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Original Research Article

Comparative Study of Ultrasonography Guided Hydrodilation and Intra-Articular Corticosteroid Injection in Adhesive Capsulitis of the Shoulder

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Abstract:

Background and Aim: Adhesive capsulitis is a condition that presents with pain and progressive limitation of both active and passive shoulder movements. As adhesive capsulitis is postulated as an inflammatory and fibrotic disease, easy treatment with intraarticular corticosteroids injection may reduce synovitis, limit the Development of capsular fibrosis, and alter the natural history of disease. The objective of this study was to compare the effects of single intra-articular Corticosteroid injection with Hydrodilation.

Material and Methods: In this study 36 Patients were taken of adhesive capsulitis of shoulder and divided in 2 groups. One group receiving corticosteroid and other one is receiving Steroid + Normal saline (Hydrodilation). The Outcome was recorded.

Results: There was statistically significant reduction in Visual analogue scale pain scorers in both the groups over a time period of 12 weeks. But the Corticosteroid injection was observed to be better in reducing the pain scores when compared to the Hydrodilation after 12th week (P = 0.00003).

Conclusion: We concluded that USG- guided corticosteroid injection is more effective therapy then USG-guided hydrodilation in terms of Pain & Improvement in shoulder function in the treatment of adhesive capsulitis of Shoulder.

Keywords: Adhesive capsulitis, Corticosteroid, Hydrodilation, Visual Analogue Scale.

Introduction

Adhesive capsulitis, as defined is "a condition of uncertain etiology characterized by a significant restriction of both active and passive shoulder motion that occur in absence of known shoulder disorder. This condition presents with pain and progressive limitation of both active and passive shoulder movements. Both active and passive shoulder movements are affected, mainly involving the glenohumeral joint. It can be primary or secondary; the latter includes causes such as rotator cuff tear, cardiovascular disease, and diabetes mellitus. [1,2]

There are 3 stages of adhesive capsulitis: Stage 1 – Freezing stage, with pain and stiffness lasting around 9 months. Stage 2 – Frozen stage, with persistent stiffness lasting 4–12 months. Stage 3 – Thawing stage, with spontaneous recovery lasting 12–42 months. [3] The symptoms are generally self-limiting over 1 to 3 years, more commonly affecting females over males in the 5th and 6th decades. The treatments for this condition aim to relieve pain, restore movement, and eventually regain shoulder function. The treatment options can be conservative or invasive. Conservative methods include Non-steroidal anti-inflammatory drugs (NSAIDS) and physical therapy, less invasive methods are corticosteroid injections, injection of saline with local anesthetic, pure invasive include capsular distension, myofascial release, manipulation under anesthesia, and arthroscopic capsular release. [4,5]

Intra-articular CS injection is one of the most commonly used procedures for treating adhesive capsulitis due to it being economical and easily acceptable among patients. [6] The CS injection provides symptomatic relief and prevents the formation of capsular fibrosis. Recently, new evidence has emerged is Hydrodilation as an

adjuvant in treating intracapsular injuries. [7,8] In which Volume of drug is increased by diluting drug with normal saline and then injected into the affected shoulder joint. This play an important role in relieving pain and stiffness of joint.

The objective of this study was to compare the effects of single intra-articular Corticosteroid injection with Hydrodilation. We hypothesized that Hydrodilation is good in providing symptomatic relief to the patient of adhesive capsulitis; corticosteroid injection will ultimately provide better improvement in pain and shoulder function.

Materials and Methods

Thirty six patients suffering from adhesive capsulitis were chosen for this study after proper clinical and radiological assessments. All the studies were performed at the pain clinic, Department of Anesthesiology, G.M.E.R.S. Medical College & General hospital, Junagadh. The procedure was explained, and informed consent was taken. The patients were divided randomly into two subgroups: Subgroup A received Corticosteroid injection and Subgroup B received Hydrodilation.

All the patients were more than 18 years of age, with persistent shoulder pain diagnosed clinically and radiologically, more than 1/3rd restriction of shoulder flexion, abduction, and external rotation. Other selection criteria included willingness to participate in the study and forgo any other concomitant treatment modality.

The exclusion criteria were intrinsic glenohumeral pathology, history of injection in the involved shoulder during preceding 6 months, history of shoulder trauma or surgery, patients receiving anticoagulant therapy or on antiplatelet or with hematological disorders, patients having hypersensitivity to local anesthetics, uncontrolled psychiatric disorder or major depression, patients with autoimmune disease, malignancy, uncontrolled diabetes mellitus, local infection or ongoing septicemia, hyperlipidemia, pregnant and breastfeeding females, and patients with body mass index >30. Group 1 was receiving Corticosteroid injection[Inj. Triamcinolone 2ml (80 mg) + Inj. Ropivacaine 0.2% 2 ml + Normal Saline 1 ml (Total Volume 5 ml)], While Group 2 was receiving, [Normal Saline 15 ml + Inj.Triamcinolone 2ml (80 mg) + Inj. Ropivacaine 0.2% 2 ml + Normal Saline 1 ml (Total Volume 20 ml)].

Both the procedures were carried out under ultrasound guidance. All patients were advised not to take any analgesics such as NSAIDS during the study period. All the patients were assessed 1 week before the procedure and standard protocol for treatment, i.e., a combination of oral tramadol 37.5 mg and paracetamol 325 mg was advised to them. Patients were followed up at 1 week post injection, then after the 4thweek, and then at the end of the 12th week.

Results

All the subjects finished the entire 12-week study period. Most of the patients were in the age group of 40–60 years in both the groups. To assess the degree of pain and shoulder function, the Visual analogue scale (VAS) score and the Shoulder Pain and Disability Index (SPADI) scores were calculated for each patient at the start of the study and later at each follow-up visit.

The average changes with respect to the baseline scores are recorded. The VAS and SPADI scores for the two groups were compared at each period of time, and the significance in differences was evaluated using a paired t-test.

There was a statistically significant reduction in VAS pain scores in both the groups over a time period of 12 weeks, but the Corticosteroid injection was observed to be better in reducing the pain scores when compared to the Hydrodilation after the 12th week. at the end of the study period (12 weeks), a marked difference was observed between the resulting scores of Corticosteroid and Hydrodilation groups. There was a significant reduction in SPADI scores of both the groups, but Corticosteroid gave better results in compared to the other group.

Table 1: Comparison of changes from Baseline between Corticosteroid and Hydrodilation groups

	Mean (SD)		P
	Corticosteroid	**Hydrodilation**	
VAS Score			
Week 1	2.83 (0.33)	2 (0.49)	0.023
Week 4	4.06 (0.09)	3.28 (0.15)	0.0029
Week 12	5 (0)	4 (0.11)	0.00003158
SPADI Score			
Week 1	29.22 (2.4)	20.83 (0.93)	< 0.001
Week 4	47.61 (1.28)	41.50 (1.35)	< 0.001
Week 12	58.27 (1.71)	54.67 (1.89)	< 0.001

Discussion

The primary aim of this research was to evaluate the effectiveness of injection Corticosteroid and Hydrodilation in the treatment of patients suffering from adhesive capsulitis of the shoulder. Adhesive shoulder capsulitis, or arthrofibrosis, describes a pathological process in which the body forms excessive scar tissue or adhesions across the glenohumeral joint, leading to stiffness, pain, and dysfunction. Painful stiffness of the shoulder can adversely affect day-to-day activities and consequently impair quality of life. Dai et al from China analyzing patients of primary frozen shoulders revealed that combination of corticosteroid hydrodilatation was more effective than any of these alone. ($p<0.01$)9 some other researchers have shown that hydrodilatation with corticosteroids is most efficient conservative mode of management for managing adhesive capsulitis. [10,11]

Corticosteroid & Hydrodilation is done by adding 0.2% ropivacaine and Normal saline. Both Corticosteroid &Hydrodilation injection given by ultrasound guided in rotator cuff tendinopathy and found that Corticosteroid injection is a safe, cheap and outpatient procedure, which showed competitive, promising, and well proved results when compared to other modality outcomes such as conventional surgeries, arthroscopic procedures, and physiotherapy.

Corticosteroid with hydrodilatation could be preferred over any of these alone as the high-pressure delivery enhances spread throughout articular cavities specifically along biceps tendon sheath for broader anti-inflammatory effects. [9] A meta-analysis done by Saltychev et al found that hydrodilatation alone in adhesive capsulitis did not yield any significant improvements in functional outcomes. [12]

A study done by Oh et al from Korea comparing corticosteroid versus hyaluronic acid versus corticosteroid plus hyaluronic acid in patients with adhesive capsulitis revealed that simultaneous injection of corticosteroid and hyaluronic acid were better in improving SPADi scores. [13]

In our study, we injected injection Coricosteroid and injection Hydrodilation into two groups of patients having adhesive capsulitis of the shoulder. The patients in both the groups showed a statistically significant difference in pain and shoulder function. However, injection Corticosteroid showed a significantly better improvement in pain and shoulder function at 12th week as compared to injection Hydrodilation.

Being a single center study with a relatively moderate follow-up period were some of the limitations of this study. Further similar studies could be conducted in the light of this research like different strengths of corticosteroid injections could be compared.

Conclusion

We can conclude that both Corticosteroid and Hydrodilation are effective in treating adhesive capsulitis of the shoulder. However, at the follow-up after the 12th week, the Corticosteroid injection was found to be more effective than the Hydrodilation injection in terms of improving pain and disability in patients.

This study provides evidence that Corticosteroid can be used with significantly better results in patients of adhesive capsulitis where Hydrodilation can be refused by the patient.

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