

How Much Should We Inject Of Steroid Injection For Treatment Of Primary Shoulder Stiffness: A Prospective Randomized Controlled Trial With High- And Low-Dose Steroid Injection

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COI Disclosure Information

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Introduction

- Shoulder stiffness is a common cause of shoulder pain and disability, and intra-articular steroid injection has remained one of the most commonly used methods as a treatment of shoulder stiffness.
- But, the optimal dose of corticosteroid is still controversial.
- The **purpose** of this study was to compare the efficacy and complications of intra-articular corticosteroid injection according to **2 different doses (high- and low-dose)** in primary shoulder stiffness.

Materials and Methods

- July 2011 ~ August 2012
- Prospective randomized, comparative study
- 164 patients
- **Inclusion criteria**
 - Stiffness: FF<100°(max.150°), ER<45°(max.90°), IR<L1(max.T7)
 - Among DM patients, controlled (HbA1c < 7) under the medication
- **Exclusion criteria**
 - Concomitant shoulder lesion
 - History of previous surgery
 - Other systemic diseases to affect shoulder ROM

Materials and Methods

- Randomly allocated into 2 groups
 - **Group 1 : 40mg triamcinolone acetonide injection + 1ml of 2% lidocaine**
 - **Group 2 : 20mg triamcinolone acetonide injection + 1ml of 2% lidocaine**
- US-guided anterior injection introduced by Valls and Melloni
- **Statistical analysis**
 - Paired t-test for ROM and functional scores
 - Mann-Whitney test for evaluation of sugar related blood levels
- **Clinical assessment & laboratory evaluation**
 - Check ROM, VAS for pain, ASES, simple shoulder test
 - DM patients : check levels of blood glucose, fructosamine, HbA1c

Results

- At baseline, **no significant difference** in demographic data between the 2 groups

Table I Demographic data of patients

	Group I	Group II	<i>P</i> value
No. of patients	76	71	
Age, years, mean (range)	57.4 (45-76)	56.34 (47-78)	.15
Sex, male/female, n	23/53	18/53	.77
Average follow-up period, months	17.6	18.1	.13
Diabetes mellitus, n	13	14	.35
Initial ROM			
Forward flexion	116	114	.45
External rotation at 90° abduction	56	56	.98
External rotation at side	61	63	.88
Internal rotation*	2.4	2.6	.42
Initial clinical score			
VAS score for pain	6.4	6.3	.98
ASES score	37.6	40.2	.75
SST	34.0	36.4	.42

Results

- **Significant improvements** in ROM and functional scores and **significant reduction of pain VAS** score in both groups at the last follow-up after the treatment

Table II Comparison of range of motion (ROM)

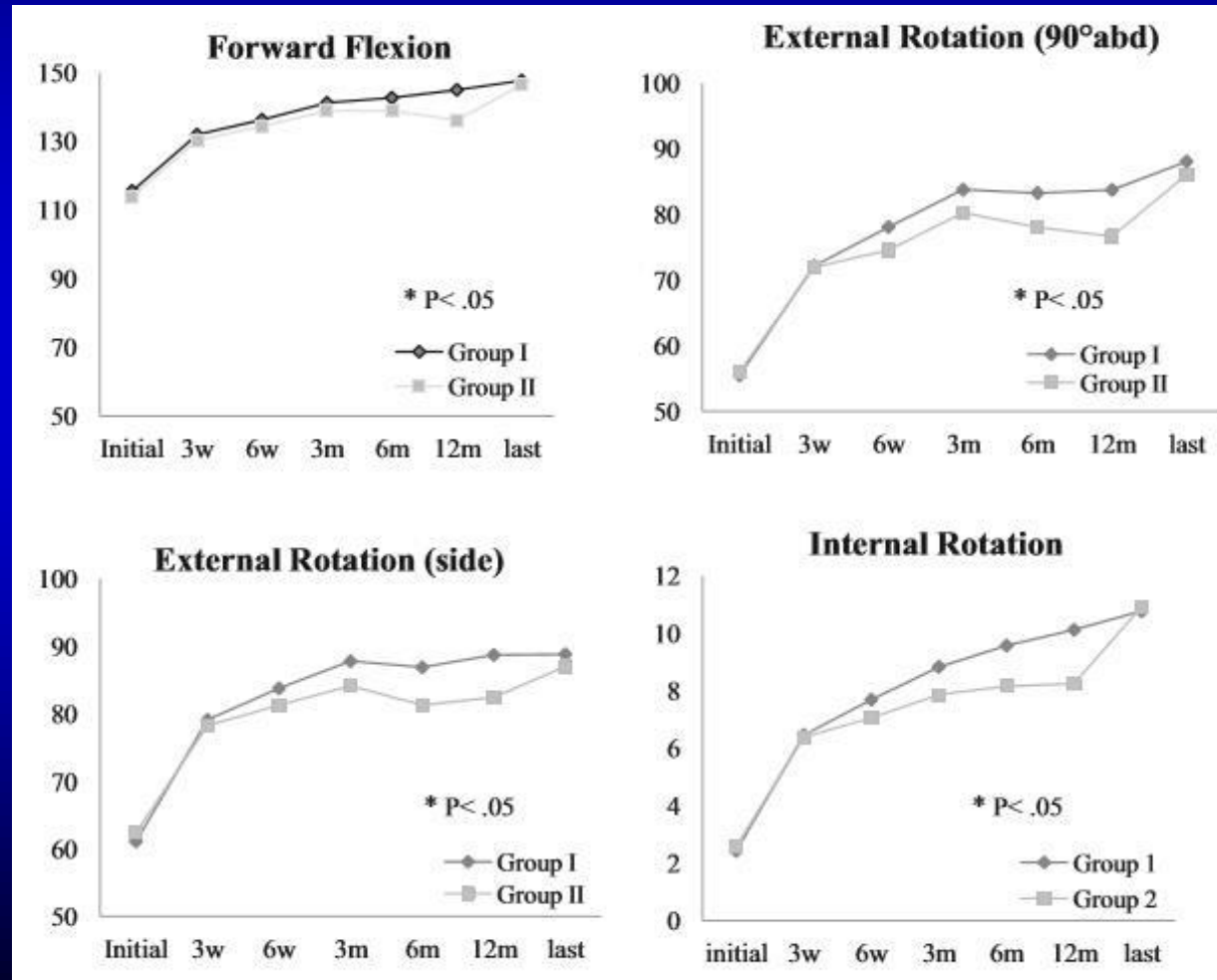
Group I			
	Initial ROM	ROM at last follow-up	<i>P</i> value
Forward flexion	116	148	.02
External rotation with 90° abduction	56	88	.01
External rotation at side	61	89	.02
Internal rotation ⁺	2.4	10.8	.01
Group II			
	Initial ROM	ROM at last follow-up	<i>P</i> value
Forward flexion	114	146	.02
External rotation with 90° abduction	56	86	.01
External rotation at side	63	87	.03
Internal rotation ⁺	2.6	10.9	.01

Table III Comparison of functional scores

Group I			
	Initial score	Score at last follow-up	<i>P</i> value
Pain VAS	6.43	1.22	.01
ASES	37.63	90.50	.01
SST	34.02	78.82	.02
Group II			
	Initial score	Score at last follow-up	<i>P</i> value
Pain VAS	6.33	1.63	.01
ASES	40.18	84.13	.02
SST	36.44	85.00	.02

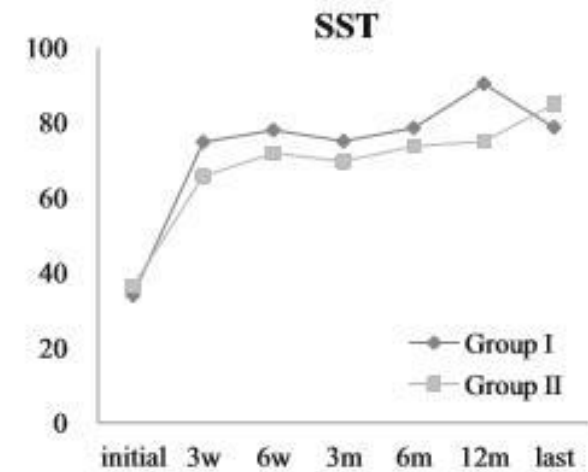
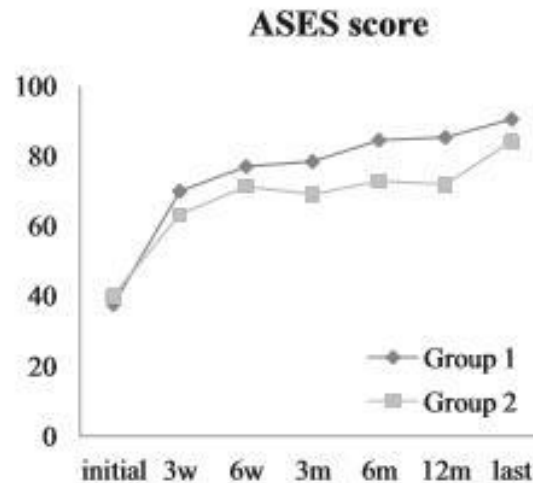
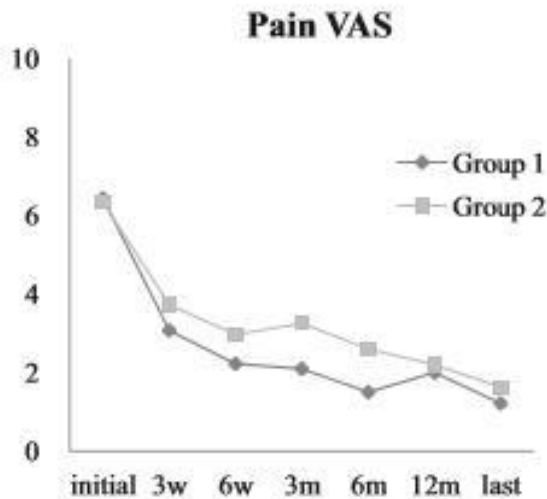
Results

- **The greatest improvements** within the first 3 weeks after injection in ROM



Results

- **No significant differences** in pain VAS score and functional scores between the 2 groups at any time point



* $P < .05$

Results

- **In DM patients, no significant increase** in blood glucose, fructosamine and HbA1c levels compared with the levels before injection in both groups
- **DM patients in group I showed a significantly higher blood glucose level** at 6 weeks after injection compared with those in group II ($P = .01$)

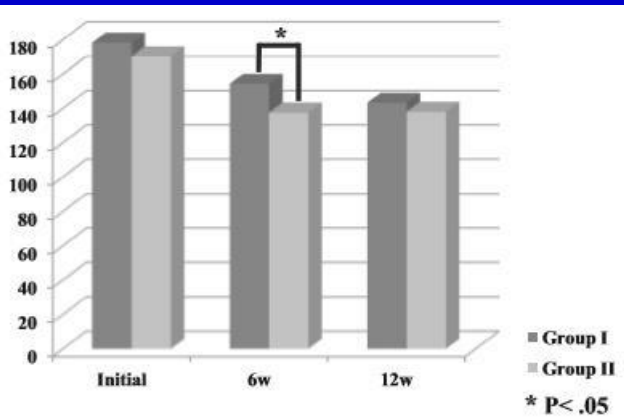


Figure 4 Serum level of glucose before and after injection.

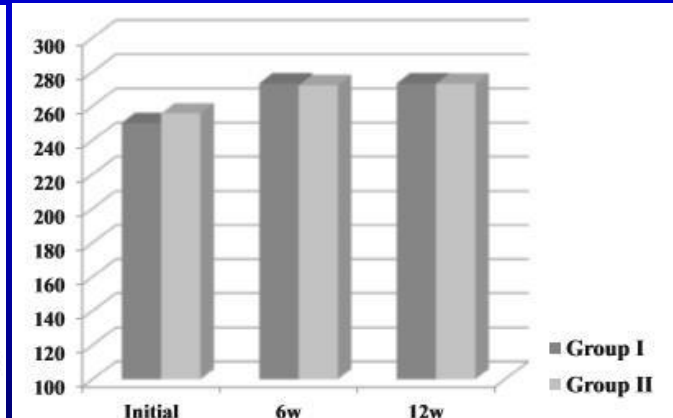


Figure 5 Serum level of fructosamine before and after injection.

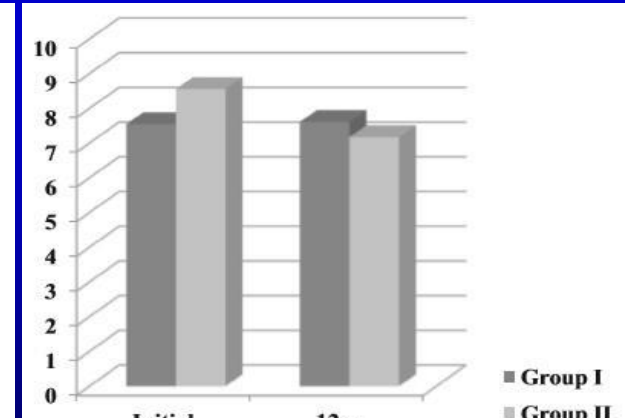


Figure 6 Serum level of HbA_{1c} before and after injection.

Limitations

- **No control group**
 - **Difficult to know the percentage of patients improved without steroid injection and effect of a placebo injection**
- **Small number of enrolled patients, especially DM patients**
 - **Difficult to expect consistent results with uncontrolled glucose levels**
- **Missing short-term results**
 - **Results might have been more reliable**

Conclusions

- Intra-articular injection of triamcinolone is an effective method for **improving ROM and clinical function** in shoulder stiffness.
- In **DM patients**, a **lower dose** is recommended as short-term glucose levels may increase with a high dose of corticosteroid.

References

1. Adebajo AO, Nash P, Hazleman BL. A prospective double blind dummy placebo controlled study comparing triamcinolone hexacetonide injection with oral diclofenac 50 mg TDS in patients with rotator cuff tendinitis. *J Rheumatol* 1990;17:1207-10.
2. Buchbinder R, Green S, Youd JM. Corticosteroid injections for shoulder pain. *Cochrane Database Syst Rev* 2003;1:CD004016.
3. Carette S, Moffet H, Tardif J, Bessette L, Morin F et al. Intraarticular corticosteroids, supervised physio therapy, oral combination of the two in the treatment of adhesive capsulitis of the shoulder: a placebo-controlled trial. *Arthritis Rheum* 2003;48:829-38.
4. de Jong BA, Dahmen R, Hogeweg JA, Marti RK. Intra-articular triamcinolone acetate injection in patients with capsulitis of the shoulder: a comparative study of two dose regimens. *Clin Rehabil* 1998;12:211-5.
5. Derendorf H, Mollmann H, Gruner A, Haack D, Gyselby G. Pharmacokinetics and pharmacodynamics of glucocorticoid suspensions after intra-articular administration. *Clin Pharmacol Ther* 1986;39: 313-7.
6. Griesser MJ, Harris JD, Campbell JE, Jones GL. Adhesive capsulitis of the shoulder: a systematic review of the effectiveness of intraarticular corticosteroid injections. *J Bone Joint Surg Am* 2011;93:1727-33.
7. Habib GS, Abu-Ahmad R. Lack of effect of corticosteroid injection at the shoulder joint on blood glucose levels in diabetic patients. *Clin Rheumatol* 2007;26:566-8.
8. Habib GS, Miari W. The effect of intra-articular triamcinolone preparations on blood glucose levels in diabetic patients: a controlled study. *J Clin Rheumatol* 2011;17:302-5.
9. Hannafin JA, Chiaia TA. Adhesive capsulitis. A treatment approach. *Clin Orthop Relat Res* 2000;372:95-109.
10. Hsu JE, Anakwenze OA, Warrender WJ, Abboud JA. Current review of adhesive capsulitis. *J Shoulder Elbow Surg* 2011;20:502-14.
11. Iwamoto T, Kagawa Y, Naito Y, Kuzuhara S, Kojima M. Steroid-induced diabetes mellitus and related risk factors in patients with neurologic diseases. *Pharmacotherapy* 2004;24:508-14.
12. Jacobs JW. How to perform local soft-tissue glucocorticoid injections. *Best Pract Res Clin Rheumatol* 2009;23:193-219.
13. Kim YS, Chung SW, Kim JY, Ok JH, Park I, Oh JH. Is early passive motion exercise necessary after arthroscopic rotator cuff repair? *Am J Sports Med* 2012;40:815-21.
14. Kim YS, Lee HJ, Park I, Im JH, Park KS, Lee SB. Are delayed operations effective for patients with rotator cuff tears and concomitant stiffness? An analysis of immediate versus delayed surgery on outcomes. *Arthroscopy* 2015;31:197-204.
15. Kim YS, Lee HJ, Park IJ. Clinical outcomes do not support arthroscopic posterior capsular release in addition to anterior release for shoulder stiffness: a randomized controlled study. *Am J Sports Med* 2014;42:1143-9.
16. Neviasser AS, Hannafin JA. Adhesive capsulitis: a review of current treatment. *Am J Sports Med* 2010;38:2346-56.
17. Neviasser AS, Neviasser RJ. Adhesive capsulitis of the shoulder. *J Am Acad Orthop Surg* 2011;19:536-42.
18. Noerdlinger MA, Fadale PD. The role of injectable corticosteroids in orthopedics. *Orthopedics* 2001;24:400-5, quiz 406-7.
19. Piotte F, Gravel D, Moffet H, Fliszar E, Roy A, Nadeau S, et al. Effects of repeated distension arthrographies combined with a home exercise program among adults with idiopathic adhesive capsulitis of the shoulder. *Am J Phys Med Rehabil* 2004;83:537-46, quiz 547-9.
20. Povlsen B, Povlsen SD. Steroid injection for shoulder pain causes prolonged increased glucose level in type 1 diabetics. *BMJ Case Rep* 2014;2014