Original Research Paper

Volume - 13 | Issue - 02 | February - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Orthopaedics

A COMPARATIVE STUDY OF MANAGEMENT OF FROZEN SHOULDER

Dr Z.m Patel	Associate professor , dept of orthopaedics, BJMC, AHMEDABAD, GUJARAT
Dr Samarth patel	senior resident , Dr HPB Sir unit, dept of orthopaedics, BJMC, AHMEDABAD, GUJARAT
Dr. Sanyam Panchani	senior resident , Dr HPB Sir unit, dept of orthopaedics, BJMC, AHMEDABAD, GUJARAT
Dr. Hardik hadiya	3rd year resident,Dr HPB sir unit, dept. Of orthopaedic, BJMC AHMEDABAD GUJARAT
Dr. Dhruv patel*	3rd year resident , Dr HPB Sir unit, dept of orthopaedics, BJMC, AHMEDABAD, GUJARAT *Corresponding Author
Dr. Khanjan ayar	1st year resident , Dr HPB Sir unit, dept of orthopaedics, BJMC, AHMEDABAD, GUJARAT

KEYWORDS :

INTRODUCTION:-

Frozen shoulder, also known as idiopathic stiff shoulder or adhesive capsulitis [18], is an idiopathic illness with natural history [45]. It is diagnosed by unexplained, sleep-disturbing pain and restricted shoulder range of motion despite normal radiographs.

The exact criteria for the diagnosis are poorly defined. Loss of motion especially external rotation is always present and pain is often a quite significant feature, particularly in the early phase of the disorder. It has been suggested that the natural history of the disorder is of a gradual resolution with time.3,4 However, there are several studies demonstrating a considerable number of patients who, if left untreated, will have long-term disability and pain.5–7 Therefore, there is a group of patients with shoulder-adhesive capsulitis who require definitive treatment.

The management of frozen shoulder has been a subject of ongoing uncertainty since it was frst described in 1934 [7], with little conclusive literature published on the topic. Since the frst systematic review on the application of non-steroidal anti-infammatory drugs (NSAIDs) in 1995 [43], further systematic reviews investigating treatment of frozen shoulder have been published on steroid injections [42], physiotherapy [11], acupuncture [12], oral steroids [4], arthrographic distension (or hydrodilatation) [5], manual therapy [15], hyaluronate injections [29], botulinum toxin [35], electrotherapy[25, 26], hyaluronic acid [22], and acupotomy [21]. These management options, amongst many others applied by practitioners, are broadly considered as conservative treatments and represent the management approaches that have been most comprehensively covered in the literature. For intractable cases of frozen shoulder, alternatives to conservative treatment have also been the subject of systematic reviews,including manipulation under anaesthesia and arthroscopic capsular release [3, 10, 16].

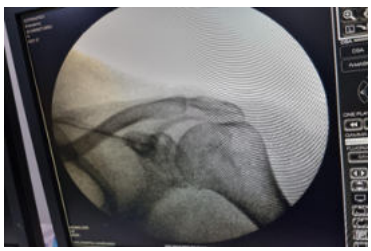
Andren and Lundberg first described hydraulic arthrographic capsular distension (hydrodilatation) in 1965.8 Since then, there have been a number of studies investigating the role of hydrodilatation with varied results. The senior author (SNB), based on clinical experience, proposed that the best results could be achieved with aggressive distension of the joint to capsular rupture using fluid containing cortisone. A prospective study was therefore set up in conjunction with a limited number of radiologists to ensure that adequate pressure and distension of the joint were reproducibly achieved.

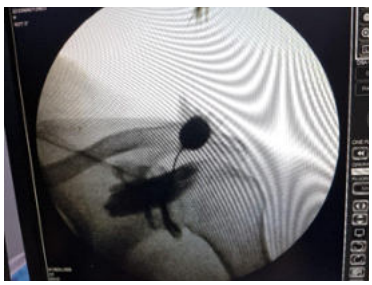
METHODS:-

1.HYDRODILATATION:-

IT involves the insertion of a needle from an anterior approach into glenohumeral joint with the position checked by an image intensifier after the injection of a small quantity of radio opaque contrast material. The size of needle varied according to patient size, but was usually 50 mm long and 22 gauge. 2 ml of 2% lignocaine and 1ml of betamethasone (sodium phosphate, acetate) was then injected. Normal saline was then injected with progressive distention of the capsule . this was followed using intensifier. Distention was continued until capsular rupture occurred usually at between 10 and 55 nl of normal saline. Occasionally, up to 100ml was required to achieve rupture. Rupture usually occurs through subscapularis bursa but occasionally down the biceps sheath. Parenteral narcotic analgesia was administered to pain of the procedure was so severe that it had to be discontinued before rupture of the capsule was achieved.

Following hydrodilatation the patient rested the arm for 2 days and then resumed normal activities. For 2 months following the procedure, a daily self assisted passive range of motion exercise programme was carried out specifically directed to improving external rotation, internal rotation and elevation range. Initial follow up was at 2 months post procedure as it was felt from previous experience that the main benefit from the procedure had been achieved by that time.





2.CONSERVATIVE MANAGEMENT WITH CORTICOSTEROIDS:-

It involves intra articular injection of mixture of corticosteroid and lignocaine 2% under visualization of image intensifier .

3.CONSERVATIVE MANAGEMENT WITH PHYSIOTHERAPY.

Table 1 Improvement in pain

Visual analogue scale	hydrodilatation		Intra articular corticosteroid		physiot herapy	
	initial	4 months follow up	initial	4 months follow up	Initial	4 months follow up
Degree of pain						
severe	12	0	10	1	6	1
moderate	23	4	24	9	23	14
mild	15	13	16	20	19	25
nil	0	33	0	20	2	10

ANALYSIS

Pain was graded by patients on a Visual Analogue Scale (VAS) as nil, mild, moderate or severe. Range of motion was measured clinically in degrees. Descriptive analysis of individual patient results was collated to judge improvement in pain and range of motion following hydrodilatation in both the diabetic and non-diabetic groups.

RESULTS

Fifty-eight percent of the patients were women and the average age was 50 years. The ratio of right to left shoulder involvement was 53:56. The average duration of symptoms prior to the hydrodilatation was 9 months. There were three patients with the condition bilaterally, and 15 who were diabetic. In the 91 non-diabetic patients (94 shoulders), the average duration of symptoms prior to treatment being initiated was 8.2 months. Of these, 65 shoulders had moderate or severe pain pre-hydrodilatation (Table 1). In the 15 diabetic patients, all had moderate or severe pain. The range of movement at initial presentation is shown in Table 2.

No patient suffered any significant complication from hydrodilatation and, in particular, there were no intra-articular infections. All 3 methods provided pain relief and improved shoulder function. Pain relief was similar with hydrodilatation and corticosteroid but was better in long term follow up with hydrodilatation.In the 150 shoulders, the measured range of passive movement improved by approximately 30° in all directions with every treatment option, but increased ROM was best seen with hydrodilatation 40° and 30° with corticosteroids. The absolute improvement in movement range was similar in severe and mild cases of adhesive capsulitis. The severe cases in the long term improved but still had more restriction in movement and had more pain than the other cases.

Improvement in pain Two months following the hydrodilatation, there was a substantial improvement in the level of pain in most patients (Table 1, Fig. 1). The improvement was not as good in the diabetic patients. In general, this resolution of shoulder pain preceded the recovery of movement. If pain had not resolved completely by 2 months from the hydrodilatation, there was usually no further improvement over a subsequent 4 months of follow up.

Improvement in range of motion Table 2 summarizes the average improvement in clinically measured range of movement in the patients 2 months following hydrodilatation and compares the range of movement in patients with and without diabetes.

Table 2

Mode of conservative management	Average Improvement in range of motion		
	External rotation	Glenohumeral abduction	Forward flexion
hydrodilatation	25⇒60	55⇒110	110⇒150
Intra articular corticosteroid			
physiotherapy			

Table 2. Average range of shoulder movement pre- and post-hydrodilatation (HD)

Aetiology capsulitis	Patient numbers (*n* = 109)	Range of movement Pre HD ⇒ Post HD (degrees)		
		External rotation	Gleno-humeral abduction	Active elevation
Primary	94	25 ⇒ 56	55 ⇒ 81	113 ⇒ 152
Diabetic	15	28 ⇒ 62	60 ⇒ 80	124 ⇒ 154

Table 3 shows the relationship between the degree of severity of adhesive capsulitis at presentation and rate of recovery in all patients. The severity of the adhesive capsulitis was categorized by the clinically measured degree loss of external rotation (ER). The more severely affected group of 29 shoulders had a greater absolute measured increase in range of motion following hydrodilatation. However, the final range of movement in the 29 shoulders was still less than in the other less severe groups. Table 3 also presents the relationship between the duration of symptoms prior to hydrodilatation and the average clinically measured gain in range of motion. When assessed at 4 months, 22 non-diabetic patients required a second hydrodilatation. Of these, one patient had severe pain, four had moderate pain, 11 had mild pain and six patients had no pain. In those with mild or no pain, the indication for the second hydrodilatation was residual stiffness. Two months later, 15 of these patients had no pain, six had mild pain and one had moderate pain. In the long term, five non-diabetic patients failed conservative treatment, which included at least two hydrodilatations, and were dissatisfied with their shoulders. These patients had operative treatment with arthroscopy, capsulotomy and manipulation. All these shoulders had had very restricted movement with external rotation of less than 10° at initial presentation and symptoms for more than 3 months. Two diabetic patients required arthroscopic capsulotomy within a few months of presentation, having failed to respond to the initial hydrodilatation. Seven further diabetic patients, when assessed at 4 months, required a second hydrodilatation. Three had moderate pain and four had mild pain. Two months following this hydrodilatation, two patients had no pain, four had mild pain and one had decided to have arthroscopic treatment

Table 3 shows the relationship between the degree of severity of adhesive capsulitis at presentation and rate of recovery in all patients. The severity of the adhesive capsulitis was categorized by the clinically measured degree loss of external rotation (ER). The more severely affected group of 29 shoulders had a greater absolute measured increase in range of motion following hydrodilatation. However, the final range of movement in the 29 shoulders was still less than in the other less severe groups. Table 3 also presents the relationship between the duration of symptoms prior to hydrodilatation and the average clinically measured gain in range of motion. When assessed at 4 months, 22 non-diabetic patients required a second hydrodilatation. Of these, one patient had severe pain, four had moderate pain, 11 had mild pain and six patients had no pain. In those with mild or no pain, the indication for the second hydrodilatation was residual stiffness. Two months later, 15 of these patients had no pain, six had mild pain and one had moderate pain. In the long term, five non-diabetic patients failed conservative treatment, which included at least two hydrodilatations, and were dissatisfied with their shoulders. These patients had operative treatment with arthroscopy, capsulotomy and manipulation. All these shoulders had had very restricted movement with external rotation of less than 10° at initial presentation and symptoms for more than 3 months. Two diabetic patients required arthroscopic capsulotomy within a few months of presentation, having failed to respond to the initial hydrodilatation. Seven further diabetic patients, when assessed at 4 months, required a second hydrodilatation. Three had moderate pain and four had mild pain. Two months following this hydrodilatation, two patients had no pain, four had mild pain and one had decided to have arthroscopic treatment

Table 3. Relationship of average improvement in motion range (in degrees) related to severity of original capsulitis and duration of symptoms prior to hydrodilatation (HD)

	Patient numbers (*n* = 109)	Pre HD ⇒ Post HD (degrees)		
		External rotation	Gleno-humeral abduction	Active elevation
Severity (degrees external rotation)				
< 15 Severe	29	6 ⇒ 40	39 ⇒ 72	85 ⇒ 135
15–30 Moderate	39	24 ⇒ 61	61 ⇒ 86	126 ⇒ 163
> 30 Mild	41	54 ⇒ 71	69 ⇒ 88	132 ⇒ 160
Duration (months)				
0–3	24	21 ⇒ 53	55 ⇒ 80	103 ⇒ 152
4–6	37	22 ⇒ 52	51 ⇒ 77	110 ⇒ 149
7–12	32	30 ⇒ 60	58 ⇒ 86	117 ⇒ 156
> 12	16	16 ⇒ 54	48 ⇒ 81	99 ⇒ 136

DISCUSSION

Adhesive capsulitis is a clinical syndrome where the patient has a painful shoulder with global restriction of active and passive glenohumeral motion for which no cause can be determined.10 It has been recognized since 188211 when it was designated as scapulo-humeral periarthritis of the shoulder. Codman first coined the term 'frozen shoulder' in 1934.12 Neviaser coined the term 'adhesive capsulitis' in 1945 when he noted during open surgery that the shoulder capsule seemed to peel from the humeral head.13 However, no intra-articular adhesions have been seen at arthroscopy, thus, the term 'adhesive' is in fact misleading.14 The diagnosis of 'shoulder capsulitis' is supported by a number of investigations, including plain X-rays and blood tests.15 Arthrography is judged to be the definitive diagnostic investigation. Neviaser described the typical arthrographic findings in

this condition with decreased joint volume and obliteration of the axillary fold and subscapular bursa.9 These features were present in arthrographic imaging of the patients in our series, confirming the clinical diagnosis. Andren and Lundberg first described hydraulic arthrographic distension in 1965.8 Since then, several authors have reported mixed results with variations of this technique.9,16–20 It is postulated that the benefit from the procedure combines the anti-inflammatory effect from the cortisone with the mechanical effect of joint distension. Rizk et al. 17 proposed that the main reason hydrodilatation decreased pain was through capsular rupture reducing the stretch on pain receptors in the capsule and periosteal attachments. In our series, as the pressure increased during the hydrodilatation, the capsule could be seen under the image intensifier to dilate gradually, and in most cases, rupture. This might explain why many of our patients commented on initial discomfort during the procedure, but within minutes, permanent improvement in previous pain. Andren and Lundberg reported the results of joint distension during arthrography in 64 rigid shoulders with mixed pathology.8 They found that in those with only moderate stiffness, 66% recovered full movement. In the patients with marked rigidity, only 20% recovered full movement. They found that relief of pain is sometimes attained despite unchanged rigidity, and this was also our experience. Jacobs et al., in another study, presented a prospective randomized trial to compare the efficacy of steroid injection only, distension only or steroid injection with distension.19 There was overall satisfactory improvement in the patients' pain at rest and with resisted abduction, and it was stated that there was little difference in pain between the three groups, with a large scatter of results being present. The improvement in range of motion was reported to be greatest in the group with both steroid injection and distension. However, the final improvement in range in all groups was extremely small, with a maximum increase of only 5°. The very poor improvement in range of motion in all groups was possibly related to the distension technique. An image intensifier was not used and only a small quantity of fluid and air (total 9 mL) was injected. There was no attempt to achieve capsular rupture. More recently, Rizk et al. 17 reported the results of hydrodilatation in 16 patients. The fluid contained cortisone and distension of the joint was continued until rupture occurred. A similar protocol was used in our study. In the study by Rizk et al., 75% had relief of pain after 2 weeks, and by 6 months, only one patient had residual mild pain. One patient had no improvement in range of motion. By 3 months, the average motion range was 75% of normal, which was very good. This is a little less than in our study. These results seem to support the importance of continuing the arthrographic capsular distension to capsular rupture in order the achieve maximum improvement in range of motion. Mulcahy et al. reported the results of 22 patients treated with capsular distension.16 In this study, air was used to distend the joint until rupture, following which cortisone was injected. In a group with individual external rotation of less than 5°, there was average improvement in ER of 13° following hydrodilatation compared with an average improvement of 35° of ER in our study group of those with less than 15° ER. In their less severe group with more than 35° ER, they reported no improvement in motion. In our study, this less severe group had an average improvement in ER of 17°. Seventy-three percent of their 16 patients reported symptomatic improvement compared with 97% in our present series. The difference in these results might indicate an advantage to using fluid containing cortisone, rather than air, for capsular distension. Diabetes mellitus has been associated with adhesive capsulitis,21,22 especially if the patient is insulin-dependent. Pollock et al. reported poorer results when treating diabetic patients.23 There were 15 diabetic patients in our series with primary shoulder capsulitis. These patients had more severe pain at presentation and less reliable relief of pain from the hydrodilatation. The improvement in motion was fairly similar to the group without diabetes. The overall results were less satisfactory, with 20% of the diabetic patients requiring arthroscopic surgery compared with 5% in the non-diabetic group. Review of the literature and the results presented here indicate that arthrographic capsular distension progressing to capsular rupture using fluid containing cortisone is a fairly effective treatment for adhesive capsulitis. However, it is less beneficial in diabetic patients. The procedure is equally effective whether performed early in the disease process or late. It is also effective both in severe and mild cases.

CONCLUSION:-

Arthrographic distention/ hydrodilatation with corticosteroids provides superior pain relief in short term as well as long term improvements in range of motion across all time frames when compared to physiotherapy and CSI in the conservative treatment of frozen shoulder

REFERENCES

1. Simon W. Soft tissue disorders of the shoulder: adhesive capsulitis, calcific tendinitis and bicipital tendinitis. Orthop Clin N Am 1975; 6: 521–39.
2. Baslund B. Adhesive capsulitis: current concepts. Scand J Rheum 1990; 19: 321–5.
3. Grey RG. The natural history of 'Idiopathic' adhesive capsulitis. J Bone Joint Surg 1978; 60A: 564.
4. Reeves B. The natural history of adhesive capsulitis syndrome. Scand J Rheumatol 1975; 4: 193–6.
5. Simmonds F. Shoulder pain. With particular reference to the 'Frozen' shoulder. J Bone Joint Surg 1949; 31B: 426–32.
6. Shaffer B, Tibone JE, Kerlan R. Adhesive capsulitis: a long term follow up. J Bone Joint Surg 1992; 74A: 738–46.
7. Binder AI, Bulgen DY, Hazleman BL, Roberts S. Adhesive capsulitis: a long-term prospective study. Ann Rheum Dis 1984; 43: 361–4.
8. Andren L, Lundberg B. Treatment of rigid shoulders by joint distension during arthrography. Acta Orthop Scand 1965; 36: 45–53.
9. Neviaser J. Arthrography of the shoulder: a study of the findings in adhesive capsulitis of the shoulder. J Bone Joint Surg 1962; 44A: 1321–30.
10. Kessel L. Disorders of the Shoulder. Churchill Livingstone, New York, 1982.
11. Putman JJ. The treatment of a form of painful periarthritis of the shoulder. Boston Med Surg J 1882; 107: 536–9.
12. Codman EA. The Shoulder. Thomas Todd, Boston, 1934. HYDRODILATATION FOR CAPSULITIS 251
13. Neviaser J. Adhesive capsulitis of the shoulder: a study of pathologic findings in periarthritis of the shoulder. J Bone Joint Surg 1945; 27: 211–22.
14. Bunker T. Time for a new name for 'adhesive capsulitis'. Br Med J 1985; 290: 1233–4.
15. Neviaser RJ, Neviaser TJ. The adhesive capsulitis. Diagnosis and management. Clin Orthop 1987; 223: 59–64.
16. Mulcahy KA, Baxter AD, Oni O, Finlay D. The value of shoulder distension arthrography with intra articular injection of steroid and local anaesthetic: a follow up study. Br J Radiol 1994; 67: 263–6.
17. Rizk T, Gavant MD, Pinals RS. Treatment of adhesive capsulitis (adhesive capsulitis) with arthrographic capsular distension and rupture. Arch Phys Med Rehab 1994; 75: 803–7.
18. Gavant M. Distension arthrography in the treatment of adhesive capsulitis of the shoulder. J Vasc Intervent Radiol 1994; 5: 305–8.
19. Jacobs LGH, Barton MAJ, Wallace WA, Ferrousis J, Dunn NA, Bossingham DH. Intra-articular distension and steroids in the management of capsulitis of the shoulder. Br Med J 1991; 302: 1498–500.
20. Gilula L, Schoenecker P, Murphy W. Shoulder arthrography as a treatment modality. Am J Roentgenol 1978; 131: 1047–8.
21. Bridgeman J. Periarthritis of the shoulder and diabetes mellitus. Ann Rheum Dis 1972; 31: 69–71.
22. Lequesne M. Increased association of diabetes mellitus with capsulitis of the shoulder and shoulder hand syndrome. Scand J Rheum 1977; 6: 53–6. 23. Pollock RJ, Duralde XA, Flatlow EL, Bigliani LU. The use of arthroscopy in the treatment of resistant adhesive capsulitis. Clin Orthop 1994; 304: 30–6.