

INTRA-ARTICULAR CORTICOSTEROIDS VERSUS PHYSIOTHERAPY IN THE MANAGEMENT OF ADHESIVE CAPSULITIS

Atif Ahmed Khan, Noreen Akhtar*, Aisha Ayyub**, Tariq Aziz*, Sara Iqbal***, Hina Kanwal Shafaat*

Combined Military Hospital Kohat Pakistan, *Armed Forces Institute of Rehabilitation Medicine/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, **Kohat Institute of Medical Sciences/Khyber Medical University Kohat Pakistan, ***Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To compare the intra-articular corticosteroid versus physiotherapy in the management of adhesive capsulitis in terms of mean pain score.

Study Design: Randomized controlled trial.

Place and Duration of Study: Outpatient department, at Armed Forces Institute of Rehabilitation Medicine, from Jul 2013 to Jul 2015.

Material and Methods: A total of 90 patients with adhesive capsulitis were enrolled as per inclusion criteria by non probability consecutive sampling. Forty five patients were assigned to group "A" and were given intra-articular injection of triamcinolone 40mg (2ml) and bupivacain 2ml into the shoulder joint. Group "B", having forty five patients received eight session of physiotherapy on alternate day. Outcome measure included mean pain score using visual analogue scale at six week follow-up.

Results: Statistically significant improvement in pain score on visual analogue scale was found in patients with group "A", with improvement in score from 7.2 ± 0.91 at the start of the study to 5.6 ± 0.18 at six week follow-up ($p < 0.001$). Whereas no statistically significant results were obtained in patients with group "B" having pain score on visual analogue scale of 7.4 ± 0.14 at the start of the study to 7.3 ± 0.14 at six week follow-up ($p = 0.54$).

Conclusion: The use of intra-articular corticosteroid injection in shoulder joint potentially offers a significantly greater clinical improvement in pain relief over the use of supervised physiotherapy in the management of patients suffering from adhesive capsulitis.

Keywords: Adhesive capsulitis, Intra-articular injections, Pain measurement, Physical therapy modalities.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Adhesive capsulitis (AC) is a painful and disabling condition with spontaneous onset of shoulder pain and loss of active and passive range of motion (ROM) at glenohumeral (GH) joint presumed to be due to capsular contracture¹. AC is a common problem encountered in rehabilitation practice, with an annual incidence of 2% in general population¹, increasing to 30% in patients with diabetes mellitus (DM)^{2,3}.

AC can be primary or idiopathic having no precipitating or inciting event with chronic inflammatory response and abnormal proliferation of fibroblasts. Secondary AC is

usually associated with shoulder injury, diabetes mellitus, cerebrovascular accident, rotator cuff injury or cardiovascular disease^{4,5}.

Diagnosis of AC is usually made clinically on the basis of pain and limitation of both passive and active ROM^{2,6}. The clinical course of the condition is self limiting and three stages of AC have been described in the literature: painful, adhesive (frozen), and recovery (thawing) stage with an average length of symptoms lasting 30 months^{3,4}. Pain, particularly during the painful phase of AC, prohibits the patient from carrying out routine activities of daily living (ADLs).

Several treatment options for AC have been studied in the literature, with none superior to the other⁷⁻⁹. Among oral medications acetaminophen and non-steroidal anti-inflammatory can be used for pain relief in

Correspondence: Dr Tariq Aziz, House No. 4, Street No. 32, Sector-C, Orchard Area, DHA Phase-I Islamabad Pakistan
Email: tariqawan80@gmail.com
Received: 06 Apr 2017; revised received: 18 May 2017; accepted: 19 May 2017

patients with AC, but with little evidence from the literature for their effectiveness^{8,9}. While Page MJ et al. proposed improved outcomes with physical therapy¹, Blanchard et al. and few other studies have found no significant improvement with physical therapy, and instead they suggested GH intra-articular (IA) corticosteroid injection having much beneficial effects as compared to other form of treatment¹⁰⁻¹². Buchbinder et al. found that capsular distention with saline is better than manipulation under anaesthesia¹³. On the contrary NgCY et al. gave the evidence that manipulation under anesthesia alleviated pain and facilitated recovery better than capsular distention¹⁴. Diwan et al. in their study proved the surgical release of the capsule was superior to other treatment options. Despite

randomized control trial, a total of 90 patients with AC were sampled through non-probability consecutive sampling from the outpatient department of Armed Forces Institute of Rehabilitation Medicine, Rawalpindi from July 2013 to July 2015. The sample size was calculated using WHO sample size calculator¹⁰. Patients included both male and female of 18-70 years of age with idiopathic shoulder pain having duration of more than 3 weeks but less than 6 months. AC was diagnosed on the basis of clinical history of spontaneous shoulder pain, and shoulder examination showing passive limitation of movements in at least two planes and plain x-rays excluding other significant shoulder diseases. Patients baseline investigations including random blood sugar

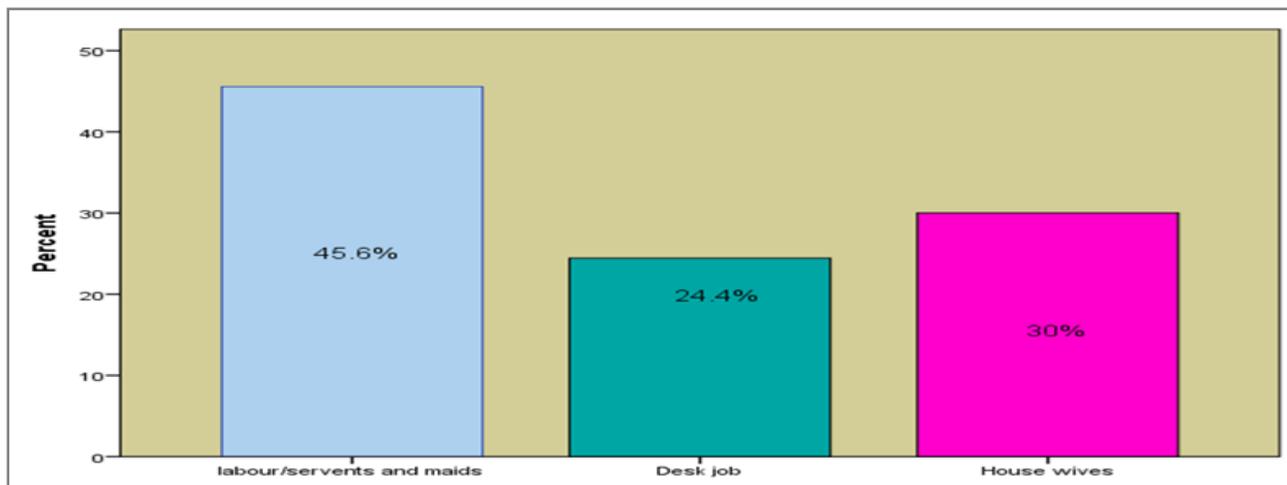


Figure: Occupation of patients with adhesive capsulitis.

all these studies and multiple treatment options, the definitive treatment remain unclear⁷⁻⁹.

To our knowledge, in Pakistan limited data is available regarding the options for effective management of AC, therefore we designed this study to compare the IA corticosteroid versus physiotherapy in the management of AC in terms of mean pain score. The results of this study may help the physician in deciding most effective therapeutic approach.

PATIENTS AND METHODS

After formal approval from the hospital ethical committee for commencement of the

level, HbA1c, thyroid profile and ultrasound of shoulder joint was also carried out to determine the possible etiology of AC. Patients with history of trauma to shoulder, surgical repair of soft tissue around the shoulder, osteoporosis and degenerative shoulder pathology, previous history of intra-articular steroid injection in shoulder joint and initiation of successful treatment within 6 weeks prior to initial evaluation by the author were excluded from the study. Patients with reflex sympathetic dystrophy, neuromuscular disorders or referred pain from disc protrusion or radiculopathy and those with contraindication to use of

corticosteroid injection were also not part of the study.

Patient's informed written consent for participation was taken after explaining the objectives and benefits of the study. Forty five patients were assigned to each group A or group B randomly by lottery method. Group A was given IA injection of triamcinolone 40mg/2ml and bupivacain 2ml into shoulder joint under aseptic measures using posterior approach by the same physiatrist without the aid of imaging modalities. Group B, received eight sessions of physiotherapy on alternate days. Each session included Transcutaneous Electrical Nerve Stimulation (TENS), Ultrasound (US) therapy, continuous passive motion (CPM), and ROM

statistics were calculated for both qualitative and quantitative variables. Frequency and percentages were calculated for qualitative variables like gender. Mean and standard deviations were calculated for quantitative variable like pain score on VAS. Chi-square test was applied for comparison of categorical variables. Independent sample t-test was use to see the statistical significance. A p -value \leq 0.05 was considered statistically significant.

RESULTS

All ninety patients completed the study with no drop out. Basic demographics of the patients are given in table-I. Of all, 41 (45.6%) patients were laborer (including servants and maids) by

Table-I: Basic characteristics among groups.

Characteristics	Group A (n=45)	Group B (n=45)	<i>p</i> -value
Mean age (years)	48.01 \pm 8.6	47.02 \pm 7.0	0.55
Gender n(%)			
Male	20 (44.4)	22 (48.9)	0.673
Female	25 (55.6)	23 (51.1)	
Shoulder side involvement n(%)			
Right	30 (66.67)	31 (68.89)	0.813
Left	12 (26.67)	10 (22.22)	
Both	3 (6.66)	4 (8.89)	

Table-II: Improvement in pain score on visual analogue scale.

Group (n)	Pain score	Mean	Std. Deviation	<i>p</i> -value
A (45)	Initial VAS	7.2000	0.91949	<0.001
	VAS after 6 wks	5.5778	1.23378	
B (45)	Initial VAS	7.4000	0.93905	0.66
	VAS after 6 wks	7.3111	0.94922	

* p \leq 0.05 is statistically significant, *Sample t-test.

exercises. Sessions were supervised and were carried out in physiotherapy department of our setup. All patients of both groups were also given identical home exercise program and same analgesics. Patients' pain scores on visual analogue scale (VAS) were recorded at initiation of management and then at six week follow-up to observe any improvement in mean pain score. Data were collected and recorded on specialized proforma by the principal investigator.

Data were analyzed with the help of statistical program SPSS version 20.0. Descriptive

profession (figure).

AC of the right shoulder was found in 61 (67.8%) patients. Overall 70 (77.8%) patients had AC of dominant side. Systemic causes (which include diabetes mellitus, hypothyroidism and hyperthyroidism) resulting in AC constitutes the major bulk of patients 52 (57.8%), intrinsic causes (bicipital tendinitis, rotator cuff injuries and calcific tendinitis) were found in 17 (18.9%) of patients. Post stroke AC patients were included in extrinsic causes of AC and constitute 21 (23.3%) (table-I).

As shown in table-II, the overall initial pain score of total 90 patients was 7.3 ± 0.92 . Statistically significant improvement in pain score on VAS was found in patients with group "A", with a *p*-value of <0.001 as compared to patients in group "B".

DISCUSSION

AC is a commonly identified but poorly understood cause of a painful and stiff shoulder which can occur in both genders at the age of 40-70 years but rarely before 40 years¹⁵. The mean age of our study population was also found to be 47.5 ± 7.9 years. Review of the literature revealed that laborers are the most AC affected occupation¹⁶ which was in accordance to our study where 45.6% of the patients were laborer, maid and servants.

The relationship between AC and systemic causes like diabetes mellitus and thyroid abnormalities is well established from the literature¹⁰. Our study results also supported this association as 57.8% patients had various systemic causes while in a study conducted in Hong Kong 33.3% of the patients were diabetics¹⁷. The reason for such difference might be due to the fact, that in our study, in addition to diabetic patients, patients with thyroid abnormalities were also included in systemic causes.

Previous studies and an extensive review of the literature on AC have highlighted controversy about effectiveness of one form of a therapy over other^{8,11-13,18}. Among many other possible explanations, one of the reasons behind this argument is the failure of many researchers to correctly define and accurately sort out AC among other causes of shoulder pain and stiffness.

Although most orthopedic literature have emphasized some form of invasive therapy like use of IA corticosteroid injections, manipulation under anesthesia or arthroscopic release or repair^{13,16,18}. On the other hand researches carried out by physiotherapists have proved exercise and therapeutic modalities to be superior over the use of invasive techniques¹⁷. Studies have shown that

deep heat and stretching exercises play a beneficial role in pain relief of patients with AC¹⁷. Another study showed that combining oral corticosteroids, non-steroidal anti-inflammatory drugs and physiotherapy, provide good pain relief as compared to physiotherapy¹⁸. Yet another study carried out by Widiastuti-Samekto proved that IA corticosteroid injection gave rapid pain relief among patients with AC¹⁹.

The results of our study indicated that the use of single IA corticosteroid injection was superior to 8 session of supervised physiotherapy program in improving shoulder pain at 6 weeks follow up which supported our hypothesis.

Our results supported findings published by Windt et al demonstrating the use of single IA corticosteroid injections were superior to those of supervised physiotherapy program with a treatment success in 77% of the patients at 7 weeks follow up post IA injection as compared to improvement in only 46% of the patients underwent physiotherapy²⁰. Even more significant improvement in pain severity on VAS was observed in a study carried out in orthopedic surgery department of Mardan medical complex where the improvement in pain score was from initial average score of 6 at VAS to an average score on VAS of 2 at the end of follow up¹⁶.

A meta-analysis carried out to see the effectiveness of IA steroids found that the response to treatment depends on the duration of symptoms. Patients who underwent intervention with IA corticosteroid injection early during AC respond better and earlier than those injected late²⁰. One reason for better response with early use of IA corticosteroid in AC might be the fact that with early use of injection during the course of AC, patients regain ROM before developing severe fibrosis²¹. Rizk et al compared four different treatments including use of local anesthetic lidocain separately and in combination with methylprednisolone and use it either IA in shoulder joint or intra-bursal with no statistically significant difference on pain score when measured at 24 weeks²².

We used a blind technique for IA steroid injection but the confirmation of injection accuracy can be obtained with fluoroscopy or ultrasound. Studies have shown that sonographic guided IA injection in shoulder joint not only result in reduction of procedural pain but can also reduce VAS pain score and better functional outcome^{23,24}.

Although our study was devised based on the best evidence available, our results cannot be generalized to physiotherapy and IA injection interventions other than what we had used in our study.

CONCLUSION

The use of IA corticosteroid injection in shoulder joint potentially offers a significantly greater clinical improvement in terms of pain relief in management of AC. Supervised physiotherapy on the other hand is of limited efficacy in the treatment of AC.

Disclosure

This is an FCPS dissertation based article.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

- Page MJ, Green S, Kramer S, Johnston RV, McBain B, Chau M, et al. Manual therapy and exercise for adhesive capsulitis (frozen shoulder). *Cochrane Database Syst Rev* 2014; (8): CD011275.
- Ranalletta M, Rossi LA, Bongiovanni SL, Tanoira I, Elizondo CM, Maignon GD. Corticosteroid injections accelerate pain relief and recovery of function compared with oral NSAIDs in Patients With Adhesive Capsulitis: A Randomized Controlled Trial. *Am J Sports Med* 2016; 44(2): 474-81.
- Uppal HS, Evans JP, Smith C. Frozen shoulder: A systematic review of therapeutic options. *World J Orthop* 2015; 6(2): 263-8.
- Dehghan A, Pishgooei N, Salami MA, Zarch SM, Nafisi-Moghadam R, Rahimpour S et al. Comparison between NSAID and intra-articular corticosteroid injection in frozen shoulder of diabetic patients; A randomized clinical trial. *Exp Clin Endocrinol Diabetes* 2013; 121(2): 75-9.
- Song A, Higgins LD, Newman J, Jain NB. Glenohumeral corticosteroid injections in adhesive capsulitis: A systematic search and review. *PM&R* 2014; 6(12): 1143-56.
- Ozkan K, Ozcekcic AN, Sarar S, Cift H, Ozkan FU, Unay K. Suprascapular nerve block for the treatment of frozen shoulder. *Saudi J Anaesth* 2012; 6(1): 52-5.
- Kraal T, Visser C, Sierevelt I, Beimers L. How to treat a frozen shoulder? A survey among shoulder specialists in the Netherlands and Belgium. *Acta Orthop Belg* 2016; 82: 78-84.
- Koh KH. Corticosteroid injection for adhesive capsulitis in primary care: a systematic review of randomised clinical trials. *Singapore Med J* 2016; 57(12): 646-57.
- Lorbach O, Anagnostakos K, Scherf C, Seil R, Kohn D, Pape D. Nonoperative management of adhesive capsulitis of the shoulder: Oral cortisone application versus intra-articular cortisone injections. *J Shoulder Elbow Surg* 2010; 19(2): 172-9.
- Blanchard V, Barr S, Cerisola FL. The effectiveness of corticosteroid injections compared with physiotherapeutic interventions for adhesive capsulitis: A systematic review. *Physiotherapy* 2010; 96(2): 95-107.
- Margo K. A high- or low-dose triamcinolone injection improved pain and function in adhesive capsulitis. *Ann Intern Med* 2013; 159(6): JC6.
- Yoon SH, Lee HY, Lee HJ, Kwack KS. Optimal dose of intra-articular corticosteroids for adhesive capsulitis: A randomized, triple-blind, placebo-controlled trial. *Am J Sports Med* 2013; 41(5): 1133-9.
- Buchbinder R, Green S, Youd JM, Johnston RV, Cumpston M. Arthrographic distention for adhesive capsulitis (frozen shoulder). *Cochrane database Syst Rev* 2008; 23(1): CD007005.
- Ng CY, Amin AK, Narborough S, McMullan L, Cook R, Brenkel IJ. Manipulation under anaesthesia and early physiotherapy facilitate recovery of patients with frozen shoulder syndrome. *Scott Med J* 2009; 54(1): 29-31.
- Dias R, Cutts S, Massoud S. Frozen shoulder. *BMJ* 2005; 331(7530): 1453-6.
- Shah FA. Outcome of intra-articular injection of methylprednisolone in idiopathic frozen shoulder. *Rawal Med J* 2012; 37: 34-7.
- Leung MS, Cheing GL. Effects of deep and superficial heating in the management of frozen shoulder. *J Rehabil Med* 2008; 40(2): 145-50.
- Buchbinder R, Green S, Youd JM, Johnston RV. Oral steroids for adhesive capsulitis. *Cochrane Database Syst Rev* 2006; 4: CD006189.
- Widiastuti-Samekto M, Sianturi GP. Frozen shoulder syndrome: Comparison of oral route corticosteroid and intra-articular corticosteroid injection. *Med J Malaysia* 2004; 59(3): 312-6.
- Van der Windt DA, Koes BW, Deville W, Boeke AJP, de Jong BA, Bouter LM. Effectiveness of corticosteroid injections versus physiotherapy for treatment of painful stiff shoulder in primary care: randomised trial. *BMJ* 1998; 317: 1292-6.
- Marx RG, Malizia RW, Kenter K, Wickiewicz TL, Hannafin JA. Intra-articular corticosteroid injection for the treatment of idiopathic adhesive capsulitis of the shoulder. *HSS J* 2007; 3: 202-07.
- Rizk T, Pinals R, Talaiver A. Corticosteroid injections in adhesive capsulitis: Investigation of their value and site. *Arch Phys Med* 1991; 72(1): 20-22.
- Ettinger M. Adhesive capsulitis Intraarticular corticosteroid: it does not reach the dose. *Z Orthop Unfall* 2013; 151(3): 219.
- Sibbitt WL, Peisajovich A, Michael AA. Does sonographic needle guidance affect the clinical outcome of intraarticular injections? *J Rheumatol* 2009; 36(9): 1892-902.