ORIGINAL ARTICLE

Frozen Shoulder Syndrome: Comparison of Oral Route Corticosteroid and Intra-Articular Corticosteroid Injection

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Summary

Twenty-six patients with frozen shoulder syndrome (Stage 2 and 3) were included in this study conducted at Dr. Kariadi General Hospital, Semarang: Indonesia and randomly allocated into 2 groups: 40mg triamcinolone intra-articular injection and triamcinolone oral tablets. The result showed that triamcinolone intra-articular injection group "cured" rate was 5.8 times higher at week one compared to the triamcinolone tablet group. Sixty-two percent of the cases with triamcinolone intra-articular injection achieved their "cured" condition after one week of therapy, compared with only 14% of the triamcinolone tablets group. We conclude that, intra-articular corticosteroid injection provide faster improvement compared to oral route.

Key Words: Frozen shoulder syndrome, Adhesive capsulitis, Corticosteroid, Physiotherapy, Intra-articular injection

Introduction

Frozen shoulder syndrome *(adhesive capsulitis)* is one of the commonest musculoskeletal problems seen in the outpatient clinic. This is a condition in which a soft tissue glenohumeral capsular lesion is accompanied by painful and restricted active and passive shoulder motion[1,2]. There is no consensus for any one type of treatment in our clinical practice, but commonly we use corticosteroids (oral route or locally injected), NSAID or physiotherapy. Frozen shoulder syndrome has a protracted natural course[3,4]. Most of our outpatients attending the neurology clinic at Dr. Kariadi General Hospital tend to default long term therapy. This prompted us to compare oral corticosteroid and intra-articular corticosteroid injection in the treatment of frozen shoulder, while still having their physiotherapy program (starting after 3 days' therapeutics). The issues for us in this trial are the speed of pain relief, and improvement in range of motion of the shoulder.

Materials and Methods

Subjects

The study was a hospital based randomized trial. We recruited consecutive patients attending the neurology clinic at Dr. Kariadi General Hospital with a new episode of frozen shoulder syndrome or adhesive capsulitis (not previously treated) between August 2002 and November 2002. Inclusion criteria was a painful restriction of glenohumeral mobility, age 40 years or older and informed consent. Only patients who were in stage 2 or 3 of the disease process were studied, as

This article was accepted: 16 October 2003

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these patients were mostly encountered at the neurology clinic seeking treatment[2]. The exclusion criteria were contraindications to oral or intra-articular injection of corticosteroid, insulin-dependent diabetes mellitus, neurological disorders, cervical spondylosis, and if the patients had fractures, surgery or dislocation in the shoulder area. The study was approved by the local research ethics committees of Dr. Kariadi General Hospital and the Faculty of Medicine, Diponegoro University.

Diagnosis of frozen shoulder syndrome was made using a diagnostic guideline; confirming that there was painful limited passive glenohumeral mobility, external rotation < 30^0, abduction < 90^0; and no clear sign of other shoulder pain condition such as painful arc, positive resistance test, and loss of power. Stage 2 frozen shoulder syndrome was defined as painful limited passive glenohumeral mobility with external rotation between 20^0 - 30^0, and abduction between 60^0 - 90^0; stage 3 was defined as external rotation equal to or less than 20^0, and abduction equal to or less than 60^0. Where doubt existed about the diagnosis in addition to history and examination, radiographs were done.

Randomization
Patients were randomly allocated into oral corticosteroid and intra-articular corticosteroid injection treatment. The random sequence was generated using random number tables. Numbered, sealed envelopes containing the treatment allocation were prepared before the trial.

Intervention
Patients with oral corticosteroid treatment were given triamcinolone 4mg tablets: three times a day for a week, then two times a day for a week and finally once a day for a week. Patients with mild or moderate gastric complaints were given also ranitidine twice a day. Patients with severe gastric complaints were excluded. Compliance was considered by giving patients a special tube for the tablets and by secretly counting the remainder of the tablets at each weekly evaluation event.

Patients allocated to intra-articular corticosteroid injection were given intra-articular injection of 40mg triamcinolone acetonide using the posterior route by one physician trained in that procedure. The patient sits with his back to the physician who palpates the acromion process with the tip of his thumb and the coracoid process with the forefinger. The needle was advanced below the thumb (i.e. below the acromion tip and medial to the humeral head) about 25mm towards the finger anteriorly marking the coracoid process. The injection was given only once on the first day visit of the patient[1,5,6,7].

Physiotherapy was started on the fourth day, consisting of 12 sessions of 20 minutes during which all patients received active exercise and passive joint mobilization treatment. Ice or hot packs were allowed, but other treatment modalities were not allowed; for example acupuncture, ultrasound or electrotherapy. Treatment could be adjusted according to the severity of pain. All details of treatment including adverse drug reactions were recorded on standardized forms.

Outcome assessment
The outcome of the intervention was assessed weekly during the three weeks. Patients were labeled as cured if there was improvement achieving 90% of normal passive glenohumeral range of motion for abduction and external rotation . Pain was assessed using the Visual Analogue Scale. Assessments were done by a physician who was *blinded* to the patients' treatment allocation.

Statistical analysis
Analysis was carried out with SPSS version 10.0. The Mann-Whitney statistic and Cox regression were used to analyse the data. A p-value of 0.05 was taken to be significant.

Results

Twenty-eight patients were included in the study, after excluding 9 patients with insulin-dependent diabetes mellitus and stroke. Thirteen patients received intra-articular triamcinolone injection and the rest received their oral triamcinolone tablets schedule. One of the patients with oral triamcinolone dropped out during the second week because of severe gastric complaint. Table I shows the baseline characteristics. No significant differences exist between the two study groups including the VAS value. Table II shows the rate of "cured" patient achievement in both groups in weeks 1,2 and 3.

Figure 1 shows the cumulative proportions of cases with triamcinolone intra-articular injection that achieved their "cured" condition. These were consistently higher after one week, two weeks and three weeks of intra-articular injection, compared to the triamcinolone tablet group. The difference in the

cumulative proportions was most prominent after one week of therapy.

Cox regression analysis showed the contribution of route of triamcinolone therapy and stage of the frozen shoulder syndrome to "cured" condition; resulted in odds ratio of 0.318 (95% CI: 1.3-0.77) for oral versus injection route (p=0.012) and odds ratio of 3.6 (95% CI: 1.13-11.43) for stage 2 versus stage 3 of the disease (p=0.030).

The VAS value was significantly different between the two study groups after the first week of therapy (p=0.022). After two weeks the VAS value was not different between those two study groups (p=0.239).

During the study adverse effects of triamcinolone therapy were also documented. Table III shows only 3 patients with epigastric pain among the oral triamcinolone group. Among the injection group none of them had epigastric pain and only three cases complained of pain on the site of injection.

Table I: Base line characteristics of study groups

Characteristics	Triamcinolone Injection group	Triamcinolone oral group	p-value
	(n)	(n)	
Sex			0.267
Male	4	7	
Female	9	7	
Age			0.815
40-49 years	5	4	
50-59 years	5	7	
60-69 years	3	3	
Duration			0.638
1-3 month	10	11	
4-6 month	3	3	
Stage			0.286
Two	9	12	
Three	4	2	
Shoulder side			0.267
Left	9	7	
Right	4	7	
	(mean/SD)	(mean/SD)	
VAS value	5.85±0.90	5.21±0.89	0.079

Table II: "Cured" rate of frozen shoulder syndrome

Therapy	Week 1	Week 2	Week 3
Oral	0.154	0.889	**
Injection	0.824	1.333	**

Wilcoxon (Gehan) statistic: p=0.009

** The statistic calculations for the last interval are meaningless.

Table III: Adverse effects of triamcinolone

Adverse effect	Local injection	Oral route
Epigastric pain	0	3
Pain on site of injection	3	0
None	11	10

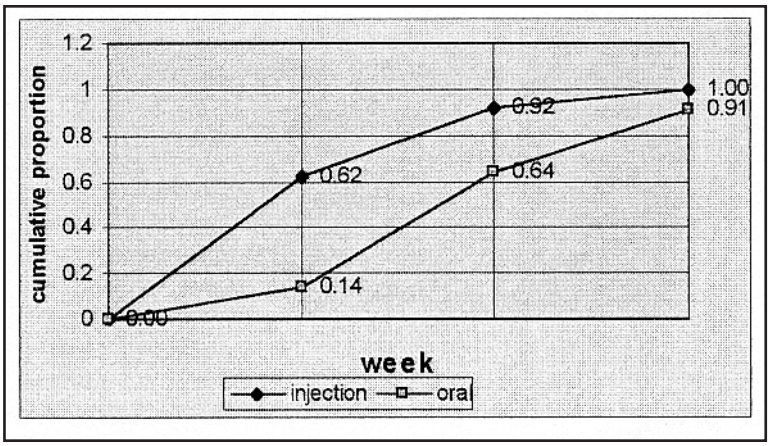

Fig 1: Cumulative proportion of "cured" frozen shoulder syndrome patients after 1, 2 and 3 week therapy

Discussion

In daily clinical practice intra-articular corticosteroid injection is a common treatment offered for frozen shoulder syndrome[8]. We have demonstrated that the *"cured"* rate of patients with frozen shoulder syndrome (Stage 2 and 3) treated with triamcinolone intra-articular injection or oral route triamcinolone were significantly different at the end of the study (p=0.009). Triamcinolone intra-articular injection provided more rapid achievement of nearly normal (90%) passive glenohumeral range of motion for abduction and external rotation, compared to treatment with triamcinolone tablets. At the end of the first week after injection, 62% of patients were *"cured"*. This of course is very beneficial in terms of earlier return to activity of daily living (ADL). It also overcome, the problem of compliance, if they were treated with triamcinolone tablets. According to Dacre et al.[9] intra-articular steroids were as effective as physiotherapy alone or in combination, after six weeks observation. More recent studies reported faster relieve of complaints of frozen shoulder syndrome patients with intra-articular corticosteroid injection treatment compared to physiotherapy alone[10,11]. At 7 weeks Van der Windt et al.[1] found 77% out of 55 patients were considered successful in intra-articular injection treatment compared with physiotherapy (only 46% were successful). However, at 26 and 52 weeks differences between those two groups were relatively small. These are comparable to our study in which intra-articular steroid injection resulted in faster improvement in degree of passive external rotation and abduction in the earlier weeks. The adverse reactions were also generally not serious. Our study showed only three cases with pain on the site of injection. Carette et al.[5] compared intra-articular triamcinolone, physiotherapy, a combination of the two and a placebo group. At six weeks there were more significant improvements in Shoulder Pain and Disability Index score in the group with intra-articular injection compared with the group with combination of intra-articular injection and physiotherapy; followed by the group with physiotherapy alone and finally placebo (p=0.0004). However, at 12 months all groups were similar.

The benefit of intra-articular corticosteroid injection is very clear in this study in terms of earlier return to earlier activity daily living. Because single intra-articular injection of 40mg triamnicolone was adequate, the implication is best seen in cost savings and compliance.

The limitation of this study is the narrow spectrum of disease (consisted only of stage 2 and 3 cases), the small sample and the relatively short time of observation. Long-term follow up was not conducted.

Conclusion

This study has demonstrated that intra-articular steroid (triamcinolone) injection combined with physiotherapy exercises provide faster improvement in stage 2 and 3 frozen shoulder syndrome compared with triamcinolone tablets treatment. This improvement was seen mostly in the first week. The reduction of pain intensity (VAS value) was also significantly different between the study groups at the end of week one.

Acknowledgments

We thank the Neurology clinic of Dr. Kariadi General Hospital staff and the participating physiotherapist for their assistance in data collection.

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