

# Effect of Extracorporeal Shock Wave Therapy and Dry Needling in Treatment of Impingement Syndrome

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Dear Editor,

Injuries to the shoulder joint have been very common throughout society. There are several common shoulder diseases, including rotator cuff tears, osteoarthritis, shoulder impingement, bursitis, and cervical radiculopathy, which result in shoulder girdle muscle dysfunction, and struggle with everyday tasks [1] of which osteoarthritis (OA). Impingement syndrome refers to rotator cuff abnormalities that encompass all stages of tendon degeneration. Shoulder impingement syndrome (SIS) is caused by compression of the teres minor, teres minor, supraspinatus muscle, soft tissues, biceps tendon, and subacromial bursa between the coracoacromial arch and humeral head. Shoulder discomfort may result from this disorder. Additionally, several structural and functional elements that reduce the subacromial space may potentially contribute to shoulder impingement [2]. Patients with shoulder impingement syndrome have persistent pain. Patients usually report shoulder discomfort in the anterior and lateral acromion regions, and it frequently extends to the lateral aspect of the midarm. When patients lie on the afflicted side, the discomfort can also induce stiffness and weakness; pain is the worst at night [3].

Numerous studies have pointed out the association between shoulder discomfort and myofascial trigger points (MTrPs). The tight bands of skeletal muscle have MTrPs, which are incredibly sensitive to pressure. These locations result in motor dysfunction as well as discomfort that can either be caused by compression or arise spontaneously. In terms of biomechanics, the scapula is critical to the function of the shoulder. The normal arthrokinematics at the glenohumeral region might get disrupted as a result of a muscle imbalance. The discomfort and dysfunction resulting from MTrPs, which may alter scapulohumeral rhythms, could lead to the onset of subacromial pain syndrome. In addition to having high levels of acetylcholine and nicotinic receptor activation, studies have demonstrated that the subscapularis tendon and joint capsule also have significant levels of inflammatory mediators. These findings support the theory of the trigger points, which is still being debated [4]. Extracorporeal shock wave treatment (ESWT), a high-pressure sound wave, is applied to address damage to soft tissues and discomfort brought on by degradation of the musculoskeletal system. This technique is



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especially common for treating sports-related tendinopathies such as proximal plantar fasciitis on the heel, calcific or non-calcific tendonitis at the shoulder, and lateral epicondylitis of the elbow. Typically, ESWT is administered over the course of three sessions, one session per week [2]. The minimally invasive technique known as dry needling (DN) involves injecting a tiny needle into the skin all over. MTrPs, connective tissue, and muscles are stimulated as part of this procedure to alleviate pain and functional impairment. It is still unknown how all of these activities are created by the various systems. Nevertheless, has been proven in several meta-analyses that dry needling is helpful in reducing pain and may inactivate or destroy MTrPs in several musculoskeletal diseases. Using the fast-in and fast-out approach, dry needling intervention was used to treat trigger sites up to local twitch occurrence. Most frequently treated with supraspinatus and infraspinatus. With the exception of one trial, which employed three sessions in one week, dry needling treatment was performed in two or three sessions over a three to four-week period [4].

#### Patient information:

A 48-year-old delivery man visited the outpatient department with complaints of inability to lift his right arm while wearing his t-shirt with most pain while sleeping on his right side or scratching his back for about 2 months which increased gradually. He complains of most pain in the shoulder joint. He visited the orthopaedics department, which suggested an

x-ray of the shoulder joint, which did not show any significant changes. He was then prescribed NSAIDs for pain and referred to physiotherapy for further management.

#### Clinical findings

He was examined in the high sitting position on the couch, he was asked to do Aple's Scratch test, Neers Impermeant, Hawkins Kennedy, empty can and full can test which came out to be positive. There was grade 3 tenderness on the infraspinatus, supraspinatus, and rhomboid muscles. The range of motion in overhead flexion, extension and internal rotation was restricted due to pain leading to an empty Endfield (Table 1 and Table 2). Shoulder Pain and Disability Index (SPADI) score was 73% and Shoulder Function Index (SFInX) was 43.

#### Intervention:

**ESWT-** While sitting on the bed, the patient's elbow was bent 90 degrees and his forearm was neutral. The ESWT device's head was placed in a 90-degree, tangential position above the painful area. Safety earmuffs were worn by the patient and the operator to shield them from the device's deafening noise. The application area was cleaned with an iodine solution, and concussion intensity was increased by adding gel material. First, 500 shock wave pulses fired successively at a repetition rate of 5 Hz, then 1800 shock wave pulses fired successively at a repetition rate of 12 Hz, were used for three weeks, with three sessions, one every week [2].

**Table 1.** Isometric Strength

Muscles	Right	Left
<b>Shoulder</b>		
Flexors	Weak and Painful	Strong and Painless
Extensors	Weak and Painful	Strong and Painless
Abductors	Weak and Painful	Strong and Painless
Adductors	Weak and Painful	Strong and Painless
Internal Rotation	Weak and Painful	Strong and Painless
External Rotation	Weak and Painful	Strong and Painless
<b>Elbow</b>		
Flexors	Strong and Painless	Strong and Painless
Extensors	Strong and Painless	Strong and Painless
Supination	Strong and Painless	Strong and Painless
Pronation	Strong and Painless	Strong and Painless

**Table 2.** Range of Motion

Joint	Rt Active	Rt Passive	Lt Active*	Lt Passive*	Limitation
<b>Shoulder</b>					
Flexion	0-120 <sup>0</sup>	0-180 <sup>0</sup>	0-180 <sup>0</sup>	0-180 <sup>0</sup>	Unable to perform due to pain
Extension	0-30 <sup>0</sup>	0-180 <sup>0</sup>	0-180 <sup>0</sup>	0-180 <sup>0</sup>	Unable to perform due to pain
Abduction	0-110 <sup>0</sup>	0-180 <sup>0</sup>	0-180 <sup>0</sup>	0-180 <sup>0</sup>	Unable to perform due to pain
Adduction	0-110 <sup>0</sup>	0-180 <sup>0</sup>	0-180 <sup>0</sup>	0-180 <sup>0</sup>	Unable to perform due to pain
Internal Rotation	0-20 <sup>0</sup>	0-45 <sup>0</sup>	0-45 <sup>0</sup>	0-45 <sup>0</sup>	Unable to perform due to pain
External Rotation	0-25 <sup>0</sup>	0-45 <sup>0</sup>	0-45 <sup>0</sup>	0-45 <sup>0</sup>	Unable to perform due to pain
<b>Elbow</b>					
Flexion	0-120 <sup>0</sup>	0-120 <sup>0</sup>	0-120 <sup>0</sup>	0-120 <sup>0</sup>	NA
Extension	0-120 <sup>0</sup>	0-120 <sup>0</sup>	0-120 <sup>0</sup>	0-120 <sup>0</sup>	NA
Supination	0-100 <sup>0</sup>	0-100 <sup>0</sup>	0-100 <sup>0</sup>	0-100 <sup>0</sup>	NA
Pronation	0-80 <sup>0</sup>	0-80 <sup>0</sup>	0-80 <sup>0</sup>	0-80 <sup>0</sup>	NA

**Dry Needling** - Over the rhomboids, infraspinatus, and supraspinatus muscles, dry needling was used to minimize discomfort and trigger points [5].

**Exercises-** The exercise regimen comprised finger stair exercises, posture, pectoral and trapezius stretching activities, shoulder range of motion exercises, and shoulder stretching exercises. Exercises for rotator cuff and scapular muscle strengthening were undertaken once the patient had reached an active full range of motion. He was first instructed to complete each exercise, which consists of one set of five repetitions, three days a week. The number of workout sessions and series for each exercise was increased, progressively raising the exercise intensity. Over the course of four weeks, the workout program was performed once a day, five days each week, with 10 to 15 repetitions [6].

**Timeline**

Date of physiotherapy reference - 02/11/2023

Date of assessment - 05/11/2023

Date of commencement of treatment – 06/11/2023

Date of last follow up – 5/12/2023

**RESULTS**

The outcome measures used in the study were VAS for pain assessment, ROM assessment for movement of joints, isometric strength for assessing muscle strength, and the Shoulder Pain and Disability Index (SPADI) and Shoulder Function Index (SFInX) for assessing pain-related disability in day-to-day life.



**Figure 1.** Post rehabilitation increased range of motion (Flexion)

The data was collected at the initial evaluation and after 4 weeks. The patient has made significant improvements in all functional areas, as evidenced by pain reduction, improvements in joint range of motion (Figure 1), and muscle strength. The muscles on the right side were relaxed, with no pain and no tenderness on palpation. His right scapula was no higher than the left side. Shoulder pain reduced from 7/10 to 1/10 during activity. SPADI was 2.3% and SFInX was 89.

## DISCUSSION

Patients who suffer from shoulder impingement syndrome have constant pain. Patients often describe shoulder pain radiating to the lateral side of the midarm and originating mostly in the anterior and lateral region of the acromion. Patients who are lying on the afflicted side have more pain at night and during these times. Pain might occasionally also be accompanied by stiffness and weakness which coincided with the patient's chief complaints and reconfirmed with a special test which came positive [3]. ESWT is a popular and efficient treatment for treating shoulder and elbow chronic tendon issues as well as for reducing heel pain. When concentrated ESWT was used in conjunction with isokinetic exercise to rehabilitate the rotator cuff in individuals with SAIS, it offered a larger short- to medium-term decrease in discomfort, better recovery in functions, and improved muscular endurance than ESWT alone [2], which helped a lot with pain. MTrPs are extremely sensitive pressure receptors in the tight bands of skeletal muscle that are also very irritable sites. Due to MTrPs' impairment and discomfort, that might alter scapulohumeral rhythms, subacromial pain syndrome could occur. Dry needling regulates MTrPs, connective tissue, and muscles to reduce pain and functional impairment. A reduction in sensitizing chemicals like bradykinin and calcitonin might result after dry needling since it increases blood flow in MTrPs. Additionally, it might lessen synaptic and pH abnormalities, restoring a normal amount of enzymes like acetylcholinesterase where they are needed, and reducing the malfunctioning of the MTrPs' motor plate as a result [4], which helped him to get rid of the tender points and taught bands thus restoring the movements.

Exercise is usually recognized as a helpful intervention for treating symptomatic rotator cuff tendinopathy; however, combination therapy involving exercise and other therapies may be more beneficial than single-intervention therapies in treating this condition [6] which reinforces the idea of using combination therapy. A shoulder exercise program seeks to minimize pain, increase strength, speed up healing, correct abnormal

imbalances in muscles, and regain pain-free joint range of motion. Exercises involving stretching assist in speeding up healing as well as reducing stiffness and enhancing suppleness in the tendon. By strengthening the rotator cuff muscle using isometric and isotonic activities, the deltoid muscle's activity may be regulated once again. Electromyographic investigations have revealed that SAIS subjects had elevated action of the upper trapezius, diminished activity in the serratus anterior, middle, and lower trapezius fibres, and abnormalities in asynchronous timing. Scapular stability exercises are therefore included in the rehabilitation of those with SAIS helped us with deciding the exercise regime [7] strength, function, and quality of life. Data were summarized qualitatively using a best evidence synthesis. Treatment effect size and variance of individual studies were used to give an overall summary effect and data were converted to standardized mean difference with 95% confidence intervals (standardized mean difference (SMD). Minimizing pain in the shoulder while improving the function of the shoulder were the objectives for physiotherapy in rotator cuff tendinopathy in these researches. All of the programs that were examined focused solely on muscle growth [8], and encouraged us to include isometrics and free exercises. A study by Esra Circi et al., was conducted on effectiveness of extracorporeal shockwave treatment in subacromial impingement syndrome and they concluded that ESWT was found to be effective in the treatment of impingement syndrome both for pain and functional outcome in the early period [9]. Parvaneh Jalilpanah and colleagues conducted a study to investigate the impact of dry needling (DN) and muscle energy technique (MET), both individually and in combination, on patients with shoulder impingement syndrome and active trigger points in the infraspinatus muscle. The research found that the application of DN, MET, and their combination effectively reduced pain, increased pressure pain threshold (PPT), and improved shoulder range of motion (ROM) in individuals with shoulder impingement syndrome. Both techniques proved to be effective in treating trigger points, yet DN demonstrated superior efficacy in enhancing flexion and abduction ROM [10].

## CONCLUSION

In conclusion, following a four-week rehabilitation program, notable advancements were observed across various functional domains, including marked reductions in pain, enhanced joint range of motion, and improved muscle strength. Symmetry was achieved, with the right scapula now positioned no higher than its left counterpart. The promising outcomes of the four-week

rehabilitation program suggest potential future advancements through long-term follow-up studies, comparative effectiveness trials, multidisciplinary collaboration, and patient-centric approaches.

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**Author’s Contribution**– All authors contributed equally to the study.

**Conflict of Interest**– The authors declare that they have no conflict of interest.

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