

Evaluation of the Treatment of Frozen Shoulder by Hydraulic Distention Under Local Anesthesia and its Comparison with Intra Articular Steroid Therapy

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Objective: To evaluate the result of treatment of frozen shoulder by Hydraulic Distention under local anesthesia with steroid and intra-articular steroid alone.

Study Design: It was a prospective and comparative study.

Samples size: 60 patients were taken in this study and were divided into two groups.

Duration and Setting: The study was conducted in 2000 - 2001 treated in the department of Orthopaedic, Mayo Hospital Lahore.

Methodology: The patients were divided into two groups. Group-I were treated by hydraulic distension of glenohumeral joint with 50 ml normal saline under local anesthesia with steroid followed by medicines (oral analgesics and muscle relaxants) and exercises. Patients in group-II were treated by intra-articular steroid followed by medicines (oral analgesics and muscle relaxants) and exercises.

Results: The average age of patients in group I was 52 ± 2.16 years and 50 ± 2.03 in group II. There were 37 (63%) females and 22 (37%) males in our study. Female to male ratio was 1.7:1. All patients in group-I noted immediate pain relief with excellent return of range of motion (ROM) and resumption of normal sleep. At the end of 45 days of follow up all patients had returned to their normal daily activities. Most of them got excellent ROM and pain relief. All patients in group-II noted immediate pain relief and resumption of almost normal sleep. At the end of 45 days of follow up most of the patient presented with good relief of pain but could not return to most of their normal activities because of less improvement in ROM.

Conclusions: Hydraulic distension technique is a quick, safe and gives early results, so it should be considered first for the treatment of frozen shoulder.

Key Words: Frozen Shoulder, Hydrologic Distention, Intra articular steroid.

Introduction

Frozen shoulder is a chronic fibrosing condition of the capsule of the shoulder joint.¹ The term frozen shoulder as first used by Codman 1932 who described the common features as a pain of gradual onset, which is felt near the insertion of the deltoid, inability to sleep on the affected side, painful restriction of elevation and external rotation and a normal radiological appearance.^{1,2} He stated that most cases resolved in about two years without treatment. More recently, ZuCkerman and Cuomo defined frozen shoulder, or adhesive capsulitis, as a condition of uncertain etiology characterized by substantial restriction of both active and passive shoulder motion that occurs in *the* absence of a known intrinsic shoulder disorder.³

The cause of frozen shoulder remains enigmatic.² Navisor (1945) suggested a chronic inflammatory condition Lundberg (1969) suggested that the primary pathology was fibrosis & fibroplasias.² Recently arthroscopic studies showed that the capsule was contracted, there were no adhesions and that the maximal area of abnormality was at the rotator interval.¹ Frozen shoulder has been divided into three stages depending on its symptoms.

1. Freezing phase also called the painful phase. This condition lasts for 2-9 months.
2. Frozen phase also called the stiffening phase, lasts for 4-12 months.
3. Thawing phase also called the recovery phase, may last for 6-9 months.^{4,5}

Adhesive capsulitis usually occurs during the fourth to sixth decades, affecting women more often than men.⁴ Bilateral involvement occurs in 10-40% of cases but frequently involves in the non-dominant extremity.⁵ There is higher than normal association between frozen shoulder and diabetes mellitus. The incidence in general population is 2-5% while among diabetics is 10-20%.⁶

A variety of different treatments have been recommended and numerous studies have demonstrated successful results. The types of treatment have included benign neglect, chiropractic manipulation oral corticosteroids, injection of corticosteroids, physical therapy exercises and modalities, manipulation under anesthesia and arthroscopic and open release of the contracture.³ This study was conducted to evaluate and compare the results of treatment of frozen shoulder by hydraulic distension under local anesthesia with

steroid and with intra articular steroid therapy. A rapid, immediate result and cost effectiveness of hydraulic distension technique is also to be evaluated in this study.

Objectives

The purpose of study was to evaluate the results of treatment by hydraulic distension under local anesthesia with steroid and intra-articular steroid alone and to compare the result of two methods and to ascertain the range of motion gained, to assess patient compliance, subjective satisfaction, and to note any complication during follow up period in each group.

Materials and Methods

Study Design: It was a prospective, observational, comparative and clinical study.

Samples size: 60 patients were taken in this study and were divided into two groups.

Duration and Setting: The study was conducted in 2000 - 2001 treated in the department of Orthopaedic, Mayo Hospital, and Lahore.

Methodology: The patients were divided into two groups. Group-I were treated by hydraulic distension of glenohumeral joint with 50 ml normal saline under local anesthesia with steroid followed by medicines (oral analgesics and muscle relaxants) and exercises. Patients in group-II were treated by intra-articular steroid followed by medicines (oral analgesics and muscle relaxants) and exercises.

Procedure

Detailed history was taken and physical examination was done. X-rays of the shoulder joint AP view were obtained. Unbiased randomization of cases was taken in each group. The patients in group-I were managed initially by preparing skin with povidone iodine solution. Three ml of 1% plain lidocaine was injected into the skin and soft tissues overlying the joint capsule with a 23 gauge x 1" needle. Thereafter, 3 ml of 1% lidocaine was injected intraarticularly by anterior approach (with the needle passing through the deltopectoral groove and then below and medial to the tip of the coracoid process, through the coracobrachialis - biceps origin and subscapularis² with a 21 gauge x 1.5" needle, followed by steroid (40 mg triamcinolone acetate mixed with 2 ml of 1% lidocaine). Distension of the capsule was then performed with 50 ml sterile saline solution. The patient then had active and assisted range of motion exercises under supervision. These consisted of pendulum exercises, resisted flexion, extension, internal and external rotation and abduction exercises along with oral medicines (NSAIDs, analgesics and muscle relaxants). The patients continued with regular home physical therapy exercises performed four times daily, assisted by the family. The patients in group-II were managed after preparing skin with povidone-iodine solution, with intra-articular steroid injection (40 mg triamcinolone acetate mixed with 3 ml 1% plain lido-

caine). The injection was carried out through anterior approach as in group-I, followed by exercises and medicines as in group I.

Follow up examination was done in each group on day 0,7,15, 30 and 45.

When range of motion exercises, pain grading, patient's satisfaction, complications and activity level was taken note of by the same observer (by me) on each visit to decrease interobserver bias. Functional assessment of the shoulder was done by scoring system modified from constant score by constant CR and Murley AHG, which is based on the subjective and objective assessment.^{7,8} The results thus obtained were compared between each group and with those of other published series.

Results

The average age of patients in group I was 52 ± 2.16 years and 50 ± 2.03 in group II. There were 37 (63%) females and 22 (37%) males in our study. Female to male ratio was 1.7:1. All patients in group-I noted immediate pain relief with excellent return of range of motion (ROM) and resumption of normal sleep. At the end of 45 days of follow up all patients had returned to their normal daily activities. Most of them got excellent ROM and pain relief. All patients in group-II noted immediate pain relief and resumption of almost normal sleep. At the end of 45 days of follow up most of the patients presented with good relief of pain but could not return to most of their normal activities because of less improvement in ROM. At the end of 45 days 25 (86%) patients got complete resolution of pain while 4 (14%) patients complained of occasional mild pain in group-I.

Most of the patients treated by distention technique told that they had enjoyed first good night's sleep that they could not since the onset of their symptoms. Moreover consumption of oral analgesics and NSAIDs was markedly reduced earlier in group-I than in group-II. In group-II 18 (60%) patients got complete resolution of pain while 12 (40%), patients complained of occasional pain of extreme of motion. There was no significant difference in pain relief as a whole 97% improvement in group-I and 92% improvement in group-II (P-values > 0.05).

Most of the patients in our study complained of extreme difficulty in toileting, personal hygiene problems, combing hair, change of dresses. This was due to restricted ROM and pain. Most of the patients in group-I after hydraulic distension technique got immediate freedom from above mentioned problems and this technique was much appreciated. Many patients called it as a miracle for them. We also observed marked elevation of mood in most of our patients in group-I. In group-I 23 (79%) patients resumed to their near full daily activities. Six (23%) patients were not fully satisfied. In group-II most of the patients were not as happy as in group-I. Only three (10%) patients returned to near full daily activities. Twenty-two (73%) patients could achieve half of their daily activities and were not satisfied as in group-I. This all was due to less improvement in ROM.

Statistical analysis showed P-value < 0.001.

Average improvement in daily living was 91% in group-I and 78.5% in group-II. (P-value is < 0.001).

In group-I we noted immediate remarkable improvement in ROM 46% - 95% (average 66%) right after distension technique. Immediate improvement was as in sequence.

- Forward elevation 146° (81%).
- Lateral elevation (abduction) 130° (72%).
- External rotation 64%.
- Internal rotation 47%.

We did not find any immediate improvement in group-II. This marked difference continued till 45th day. At the end of the 45th day there was marked difference in improvement in ROM 84% in group-I and 63% in group-II. This difference was much significant that patients in group-I got excellent freedom of ROM and achieved nearly full daily work. While it was not as in group-II. (P-value < 0.001). It is interesting to see that there was maximum improvement in forward elevation and lateral elevation (abduction). 93% and 87% in group-I and 78% and 59% in group-II, respectively, and least improvement in external rotation and internal rotation, 83.5% and 73% in group-I, 63% and 53% in group-II respectively.

As a whole we got excellent results 88% in group-I and fair to good 70% in group-II. Patients in group-I being treated by hydraulic distension technique were extremely happy.

Discussion

The literature on frozen shoulder is replete with confusing and contradictory information concerning its etiology, pathology and treatment.⁹ Steroid therapy has been advocated in frozen shoulder with the belief that inflammation has played an important role in the pathogenesis. Naviaser found mild subsynovial inflammation in some cases, with edema, vascular dilatation, and mononuclear cell infiltration. However, Lundberg did not find significant inflammation in a study in which surgical specimens from patients with frozen shoulder and controls were interpreted blindly. Unfortunately, patients from whom surgical specimens are obtained may not demonstrate the early pathologic changes.

Corticosteroid therapy was suggested by Crisp and Kendall. Since then there have been many reports of uncontrolled experience with local corticosteroid. The reported results cover the entire gamut from no benefit to dramatic improvement.¹⁰

We also noted excellent response in one patient being treated by intra-articular steroid in group-II. In this study, we evaluated the subjective and objective outcomes of the treatment of frozen shoulder with hydraulic distension under local anesthesia with steroid, compared with steroid alone. We found significant improvement in the ROM and analgesic usage in the group-I treated with hydraulic distension of the GH joint under local anesthesia with steroid compared with steroid alone.

Frozen shoulder is a very protracted condition, which

only resolves after years rather than months². Distension treatment has been advocated as giving immediately pain reduction but without confirmation in the literature⁸. We found it true in our study.

Review of the previous literature on frozen shoulder demonstrates controversy about which of the many available treatment is best³. A number of different treatments, such as rest and analgesics, NSAIDS, local or oral steroids physiotherapy, distension of the joint capsule, manipulation or a combination of these have been advocated. No standard treatment regime is universally accepted⁴. Recently arthroscopic treatment and surgical release has been recommended for this condition.¹¹

Some studies have found that local steroid injection gave some pain relief but without restoring movements and with no superior effect on the duration of symptoms compared with other treatments e.g. Heat, physiotherapy, ice, local analgesic injections manipulation or no treatment. Other studies have reported that local steroids were without advantage compared to physiotherapy or oral non-steroidal anti-inflammatory. Manipulation of the shoulder under general anesthesia with an intra-articular steroid and local anesthetic injection has been recommended for frozen shoulder. This requires a more costly inpatient stay with general anesthesia and immediate post operative physiotherapy. There are also risks of fracture of the humeral neck and rupture of the rotator cuff when the procedure is performed by an inexperienced surgeon¹².

Simon described infiltration brisement under anesthesia in which fluid injected under pressure hydrostatically dissects the capsule from the glenoid and the humeral head and ruptures the capsule at its weakest point. The shoulder is then put through its ROM.¹³ During the last ten years, one of the authors has observed that local infiltration of anesthesia and hydraulic distension of the glenohumeral joint have been highly successful alternative for the management of this condition, providing to be safe, direct effective and cost-efficient method of treatment.¹¹

Sharma RK, treated 32 patients, who had frozen shoulder which had not improved with physiotherapy were treated by manipulation under general anaesthesia or by steroid injection and hydraulic distension under local anaesthesia and recommended distension technique as it was easy to carry out and gave better results than manipulation.¹⁴

In a prospective study Van Royen said that hydraulic distension technique and manipulation under local anesthesia is safe, reliable and effective treatment for frozen shoulder.¹⁵ Fareed and Gallivan treated 20 cases of frozen shoulder syndrome by hydraulic distension under local anesthesia. All these patients noted immediate resolution of previous pain and resumption of normal sleep.¹¹ Our patients also noted immediate good relief of pain and resumption of normal sleep in Group-I. Fareed and Gallivan added that local anesthesia with hydraulic distension is a safe, direct procedure that results in immediate relief of pain improved ROM, normal sleep, and complete resolution of the condi-

tion within a period of four weeks.

Fareed and Gallivan noted that the local anesthetic, along with hydraulic distension, lyses adhesions, and allows progressive motion. Virtually all patients with frozen shoulder complain of pain, sleep loss, and limited shoulder motion. Elimination of pain and restoration of a normal night sleep are immediately noted. Patients are pleased when their motion improves and they are able to regain normal function. It is impressive to see the change in mood and affect associated with the return to normal status. We also observed same feelings, or rather more than that in our patients, treated by hydraulic distension technique. Many patients called this technique as a miracle.¹¹

We also observed excellent ROM (80-95%) in two patients and good ROM (72%-77%), in eleven patients treated by hydraulic distension technique immediately after the procedure and in two patients ROM (62% 69%) was not good even after 45 days of follow up in group of distension technique. In a study Loyd JA and Loyd HM, noted that the steroid injections have not been shown to improve the rate of return of shoulder motion⁶.

In our study patients in group-II did not show significant improvement in ROM (average 63%) after 45 days while in group-I improvement in ROM was excellent (average 84%). Pain relief was almost equal in both groups, 97% in group-I and 92% in group-II. We also observed immediate improvement in ROM (66%), in group-I, while it was not in group-II.

We did not find any side effect other than mild pain during hydraulic distension technique in group-I except in one female patient who went into transient shock (vasovagal) during hydraulic distension technique but recovered immediately by conservative measure elevating both lower limbs, later on patient gave history of frightening of injection. So one should go for full cooperation and get confidence of the patient about hydraulic distension technique. Further studies are required to know more about etiology pathology and treatment of frozen shoulder. These could lead to better understanding of this common, protracted and painful condition.

In our study we found excellent results (88% average) with hydraulic distension technique. On the basis of the findings in our study we recommend that patients with frozen shoulder should be treated with hydraulic distension under local anesthesia with steroid because this technique is safe and cost effective and provides immediate relief of symptoms and early return to nearly full function.

Our patients in group-II, who were given only intra-articular steroid, gave fair to good results (70% average) but most of them were not satisfied. Because the improvement in ROM of shoulder was much lesser in these patients 63% as compare to the patients in group-I (84%) being treated by hydraulic distension technique.

Conclusion

We conclude that hydraulic distension technique under local

anesthesia with steroid should be considered first in the management of frozen shoulder.

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