

Comparison Between Hydroplasty and Intra-Articular Steroid Injection in Treatment of Idiopathic Frozen Shoulder

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Abstract

Introduction: Idiopathic frozen shoulder is one of the common problems in orthopedic outpatient department. It is characterized by gradually progressive pain and stiffness of the shoulder followed by spontaneous recovery over the period of time.. Many different modalities are available for the treatment of Idiopathic frozen shoulder, but no one is universally accepted. The purpose of this study was to compare the outcome of hydroplasty with intra-articular steroid injection.

Methods: This was a comparative hospital based study conducted between March 2011 to September 2012, which included 50 patients with Idiopathic Frozen shoulder. There were 25 patients in each group. The mean age of respondent was 57.36 years. Simple Random method of sampling was adopted for selecting patients for each group. Hydroplasty group was given 30ml chilled(cold) sterile normal saline with 2 ml Methylprednisolone (80 mg), 4 ml 2% Lidocain(plain) and 4 ml 0.5% Bupivacain (total volume:40ml) and steroid group was given 2ml Methylprednisolone, 4ml 2% Lidocain(pain), 4ml 0.5% Bupivacain with total volume: 10 ml. Both groups were attached for therapeutic exercises. Comparison of outcomes between two treatment groups was done using Visual Analogue Scale (VAS) for pain, Shoulder Pain and Disability Index for Shoulder function and degree of range of motion. Statistical analysis was done using SPSS 17.0

Results: There was significant improvement in level of pain, Shoulder function (Shoulder Pain and Disability Index) and range of motion in forward flexion, abduction, external rotation, and internal rotation in three month period in Hydroplasty group compared to Steroid group.

Conclusion: There was improvement in pain, range of movement and Shoulder Pain and Disability Index (SPADI) score in all patients of both group but the difference in improvement was found to be statistically significant in hydroplasty group as compared to steroid injection group. So Shoulder hydroplasty technique was found to be more effective treatment modality than intra-articular steroid injection in idiopathic frozen shoulder.

Key words: Frozen shoulder, Hydroplasty, Intrarticular steroid injection, Shoulder pain and Disability Index

Introduction

Idiopathic frozen shoulder is a commonly encountered problem in orthopedic outpatient department. The “frozen shoulder” diagnosis has been used for many years in describing shoulder pain and limited motion, and was originally thought to be “peri arthritis.” Nevasier was the

first to identify the pathology through histological and surgical examination of frozen shoulder patients. It is characterized by gradually progressive pain and stiffness of the shoulder with slow, spontaneous restoration of partial or complete motion over months to years



Although many treatment options have been proposed for the frozen shoulder syndrome, each has limitations. Home exercises may not improve the rate of natural recovery.^{2,3} Benefits from intensive physical therapy are slow.⁴ Manipulation with anaesthesia can be effective, but significant complications have been documented and publications report protracted recovery.⁵ Injection of intra-articular steroids only may benefit some patients, but this hypothesis is based on only few quality studies.⁴ Arthroscopic release done under general anesthesia is invasive and only few patients' outcomes are reported.^{6,7} Hydraulic distension of the shoulder joint capsule (hydroplasty) has potential to provide rapid relief of pain and immediate improvement of shoulder function for patients with adhesive capsulitis⁸.

The purpose of this study was to compare the outcome of hydroplasty and therapeutic exercise with steroid injection and therapeutic exercise in idiopathic frozen shoulder.

Methods

It was a prospective hospital based comparative study on effectiveness of hydroplasty with therapeutic exercise and steroid injection with therapeutic exercise in idiopathic frozen shoulder. All cases with Idiopathic Frozen Shoulder (IFS), irrespective of gender, attending the hospital and have given written consent to participate the study were included till the number reached 50. There were 25 patients in both hydroplasty(group A) and intra-articular steroid injection group(group B). Simple random sampling technique was used to divide the patients into two groups. Respondents who chose odd numbers were allocated to group A (hydroplasty group) and even numbers were allocated to Group B (steroid group).

The patients with pain for at least one month duration and decrease range of motion in all direction fulfilling the criterias given by Rizk et al.⁹ were included in the study.

Ethical clearance was taken from institutional review board of the Institute before starting the study.

Demographic and medical information was collected from patients participated in the study. Range Of Motion, Visual Analogue Scale for pain(VAS) and Shoulder Pain And Disability Index(SPADI)¹⁰ were systematically measured before the procedure and at 1 week, 1 month and 3 months after the procedure.

Injection technique

Pre- Procedure systemic examination was done and VAS, range of movement and SPADI was recorded in all patients.

The anterior approach was used in all cases. The bony landmarks were drawn first. Patient was laid in the supine position, adequate betadine paint was done, The tract of the injection site, including the skin and soft tissue over the capsule, were injected with a combination of 3 mL of 2% xylocaine with adrenaline.

The joint was entered with a 18 G 1.5-inch needle placed just lateral to the coracoids sliding medial to humeral head. The needle was directed posterior and slightly superiorly and laterally.. An intra-articular injection was performed using a 10-mL syringe containing with 4 ml of 2% lidocaine(plain), 4 ml 0.5% Bupivacine and 2 ml of corticosteroid (80mg Methylprednisolone) in intra articular steroid injection group.

In Hydroplasty group, after injecting steroid as mentioned above, further injection was given by three separate 10 mL syringes containing chilled sterile normal. The injected site was covered with sterile antiseptic adhesive tape. The patients were attached for physiotherapy (therapeutic exercise) after the procedure immediately.

Therapeutic Exercise

After the procedure every patient was sent for physiotherapy on the day of the procedure. Techniques like: oscillations, distraction, glides of glenohumeral joint and passive stretch in all motion to end range as tolerated by the patient was started from day one .Then patient was taught these exercise ten repetitions four times daily . Thereafter duration & frequency of home exercise was gradually reduced over three months. Statistical analysis was done using t-test and Mann Whitney test for testing two samples by SPSS 17.0. "P" value of <0.05 was considered to be significant with 95% confidence limit.

Results

There were total of 50 patients with 25 patients in hydroplasty group and 25 patients in steroid group. The ages of the patients ranged from 43 years to 82 years with mean age of 57.36 years. Most of the patient (42%) was between age group 50-59 years. There were 18 male and 32 female patients. Out of 50 patients 32 (64%) had non dominant hand involvement.



Table 1. Comparison of Range of Motion (ROM) in Two Groups

Range Of Motion Assessment	Hydroplasty (Mean degree of increment \pm SD)	Only Steroid ((Mean degree of increment \pm SD)	P Value
Forward Flexion Pre Procedure	80.40\pm 10.20	82.2\pm 14.72	0.618
Forward Flexion in 1 week	32.6 \pm 10.11	21.6 \pm 6.88	0.000
Forward Flexion in 1 month	58.00 \pm 12.4	47.2 \pm 11.00	0.002
Forward Flexion in 3 month	70 \pm 13.5	60.4 \pm 11.62	0.006
Abduction Pre Procedure	60.20 \pm11.68	65.2 \pm12.28	0.147
Abduction in 1 week	39 \pm 6.92	27 \pm 7.0	0.000
Abduction in 1 month	67 \pm 11.90	55 \pm 11.6	0.001
Abduction in 3 month	85 \pm 13.60	74 \pm 13.8	0.003
External Rotation Pre Procedure	12.4 \pm8.8	11.8\pm7.75	0.799
External Rotation 1 week	10.6 \pm 3.9	6.4 \pm 2.3	0.000
External Rotation 1 month	19.0 \pm 5.0	14.2 \pm 4.25	0.001
External Rotation 3 month	35.20 \pm 9.5	29.00 \pm 8.16	0.017
Internal Rotation Pre Procedure	3.64\pm 1.44	3.16\pm 1.10	0.192
Internal Rotation in 1 week	3.32 \pm 0.7	2.85 \pm 0.55	0.009
Internal Rotation in 1 month	6.6 \pm 0.96	5.90 \pm 1.12	0.006
Internal Rotation in 3 month	8.2 \pm 1.2	7.26 \pm 1.3	0.004

We observed gradual improvement in Range of motion from day one to three months. There was significant improvement in Hydroplasty group compared to steroid group. Range of movement in both group before the procedure was statistically not significant but after procedure there was statistically significant differences between two groups at day one to 3 months periods (P value <.05).

Table 2: Comparison of Shoulder Pain Disability Index at different time between two groups

Assessment of Shoulder Disability	Hydroplasty(Mean reduction in SPADI score \pm SD)	Steroid(Mean reduction in SPADI score \pm SD)	P Value
SPADI Pre Procedure	7.12 \pm 0.60	7.24 \pm 0.43	0.25
SPADI 1 Week	2.68 \pm 0.55	2.13 \pm 0.65	0.05
SPADI 1 Month	5.36 \pm 0.90	4.61 \pm 0.9	0.048
SPADI 3 Months	6.52 \pm 0.82	5.57 \pm 1.2	0.037

Shoulder Pain Disability Index difference was not statistically significant between two groups before procedure but difference of reduction in the SPADI score was statistically significant(P value <.05) in one month and 3 month follow up.



Table 3: Comparison of visual analogue scale at different time between two groups

Assessment Pain Score	Hydroplasty (Mean reduction in pain score \pm SD)	Only Steroid (mean reduction in pain score \pm SD)	P Value
VAS Pre Procedure	6.56 \pm 0.82	6.88 \pm 0.73	0.15
VAS 1 week	2.72 \pm 0.73	2.12 \pm 0.65	0.05
VAS 1 month	5.64 \pm 0.75	5.03 \pm 0.75	0.043
VAS 3 months	6.16 \pm 0.55	5.46 \pm +0.84	0.029

Visual analogue scale was not statistically significant between two groups before procedure, which was found to be significant (P value <.05) after procedure in 1 month and 3 months period.

Discussion

Frozen shoulder has been a subject of numerous investigations to determine the effective treatment. Treatment modality varies simply from benign neglect or expectant observation to surgical arthrolysis. No standard treatment regimen is universally accepted. There is still a controversy about which many available treatments are the best. Thus, this study was conducted to evaluate the effectiveness of hydroplasty with therapeutic exercise over steroid injection with therapeutic exercise.

In our comparative study, total 50 patients who met our inclusion criteria were selected for the procedure. Among the fifty patient 32(64%) were female and 18(36%) were male. Most of the patient (42%) was between age group 50-59 years. The mean age of respondent was 57.36 years and 32 (64%) of the patient in this study had non dominant hand involvement.

Similarly, a study done by Donald O Fareed and William R Gallivan¹¹ in 50 patients with frozen shoulder, the mean age was 56 years ranging from 42-76 years and non dominant shoulder involvement was 55%. Similarly another study done by VJ Van Royan and P W Pavlov¹² in 22 patients , 15 cases (68%)were female and 7 cases(32%) were male and average age was 48 and non dominant shoulder involvement was 55%. Likewise, another study done by TA Hamdan and K A AL Essa¹³ a similar observation to this study was made. Although these studies were done in different period of time, these studies indicate that frozen shoulder usually occurs in 5th to 6th decades of life ,commonly affects female sex, mostly the non dominant shoulders were affected.

All respondents entered in this study showed decreased intensity of pain with decrease analgesic use and felt easier to perform daily activity that was difficult before the procedure. Pain is a subjective measure and difficult to assess, so we used Visual Analogue Scale (VAS) for pain assessment. In comparison of both treatment groups ,significant improvement was observed in VAS Scale in Hydroplasty group compared to steroid group in 3 month follow up (P<0.03).

In the comparison of pre procedure, ability to perform daily activity with affected shoulder assessed by Shoulder Pain and Disability Index (SPADI), There was improvement in disability score in both treatment group, however there was significant improvement in disability score among hydroplasty group compared to steroid group in three months follow up (P<0.019).

In this study, the assessment of Range of motion of affected shoulder was done by using goniometer. We found out that there was gradual increment in range of motion in different planes in both treatment groups. But there was statistically significant improvement in ROM (forward flexion,abduction,external rotation and internal rotation) in hydroplasty group compared to steroid group in three months follow up('P'<0.006,P<0.003,P<0.017,P<0.004 for forward flexion,abduction,external rotation, internal rotation respectively).

A study done by Gam AN, Schydlowsky P et al¹⁴ in 32 patients, comparison of treatment of Idiopathic Frozen Shoulder distension combined with steroid with steroid alone with evaluation based on pain scales, analgesic usage, and ROM outcome scale. The analgesic usage was significantly lower in the group treated with distension at the end of the study. The study also concluded that the VAS outcomes showed no difference between the treatments, while in the distension group ROM showed significant improvement in all directions except extension (external rotation p=0.0007, flexion p=0.03, extension p=0.1). The analgesic use was significantly lower in the group treated with distension at the end of the study (p=0.008).). They concluded that distension with steroid can seem to help in management of idiopathic frozen shoulder.

Similar to the above study, we also found significant improvement in ROM in hydroplasty group compared to steroid group in three months follow up Likewise analgesic usage after the procedure was significantly less in hydroplasty group compared to steroid group (P<0.016).

Buchbinder R, Green S.¹⁵ in a study consisted of shoulder

joint distension with combination of saline with steroid and steroid alone for patients with a painful stiff shoulder, showed that there was significant benefit in improving function, pain, and range of motion in distension group in three months follow up.

Likewise in our study, outcomes (improvement on level of pain, improvement in shoulder motion and function) were significantly better in hydroplasty group compared to steroid group. The results of our study was also comparable to the similar study done by Callinan N et al.⁸ in 28 patients and Halverson L et al. in 21 patient¹⁶.

A study done by Corbeil V et al.¹⁷ showed that there was no significant difference between the two treatment groups (distension with steroid and steroid alone) in the degree of pain or limitation of movement experienced by the patients after 1 and 3 months of follow up. In contrast to this study, our study showed significant improvement in the level of pain, improvement in range of motion and shoulder function in 3 months follow up.

A research done by Tveita E K et al.¹⁸ on treatment effects in patients with idiopathic frozen shoulder, who received intra articular injections either with or without a dilatation procedure. No significant differences for selected outcomes between the two treatment groups were recorded, but he concluded that it was possible that hydroplasty had an important treatment effect in some cases.

In this study, we found out significant improvement in pain scale, range of motion and disability scale in three months follow up in hydroplasty group compared to steroid group indicating that hydroplasty had an important treatment effect in most of the cases with idiopathic frozen shoulder.

Conclusions

There was improvement in pain, range of movement and Shoulder Pain and Disability Index (SPADI) score in all patients of both group but the difference in improvement was found to be statistically significant in hydroplasty group as compared to steroid injection group. So Shoulder hydroplasty technique was found to be more effective treatment modality than intraarticular steroid injection in idiopathic frozen shoulder.

Conflict of interest: None declared.

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