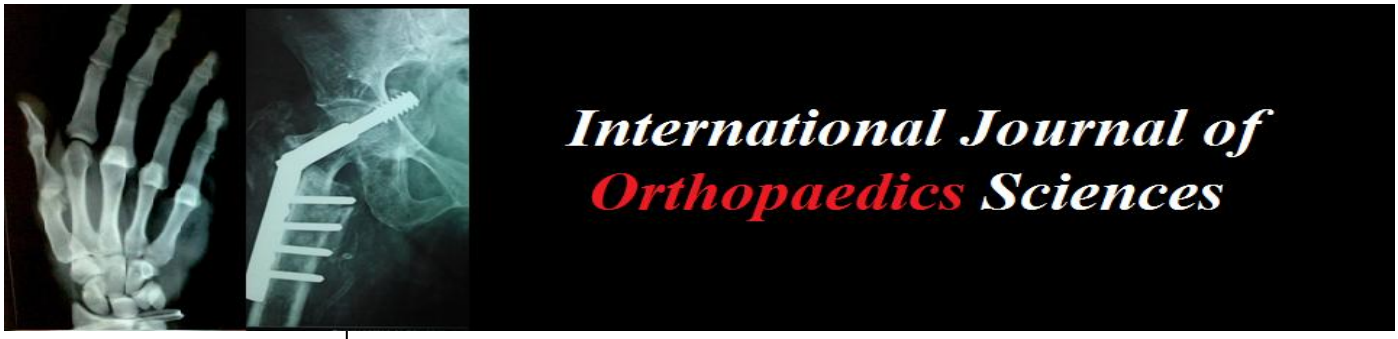

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An observational study to compare the outcome of local steroid injections and ultrasonic wave therapy in frozen shoulder patients

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Abstract
Background: Frozen shoulder is described as a painful shoulder condition of insidious onset associated with stiffness and disturbance in sleep due to pain in shoulder on the affected side [1]. Frozen shoulder is associated with synovitis and capsule contracture though it is never associated with capsular adhesions. The condition leads to a loss of range of movements of shoulder joint [3]. FS is a self-limiting disease. Various management options are available and in this study we compared the effects of physiotherapy modality Ultrasonic wave therapy with intraarticular steroid injections. Steroids are known to reduce inflammatory cascade and manipulation in any of the modalities reduce the adhesions.
Material and Methods: 100 patients of frozen shoulder were divided in 2 groups (50 patients each) with nonspecific pain and stiff shoulder not treated over a period of one month by conventional analgesics. In Group 1 Patients treated with two intraarticular steroid while in group 2 Patients treated with ultrasonic wave therapy. Diagnosis of frozen shoulder was confirmed by ultrasonography of shoulder. Outcomes were accessed with SPADI score & Pre and post treatment VAS (visual analog scale) for pain.
Observations: Group I patients with intraarticular injections showed better improvement manifested as increased range of motion and significant improvement in SPADI score at Day 7 as compared to group 2. But at later stage that is at Day 21 and 60, improvement in both the groups was similar as shown in Table 1 and graphs. Internal rotation at the end of 60 days was upto D12 in group 1 & 2 both. External rotation was 80.4(±10.6) while in group 2 was 78.8 (±11.4) at the end of day 60. Abduction in group 1 was 169.2(±11.4) in group 2 it was 168.4 (SD±8.2) at day 60. SPADI score was 6.4% (SD±7.6) in group 1 while in group 2 it was 7.2% (SD±9.6). VAS score was 1.2 in group 1 while in group 2 it was 1.5 at day 60.
Results and Conclusions: Immediate improvement is better with intra articular injections but overall long term results are very much similar in both the injection and physiotherapy groups. For any of the acute situations, intra articular injections may be tried to provide immediate relief but both the therapies are providing same degree of rehabilitation over a longer period. Otherwise also a long therapy with proper compliance of patient and supervised exercise protocol is mandatory for adhesive capsulitis of shoulder joint.

Keywords: frozen shoulder, adhesive capsulitis, steroid injection, ultrasound, physiotherapy, SPADI score, VAS score

Introduction
In 1934 the term FROZEN SHOULDER (FS) was first introduced by Codman. This is described as a painful shoulder condition of insidious onset associated with stiffness and disturbance in sleep due to pain in shoulder on the affected side [1]. It is associated with the marked reduction in abduction and external rotation that are the hallmarks of the disease. In 1872, similar condition had already been identified by Duplay as "peri-arthritis" [2].
Neviaser in 1945, coined the term "adhesive capsulitis." This more recent term is misnomer as although a frozen shoulder is associated with synovitis and capsule contracture, it is never associated with capsular adhesions. The condition leads to a loss of range of movements of shoulder joint [3].
FS is a self-limiting disease process but a lot of chronic disabilities can develop over the course of disease. Various management options include analgesics, corticosteroids in oral or

intra articular form, arthroscopic adhesiolysis, manipulation of shoulder under sedation or anaesthesia, physiotherapy or open surgical procedures. This study is meant to compare the effects of physiotherapy modality Ultrasonic wave therapy with intraarticular steroid injections. Steroids are known to reduce inflammatory cascade and manipulation in any of the modalities reduce the adhesions.

Primary Objectives of the study: we compared the outcome of local steroid injections and ultrasonic wave therapy in frozen shoulder patients.

Material and Methods

Setting: Study was carried out at Adesh Institute of Medical sciences and research, Bathinda.

Duration: Study was carried out until the desired numbers of subjects were completed, after getting approval from the research committee, AIMSR and ethical committee of Adesh University.

Type of study: Cross-sectional observational study.

Sample size: Patients who came in OPD of Department of orthopaedics for six months were accessed and 100 patients of frozen shoulder were taken from department of orthopaedics and divided in 2 groups (50 patients each).

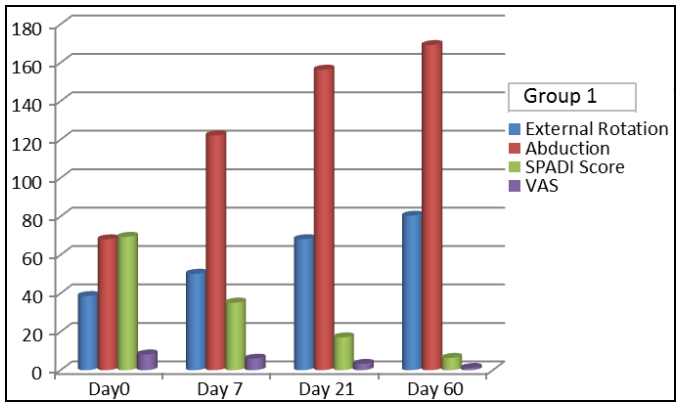
Inclusion and Exclusion Criteria

Inclusion criteria include adult patient with nonspecific pain and stiff shoulder not treated over a period of one month by conventional analgesics.

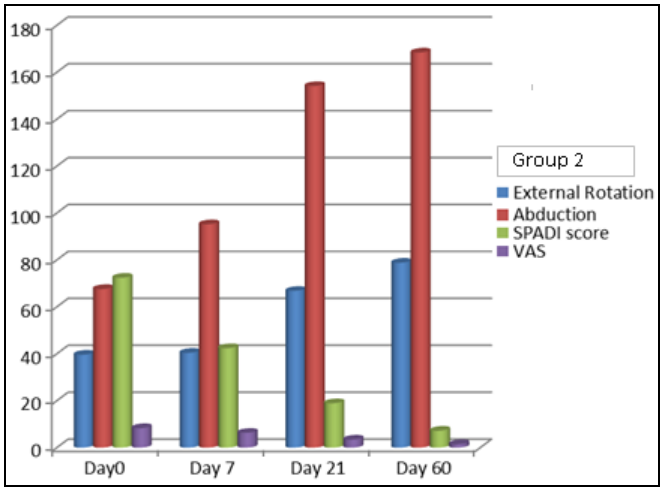
Exclusion Criteria: Patients with intrinsic shoulder diseases as biceps tendinitis, rotator cuff tears, history of previous trauma and joint arthritis plus extrinsic causes as Parkinsonism, cervical radiculopathy and previous surgery of shoulder [5] are excluded.

Patients of shoulder pain were assessed and diagnosed as frozen shoulder. Diagnosis of frozen shoulder was confirmed by ultrasonography of shoulder. Then, all patients were divided into two groups. Outcome would be accessed with SPADI score.

Graphs showing Range of motion, SPADI score and VAS in Group 1 and Group 2



Group 1: Patients treated with two intraarticular steroid (Depo-medrol® 40mg and 10ml of 0.2% lignocaine).



Group 2: Patients treated with ultrasonic wave therapy.

Pre and post treatment VAS (visual analog scale) for pain, range of motion of the affected shoulder (abduction, external rotation and internal rotation) pre and posttreatment along with the analysis of SPADI scores [9] at day 0, day 7, day 21 and day 60 is done and compared.

Observations

Group I patients with intraarticular injections showed better improvement manifested as increased range of motion and significant improvement in SPADI score at Day 7 as compared to group 2. But at later stage that is at Day 21 and 60, improvement in both the groups was similar as shown in Table 1 and graphs.

Comparision of two groups showing range of motion shoulder, SPADI scores and VAS scores

Table 1: Group I Intra articular Injection, Group 2 Ultrasonic therapy

Groups →	Group 1				Group 2			
Observations ↓	Day 0	Day 7	Day 21	Day 60	Day 0	Day 7	Day 21	Day 60
Internal Rotation	Max. Upto Sacrum	L3	L1	D12	Max. Upto Sacrum	L4	L2	D12
External Rotation	38.6 (Sd±7.6)	50.2 (Sd±9.6)	68.2 (Sd±11.6)	80.4 (Sd±10.6)	39.6 (Sd±7.6)	40.4 (Sd±11.6)	66.8 (Sd±9.9)	78.8 (Sd±11.4)
Abduction Shoulder	68.1 (Sd±15.2)	122.2 (Sd±21.1)	156.4 (Sd±12.2)	169.2 (Sd±11.4)	67.6 (Sd±9.6)	95.2 (Sd±18.2)	154.1 (Sd±19.2)	168.4 (Sd±8.2)
Spadi Score	69.4% (Sd±6.6)	35.2% (Sd±8.6)	17.1% (Sd±11.6)	6.4% (Sd±7.6)	72.4% (Sd±6.8)	42.4% (Sd±12.6)	18.9% (Sd±6.9)	7.2% (Sd±9.6)
Vas	8.2	6.0	3.3	1.2	8.3	6.3	3.4	1.5

Discussion

We studied the efficacy of intraarticular steroid injection versus ultrasonic wave therapy for patients with frozen shoulder. We also evaluated the safety and efficacy of steroid injection over ultrasonic wave therapy. Patients were evaluated at 7th day, 21st day and 60th day after initiation of treatment. A record of VAS (visual analog score), shoulder range of motion and SPADI score was made at each of the follow-up visits. An improvement in SPADI score and all the range of motion was observed in both the groups over a duration of six months.

Equal effectiveness of both the interventions was documented by of Lee *et al*., Bulgen *et al.* [4] but that steroid injection proved significantly much better than physiotherapy in improving in function at 6 weeks and was similar at 26 weeks. There was a difference in the frequency of steroid injections used in different studies, a study conducted by Bulgen *et al.* received 3 injections at a week's interval, while a study done by Lee *et al.* a single intraarticular injection was used. Also they reviewed their results at six to seven weeks. The inconsistency indicated that more injections were probably related to faster functional improvement compared with physiotherapy.

A meta-analysis by Blanchard *et al.* [5] suggested that although both interventions were found to be effective for FS, isolated steroid injection was more effective in improving shoulder function from six to twenty six weeks. More stress is laid on improvement in range of motion of shoulder especially external rotation rather than pain shoulder. Adverse effects of both the interventions were also taken into consideration.

Difference in results may be attributed to the dose of pain killers Nonsteroidal anti-inflammatory agents taken by the patients [6]. Analgesic dose was not considered in any of the meta-analysis or study.

We found that 2 intra-articular steroid injection for treatment of frozen shoulder showed satisfactory improvement in function of shoulder and reduction in VAS for pain which otherwise take longer duration of compliance ultrasonic therapy session for weeks. The only undermining factor in our study was patients were in different stages of frozen shoulder However, caution must be taken when interpreting outcomes. According to the pathological progress, this condition can be divided into the following three stages, freezing stage with increasing pain, frozen stage with decreasing pain, and thawing stage. In the current analysis, patients with different stages of condition were included for comparison, undermining the strength of outcomes. Limited information about steroid injection technique precluded us from making subgroup analysis. Besides, a cost-effective analysis was not launched due to lack of details in articles. Compared with a single steroid injection in most studies, physiotherapy consisted of several sessions with different modalities, adding financial burden to patients and deceasing compliance. Third, components of physiotherapy were various, and detailed prescription of NSAIDs was not detailed among studies. It is the variety that precludes us from performing subgroup analysis to refine results. Finally, some data input for calculation was an estimate one, and detailed exercise programs were not always reported, which might have exert an impact on the pooled outcomes.

Results and Conclusions

Immediate improvement is better with intra articular injections but overall long term results are very much similar in both the injection and physiotherapy groups. This study also highlights the adverse effects of invasive procedures especially in old and debilitated patients.

For any of the acute situations, intra articular injections may be tried to provide immediate relief but both the therapies are providing same degree of rehabilitation over a longer period. Otherwise also a long therapy with proper compliance of patient and supervised exercise protocol is mandatory for adhesive capsulitis of shoulder joint.

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