approach to

treatment, which may include physical therapy, medication, and surgical intervention when necessary^[6].

To decide if an extracorporeal shock wave therapy for adhesive capsulitis is efficacious, Dong-zi Cao et al. performed a study. Intensity of pain is the major endpoint, whereas shoulders function, quality of life, and negative effects are the important secondary outcomes. Its results can offer the latest evidence in favor of using shock wave therapy outside the body to treat adhesive capsulitis^[7].

Ram Prasad Mathukrishnan et al. (2019), conducted a study on the safety of electroshock treatment for treating frozen shoulder. In two groups of people with frozen shoulders, the study assessed the effectiveness of extracorporeal trauma treatment, ultrasonic therapy, as well as mobility and therapeutic physical activity. The study group (n=15, mean=46.50), and underwent ESWT along with mobilization and exercise, & the control group (n=), which received ultrasound treatment, mobilization, and exercise, were made up of 25 frozen shoulder patients in total. The researchers recorded disability ratings at the end of the fourth week to assess the outcomes of the interventions.^[8]

Han-Yong Qiao et al. (2020) conducted a study to determine the analgesic efficacy of extracorporeal electric shock therapy for treating frozen shoulder. Individuals in Group 1 received a single morning dosage of 30 mg of prednisolone orally regular for 2 weeks, followed by daily doses of 15 mg for an additional 2 weeks. Then, on the first, fourteenth, and twenty-eighth days, group 2 patients underwent five doses of extracorporeal vibration treatment. ESWT significantly improves frozen shoulder functioning and shoulder discomfort when compared to the control group^[9].

Taheri parisa et.al (2014) carried out an investigation to see how well ESWT treats frozen shoulder. For four weeks, extracorporeal shock wave therapy was given to the treatment group once a week, while the other control group received sham shock wave therapy. After the follow-up period, pain and disability were tracked using the elbow discomfort and impairment index (SPADI) questionnaire, and athletic performance changes were evaluated using a device called a goniometer.^[10]

Chan park et al. (2015) carried out a research aimed at assessing the result of extracorporeal shock treatment. He divided his 30 patients with frozen shoulder into two categories: 15 patients had traditional physical therapy, and 15 received extracorporeal shock wave therapy. The extracorporeal shock wave care (ESWT) group had general physical therapy twice weekly for seven weeks, whereas the conservative personal therapist group could not^[11].

Jin-Yong ko et al has out a research to examine the healing potential of ESWT for rotator cuff injuries accompanied by shoulder discomfort and stiffness. Based on statistical randomization, 38 patients with rotator cuffed pathologies and arm stiffness were randomly assigned to either shock wave treatments or sham treatment. An isolated encounter of electroshock therapy 3,000 impulsive 24 KV (0.32mJ/mm²) stationed at two separate locations. At 6 and 12 months following intervention, the ESWT group has considerably superior VAS, strength of muscles, CMS, and amount of motion^[12].

Otavio victor et al. (2021) undertook a study to determine the effectiveness of extracorporeal impact treatment in treating shoulder pain and stiffness. Patients were evaluated utilizing a functional questionnaire, a shoulder range of motion test, and the VAS for discomfort. The tests for degrees of flexion, outer rotation, and abduct shoulder significantly increased in the assessments after treatment compared to baseline testing, and the VAS score substantially dropped.^[13]

Z. change-e et al. (2017) did a study to see the extracorporeal shock wave rehabilitation for frozen shoulder: the effectiveness. 816 individuals participated in 11 trials. ESWT might successfully relieve shoulder stiffness and discomfort. The patients' range of motion improved with ESWT, with a few exceptions of extension^[14].

Bravi Marco et al. (2020) seven studies met the requirements for admission in a study to assess the effectiveness of shock wave therapy delivered through the skin for treating frozen shoulder. Within minutes of treatment, ESWT considerably decreased pain in comparison to a placebo. Extracorporeal shock waves are more effective at reducing discomfort and increasing shoulder range of motion.^[15]

Radwa Mohammad Yehia et al. (2022) took a research to figure out if extracorporeal shock wave treatment (ESWT) is useful in treating frozen shoulder. 62 female volunteers with diabetics frozen shoulder got involved with the studies. While the control range (Group A) got physiotherapy solely for the same period of time, one group (Group B) received the same physiotherapy regimen together with ESWT. The purpose of the study was to evaluate the effectiveness of ESWT as a supplementary therapy for frozen shoulder, particularly in diabetic patients.^[16]

Dong-zi cao et. Al The efficient functioning of extracorporeal shock wave therapy for frozen shoulder was investigated. To ascertain if the trials' methodology corresponded with the rules they set, two authors independently reviewed the papers, gathered the data, and reviewed the trials. The arm's function and joint dysfunction are the secondary outcomes, whereas the pain and severity are the major results^[17].

Davil Rodriguez- sanzetal et.al carried out a research project to evaluate the success of shock wave treatments for treating shoulder freezing after being administered through the belly. Fifty frozen shoulder patients were placed into two groups: group A (which got intra-arterial corticosteroid injections) and group B, which had a total of twelve sessions of shock wave treatment along with conventional physiotherapy^[18].

Dimitris Challommas et al. (2020) conducted a comparison of frozen shoulder treatments studies. Thoracic freedom of motion was a secondary endpoint, with pain and function as the major results. Resulting from paired meta analyses, average distinctions for function were displayed^[19].

Vivek pandey et al. (2021) did a study to evaluate the set of medical recommendations of frozen shoulder these studies have confirmed higher prevalence and incidence (10.9%) other associated conditions with frozen shoulder are smoking, cardiac diseases, parkinsons diseases stroke, neck cardiac surgery[20].

Babak et all (2014) did an analysis on people who were sent to a hospital care clinic for frozen shoulder. The research had 36 participants, who were split into two parts. Extracorporeal shockwave treatment (ESWT) was administered to the intervention group

once weekly for a time frame of four weeks whereas sham ESWT was delivered to the control group. Each patient's performance and level of pain and impairment were determined using a Shoulder Pain and Limitations Index (SPADI) questionnaire, and changes in range of motion were observed utilizing a goniometer. During follow-up phase, the gathered data was evaluated applying SPSS software, which has greater impact on their recovery^[21].

Azzam Alarab et al (2018) carried out a research on individuals who underwent shockwave therapy together with exercise alongside people that received ultrasound just alone. The SWT group was proven to be more beneficial than the University of the Philippines group in terms of pain alleviation and increased range of motion.^[22]

Chih-Yu Chen et al (2014) conducted a study to determine if oral steroid medication vs extracorporeal shock waves therapy (ESWT) improves the functional effect for main adhesive capsulitis. In compared to the steroid category, the SWT group showed early apparent development and major enhancement within a short span of time^[23].

Irena Kola et al. (2022) conducted studies on the classification and use persistent shock wave radiation for adhesive capsulitis cure. Patients with wrist contracture participated in the trial and were randomized to participate in one of two different groups. According to the study's findings, shockwave therapy helped those who had adhesive capsule inflammation of the arms immediately function better. As to the inquiry, ESWT is equivalent to various therapies for treating adhesive capsulitis patients' discomfort and enhancing correct range of motion (ROM).^[24]

Sangho Lee et. al (2017) conducted a trial in which 30 patients with adhesive capsulitis (AC) are divided into two groups, one undergoing extracorporeal shock wave implementation. (n = 15) and the other receiving conservative physiotherapy (n = 15). For four weeks, both groups underwent psychotherapy three times a week. Both groups demonstrated that in an intra-group examination comparing the two times, a significant reduction in discomfort and a reduction in their range of motion. Following treatment, there existed a statistically wide changes between the experimental and control groups when speaking of pain levels and range of motion. Therefore, for those

with adhesive capsulitis, ESWT may be an appropriate therapy choice in decreasing annoyance and promoting range of motion^[25].

Qiao et. al (2020) completed An examination of the analgesic effects of extracorporeal shock wave treatment for frozen shoulder. Patients have been divided into a couple of categories based on their shoulder discomfort. The patients in Group 2 received extracorporeal shock wave attitudes (ESWT), which took place in three sessions on the first, fifteenth, and thirty-first days. Group 1 patients received oral prednisolone; a form of corticosteroid, at a dose of 30 mg for two weeks and then 15 mg daily for the next two weeks. The outcome demonstrates that extracorporeal shock therapy implementation. is superior to corticosteroids at reducing discomfort, stiffness, function, and range of motion^[26].

Dimitris Challoumas et al (2020) completed a research comparing the various frozen shoulder treatment options that are available. The two groups were split. Group 1 received intra-articular corticosteroids, whereas Group 2 received standard care (exercises for flexibility, manual therapy, and movement. The findings of this study highlight the superiority and effectiveness of early intra-articular corticosteroid administration compared to other treatments in managing symptoms related to shoulder pain, disorders, and improving proper function and range of motion.^[27]

Discussion

According to the research ESWT plays a very important and beneficial role to the patient with frozen shoulder. In comparison to other modalities ESWT is seen to be more effective to the patient. According to the developing knowledge on ESWT for frozen shoulder, it is important to explore the systematic research syntheses in order to determine the efficiency and safety of ESWT for frozen shoulder patients. We must, therefore bring forth presently available knowledge on security and feasibility with ESWT for management of frozen shoulder. Findings from current ongoing research will be distributed to various partners captivated by ESWT treatment in order to advise specialists for more assessments and clinical exercises focused on overall wellbeing.

Frozen shoulder's disease progression continues to be unclear. Despite the disputes, the most widely accepted explanation for the freezing is cytokine-intervened synovial inflammation with fibroblastic development. For instance, the patient's capsular biopsy revealed elevated quantities of development variables, cytokines, and network metalloproteinase, suggesting that these are substances connected to the ferocious and fibrous fountain of frozen shoulder.

ESWT, or extracorporeal shock wave therapy, encompasses a range of sound waves that, when generated by a specialized device and directed towards a specific target area, exert therapeutic effects. Each sound wave possesses a specific energy density. Initially, the energy emitted by shockwaves can penetrate the affected area through bodily fluids and tissues, influencing the nearby blood flow and enhancing molecular and immunological responses. This stimulation can promote angiogenesis (the formation of new blood vessels), improve microcirculation, increase oxygen delivery to cells, and induce analgesic effects, among other beneficial outcomes. Additionally, ESWT has the ability to increase N2O concentrations, foster production of nitric oxide by endothelial function, and decrease atomic subunit kappa B articulation. Third, Shockwave therapy may further the partitioning of glue tissue, generate entomb tissue discharge, and supply a cavitation consequence between tissues. The technique alters how often nociceptors respond to hurt, what constitutes compound regulators surrounding nociceptors, the causes of switches in the cells of free radicals that result in the dissolution of substances that repress suffering, and ways to get rid of the transmission of physiological change. The neighborhood extremely focus on the shockwaves can deliver super stimulation to sensitive spots, and decrease nerve awareness, obstruct nerve conduction capability, and alleviate torment. At long last, heightening of tissue recovery, lowering n tissue apoptosis, and powerful enlistment of fibroblast have been seen in a few fundamental examinations.

Conclusion

According to the above studies ESWT helps with quicker relief of pain and improvement of daily activities and helps with flexibility and elevation of range of Motion in frozen shouldtet Patients.

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