A STUDY ON MANAGEMENT OF ADHESIVE CAPSULITIS (FROZEN SHOULDER) BY HYDRODILATATION METHOD

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ABSTRACT

AIMS AND OBJECTIVES

To study the efficacy of hydraulic distension under local anaesthesia in the management of frozen shoulder. To study the age and sex distribution of frozen shoulder.

MATERIALS AND METHODS

50 Patients with 54 shoulders of frozen shoulder syndrome, 4 cases with bilateral shoulder involvement were studied. A detailed history was elicited with particular reference to frozen shoulder (as shown in the proforma). A preliminary general physical examination was done.

RESULTS

Fifty patients with 54 shoulders of frozen shoulder syndrome were treated with hydraulic distension under local anaesthesia. The maximum and minimum age in this study was found to be 85 years and 41 years respectively. The average age of the patients in this study was calculated as 54.16 years. Out of 50 patients followed up, 32 were females and 18 were males. The Female: Male ratio was 1.77:1. In this series, 4 patients had bilateral involvement. In 17 patients, side involved was the dominant that is right arm. In 29 cases, the left arm that is non-dominant arm was involved. Associated conditions in this series are 7 patients had diabetes mellitus, 4 patients had hypertension, 5 patients had osteoarthritis of knee, 2 had peptic ulcer, 1 pulmonary Koch's and 1 had bilateral cataract.

CONCLUSION

Concomitant home exercises program is a must and is the hallmark of success following hydraulic distension. Hydraulic distension is a safe, reliable, cost effective without requiring specialised equipment in the management of frozen shoulder.

KEYWORDS

Capsulitis, periarthritis, supraspinatus tendinitis, Bicipital tendinitis.

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INTRODUCTION: Frozen shoulder is a condition of unknown aetiology characterised by gradually progressive, painful restriction of all shoulder joint motions, chronicity and slow spontaneous restoration of partial or complete motion over months to a year.[1] Frozen shoulder has very confusing terminologies. Initially, periarthritis of the shoulder was used as an all-encompassing term to describe painful shoulders for which the symptoms could not be explained on the basis of arthritis of glenohumeral joint with the improved understanding of the different pathological processes occurring about the shoulder, the broad term of periarthritis has been further resolved into its component parts. This include bicipital tendinitis, Supraspinatus tendinitis, Subacromial bursitis, Calcific tendinitis, Partial tear of the rotator cuff. At times, the terms "Periarthritis" and "adhesive capsulitis" have been used synonymously with frozen shoulder.

Here the term frozen shoulder will indicate the clinical entity defined above.[2] for the past 120 years, the frozen shoulder has been an enigma to orthopaedic surgeons. Perhaps, Codman's description in 1934 best attests to this enigma. "A class of cases which are difficult to define, difficult to treat and difficult to explain from the point of view of pathology.[3] Other clinical conditions which are to be excluded from frozen shoulder includes, patients with shoulder arthritis, fractures, dislocations, cervical spondylosis, and referred pain. Specific exclusion includes conditions like calcific tendinitis, supraspinatus tendinitis, bicipital tenosynovitis, and subacromial impingement. All these conditions can be excluded by careful history and clinical examination. Binders and associates found that 40% of their patients with frozen shoulder had pain or resisted active shoulder movements, suggesting that these patients had an element of tendinitis as well.

MATERIALS AND METHODS: 50 Patients with 54 shoulders of frozen shoulder syndrome, 4 cases with bilateral shoulder involvement were studied in the out and inpatient departments of Mahatma Gandhi General Hospital attached to Kakatiya Medical College, Warangal, Telangana. All the patients were treated with hydraulic

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distension under local anaesthesia, on an outpatient and inpatient basis.

All these cases were treated from June 2013 to July 2016. A detailed history was elicited with particular reference to frozen shoulder (As shown in the proforma). A preliminary general physical examination was done. The build and nourishment, physiological age and psychological status of the patients were assessed. Systemic examination of CVS, Respiratory, GI, and genitourinary examinations were followed as routine. To rule out any specific cause for pain restricted movements of the shoulder joint, a detailed local examination was done. Inspection: The patient's both shoulders were adequately exposed so as to compare the affected side with normal side and the following points noted; attitude, deformities and swelling and muscle features (Wasting). Palpation: Palpation of the shoulder was regionalised by considering the anterior, lateral, posterior, and superior aspect of the shoulder separately. Tenderness, Swelling, Temperature changes, deformities, muscle contractures and relationship of various structures were also noted.

Movement: Both the quality and the range of motion of both shoulders were recorded. The quality of motion was seen as the ease of movement of the upper limb in toto when the patient was undressing.

Range of Motion: As per the recommendation of the "Society of American Shoulder and Elbow Surgeons" the following arcs of motion were recorded.[2] Passive forward elevation with the patient in supine position measured as the angle between the arm and thorax. Passive external rotation with the arm at the side measured as an angle between the forearm and the sagittal plane with the elbow flexed to 90^0. Active internal rotation measured at the level of spinous process that the patient can reach behind the back with the tip of the thumb of the affected hand. Active abduction in the plane of the scapula measured as the angle between the trunk and the arm. For pain and different basic functions a scoring system was used.

The Scoring System for Pain was as Follows: Score 0: Complete disability. Score 1: Marked pain. Score 2: Moderate pain. Score 3: After usual activity. Score 4: Slight. Score 5: None. Different basic functions like tucking the Saree at back if female or using the back pocket if male and touching the opposite axilla, eating, combing hair and use of hand overhead were assessed. The functional scores were as follows:

Results	Pain	Range of Movement	Function
Excellent	4 & Above	$111\text{-}130^0$	4
Good	3	$81\text{-}110^0$	3
Fair	2	$61\text{-}80^0$	2
Poor	1	Below $40\text{-}60^0$	1
Results which were Graded as Follows			

Diagnostic Criteria's: Different authors have indicated different range of restricted shoulder motion for a patient to be diagnosed as having frozen shoulder.

In this study, the diagnostic criteria used by Patrik. J. Mumaghan has been used. It includes patients who has progressive shoulder pain and stiffness with reduced movement, for which no specific cause was identifiable, patient should have has less than 30 degrees of external rotation, less than 130 degrees of forward elevation and less than 120 degrees of abduction to be included in the study. There was variable limitation of internal rotation.

Hydraulic Distension: Technique: The distension of the affected shoulder was performed in the supine posture and with all aseptic precautions. The affected side was exposed, painted with povidone iodine solution, cleaned with spirit and draped with a holed sterile towel. The shoulder was palpated and good understanding of the anatomical configuration was made. The arm was held in as much external rotation as possible to facilitate the needle placement into the anterior aspect of the joint. This position was maintained while palpating anatomical landmarks and also during procedure. The joint space was entered at a point just inferior to angle of the acromion. 2 mL of 2% injection Xylocaine and 2 mL of triamcinolone acetate was injected into the skin and soft tissues overlying the joint capsule. Distension of the capsule was then performed with normal saline using a 10 mL disposable syringe with a 22 gauge needle. The quantity of normal saline used for distension depended on the distensibility of the joint capsule. Distension was continued till the resistance was felt. The patient then had active assisted range of movement exercises. The patients were advised to continue regular home exercises. This consisted of pendulum exercises, resisted flexion, extension, internal and external rotation and abduction exercises performed four times daily. The patient was sent home with an advice to take a course of antibiotics, (Ampicillin and Cloxacillin 500 mg thrice a day for 5 days) with diclofenac tablets 50 mg twice a day for 5 days. They were followed up at 2 weeks interval, range of movements and functions were examined, second distension was repeated if necessary. At 6 weeks followup examination, function and range of movements were again documented.

RESULTS: Fifty patients with 54 shoulders of frozen shoulder syndrome were treated with Hydraulic distension under local anaesthesia as an outpatient procedure in M.G.M. Hospital, attached to Kakatiya Medical College, Warangal, Telangana. The following analysis was made from the data collected from these patients.

Age of the Patients	No. of Patients	Percentage
41-50	22	44
51-60	20	40
61-70	6	12
71-80	1	2
81-90	1	2
Sex		
Female	32	64
Male	18	36

Table 1: Shows Age Incidence, Sex Distribution

Table 1 Shows the maximum and minimum age in this study was found to be 85 years and 41 years respectively. The average age of the patients in this study was calculated as 54.16 years. Out of 50 patients followed up, 32 were female and 18 were male. The Female: Male ratio was 1.77:1.

Side	No. of Patients	Percentage
Dominant Arm	17	34
Non-Dominant Arm	29	58
Bilateral	4	8
Associated Conditions		
Diabetes Mellitus	7	14
Hypertension	4	8
OA of Knee Joint	5	10
Peptic Ulcer	2	4
Pulmonary Koch's	1	2
Bilateral Cataract	1	2

Table 2: Shows Side Involved, Associated Conditions

Table 2 shows, in this series, 4 patients had bilateral involvement. In 17 patients, side involved was the dominant that is right arm. In 29 cases, the left arm that is non-dominant arm was involved. Associated conditions in this series are 7 patients had diabetes mellitus, 4 patients had hypertension, 5 patients had osteoarthritis of knee, 2 had peptic ulcer, 1 had pulmonary Koch's and 1 had bilateral cataract.

Pain Score	No. of Shoulders			Percentage		
	Pre-distension	Post-distension	Follow-up	Pre-distension	Post-distension	Follow-up
0	1	0	0	2	0	0
1	17	6	0	34	12	0
2	16	15	4	32	30	8
3	20	24	10	40	48	20
4	0	9	34	0	18	68
5	0	0	6	0	0	12
Range of Movements						
0-20	1	0	0	2	0	0
21-40	14	2	1	28	4	2
41-60	10	12	1	20	24	2
61-80	23	12	12	46	24	24
81-100	6	12	8	12	24	16
101-120	0	16	18	0	32	36
121-140	0	0	14	0	0	28
Functional Score						
0	1	1	0	12	2	0
1	12	5	0	24	10	0
2	19	22	9	38	44	18
3	16	23	23	32	46	46
4	1	3	22	2	6	44

Table 3: Shows Pre and Post-distension Comparison

Results	No. of Shoulders		Percentage	
	Post-distension	Followup	Post-distension	Followup
Excellent	2	19	4	38
Good	22	26	44	52
Fair	23	8	46	16
Poor	7	1	14	2

Table 4: Results Represented in the Study as Per Score

DISCUSSION: In this study, a descriptive term "Frozen shoulder" is used to describe a clinical syndrome where the patient has restricted range of movement (Both active and passive) for which no other cause can be identified.

Age Incidence: In this study, the average age documented was 54.16 years. 42 of the 50 cases were under 60 years. It was observed that frozen shoulder was common in 5th and 6th decades of life.[1] R.J. Neviaser, and T.J. Neviaser, has noted that frozen shoulder is very commonly affected the patients between the age group of 40 to 60 years.[4]

Sex Incidence: The female-male ratio in this study, 1.77:1 was established. Most authors have documented female predominance.

Side Affected: In this study, there was predominance of the non-dominant arm. Most authors have concluded that there is significant difference in the involvement of dominant arm and non-dominant arm.[4]

Associated Diseases: It is observed that association of diabetes mellitus is very common, particularly in insulin dependent diabetes mellitus.[5,6] In our study, there were 7 cases of diabetes mellitus and these were non-insulin dependent and were under control. Four cases were hypertensive under control of treatment. We noticed 5 cases of OA of knee joint, 2 peptic ulcer, 1 bilateral cataract and 1 pulmonary Koch's. Reports on increased incidence of frozen shoulder in patients treated for TB in sanitoria was found.[2] I have not noticed any intrathoracic disorders other than pulmonary Koch's and thyroid disorders in this study.

Investigations: Routine investigations were done for all patients as mentioned earlier. No specific relationship has been established between them. Urine examination and RBS were done routinely for all patients to rule out diabetes mellitus. I have noticed 7 patients of diabetes mellitus. Except for mild osteoporotic changes seen in few cases (5), the shoulder AP views were normal. Reports have stated that the shoulder x-ray in all the patients with frozen shoulder were apparently normal.[3,4]

Treatment of frozen Shoulder: All the patients were managed with hydraulic distension under local anaesthesia without using any sedatives. No complications were noticed and the procedure was well tolerated by the patients.

Pain: Almost all the patients had severe pain and disturbed sleep before treatment. Diffuse shoulder pain particularly during rotational movements was noticed. Tenderness over the glenohumeral joint was present in majority of the patients. 35 patients out of 50 patients were previously treated with oral NSAID but without much relief. Five patients had steroidal intra-articular injection. The relief was almost spontaneous with improvement after 2 weeks followup. It was common saying that they had the first good night sleep on the day of distension since the onset of symptoms.

Pain Score: Score 0: Score 0 was seen in one patient before distension but none after the distension and at followup. Score 1: 17 shoulders out of 54 had score 1 before distension, 6 patients had this score after distension and none of the patients had this score at followup. Score 2: This score was seen in 16 patients before distension, 15 patients had after distension, 4 patients had this score at followup. Score 3: This score was seen in 20 patients in pre-distension, 24 post-distension and in 10 patients at followup. Score 4: No patients had this score before distension, 9 patients had after distension and 34 patients had at followup. Score 5: Six patients had this score at followup but no patients had this score before and after distension.

Range of Movement: Range 0-60 Degrees: Before distension, 25 patients had range of movement less than 60 degrees, out of these 14 had this range of movement after distension and 2 at followup.

Range 61-100 Degrees: 29 patients had this range of movements before distension, 24 had this range of movement after distension, and 20 at followup.

Range 101-140 Degrees: None of the patients had this range of movements before distension, 16 patients had after the distension, and 32 patents at followup.

Functional Score: Average functional score of 0 was seen in 6 cases pre-distension, 1 in post-distension and in no cases at followup. Average functional score 1 was noticed in 12 shoulders pre-distension, 5 after post-distension and 0 at followup. Average functional score 2 was noticed in 19 shoulders during pre-distension, 22 shoulders during post-distension and in 9 shoulders at followup. Average functional score 3 was seen in 16 shoulders during pre-distension, 23 during post-distension, and 23 at followup.

Score 4 was noticed in 1 shoulder during pre-distension.[7,8,9] 3 during post-distension and 22 at followup. There were 7 shoulders with poor result after distension of which one shoulder did not improve even at followup. 23 shoulders had fair results after distension and only 8 shoulders had fair results at followup. There were 22 shoulders with good results after distension and 26 good results at followup.

In total, there were 19 shoulders with excellent results at followup, as compared to 2 shoulders with excellent results after distension. Patients who had deteriorated revealed that they had failed to do regular prescribed home exercises. In contrast, patients who had gained excellent results had their regular home exercises as prescribed to them. Two cases were given 2" trial of hydraulic distension but there was no improvement. Frozen shoulder with severe restriction of motion in range of movements less than 60 degrees very minimal improvement was seen. In shoulders which had initial range of movements of 60 to 100 degrees showed better results. The best results were seen in shoulders which had range of movements more than 100 degrees.

Quantity of Fluid: In this study, quantity of fluid depended on the distensibility of the capsule. The shoulders with less than 40 degree of range of movements could accommodate 15-20 mL, whereas shoulders with range of movements above 80 degrees could accommodate fluid from 35 to 50 mL. So it appears that the longer the duration of the disease, the lesser the range of movements. The more contracted the capsule gets the lesser the quantity of fluid could be injected. The results were also poor consequently.

Comparison of Results: The study conducted by Donald O Fareed, and William R, Gallivan, Jr., for the treatment of frozen shoulder under the local anaesthesia noted immediate resolution of previous pain and resumption of normal sleep in all patients.[10] At four weeks followup examination, all patients had resumed their normal function. At the two week followup examination, some loss of motion was usually noted (10-15 degrees). They noticed 90% return of function and range of movements immediately after the first treatment. Two cases were given 2" trial of hydraulic distension but there was no improvement.

CONCLUSION: Frozen shoulder is a clinical syndrome seen in the age group between 40 to 85 years with a mean age of 54.16 years. Slight predominance was noticed in female patients. Excellent results were limited to shoulders treated in early stages of frozen shoulder but improvement was noticed in all shoulders treated by this method. About 14% of the diabetics had an associated frozen shoulder. Diabetics are at a relatively high risk of developing frozen shoulder. The hydraulic distension done at followup had no additional advantage. The best improvement in their range of movements was observed in forward elevation than in abduction with minimal to moderate improvement in external rotation. Concomitant home exercises program is a must and is the hallmark of success following hydraulic distension. Hydraulic distension is a safe, reliable, cost effective without requiring specialised equipments in the management of frozen shoulder. Under total aseptic precautions, when performed with a right technique, absolutely there are no side effects.

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