

Comparative Analysis of Extra Corporeal Shock Wave Therapy and Steroid Injection for the Treatment of Shoulder Joint Adhesive Capsulitis: A Prospective Clinical Study

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Abstract: Introduction: Shoulder adhesive capsulitis (AC), also known as “frozen shoulder,” is a common shoulder disorder characterized by a progressive and painful restriction in range of motion (ROM) that results in functional disability. To compare the efficacy of radial extracorporeal shock-wave therapy (ESWT) vs. an intra-articular steroid injection in pain reduction and functional improvement in patients with shoulder adhesive capsulitis (AC). Methods: We randomized 53 patients with shoulder AC to receive either 4 sessions of ESWT, 1 week apart (ESWT group, n=27), or a single intra-articular steroid injection of 40 mg/ml of triamcinolone acetonide (steroid group, n=26). The outcome measure was functional improvement evaluated by Pain severity by visual analogue scale (VAS) score, the Quick Disabilities of the Arm, Shoulder and Hand (qDASH) score. Follow up done at 4-week, 8 week and 12 weeks. Results: By 12 weeks, both groups demonstrated a significant reduction in the qDASH score and pain severity. However, significantly improved function (qDASH score, 28.86 +_11.23 vs. 20.9+_10.6; P < .05) and shoulder pain reduction (visual analog scale score, 3.2+_0.73 vs. 2.46 +_0.71; P <.05) were found in the ESWT group vs. the steroid group. Conclusion: At 12 Weeks follow-up an intra-articular steroid injection is the main stay in improving ROM, function and pain in patients with shoulder AC. ESWT can be consider as an alternate treatment modality in patients with shoulder AC but it has a lower efficacy.

Keywords: Shoulder Adhesive capsulitis, Physical medicine, Extracorporeal shockwave therapy, Diabetic patients, Pain severity, Visual analogue scale, Quick Disabilities of the Arm, Shoulder and Hand (qDASH) score, Range of motion, Standard conservative management, Steroid therapy

1. Introduction

The current consensus definition of a frozen shoulder by the American Shoulder and Elbow Surgeons is “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]

A condition of varying severity characterized by the gradual development of global limitation of active and passive shoulder motion where radiographic findings other than osteopenia are absent. Adhesive capsulitis occurs in 2%-5% of the general population: it is 2-4 times more common in women than men and is most frequently seen in individuals aged between 40 and 60 years; and about 20%-30% of cases of this condition are bilateral. [2]

Extracorporeal Shockwave Therapy (ESWT) has garnered attention as a non-invasive treatment modality for various musculoskeletal conditions, including frozen shoulder. ESWT initiates an inflammatory-mediated healing process, promotes the healing of soft tissues, and improves blood flow to the treated area. [3]

Steroids help in control of inflammation and fasten the healing process but they should be use with precautions in allergic patients, diabetic patients.[4]

1.1 Aim and Objectives

This study was aimed to compare the efficacy of radial extracorporeal shock-wave therapy (ESWT) vs. an intra-articular steroid injection in pain reduction and functional improvement in patients with shoulder adhesive capsulitis (AC) at OPD, IPD in Department of PMR, S. M. S. Medical College Jaipur . Institutional & Ethical Permission was taken prior to the study

1.2 Study

Prospective clinical Study at PMR Department, SMS Medical College, Jaipur, conducted between March 2023 to august 2023.

1.3 Sample size

Required sample size was 53 based on an assumed study power of 80%, CL 95% and a predicted difference of 1.0 SD in mean changes in the measured variables between the 2 groups. [5]

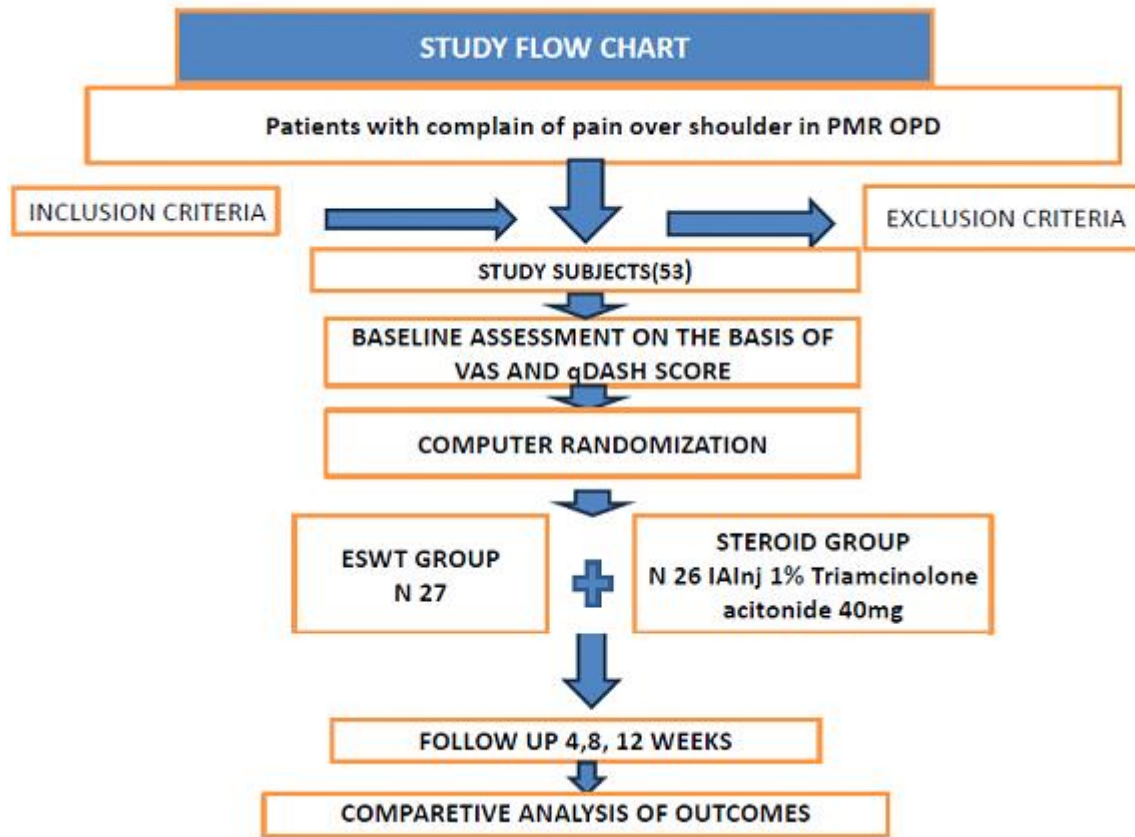
2. Methodology

Study proforma and Study Tool:-We randomized 53 patients with shoulder AC to receive either 4 sessions of ESWT, 1 week apart (ESWT group, n=27), or a single intra-

articular steroid injection of 40 mg/ml of triamcinolone acetonide (steroid group, n=26). The outcome measure was functional improvement evaluated by Pain severity by visual analogue scale (VAS) score, the Quick Disabilities of the Arm, Shoulder and Hand (qDASH) score. Follow up done at 4-week, 8 week and 12 weeks.

Inclusion criteria were: Age 18-65 years, Patients diagnosed with AC, Duration of symptoms >2week and those provide written informed consent.

Exclusion criteria's was: Contraindications to Treatment, Previous Interventions, Severe Comorbidities, Pregnancy and Psychiatric Conditions.



3. Results

Baseline Characteristics: The study enrolled a total of 53 participants with adhesive capsulitis, with 26 patients in Steroid Injection treatment group and 27 in Extra Corporeal

Shock Wave Therapy treatment group. The baseline characteristics, including age, gender distribution, duration of symptoms, and baseline range of motion and pain scores, were almost similar between the two groups, ensuring an appropriate comparison.

Table.1 Characteristics of the study participants

Characteristic	ESWT Group (n=27)	Control Group (n=26)
Age (years), Mean ± SD	53.4 ± 4.5	54.2 ± 4.7
Gender (Male/Female)	14/13	13/13
Duration of Capsulitis (week)	4.2± 1.3	3.7± 1.07
Affected shoulder	21R & 6L	22R & 4L
ROM on Day Zero	35'±5'	30'±5'

Outcome Measures:

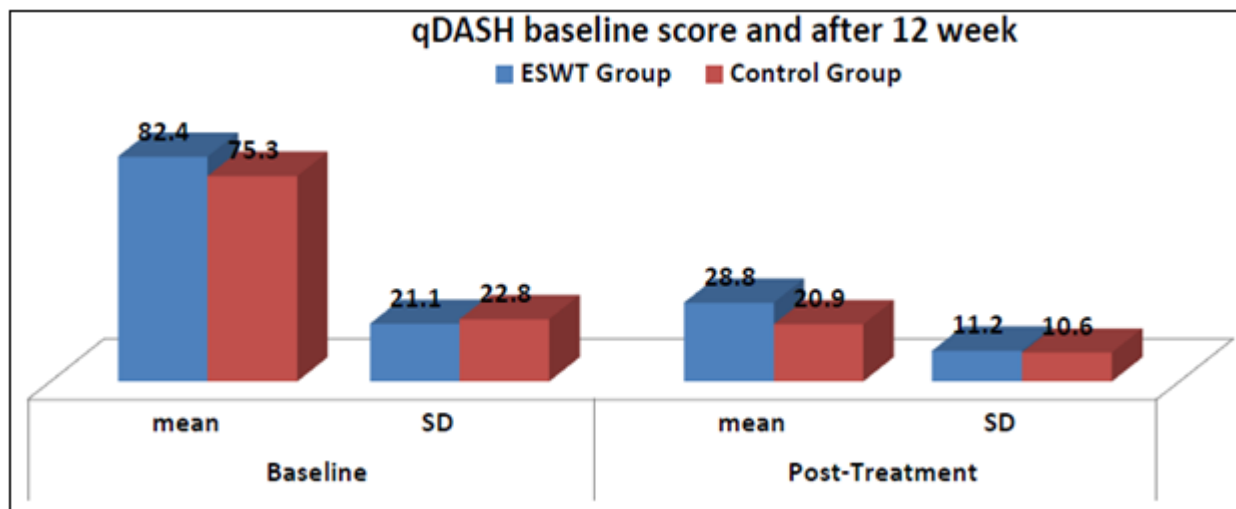
1) **Pain Levels (Visual Analog Scale):-** Shows significant mean difference, t test =4.02, p<0.05 between ESWT and steroid group

Table 2: Pain Levels (Visual Analog Scale)

Group	Baseline VAS (Mean ± SD)	Post-Treatment VAS (Mean ± SD)	p-value
ESWT Group	8.1 ± 2.4	3.2 ± 0.73	<0.05
Steroid Group	7.7.X ± 2.2	2.46 ± 0.6	<0.05

- At the initial assessment, both treatment groups reported high pain levels, with mean scores of 7.7 ± 2.2 in the Steroid Injection group and 8.1 ± 2.4 in the ESWT group.
- Over the course of treatment, the Steroid Injection group showed a rapid reduction in pain scores, reaching a mean score of 2.4 ± 0.6 at the 3-month follow-up.

- In contrast, the ESWT group exhibited a more gradual reduction in pain, with a mean score of 3.2 ± 0.7 at the 3-month follow-up.
- 2) **Shoulder Joint Range of Motion (Degrees):**
 - Baseline assessments revealed restricted range of motion in both groups, with no significant differences.
 - In the Steroid Injection group, significant improvements in shoulder joint range of motion were observed within the first month of treatment, with an increase of 40 degrees in forward flexion.
 - The ESWT group exhibited a more gradual improvement, with an increase of 32 degrees in forward flexion at the 3-month follow-up.
- 3) **Quick Disabilities of the Arm, Shoulder and Hand (qDASH) score: Shows significant mean difference, t test =2.3164, p=0.011 between steroid and ESWT group**



Discussion:

S.No	Discussion Points	Findings in our study
1.	Socio – Demographic distribution of the study participants	<ul style="list-style-type: none"> • Age group : 82% were from 40-60 years • Gender: Males =females, • Occupational status:44% Unemployed
2.	qDASH	<ul style="list-style-type: none"> • Significantly improved in both group but faster in steroid group
4.	VAS	<ul style="list-style-type: none"> • At 12 Weeks follow-up an intra-articular steroid injection is the main stay in improving function and pain in patients with shoulder AC.
5.	ROM	<ul style="list-style-type: none"> • EWST can be consider as an alternate treatment modality in patients with shoulder AC but it has a lower efficacy.}

4. Conclusion

Patients showed functional outcome improvements regardless of whether they were treated with ESWT or injection steroids, but those who received steroids had faster and better functional outcome improvements.

In the steroid group, pain was significantly reduced in the early phase of the study (baseline to 8th week); ADL and ROM improved in the later phases (fourth to 12th week).

5. Limitation of study

The sample size was relatively small, and the follow-up period was limited to 12 weeks. Longer-term follow-up and larger cohorts would provide more comprehensive insights into the comparative effectiveness of these treatments. Additionally, the potential for selection bias and generalizability to a broader population should be considered.

References

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