Original Article

Comparison of corticosteroid injections, physiotherapy, and combination therapy in treatment of frozen shoulder

Mobini Maryam¹, Kashi Zahra², Bahar Adeleh³, Yaghobi Morteza⁴

ABSTRACT

Objective: Frozen shoulder is a common cause of shoulder pain and disability that refers to a stiffened glenohumeral joint that restricts range of motion significantly. This study was conducted to compare the effect of corticosteroid injection, physiotherapy, and combination therapy in treatment of frozen shoulder.

Methodology: This study is a randomized clinical trial on 87 patients from a rheumatology clinic in Sari, Iran, who were suffering from frozen shoulder. The patients were randomized to 1 of the following 3 groups: corticosteroid injection, physiotherapy and combination therapy. Age, sex, duration of disease, level of education, employment, diabetes mellitus, SPADI score and active and passive range of motion were recorded and compared at baseline and after 6 weeks.

Results: Eighty seven patients with frozen shoulder were enrolled. The baseline characteristics were similar in the 3 groups, except that external rotation. Six weeks after intervention, patients in combination therapy had more improvement in SPADI and disability scores than physiotherapy (p=0.042 and 0.004). Changing in external rotation (degree) had more improvement in injection group but it was not significant.

Conclusion: Combination therapy is more effective than physiotherapy. When used alone, physiotherapy has a limited efficacy in the management of frozen shoulder.

KEY WORDS: Corticosteroid injection, Physiotherapy, Frozen shoulder.

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INTRODUCTION

Frozen shoulder or adhesive capsulitis is a common cause of shoulder pain and disability that refers to a stiffened glenohumeral joint that restricts range of motion significantly and affects between 2-5% of the population.¹ The pathophysiology of disease is poorly understood and most authors have reported various degrees of inflammation in the synovial membrane.² In this condition, joint capsule loses its normal distensibility and in long term it may make some adhesions between joint capsule and humeral head.³ Rotator cuff tendonitis is the most common cause of frozen shoulder and patients with diabetes mellitus are at greater risk.⁴ Rotator cuff tendonitis presents with restriction of active range of motion, painful arc, and pain localized on anterior or lateral of shoulder that

are common with adhesive capsulitis⁵ Although typically described as a self-limiting disease process, the natural history of adhesive capsulitis is not completely known, and recent studies have shown that it can lead to longer-term disability over the course of several years.⁶

Historically physiotherapists have treated adhesive capsulitis, but in 1995 injection therapy was introduced to manage this disorder.¹ There are several studies on comparison of modalities of treatment in this disorder but there is a little evidence about effectiveness of physiotherapy or corticosteroid injections in frozen shoulder treatment.7 In a systematic review in 2010, effectiveness of corticosteroid injections compared with physiotherapeutic interventions for adhesive capsulitis and authors concluded that corticosteroid injections have greater effect in the short term compared with physiotherapeutic interventions but only a small effect in favor of injections in the longer term.8 Because of coexistence of this disorder and rotator cuff tendonitis, we decided to add injection of subacromial bursa in patients who were considered for giving injection.

METHODOLOGY

This study is a randomized clinical trial on 87 out patients from a rheumatology clinic in Sari, Iran, who were suffering from frozen shoulder. Selected patients were 18 years or older and duration of their symptoms were <1 year. Frozen shoulder was defined as the presence of shoulder pain with limitation of both active and passive range of motion in glenohumeral joint $\leq 25\%$ in at least 2 directions: flexion, abduction, external and internal rotation, as compared with normal values or contra lateral shoulder.⁹

All the patients having a total score of \geq 30 on Shoulder Pain and Disability Index (SPADI) were included.¹⁰ Patients were excluded if their disorder was secondary to inflammatory, degenerative, metabolic (except for diabetes mellitus), trauma, septic arthritis and cerebrovascular accident. Diabetic patients were matched in treatment groups. Patients, who had been treated with injection or physiotherapy in last 6 months, were also excluded. The study was approved by ethics committee of Mazandaran University of Medical Sciences and was recorded in IRCT (IRCT code: 13880201182). First the study was conducted for a sample size of 35 subjects per group in order to be adequate with 80% power to detect a difference at the 5% level of significance.

Unfortunately, the trial was stopped before we reached this sample size because of difficulty in recruiting subjects. The main limiting factor in recruitment was refusal of injection or physiotherapy, because of fear or costs. After taking written informed consent, the patients were randomized to 1 of the following 3 groups: corticosteroid injection, physiotherapy and combination therapy. Corticosteroid injections were included as 60 milligrams triamcinolone acetonide and 3 cc lidocaine in shoulder joint with posterior approach and 20 milligrams triamcinolone acetonide and 1.5 cc lidocaine in subacromial bursa. Physiotherapy modalities used in the treatment included transcutaneous electrical nerve stimulation, active ROM exercises, and ice application in 10 sessions. Interventions for patients in combination therapy group were corticosteroid injection and physiotherapy after 1 week. A simple

Characteristic	Group1, PT (n=27)	Group 2, CS+PT (n=29)	Group 3, CS (n=31)	P Value
Age (vear)	53.73±7.49	53.71±6.69	53.33±7.49	0.974
Low Level of	22 (75.9%)	25 (83.3%)	16 (61.5%)	0.234
Moderate education	5 (17.2%)	3 (10.0%)	9 (34.6%)	
High	2 (6.9%)	2 (6.7%)	1 (3.8%)	
Female	26 (96.3%)	25 (86.2%)	27 (87.1%)	0.392
Hard employments	1 (3.7%)	1 (3.4%)	1 (3.2%)	0.995
Duration of disease (Months)	4.48± 3.37	6.21± 3.95	6.83± 3.75	0.141
With diabetes	20 (74.1%)	21 (2.4%)	25 (80.6%)	0.732
Right shoulder involvement	15 (57.7%)	16 (57.1%)	10 (37.0%)	0.224
Pain score	31.22±11.58	32.58±12.63	26.70±13.03	0.167
Disability score	45.40 ± 17.44	40.27 ± 18.02	43.87 ± 18.10	0.543
SPADI score	50.39 ± 66.92	49.99±65.91	46.07 ± 62.60	0.709
Hand behind back (cm)	29.11± 12.02	24.51±11.5	25.83 ± 11.05	0.322
Flexion (degree)	125.52 ± 141.0	126.36 ± 141.9	121.30 ± 137.2	0.619
Abduction (degree)	75.93± 91.2	74.98 ± 93.9	75.98± 89.7	0.955
External rotation (degree)	40.67 ± 48.2	36.70 ± 47.4	32.71 ± 40.18	0.027
Complete the study	19 (70.4%)	22(75.9%)	28 (90.3%)	0.148

Table-I: Baseline characteristics of the 87 patients with frozen shoulder.

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Characteristic	Group1, PT (n=19)	Group 2, CS+ PT(n=22)	Group 3, CS (n=28)	P Value
Pain score	19.94± 11.75	16.40 ± 13.93	12.61±13.69	0.191
Disability score	33.10 ± 16.08	14.59 ± 13.66	22.03 ± 21.45	0.006
SPADI score	40.56 ± 20.55	23.14±20.05	26.36± 25.57	0.039
Change in distance of hand	-7.31± 9.25	-7.57± 6.59	-5.07 ± 5.95	0.428
behind back (cm)				
Change in flexion (degree)	13.75±19.7	14.52 ± 18.5	14.73±18.6	0.986
Change in abduction (degree)	18.43 ± 19.2	19.28 ± 28.2	20.26 ± 22.1	0.970
Change in external rotation (degree)	1.56±16.9	3.80 ± 12.3	9.80 ± 10.7	0.107

Table-II: Clinical and functional changes at 6 weeks in three groups.

shoulder exercise program was taught to all of the patients and it was allowed to use acetaminophen for pain relief.

Age, sex, duration of disease, level of education, employment, diabetes mellitus, SPADI score and active and passive range of motion were recorded at baseline. The patients were reevaluated for SPA-DI and changes in active and passive range of motion after 6 weeks. SPADI questionnaire consisted of 13 items divided into 2 subscales including pain with 5 items and disability with 8 items. The items are marked on a 100 mm numeric scale (visual analogue scale) and SPADI is scored 0-100 by averaging the scores of 2 subscales. An increase or decrease in the SPADI score ≥10 indicates worse or improvement in shoulder pain and disability.² Evaluations of SPADI score were done by an observer blind to treatment allocation. Range of motions was measured by a goniometer with the patient in the supine position for flexion, abduction and external rotation and in the sitting position for active combined movement of shoulder (vertical distance between thumb and inferior angle of the scapula.

Statistical analysis was done by Chi-Square and one way ANOVA for comparisons of mean values of patients at baseline and after intervention.

RESULTS

The study was done between September 2008 and December 2010, 87 patients with frozen shoulder were enrolled in the study, with 27 in the physiotherapy group, 29 in combination therapy group and 31 in injection group. Eight patients in physiotherapy group, 7 in combination therapy group and 3 in injection group did not continue, so statistical analysis was done on 69 remaining patients. The baseline characteristics were the same in the 3 groups (Table-I), except that external rotation.

Six weeks after intervention, the groups were evaluated about clinical and disability parameters. Compared with baseline values, patients in combination therapy had more improvement in SPADI and disability scores than physiotherapy (p=0.042 and 0.004). Changing in external rotation (degree) had more improvement in injection group but it was not significant. Clinical and functional changes in three groups at 6th week are shown in Table-II. About 36 patients have been reevaluated in 24 weeks (Table-III). However we cannot consider this stage of study because of a high number of missed patients, but we can see a more subjective improvement during 6 months in physiotherapy group.

DISCUSSION

In our study, patients were matched for demographic characteristics and diabetes in groups except for restriction in external rotation which was more severe in physiotherapy group. Disability score and SPADI score were better in combination therapy than other groups at 6th week but pain scores and range of motion did not have any difference.

In Carrete study, 93 patients with adhesive capsulitis, were randomized to 4 groups, including

Table-III: Clinical and functional changes at 24 weeks in three groups.

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Characteristic	Group 1, PT (n=8)	Group 2, CS+ PT (n=14)	Group 3, CS (n=14)	P Value
Pain score	8.62 ± 4.20	17.00 ± 15.48	12.00 ± 14.18	0.356
Disability score	19.87±16.23	18.57± 22.35	19.92±15.62	0.978
SPADI score	21.92 ± 14.18	27.41±27.78	23.78±22.33	0.852
Change in distance of hand	-975±11.31	-4.21 ± 9.55	-6.64 ± 7.22	0.400
behind back (cm)				
Change in flexion (degree)	6.66± 34.3	11.07± 29.5	15.00 ± 14.4	0.759
Change in abduction (degree)	12.50 ± 22.3	7.50 ± 18.4	18.57 ± 20.7	0.363
Change in external rotation (degree)) 5.62± 5.6	5.00 ± 11.0	9.61± 17.6	0.636

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physiotherapy, corticosteroid injection and corticosteroid injection alone, saline injection as placebo and physiotherapy, and saline injection alone. In 6th week SPADI score was improved significantly in first and second groups and range of motion was increased in all groups but it was greater in first group. In 3rd month, the better improvement was continued in first and second groups. The authors concluded that a single corticosteroid injection combined with a simple home exercise program is effective in improvement of frozen shoulder.² In this study, only intra articular corticosteroid injections were given.

In a study by Windt and coworkers, corticosteroid injection was compared with physiotherapy in 109 patients with painful stiff shoulder. Patients were injected 1-3 times during 6 weeks or undergone 12 sessions of physiotherapy and outcome assessments were done at 3 and 7th week. They found better results with corticosteroid injection. Patients in two groups had some differences in demographic and disease severity indexes.⁷ Sessions of injection and physiotherapy modalities were not the same in all patients and there was not a group as combination therapy.

Ryans et al, in 2005 compared injection of 20 mg triamcinolone and 2 ml saline in 20 patients with physiotherapy in other 20 patients and saline injection in 19 patients and followed up them in 6th and 16th weeks. They found that physiotherapy is more favorable than corticosteroid injection in reducing pain but after considering drop outs, corticosteroid injection had a significant effect on pain in 16th week.¹¹

Dacre et al, in 1989 compared injection of 20 mg triamcinolone and 4-6 weeks physiotherapy and combination therapy in 62 patients and followed up them at 6th and 26th weeks. They did not find any significant difference between groups.¹²

Arslan compared injection of 40mg methyl prednisolone in 10 patients with physiotherapy in other 10 patients and followed up them at 2nd and 12th weeks and did not find any significant difference between groups.¹³

In one study in Iran, 124 patients with painful shoulder syndrome who had corticosteroid injection in painful site or physiotherapy and authors had shown a more effectiveness of corticosteroid injection. In this study, injections were given in every painful site.¹⁴

We conclude that combination therapy of steroid injection and physiotherapy has more success in treatment of frozen shoulder than other two methods for short term follow up. Corticosteroid injection was more effective than physiotherapy. Because of large number of missing patients in 24th week we could not show any significant change in morbidity parameters in this time.

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