



HYDRODILATATION:THE OPTIMAL THERAPEUTIC APPROACH FOR ADHESIVE CAPSULITIS

Orthopaedics

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ABSTRACT

Introduction : Idiopathic shoulder pain lasting at least one month, accompanied with limits in active and passive glenohumeral motions in all directions, in individuals with no underlying illness and normal radiological findings. **Material and Methods:** This study was undertaken at the department of orthopaedics at GEMS (Great Eastern Medical School) from August 2022 to May 2024 on candidates aged 35-65. Clinical results were examined using the Shoulder Pain and Disability Index (SPADI). **Result:** The SPADI score at 1 and 6 months follow-up indicates that all stages of frozen shoulder had positive clinical outcomes, with early stages showing excellent results. **Conclusion:** This treatment showed improvement in all shoulders treated, albeit it was most effective for those with frozen shoulder in its early stages. Approximately 14% of diabetics had frozen shoulders. Diabetics have a higher chance of acquiring frozen shoulders. Complementary home workouts are essential for success after hydrodilatation.

KEYWORDS

Frozen shoulder, adhesive capsulitis, hydrodilatation, shoulder joint

Introduction

A variety of pathologies or clinical scenarios can result in shoulder stiffness. It has been referred to as scapula humeral periarthritis, immobilized shoulder, and adhesive capsulitis in the past. Frozen shoulder is a clinical condition with an uncertain etiology that is characterized by a substantial restriction of active and quiescent motion in the shoulder. This condition is present in the absence of a known intrinsic shoulder disorder.

The hallmark of this condition is a substantial reduction in the active and passive range of shoulder movements [1].

Clinical features

Freezing stage

Also known as the painful stage. The shoulder ache develops slowly and is spread out. The discomfort intensifies during the night and is worsened by sleeping on the affected side. Sleep disturbance has a prevalent history and it is during this period that the majority of patients experience anxiety. The duration of the period ranges from 2 to 9 months.

Frozen stage

Also known as the stiffening stage. After the painful stage, there is typically a gradual decrease in shoulder mobility. This condition may last for a duration of 4 to 12 months. The classic pattern of shoulder movement restriction involves first external rotation, followed by internal rotation, and subsequently abduction. The majority of patients will experience a limitation in external rotation of less than 30 degrees.

Thawing stage

The next stage, known as thawing or the slow restoration of movement, typically takes weeks or even months to complete, rather than just a few days.

As motion gradually intensifies, there is a progressive reduction in discomfort. The duration is highly uncertain. The duration for patients to recover their functional range of motion can vary from 6 to 9 months, and in certain cases, it may take up to 2 years [3, 4].

Mechanism of action

An inherent process that may occur is that the elevated conversion of glycosaminoglycans observed in the joint capsule during frozen shoulder stimulates myofibroblast activity, which is then counteracted by joint distension.

Another method involves the rupture of the capsule, which can

mechanically resolve shoulder stiffness. This mechanism is also implicated but remains contentious. Intra-articular steroid is used to mitigate the acute inflammation resulting from the rupture of adhesion or adhesolysis.

Predisposing factors

1. Age distribution: It is rare for individuals below the age of 40 or over the age of 70. The patients typically fall into the middle-aged category, with males having a higher average age than females (55 years compared to 52 years) [4].

2. Trauma: Frozen shoulder is commonly linked to significant injury to the shoulder or other areas of the limb. Postoperative exercises can effectively prevent the development of frozen shoulder following surgery [5].

3. Immobilization period: A typical occurrence in individuals with frozen shoulder is a phase in which the shoulder has experienced limited movement. The period of immobility can be attributed to various factors, such as a sudden worsening of cervical spondylosis, small shoulder injury, or pain caused by excessive use.

4. Diabetes mellitus significantly increases the likelihood of developing frozen shoulder, with a prevalence of 10-20% among diabetics compared to 2-5% in the general population. Individuals with insulin-dependent diabetes have a greater likelihood of developing frozen shoulder, with a prevalence rate of 36%. The occurrence of bilateral involvement is elevated at 46%. Therefore, when a patient presents with pain in both shoulders, medical tests should be conducted to rule out the presence of diabetes. Individuals diagnosed with adhesive capsulitis, also known as frozen shoulder, and diabetes mellitus have a higher likelihood of developing retinopathy. Patients who have been reliant on insulin for over a decade face a heightened risk of experiencing shoulder symptoms that last for more than two years [6].

5. Cervical disc disease: Lundberg and other researchers have observed a higher occurrence of frozen shoulder in individuals with degeneration of the intervertebral disc in the cervical spine. The highest occurrence of cervical disc degeneration aligns with the highest occurrence of frozen shoulder [4].

6. Hyperthyroidism has been reported to be associated with frozen shoulder. Shoulder problem is resolved by correcting hyperthyroidism.

7. Thoracic disorders: Saha documented a correlation between frozen shoulder and emphysema. Frozen shoulder can be linked to upper lobe

bronchogenic cancer. The well-established connection between ischemic heart disease and frozen shoulder is widely recognized [6]. Patients with intracranial disease such as hemiplegia, cerebral hemorrhage, or tumors are at a higher risk for developing frozen shoulder [6].

Objectives

To assess the functional outcome of treatment of frozen shoulder by using hydraulic capsular distension using normal saline along with steroid.

Inclusion Criteria: - Presence of shoulder joint stiffness persisting for a duration of 3 months or longer. - Limited range of motion in the shoulder, with a restriction of movement of approximately 30 degrees or more in two or more planes.

Both males and females in the age range of 30 to 60 years. Exclusion criteria for this study include individuals who are under 18 years of age, individuals who are over 60 years of age, and individuals with shoulder stiffness caused by fractures around the shoulder or prolonged immobilization.

Pre procedure assessment

Range of movements: The extent and duration of the movements were recorded.

X-ray: Should be Normal

MRI:

In cases of adhesive capsulitis, the axillary recess may exhibit thickening of 1.3 cm or greater. Additionally, the joint capsule, inferior glenohumeral ligament, and coracohumeral ligament also experience thickening.

A characteristic sign known as the "subcoracoid triangle sign" can be observed in sagittal oblique T1 weighted images.

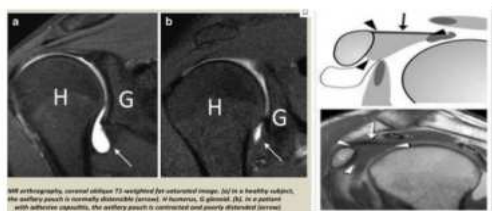


Fig 1: MRI

Materials requirement

- A 23G spinal needle
- Lignocaine + bupivacaine - Long acting local anaesthetic
- Distilled water
- Syringes
- 3 way adaptor



Fig 2: Materials requirement

Technique:

The expansion of the afflicted shoulder was carried out while the patient was lying on their back and with all necessary measures taken to prevent infection. The injured side was uncovered, coated with povidone iodine solution, sterilized with spirit, and covered with a sterile towel having a hole in it.

The shoulder was examined by touch and a thorough comprehension of its anatomical structure was achieved. The arm was positioned in

maximum external rotation to aid in inserting the needle into the front part of the joint, with the use of C-Arm imaging guidance. The position was upheld while palpating anatomical markers and throughout the process.

The joint space was accessed just below the acromion angle. An injection of 5 ml of 2% Xylocaine and 5ml of 0.5 % Bupivacaine was administered into the joint cavity. Next, the capsule was expanded using normal saline by means of a 10ml disposable syringe equipped with a 22 gauge needle. The amount of normal saline utilized for distension was contingent upon the distensibility of the joint capsule. The distension was maintained until the point of resistance was detected. Subsequently, the patient engaged in active aided Range of movement activities. The patients were instructed to maintain their routine home exercise regimen. The rehabilitation program included pendulum exercises, resisted flexion, extension, internal and external rotation, and abduction movements, which were performed four times a day. The patient was discharged with a prescription for a five-day course of antibiotics, specifically Amoxycillin with clavulanic acid 625mg, to be taken twice daily. Additionally, the patient was advised to take diclofenac tablets 50 mg twice daily for the same duration. The participants were monitored at two-week intervals to assess their range of movements and functions. If needed, a second distension was performed. During the 6-week follow-up assessment, the function and range of motions were once again recorded.



Home treatment regimen

Pendulum exercises involve the patient assuming a forward stooping position and placing one hand on a table or chair. The patient then progressively swings the arm in a pendulum-like motion and then performs a circumduction movement. 5 times daily in 5 to 10 minute sessions

Shoulder Elevation Exercises: Using the unaffected hand to support the affected one, progressively raise the shoulder to a position of flexion, abduction, and external rotation. **Hand to Back Position:** The patient moves the arm rearward while keeping the shoulder extended and adducted. **Shoulder Wheel Exercises:** Patient-performed exercises in the physiotherapy center. **Pulley exercises** that can be performed alone by the patient in their own house.

Case

PRE PROCEDURE



POST PROCEDURE



6 MONTHS POST PROCEDURE



Results

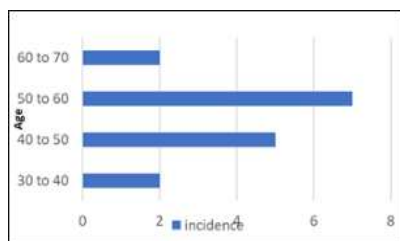
In our analysis of 20 instances, 11 (55%) were female and 9 (45%) were male in age. Our study sample ranges from 35 to 65 years old, with a mean age of 50 years (Graph-1). The majority of cases involve the left side (11 cases, 55%) (Graph-3).

Out of 20 cases, 8 (40%) were in the freezing stage, while the remaining 12 were still frozen. During the initial visit, patients who met the inclusion criteria had a shoulder X-ray, range of motion assessment, and SPADI score reported. An anterior route was used to administer an intra-articular normal saline (20-40 mL).

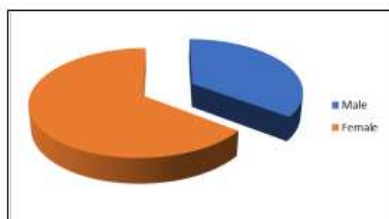
After one to six months, all cases were followed up on, with only two (10%) cases missing. After follow-up, patients' SPADI scores were dramatically lowered by 64%. (Graph-4)

There is a 40% increase in range of movements. There is a significant reduction in analgesic intake. Two patients with uncontrolled diabetes mellitus experienced recurrence. No significant local or systemic side effects were observed. Out of 20 cases 11 (55%) were excellent outcome, 7 (35%) good, 2 (10%) fair and non were poor outcome (Table 2)

Graph 1: Age and incidence of frozen shoulder



Graph 2: Sex distribution



Graph 3: Side of Shoulder affected in patients



Graph 4: SPADI score

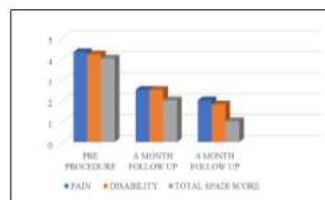


Table 1: Functional outcome using SPADI score

SPADI score	Number of patients	Percentage
Excellent	11	55
Good	7	35
Fair	2	10
Poor	0	0
Total	20	100

Discussion

Frozen shoulder is a frequent condition that can cause discomfort and disability for up to 42 months without treatment. Treatment options for frozen shoulder include rest, analgesics, and mobility exercises, as well as surgical release. The term "frozen shoulder" refers to a clinical phenomenon where patients have limited range of movement, both active and passive, with no known explanation.

Age distribution: The survey recorded an average age of 50.16 years. Out of the total of 20 cases, 15 of them were individuals who were younger than 55 years old. It was noted that frozen shoulder was prevalent among individuals in their fifth and sixth decades of life. R.J. Neviaser and T.J. Neviaser have observed that frozen shoulder frequently affects individuals aged 40 to 60 years [8].

Sex incidence in this investigation was determined to be 1.77 females for every 1 male. Female preponderance has been well documented by most authors [1, 4, 5, 8].

Affected side: This study found that the non-dominant arm was more prevalent. The majority of scholars have reached the conclusion that there is a notable disparity in the level of participation between the dominant arm and the non-dominant arm. 1% experienced involvement of their dominant arm, 58% experienced involvement of their non-dominant arm, and 8% experienced involvement of both shoulders.

Co-occurrence of diabetes mellitus is frequently found, especially in cases of insulin dependent diabetes mellitus [5, 6]. Our study included 7 cases of diabetes mellitus, all of which were non-insulin dependent and well-managed. There were four cases of hypertension that were well managed by medication. We saw three instances of thyroid abnormalities, with two of those people also presenting cardiac issues.

The aims of treatment are to relieve pain by reducing inflammation and restoring joint ROM. General conservative treatments consist of physical therapy, exercise, nonsteroidal anti-inflammatory drugs, and intraarticular steroid injections. Interventional procedures include hydraulic distension and manipulation under anesthesia. Surgical procedures include arthroscopic capsular release and open capsulotomy. Because the inflammatory reaction causes fibrosis, anti-inflammatory treatment is essential to improve symptoms and prevent fibrosis; therefore, intraarticular steroid injections, which have a strong anti-inflammatory action, are effective [9].

The most important finding of this overview on conservative treatments of frozen shoulder was that capsular distension (hydrodilatation) provides the best overall prospect for short-term pain relief and improvement in range of motion across all time frames. Specifically, intra-articular distension provide clinically important advantages over placebo in short-term pain relief [16, 17, 18].

The present patterns in hydraulic distension, The therapeutic mechanisms of hydraulic distension Hydraulic distension, a technique introduced by Andren and Lundberg in 1965, involves injecting fluid into the shoulder joint to enlarge the rigid joint capsule and remove adhesions that restrict the range of motion [10-14]. Injecting a substantial amount of fluid increases the pressure inside the joint, causing the joint capsule to burst. This rupture helps to remove adhesions and scar tissue, leading to an improvement in range of motion (ROM).

Based on existing research, hydraulic distension is more effective than other general conservative approaches for treating adhesive capsulitis. The combination of hydraulic distension with steroids and physical therapy was more effective than physical therapy alone in improving the functionality of adhesive capsulitis [2].

In conclusion Frozen shoulder is a medical condition that commonly affects individuals between the ages of 35 and 65, with an average age of 50.16 years. A marginal majority was observed in female patients. Significant outcomes were observed exclusively in shoulders that were treated during the initial phases of frozen shoulder. However, enhancement was observed in all shoulders that underwent this particular approach. Approximately 14% of individuals with diabetes experienced a frozen shoulder as a related condition. Individuals with diabetes have an elevated susceptibility to acquiring frozen shoulder. The hydro dilatation performed during the follow-up did not provide any extra benefit. The most significant enhancement in their range of motion was noted in forward elevation, followed by abduction, with a slight to moderate increase in external rotation. Implementing a concurrent home exercise regimen is essential and serves as the defining characteristic of achieving success after hydrodilatation. Hydrodilatation is a secure and dependable method for treating frozen shoulder that is both cost-effective and does not necessitate the use of specialized equipment. When performed with proper technique and under strict aseptic measures, there are no negative effects.

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