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Comparison of the Efficacy of Physiotherapy and Local Corticosteroid Injections on Painful shoulder

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Abstract

Objectives: Local corticosteroid injections and physiotherapy are commonly used treatment options for painful shoulder. While evidence for these two interventions is poor we decided to design a study in order to investigate the efficacy of local steroid injections and physiotherapy and compare the results of two treatment groups.

Methods: A total of 40 patients admitting with shoulder pain were included in the study. Patients were randomized to two treatment groups. The first group (n=20) received a total of 10 physiotherapy sessions. The second group (n=20) received a single corticosteroid injection for the shoulder joint through posterior approach. In addition, both treatment groups received a standardized exercise program. The patients were evaluated before treatment and 2,4,12,24 weeks after the treatment for the clinical and functional parameteres.

Results: Compared to baseline, statistically significant improvement was noted at all follow-up assessments in both groups in Visual Analog Scala(VAS) score, shoulder ROM(range of motion) measurements, Constant-Murley score(CMS), and Shoulder Disability Questionnaire (SDQ)score. There was no significant difference between the two treatment interventions.

Conclusions: Both physiotherapy and local corticosteroid injections are effective in reducing pain and improving functional status in patients for shoulder pain and two methods are not superior to each other.

Keywords: Shoulder pain; Physiotherapy; Corticosteroid injections; VAS; Constant–Murley score

Abbreviations : VAS: Visual Analog Scala; ROM: Range of Motion; CMS: Constant-Murley Score; SDQ: Shoulder Disability Questionnaire

Introduction

Shoulder pain is the third most common musculoskeleal symptom encountered in the medical practice after back and neck pain [1]. Periarticular shoulder disorders refers to a set of diverse diseases including subacromial and subdeltoid bursistis, rotator cuff tendinitis, calcific tendinitis and rotator cuff tear with or without adhesive capsulitis [2-4]. No standardized classification for shoulder complaints exists, most shoulder patients show clinical signs of subacromial impingement [5]. The symptoms of subacromial impingement syndrome primarily includes pain, functional restrictions and limitation in range of motion [2,3,5]. Differention is possible with adequate history and examination, on the other hand imaging tecniques like ultrasound and magnetic resonans imaging (MRI) are beneficial in exposing the underlying pathology [5,6]. Considering mainly the periarticular disorders like rotator cuff tendinitis, calcific tendinitis, partial tendon ruptures; similar conservative treatment strategies are being used [2,3,7]. However, many commonly used interventions including non-steroidal antiinflammatory drugs, physical therapy, local corticosteroid injections and surgery have little evidence either to support or refute their efficacy. Results of meta-analysis searching effects of physiotherapy on shoulder pain indicate that some physiotherapy interventions are effective for some spesific shoulder disorders, however results overall provide little evidence [8]. On the other hand, meta-analysis of the trials searching the efficacy of intraarticular corticostreroid injections for shoulder pain indicate that the effects are short lived and small [9]. While there is no consensus regarding the effectiveness of these two treatment options comprative results are lacking, we decided to investigate long term effects of both physiotherapy and corticosteroid injections on shoulder pain.

Material and Methods

The study enrolled 94 patients who admitted to the Department of Physical Medicine and Rehabilitation with the primary complaints shoulder pain were selected between 6 months period. 12 patients who had Diabetes Mellitus,13 patients who had limitation in passive range of motion, 3 patients who had shoulder pain after stroke, 4 patients who has taken physical therapy in 6 months after stroke, 7 patients who received steroid injection in 6 months period, 15 patients who had total rupture of rotator cuff in shoulder MRI excluded from the study. Total 40 patients were randomized to two treatment groups. All patients completed the study. The flowchart of patients recruiments is given in Figure 1.

The inclusion criteria were; who had a clinical sign of a painfull arc, positive Hawkins test or Neer impingement sign, limitation in active range of motion, Exclusion criteria were limitation in passive range of motion; history of upper extremity fracture, dislocation, surgery, inflammatory rheumatic disease, diabetes mellitus; shoulder pain secondary to stroke; referred shoulder pain (such as visceral pathologies, cervical osteoarthritis, etc), history of physical therapy or corticosteroid injection within the last 6 months; contraindication

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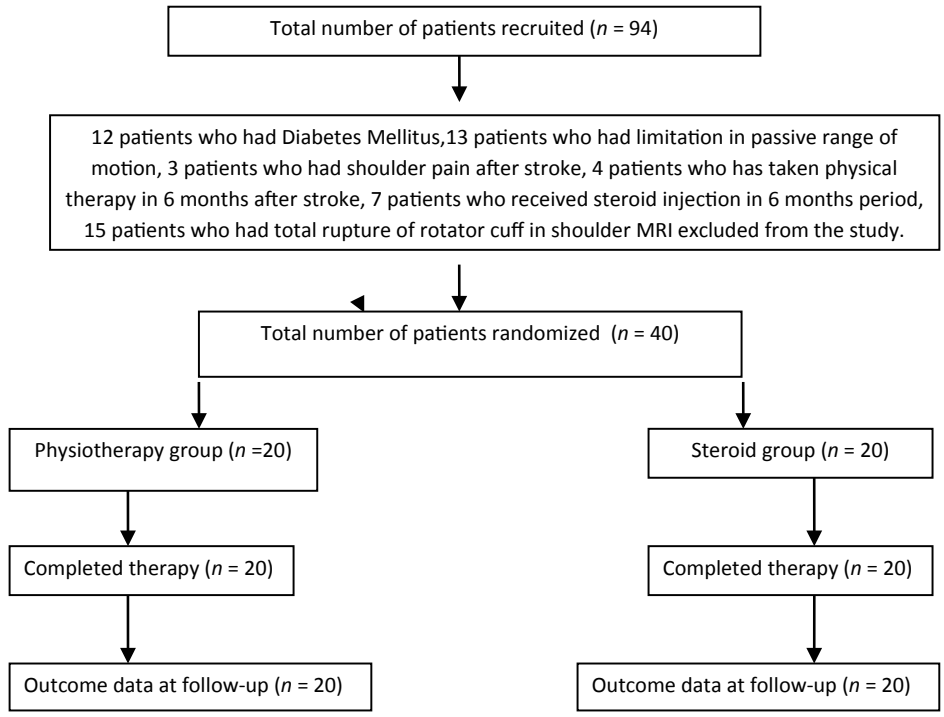

Figure 1: Flowchart of patients.

to corticosteroid injection; total rupture of the rotator cuff proven in shoulder MRI.

After obtaining informed consent from all patients, their sociodemographic information including age, sex, occupation, educational status, clinical information including symptom duration, history of trauma, previous treatments were recorded. The study was approved by the Local Ethical Board.

Magnetic Resonance Imaging (MRI) was performed in all patients in order to determine the shoulder pathology and rule out complete rupture of the rotator cuff. MRI was obtained in coronal, axial and sagittal planes and T1, T2 weighted and fat suppression sequences were used.

After the baseline assessment and data collection, a computer-generated random number list was used to randomize patients into two equal groups, Randomization was performed using sequential sealed envelopes prepared by an independent physician before enrolment. The sealed envelopes contained a record of the allocation. The researchers was all blind to the group allocation throughout the study. The first group received a total of 10 physical therapy sessions 5 times a week for two weeks. Physical therapy included applications of ultrasound 1.5 watt/cm^2 for 5 minutes (Therasonic 450 model, 1 MHz, probe area 5 cm^2), TENS (Bio Tens ST-606M model) for 20 minutes and hot pack for 20 minutes to the shoulder region. The second group received subacromial injection treatment. 40 mg triamcinolon acetonide 1 ml, 2% prilocaine hydrochloride 2 ml was applied to 20 shoulders of 20 patients. The injection was applied from the posterior of shoulder, 1 cm inferior to the corner of spina scapula combining with acromion, 1 cm paralel from medial to acromion [10].

In addition to their randomized treatment both groups received a standard home exercise program consisting of Codman, finger ladder, active ROM, stretching and strengthening exercises for 6 months. Exercises were performed once by the same physiotherapist in the clinic. The patients asked to practice the same exercise at home once a day being 10 repeats each for 6 months.

This was a single-blind study and the physician performing physical examination and assessments was blinded to treatment. All patients were assessed before treatment and 2, 4, 12 and 24 weeks after treatment by the following parameters:

Pain severity by visual analog scale (VAS)

The patient was asked to mark the severity of pain on a 10 cm linear scale and the result was recorded in millimeters. Pain severities before treatment and follow-up visits were recorded.

Assessment of shoulder range of motion (ROM)

Range of motion of the shoulder were measured by handheld goniometer. To measure shoulder flexion and abduction, the examiner measured the range of movement of the arms in sagittal and coronal plannes while the patient was asked to sit and extend the elbowjoint. For external and internal rotation the patient was sat and externally rotated the shoulder to 90°. The normal range of shoulder flexion and abduction was defined as 180°, while that of external and internal rotation was 90° [4].

Constant-Murley functional shoulder assessment scale (CMS)

The Constant-Murley score was introduced to determine the functionality after the treatment of a shoulder pain.. The test is divided into four subscales: pain (15 points), activities of daily living (20 points), strength (25 points) and range of motion: forward elevation, external rotation, abduction and internal rotation of the shoulder (40 points). The higher the score indicating a higher quality of the function [11,12].

Shoulder disability questionnaire (SDQ)

Patients were asked to complete SDQ consisting of 16 items about daily activities [13-15]. They were asked to report if they had performed these activities in the last 24 hours as yes/no/not appropriate. Total score was calculated by dividing number of items answered as "yes" by the total number of responded items and multiplied by 100. (0/100:best/worst). Reliability and validity of the Turkish version of this questionnaire has been tested [16].

Statistical analysis

Statistical evaluation of data was performed by using Statistical Package for the Social Sciences (SPSS) version 19.0. Sociodemographic and clinical features of the patients was evaluated using chi square and independent t test. Within group changes at 2, 4, 12 and 24 weeks after treatment were analyzed by Wilcoxon test and paired t test. Between group comparison of difference and percent changes were performed by Mann-Whitney U and independent t-test. P value of <0.05 was considered as statistically significant.

Results

Out of 40 patients completed the study 28 were women and 12 were men. Mean age of the patients was 51.4 ± 8.4 years with a mean symptom duration of 5.2 ± 3.4 months. There were no significant differences between the study groups in terms of sociodemographic and baseline clinical features (Table 1). History of minor trauma (i.e. fall, sprain) was present in 8 patients. Type 3 acromion was noted in shoulder MRI of 1 patient, Type 2 acromion was noted in 8 patients, increased supraspinatus tendon intensity (compatible with impingement syndrome) in 14 patients, reduced supraspinatus tendon thickness in 17 patients. In 4 patients with Type 2 acromion, supraspinatus tendon thickness was additionally found to be reduced.

Compared to baseline, statistically significant improvement was noted at all follow-up assessments in both groups in VAS score, CMS, and SDQ score ($p<0.05$). No significant difference was found between the two treatment groups ($p>0.05$). VAS, constant and SDQ scores before treatment anf follow-up visits are summarized in Table 2. Decreased levels of VAS scores and increased levels of Constant scores are shown in Figures 2 and 3.

Compared to baseline, statistically significant improvement was noted at all follow-up assessments in both groups in shoulder ROM measurements ($p<0.05$). No significant difference was found between the two treatment groups ($p>0.05$) Shoulder ROM measurements before treatment anf follow-up visits are summarized in Table 3.

Discussion

In our study both physiotherapy and local corticosteroid injections are effective in reducing pain and improving physical functions in patients with shoulder pain. Both treatment modalities showed sustained long-term effectiveness and two methods are not superior to each other.

Management of shoulder pain primarily involves conservative treatment methods such as NSAIDs, rest, physical therapy, subacromial injections (corticosteroids, local anesthetics, hyaluronate) and exercise. If not treated early and effectively, surgical treatment may be required

	Group 1 (n=20)	Group 2 (n=20)	p
Sex Male (n) Female (n)	 14 6	 14 6	1.0
Age (years) (mean ± SD)	51.4 ± 8.1	51.4 ± 8.9	1.0
Symptom duration (months) (mean ± SD)	5.4 ± 3.4	5.1 ± 3.5	0.7
History of trauma	3	5	0.4

Table 1: Sociodemographic and baseline clinical features of the patients.

	Group 1 n(20) Med (min-max)	Group 2 n(20) Med (min-max)	p
VAS score			
Before treatment 0.6	77.1 (17-100)	73.5(45-100)	
After 2 weeks	36.1(5-78)	34.4(0-92)	0.7
After 4 weeks	22.2(0-75)	23.3(0-82)	0.8
After 12 weeks	19.8(0-87)	19.7(0-72)	0.7
After 24 weeks	10.2(0-70)	16.2(0-92)	0.5
Constant-Murley score			
Before treatment 0.8	41.1(25-62)	41.7(27-63)	
After 2weeks	59.5(43-71)	60.5(31-79)	0.8
After 4 weeks	78.8(43-100)	72.2(53-100)	0.4
After 12 weeks	90.3(60-100)	86.1(49-100)	0.9
After 24 weeks	93.4(60-100)	85.8(43-100)	0.7
SDQ score			
Baseline	79.9(25-100)	73.9(50-92)	0.1
After 2 weeks	36.0(6-100)	29.8(0-93)	0.4
After 4 weeks	28.1(0-100)	20.5(0-93)	0.5
After 12 weeks	24.7(0-92)	25.6(0-93)	0.9
After 24 weeks	16.7(0-64)	23.6(0-93)	0.3
VAS: Visual Analog Scala SDQ: Shoulder Disability Questionnaire			

Table 2: Assessment results before treatment and follow-up visits.

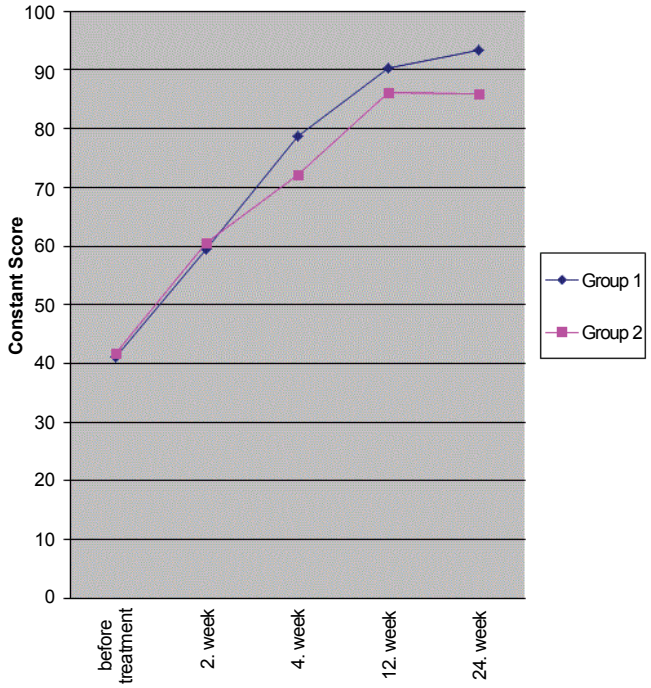

Figure 2: Constant Murley Scores before teratment and follow-up visits of two groups.

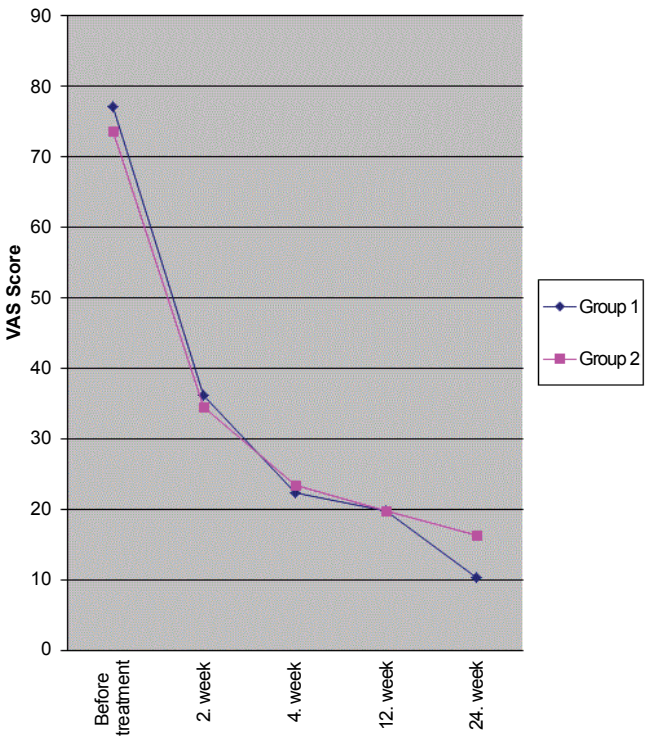

Figure 3: Visual Analog Scala scores before teratment and follow-up visits of two groups.

[1,2,4,5,7]. Several factors affect the outcome of conservative treatment in shoulder pain. Fastest improvements are achieved in patients with pain onset after an unusual activity or mild trauma that develops short-term symptoms due to excessive use of the arm [17]. There are numerous randomized, controlled studies that investigated physical therapy modalities and corticosteroid injections for the management of shoulder pain [2,3,5,8,9].

Physiotherapy is often prescribed for the treatment of shoulder pain. In a systematic review effectiveness of physiotherapy in shoulder impingement syndrome summarized. This review shows an equal effectiveness of physiotherapist-led exercises compared with surgery in the long-term and of home-based exercises compared with combined physiotherapy interventions in patients with shoulder impingement syndrome in the short and long-term, passive treatments cannot be recommended. In studies, electrotherapy methods such as TENS and interferential current therapy have been commonly used for pain control. Ultrasound is another physical therapy modality that is widely used for soft tissue disorders [8]. In our study, we used a standard physical therapy program consisting of hotpack, TENS and ultrasound which was applied to patients in a total of 10 sessions. Apart from this, patients were assigned a standard home exercise program consisting of Codman shoulder exercises, finger ladder, active ROM, stretching and strengthening exercises. We found significant improvements in pain (VAS) scores, shoulder ROM measurements Constant Murley and SDQ scores at 2,4,12,24 weeks after treatment for all patients.

Local corticosteroid injections are commonly used for relief of shoulder pain. Local corticosteroid injections suppress local inflammatory response in soft tissue and synovium. In a study by Akgun et al. in 48 patients with subacromial impingement syndrome to assess the efficacy of local corticosteroid injections, the authors reported that corticosteroid injections were effective for pain relief when combined with exercises [18]. In another study, 30 patients with subacromial impingement syndrome were divided into three groups and Group A received 20 mg triamcinolone, Group B received 20 mg triamcinolone and 1500 IU hyaluronidase and Group C received 40 mg triamcinolone two times. A more significant improvement in pain and functional status was achieved in the group receiving 40 mg triamcinolone [19]. In our study, 40 mg triamcinolone acetonide was administered as a single dose by the same person using a posterior approach. Patients were also assigned a standard home exercise program consisting of Codman shoulder exercises, finger ladder, active ROM, stretching and strengthening exercises. We observed significant improvements in VAS, shoulder ROM measurements, Constant Murley and SDQ scores at 2,4,12,24 weeks after treatment for all patients.

There are studies in literature that compared physical therapy methods versus local corticosteroid injections for painful shoulder [20,21]. In Van der Windt et al.'s study, patients were divided into 2 groups. Group 1 patients were administered up to 3 injections of 40 mg triamcinolone acetonide and Group 2 received a physical therapy program comprising heat or cold applications, electrotherapy and exercises. While corticosteroid injections were superior to physical therapy in the early stage, no difference was found between 2 groups in the long-term [20]. In their study, Hay et al. divided patients into 2 groups and while Group 1 patients were injected 40 mg methylprednisolone and second dose was given when symptoms recurred, Group 2 patients were administered physical therapy consisting of analgesic currents with addition of US and manual therapy when deemed necessary on the basis of patient's clinical findings. No between-group difference was found in the early phase; however, physical therapy group showed better results at 6 months compared to the group receiving corticosteroid

	Group 1 n(20) mean ± sd	Group 2 n(20) mean ± sd	p
Flexion			
Before treatment	160.5 ± 23.7	166.5 ± 17.6	0.4
After 2 weeks	178 ± 5,2	177 ± 9.8	0.8
After 4 weeks	179 ± 4.5	178.5 ± 4.9	0.7
After 12 weeks	179 ± 2.2	178 ± 5.2	0.5
After 24 weeks	180 ± 0	178.5 ± 4.9	0.6
Abduction			
Before treatment	159.5 ± 29.3	159.5 ± 26.1	0.9
After 2 weeks	175.5 ± 16,2	175±16.1	0.6
After 4 weeks	176.5 ± 9.5	178.5 ± 6.2	0.7
After 12 weeks	179.5 ± 2.2	178.5 ± 4.9	0.7
After 24 weeks	180.0 ± 0	179 ± 4.5	0.7
Internal rotation			
Before treatment	75 ± 19.1	77.5 ± 16.1	0.7
After 2 weeks	87 ± 7.3	86.5 ± 9.3	0.8
After 4 weeks	89 ± 4.5	88 ± 7.2	0.7
After 12 weeks	89 ± 3.2	88.5 ± 4.9	0.9
After 24 weeks	89.5 ± 2.2	89 ± 4.5	0.9
External rotation			
Before treatment	79.5 ± 15	81.5 ± 12.1	0.8
After 2 weeks	89 ± 4.3	87 ± 8.3	0.6
After 4 weeks	89 ± 4.5	88.5 ± 4.2	0.7
After 12 weeks	90 ± 0	89.5 ± 2.4	0.6
After 24 weeks	90 ± 0	89.5 ± 2.2	0.7
ROM:Range of motion			

Table 3: Shoulder ROM (degrees) before treatment and follow-up visits.

injections [21]. In our study, we found significant improvements in all parameters studied for both groups during posttreatment follow-up visits at 2,4,12,24 weeks and there was no significant difference between study groups. We observed that corticosteroid injections and physical therapy modalities were equally effective for painful shoulder with no superiority of one modality over another. Systematic reviews and meta-analyses have consistently reported that local corticosteroid injections were efficacious but their effects persisted only for a short-term [9]. However, we observed therapeutic efficacy in the corticosteroid group which was maintained through 24 weeks. We believe that this finding might be explained by the fact that all of our patients participated in a home exercise program. Studies exploring the effectiveness of physical therapy compared to local corticosteroid injections for shoulder pain differ with respect to the dosage frequency and doses of steroids administered and physical therapy modalities. Our study differs from others in using equal number and dose of injections and standardized physical therapy modalities for each patient.

The major limitations of our study include small sample size and lack of a placebo-control.

As a result of our present single-blind, randomized controlled study, it was found that both physical therapy and local corticosteroid injections were effective for improving pain and functional status in painful shoulder. Both treatment modalities showed sustained long-term effectiveness and two methods are not superior to each other. We concluded that both treatment methods can be safely used in patients with shoulder pain and their effectiveness might be improved when used in combination with an exercise program. Cost-effectiveness studies and patient's expectations would be valuable in determining which method should be definitively preferred for painful shoulder.

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