Original Article

Functional results of local corticosteroid injections in the management of shoulder pain

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ABSTRACT

Objective: To investigate the intensity of pain, range of motion (ROM) of shoulder and functional status in patients with shoulder pain after subacromial injection.

Methodology: Mixed injection which was composed of 1cc/40 mg metilprednizolon asetat and 1 cc/9 mg bupivacaine was applied into subacromial zone for patients with shoulder pain. Patients were evaluated before injection and three months, one year after injection. ROM was measured with goniometer. Pain was evaluated with Visual Analog Scale (VAS). General condition of extremities was evaluated with Constant Shoulder Score and functional status of shoulder was evaluated with Turkish version of Disabilities of Arm, Shoulder and Hand (DASH-T). Short Form-36 was used to assess general health status of the patients. Beck Depression Scale was used for evaluation of depressive symptoms.

Results: Sixty two patients were evaluated. Mean age was 51.16±10.58 years. It was observed that there was significant decrease for pain intensity and BDI scores, and significant increase for ROM of shoulder. Significant improvement in the functional status of upper extremities was also observed in these patients.

Conclusion: Improvements for functional status of upper extremities and pain relief in patients with shoulder pain at short term after injection was observed.

KEY WORDS: Corticosteroid injections, Shoulder pain, Functional status of upper extremities.

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INTRODUCTION

Shoulder pain, prevalence increases with age, reaching at peak at around age 50.[1] Subacromial impingement syndrome (SAIS) (as defined with Neer criteria) is reported to be the most common diagnosis[2] and common pathology found in the shoulder region. This pathology causes edema, inflammation and pain while reducing shoulder functions, pain and limitations significantly affect the patient's quality of life. The treatment of subacromial impingement syndrome is 90-95% conservative; and along with the traditionally implemented methods, effectiveness of the new methods are being tested as well.[3,4]

Common non-operative treatments include exercise, manual therapy, and corticosteroid injections.[5-7] With respect to subacromial impingement syndrome in particular, recent systematic reviews have found beneficial effects of exercises and manual therapy, and corticosteroid injections.[8,9] Local anesthetics and/or steroid injections are often used on the subacromial space for the diagnosis[2] and the treatment of subacromial impingement syndrome.

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If patients have a poor response to initial treatment for chronic shoulder disorders, corticosteroid injections combined with a local anesthetic can be administered. The injection needs to be directed toward the affected area, such as the subacromial space, acromioclavicular joint, or glenohumeral joint.[10-12] Individual studies have found subacromial injections to be beneficial, particularly for short-term decreases in pain and increases in function.[11,12] In these studies, generally, exercise programs are not used at all or exercise programs are not standardized. Although there are many studies on duration between injections, quality and dosage of medicines used, the effect of injections on success of exercise programs has not been determined yet. Subacromial injections for rotator cuff disease are a treatment option currently supported by the American Academy of Orthopedic Surgeons (AAOS), although this may change with further review.[13]

In this study, we examined the effects of corticosteroid plus local anesthetics injection administered to the patients with subacromial impingement syndrome. We hypothesis that the injection of corticosteroid plus local anesthetics allows the patient to do exercises and manual therapy via reducing pain, and causes better outcomes for people with subacromial impingement syndrome.

METHODOLOGY

Study participants: In this study, 62 consecutive patients diagnosed with sub-acute SAIS in the Department of Orthopaedics and Traumatology between August 2008 and March 2010 were included. Patients were given information on the study and those who agreed to participate were included in the study. Patients were treated with subacromial injections of corticosteroid and local anesthetics as ''blind'' according to anatomic landmarks.

Inclusion criteria were taken as follows: The unilateral shoulder pain lasts for six months or longer; symptoms of impingement syndrome in medical examination (Neer impingement test, Hawkins signs, Jobe supraspinatus test).[14,15]

Exclusion criteria were known blood coagulation disorders; evidence of referred pain from the cervical spine or internal organs; history of rheumatoid arthritis, polymyalgia rheumatica, or other inflammatory arthritis; bilateral shoulder pain; neurological diagnosis such as cerebrovascular event with shoulder involvement; contraindication to steroid-lidocaine injection; pregnancy or breast feeding; previous fracture, dislocation, or surgery to shoulder, upper limb, neck, or thorax; steroid injections or physiotherapy for the symptomatic shoulder pain within the previous six months; or inability to provide informed consent. And the patients under the psychiatric treatment were excluded.

Interventions: The mean age of the patients was 51.16±10.58 years. 25 male and 37 female with a mean duration of symptoms of six months who were treated with subacromial injection. Prior treatments consisted of anti-inflammatories, physical therapy and subacromial injections. Forty seven right shoulders and 15 left shoulders were involved. The treatment protocol consisted of subacromial injection of corticosteroid (1cc/40 mg metilprednizolon asetat) and local anaesthetics (1 cc/9 mg bupivacaine) combination.

The injections were administered under sterile conditions and fluoroscopically-guided. All patients were prescribed home based exercise program which consisted of pendulum exercises, ROM exercises and at 15th day after injections strengthening exercises in a pain free range of motion and proprioceptive exercises were added. Patients performed mobilization under control of a physical therapist twice a week.

Outcomes: All patients were evaluated before injection, after 3 and 12 mouths after injection. ROM was measured with manual goniometer (flexion to the front, extension, abduction, internal and external rotation). Rest, sleep, and activity pain were evaluated with Visual Analog Scale (VAS for pain). General condition of extremities was evaluated with Constant Shoulder Score and functional status of shoulder was evaluated with Turkish version of Disabilities of Arm, Shoulder and Hand (DASH-T). Short Form-36 was used to assess general health status of the patients. Beck Depression Scale was used for evaluation of depressive symptoms. Patient satisfaction was assessed with the following question: Are you satisfied with the outcome of your surgery? The patients ranked their outcome of satisfaction on a 10-point numerical rating scale (VAS for satisfaction).

Statistical analysis: Statistical analysis was performed on SPSS 15.0 for Windows software. Statistical tests for parametric variables were used. Paired t-tests were used to compare the paired groups for continuous variables. Level of significance was set up at $p \leq 0.05$. All data analysis was given as means ± Standard Deviations (SD).

RESULTS

Sixty-two patients were enrolled in the study, of which 37 (%59.7) were female. The average age was

51.16±10.58 (34.00-72.00 years) years, 31 (50%) of the patients were house wife.

All patients were evaluated before injection, three months and one year after injection. All patients achieved improvement immediately after the injection. All patients who completed one year questionnaires reported an improvement in function at one year compared to before-injection.

Shoulder pain (rest, sleep and activity pain) of all patients reduced significantly at 3rd month compared to before-injection and the improvement continued to the 1-year period (Table-III). The improvements for the level of rest and sleep pain at 3 month assessment were higher than one year assessment.

Shoulder ROM (forward flexion, extension, abduction, internal and external rotation) measured in supine positions, improved significantly at three month compared to before-injection and the improvement continued to the 1-year period (Table-III). The differences for the extension, internal, and external rotation ROM at 3rd month assessment were significantly better than 1st year assessment.

Shoulder function and ability to perform activities of daily living related to the shoulder were measured with the Constant's total score and DASH-T score, and they improved significantly between each period as analyzed using repeated measures ANOVA (Table-IV).

Table-I: Demographics and baseline characteristics of patients.

Variable	*Min-Max*	*Mean±SD*
Age (year)	34.00-72.00	51.16±10.58
Height (cm)	150-179	163.32±6.96
Weight (kg)	45-110	79.94±12.20
BMI (kg/m2)	18.73-42.97	28.17±4.87
Education	0-15	6.60±3.70
Status (year)		
Variable	n	%
Gender		
Male	25	40.3
Female	37	59.7
Dominant limb		
Right	58	93.5
Left	4	6.5
Side of shoulder pain		
Right	47	75.8
Left	15	24.2

SF-36 score also had significant improvements in almost all categories except for mental health and social functioning at first follow-up after three month. SF-36 score also demonstrated significant improvements in physical role limitations, role emotional, bodily pain at final follow-up after 1 year.

The mean Beck depression score was 10.37±6.50 at before-injection, 6.57±4.23 at 3rd month after injection, and 6.86±4.35 point at 1st year after injection. Beck depression score demonstrated significant improvements only at 3rd month after injection.

The mean of patients' satisfaction rate was 8.45±1.27 point on VAS scale at final follow-up and it was considered that patients were still satisfied with their treatment at one year after injection.

DISCUSSION

Subacromial impingement syndrome and associated rotator cuff tendinitis are common shoulder problems with the symptoms of pain and loss of motion.[16] Many operative or nonoperative treatment modalities aim to treat these conditions by decreasing the inflammation and stimulating the healing in the tendons.[17] One of these methods is subacromial corticosteroid injection and the current trend is to consider this method when other therapeutic conservative interventions fail to treat the condition.[17,18] Short term outcomes might be more determinant for the practitioners to decide which treatment to choose in clinical practice for the patients with shoulder pain. A recent UK trial comparing corticosteroid injection with local anesthetics

Table-II: Occupational distribution of patients.

Occupational distribution	*n*	*%*
Housewife	31	50
Officer	6	9.7
Textile worker	12	19.4
Teacher	3	4.8
Farmer	3	4.8
Furnisher	2	3.2
Cook	1	1.6
Oven workers	1	1.6
Hod carrier	1	1.6
Banker	1	1.6
Shepherd	1	1.6

Table-III: Differences in the pain intensity and range of motion at baseline and different follow-up periods.

Variable	*Before treatment*	*3 months*	*1 year*	*Before Treatment 3 months*	*Before Treatment 1 year*	*3 months 1 year*
		Mean±SD			*P Value*	
Pain (VAS)						
Rest pain	4.74±2.22	0.22±0.59	0.46±0.91	0.000	0.000	0.138
Activity pain	8.87±1.53	3.42±2.04	2.13±1.81	0.000	0.000	0.006
Pain disturbing sleep	6.91±2.80	0.60±1.47	0.93±2.98	0.000	0.000	0.425
Range of motion (degree)						
Flexion	125.97±37.46	159.46±15.29	170.33±15.40	0.000	0.001	0.012
Extension	20.14±9.81	41.42±25.01	40.66±4.16	0.000	0.000	0.669
Abduction	105.54±41.64	137.66±38.53	167.66±14.66	0.000	0.000	0.009
Internal rotation	43.00±24.91	85.8535.24	82.33±13.87	0.003	0.000	0.288
External rotation	44.66±28.87	72.73±18.55	82.33±11.93	0.000	0.000	0.057

injection for rotator cuff problems also highlighted the importance of looking at early outcomes.[19]

In this study we injected corticosteroid plus local anesthetics into the subacromial space. After injection relative rest and Codman's pendulum exercises were prescribed and after 15 days followed by strengthening exercises. So we assessed whether corticosteroid plus local anesthetics injection have additional benefit than only physical therapy. In this study, we placed subacromial injections ''blind'' according to anatomic landmarks.

Although there is one trial which suggested that anatomic steroid injection might be superior to trigger- or tender-point injection for general shoulder pain, it is not known whether benefits of subacromial injection depends on accurate placement of

Table-IV: Assessment functional status, depression status and general health status.

Variable	*Before treatment*	*3 months*	*1 year*	*Before Treatment 3 months*	*Before Treatment 1 year*	*3 months 1 year*
		Mean±SD			*P Value*	
Functional status						
Constant score (total)	39.34±10.48	68.20±12.41	84.26±8.81	0.000	0.000	0.001
DASH-T score	53.23±21.96	36.69±17.72	22.38±11.54	0.004	0.002	0.007
Depression Status						
Beck depression score	10.37±6.50	6.57±4.23	6.86±4.35	0.002	0.135	0.937
General Health Status (SF-36)						
General health	59.21±17.16	71.34±15.13	70.00±19.54	0.004	0.280	0.814
Physical functioning	64.42±13.04	82.00±12.07	74.00±14.04	0.000	0.135	0.075
Mental health	29.93±29.41	68.42±38.65	71.11±33.01	0.075	0.994	0.567
Social functioning	70.70±31.34	75.13±23.94	80.80±21.54	0.198	0.067	0.516
Role limitations	13.33±19.26	51.66±43.77	65.00±29.58	0.000	0.000	0.334
Role emotional	29.9329.41	68.4238.65	71.1133.01	0.000	0.002	0.577
Bodily pain	27.0513.43	59.6722.85	65.8914.85	0.000	0.000	0.167
Vitality	57.5721.41	66.7121.48	72.6623.13	0.044	0.079	0.286

steroid into the subacromial space in patients with painful shoulder.[20] Two studies investigating the efficacy of accurate injection have suggested that the accurate placement of subacromial steroid injection will be more usefull.[20,21]

The principal finding of the present study is a high patient satisfaction of mean point of (Min-Max=6-10) 8.45±1.27 at 1 year follow-up. Already after 3 months, significant improvements were found with rapid pain reduction and increased range of motion. Constant and DASH-T score and most of the categories of the SF-36 score were also significantly improved with significant influence on the patients' quality of life. These findings are compatible with the literature.

In a meta-analysis by Buchbinder, subacromial injection with corticosteroids was demonstrated to have a small benefit over placebo in some trials.[22] In another systematic review about the interventions for subacromial pain, the trust of the general practitioners in subacromial corticosteroid injection was supported by definitive evidence for short-term efficacy.[17] It seems that corticosteroids do not alter the natural progression of the disease, but only cause a short-term symptomatic relief especially in pain, perhaps due to an anti-inflammatory effect. It can alter the release of noxious chemicals which are triggered by degenerated tendon and treat pain.[23] Carrette et al.[24] compared the intra-articular corticosteroid injections with or without physical therapy and the saline injections with or without physical therapy in a placebo controlled study. After 2 and 6 weeks, significant superior results were found for the corticosteroid groups. Addition of physical therapy did not represent any further improvement compared with the group treated with cortisone injections alone. We also found that there are decrease in the level of rest, and sleep pain, and improvements in daily living activities for short-term when the corticosteroid plus local anesthetics injection was used together with exercise treatments. We noted the combined injection and exercise protocol resulted in significantly greater improvement in pain and functional disability at 3 months. According to findings of this study, subacromial injections of corticosteroid plus local anesthetics provide some advantages in addition to exercises therapy for SAIS patients. Corticosteroid plus local steroid injection will have some benefits for the patients who need to early pain relief to start to exercises immediately.

Some authors claim that corticosteroids can inhibit the production of collagen and the surrounding granulation tissue, thus prevent fibrosis, in addition to suppress inflammation.[23] Our investigation also showed that patients with symptomatic subacromial impingement syndrome achieved significant improvement in shoulder pain and range of motion following corticosteroid injections. The improvement in the joint range of motion observed in these studies may be due to pain relief and effect of fibrosis prevention, which consequently facilitates daily living activities. The short term better ROM improvement shows that this effect must more likely be due to pain relief. We found favorable improvements in the ROM values both in the short term and in the middle-term follow-up.

However, it is not surprising, because the various qualities of studies, different patient characteristics and injection techniques may affect the final outcome. In a study Esenyel et al. found that accuracy of corticosteroid injections which are evaluated by radiograms after contrast material injections correlated with subsequent shoulder pain and function in SAIS21. Subacromial corticosteroid injections were performed by an experienced physician and exercises therapy performed by a physiotherapist in this study.

Subacromial injection of corticosteroids and local anesthetics is an effective, safe and simple therapy for symptomatic subacromial pathologies, such as subacromial impingement syndrome, tendonitis and bursitis. The injection can substantially reduce shoulder pain and allow to starting exercises, and finally increase the range of motion. Although ultrasound guided injections might have better outcomes than "blind" injections, evidence is emerging about the efficacy, and optimal use of injections, and physiotherapy interventions. The long term effects of different injection techniques, and exercises treatments remain and continue to be important for future researches. A further prospective study with a larger study group and a control group is required to identify the efficacy of corticosteroid injections for subacromial impingement syndrome.

Limitations of study: Limitations of the present study are the small patient cohort and the lack of a control group. We did not set out to examine which component of the non-pharmacological intervention exercise or manual therapy, or both) is effective. The strengths of the study are the prospective study design with a homogenous patient group, and clearly defined inclusion and exclusion criteria. A well defined physical therapy program after subacromial injection is also reported.

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