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Review Article

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## A SYSTEMATIC REVIEW ON FROZEN SHOULDER (ADHESIVE CAPSULITIS)

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### Abstract

Frozen shoulder is a common condition in which the articular shoulder capsule swells and stiffens, restricting its mobility. It is very common affecting up to 5% of the population. Key characteristics are gradual onset of shoulder stiffness, pain especially at night and restriction in movement of the shoulder. It is often a self-limiting condition, but can persist for years and may never fully resolve. It is generally diagnose clinically, or with the help of imaging technique such as X-ray, MRI etc. Conservative treatments include analgesics, oral steroids, and intra-articular corticosteroid injections. If symptoms persist despite conservative measures, the surgical options include manipulation under general anaesthesia and in some cases arthroscopy with surgical release of the tight structure. In this review article, we define frozen shoulder and review its pathologic and etiologic factors, epidemiology, natural history, diagnosis and management.

**Keywords:** Frozen shoulder, shoulder stiffness, epidemiology ,diagnosis and management, corticosteroid injections

## **INTRODUCTION**

Frozen shoulder (also termed adhesive capsulitis, painful stiff shoulder or periarthritis) is a common condition characterised by spontaneous onset of pain, progressive restriction of movement of the shoulder and disability that restricts activities of daily living work. [01,02] It is very common, affecting up to 5% of the population. Approximately 70% of frozen shoulder patients are women. In India more than 10 million cases have been reported per year.[03]

It is a painful and disabling disorder of unclear cause in which the shoulder capsule, the connective tissue of the shoulder joint, becomes stiff and inflamed, greatly restricting motion and causing persistent pain. Pain is usually constant, worse at night, and with cold weather. Certain movements can provoke episodes of tremendous cramping and pain. The condition is thought to be caused by trauma or injury to the area and may have an autoimmune component. Risk factors for frozen shoulder include accidents, lung disease, tonic seizures, diabetes mellitus, stroke, connective tissue diseases, heart disease and thyroid disease. People who suffer from Frozen shoulder may have extreme difficulty concentrating, working, or performing daily life activities for extended periods of time.[04,05]

Symptoms may start gradually and resolve within one or two years. People may experience: Pain areas: in the shoulder Muscular: decreased range of motion of shoulder or muscle spasms also common. Frozen shoulder can be described as either primary (idiopathic), if the etiology is unknown, or secondary, when it can be attributed to another cause.[04]

Objective and rationale of this review is to provide an overview of the natural history, pathogenesis, diagnosis, and management of frozen shoulder, with emphasis on the most recent evidence regarding etiology and treatment as despite of over a hundred years of treating this condition the definition, diagnosis, pathology and most efficacious treatments are still largely undefined.

### **Pathophysiology and Natural History**

The pathophysiology of frozen shoulder is poorly understood. Analysis of surgical specimens suggests that capsular hyperplasia and fibrosis have a role. The presence of cytokines suggests a possible autoimmune process, but the relationship is not well

established.<sup>[06]</sup> The normal course of a frozen shoulder has been described as having four sequential phases:

1) **Stage 1 (inflammatory stage):** Duration of symptoms of this stage lasts from 0 to 3 months (**Table 01**). The pain often starts gradually and builds up. It may be felt on the outside of the upper arm and can extend down to the elbow and even into the forearm. It can be present at rest and is worse on movements of the arm. Sleep is often affected, as lying on it is painful or impossible. During this time movements of the shoulder begin to be reduced. <sup>[07,08]</sup>

1) **Stage 2 (freezing stage):** The freezing phase is a reactive phase. For patients with an acutely and globally painful shoulder, physical therapy and stretching can cause additional discomfort and stiffening. Resting from painful activities and analgesics may help with pain control.

The ball and socket joint becomes increasingly stiff, particularly on twisting movements such as trying to put hand behind back or head. These movements remain tight even when try to move the shoulder with other hand. It is the ball and socket joint which is stiff. The shoulder blade is still free to move around the chest wall, and patient may become more aware of this movement.<sup>[09,10]</sup>

2) **Stage 3 (frozen stage):** Pain gradually subsides and is only present at the extreme range of movement. Gross reduction of movement is present with almost no external rotation possible.<sup>[11]</sup>

3) **Stage 4 (thawing stage):** The final stage is the gradual regaining of the motion or 'thawing' rate of which is variable in weeks or months. Without specific treatment shoulder movement is regained gradually.<sup>[12]</sup>

### **Epidemiology**

The incidence of adhesive capsulitis is approximately 2-5% in the general population and 10-20% in diabetic population. It is rare in children, and more common in women specially over forty years of age.<sup>[13,14]</sup>

### **Etiology**

The cause for frozen shoulder is unknown. In spite of that, there are a number of risk factors include:

**Diabetes.** Diabetic patient have a higher rate of frozen shoulder 10% to 20% compared

to the general population. The exact reason for this increase is not known, but according to some experts glucose molecules (sugar) when attach to the collagen proteins of shoulder joint, causing stiffness. Diabetic patient are also more likely to develop this condition in both shoulders.<sup>[15]</sup>

**Immobilization.** Frozen shoulder can develop after a shoulder has been immobilized for a period of time due to surgery,a fracture,or other injury. Having patients move their shoulders soon after injury or surgery is one measure prescribed to prevent frozen shoulder.<sup>[16]</sup>

**Other diseases.** Some other diseases increase the risk of developing frozen shoulder, including:

- Hypothyroidism
- Hyperthyroidism
- Depression
- Cardiovascular disease
- Lung disease
- Open heart surgery
- Polymyalgia rheumatica
- Parkinson's disease <sup>[17]</sup>

### **Sign & Symptoms**

Two principal characteristics: Pain & stiffness (loss of range of movement).

**Pain:** progressive & initially felt mostly at night but usually dull or aching.

**Stiffness:** Due to contracture of the shoulder ligaments which decreases the volume of the capsule,thus limiting range of motion. There is progressive loss of passive rang of movement (PROM) & active range of movement (AROM).<sup>[04]</sup>

### **Tests**

1. **Drop arm test:** Patient is seated with examiner to the front. Examiner grasps the patient's wrist and passively abducts the patient's shoulder to 90 degrees. Examiner releases the patient's arm with instructions to slowly lower the arm. Test is positive if the patient is unable to lower his or her arm in a smooth, controlled fashion.<sup>[18]</sup>
2. **Apley's scratch test:** The patient attempts to touch the opposite scapula to test range of motion of the shoulder. 1-Testing abduction and external rotation( +ve sign

touch the opposite scapula, -ve sign can not touch the opposite scapula) 2-Testing adduction and internal rotation( +ve sign touch the opposite scapula, -ve sign can not touch the opposite scapula)<sup>[19]</sup>

3. **Coracoid pain test:** Positive The coracoid pain test is considered positive when the digital pressure on the coracoid area evokes a more intensive pain with respect to other shoulder area.<sup>[18]</sup>

### **Diagnosis**

The diagnosis of adhesive capsulitis is made from the history and physical examination. There is loss of both active and passive range of motion, and frequently there is pain on strength testing. X-rays should be taken to eliminate other diagnoses with similar symptoms such as calcific tendonitis, arthritis, or chronic rotator cuff tear. In some cases x-rays of the cervical spine (neck), chest or arm are indicated. Advanced imaging studies such as MRI are frequently performed to be sure of the diagnosis; however, they are usually unnecessary. The most significant finding on MRI in patients with frozen shoulder is thickening of the inferior joint capsule (ligaments).<sup>[20,21]</sup>

### **MANAGEMENT**

Management of frozen shoulder focuses on restoring joint movement and reducing shoulder pain, involving medications, physical therapy, and/or surgical intervention. Treatment for frozen shoulder usually starts with nonsteroidal anti-inflammatory drugs (NSAIDs) and application of heat to the affected area, followed by gentle stretching. Ice and medicines (including corticosteroid injections) may also be used to reduce pain and swelling. And physical therapy can help increase your range of motion. A frozen shoulder can take a year or more to get better.

If treatment is not helping, surgery is sometimes done to loosen some of the tight tissues around the shoulder. Two surgeries are often done, one is manipulation under anesthesia, and another surgery is arthroscopy. These surgeries can both be done at the same time.<sup>[22-24]</sup>

In general treatment can be divided into nonsurgical and surgical options.

#### **Nonsurgical Treatment**

**Medications:** Pain killers like nonsteroidal anti-inflammatory medicines (NSAIDs) e.g. aspirin and ibuprofen can reduce pain and swelling. Medication along with physical therapy can improve the condition greatly.

**Steroid injections.** Cortisone is a powerful anti-inflammatory medicine that is injected directly into shoulder joint.<sup>[25]</sup>

**Hydrodilatation (arthrographic distension):** it is first described by Andren *et al.* <sup>[26]</sup> This treatment involves the local anaesthetic injection into the capsule at a high pressure enough to distend and stretch the capsule of joint. This procedure does not need to be performed in the operation theatre but is often associated with poor tolerance due to the painful nature of the distension.<sup>[27]</sup>

**Physical therapy.** Manual therapy and exercise, usually delivered together as components of a physical therapy intervention, are commonly used interventions for adhesive capsulitis. Manual therapy includes any clinician-applied movement of the joints and other structures, for example, mobilization or manipulation. Exercise includes any purposeful movement of a joint, muscle contraction or prescribed activity. It may be performed under the supervision of a clinician or unsupervised at home. Below are examples of some of the exercises that might be recommended.<sup>[28]</sup>

### **Exercise**

Stretching and strengthening exercises are usually the cornerstone of treating frozen shoulder. Always warm up the shoulder before performing exercises. The best way to do that is to take a warm bath or shower for 15 minutes. a moist heating pad can also be use. Some of the exercises are: 1. Pendulum stretch 2. Towel stretch 3. Finger walk 4. Cross-body reach 5. Armpit stretch 6. Outward rotation 7. Inward rotation (**Figure 01**).<sup>[29]</sup>

### **Surgical Treatment**

It is uncommon to need surgery for a frozen shoulder, but it may be recommended if symptoms are severe and other treatments haven't worked after six months.

Various surgical procedures are adopted; some of the procedures used to treat frozen shoulder are described below.

### **Manipulation under anaesthesia**

If pain and movement restriction are difficult to cope with, then go for shoulder manipulation under general anaesthesia. During this procedure the joint capsule is gently stretched by moving the humerus into flexion, abduction and finally (optionally) by moving the adducted humerus into external rotation (stop sign position). There are

risks with this procedure including, humeral fracture, glenohumeral dislocation, rotator cuff tears, glenoid fractures, brachial plexus injuries, labral tears and haematomas.<sup>[30]</sup>

### **Arthroscopic Capsular Release**

An arthroscopic capsular release is a procedure performed during phase 2 (frozen) of frozen shoulder under general anaesthesia. Standard anterior and posterior portals (keyholes) are made, diagnosis is confirmed by arthroscopy and following this, part of the synovium (membrane lining the joint) and the tightened joint capsule (coracohumeral ligament and rotator interval) are released using diathermy. This procedure will vary slightly between surgeon, with some also incorporating a small manipulation. The procedure enables greater freedom of movement of the glenohumeral joint.<sup>[31,32]</sup>

Overall, this arthroscopic capsular release procedure appears to be a safe and effective treatment that can provide a rapid improvement in reported shoulder function. Some of the advantages mention in **table 02**.<sup>[33]</sup>

### **CONCLUSION**

Frozen shoulder is the common name for adhesive capsulitis, which is a shoulder condition that limits range of motions. When the tissues in shoulder joint become thicker and tighter, scar tissue develops over time. As a result, shoulder joint doesn't have enough space to rotate properly. Common symptoms include swelling, pain, and stiffness. Frozen shoulder is a condition that commonly occurs in people between 40 and 60 years of age. Women tend to suffer with frozen shoulder more than men. Stages of freezing, frozen, and thawing characterize the natural history of frozen shoulder, and the condition is self-limiting within one to three years. By applying appropriate treatment techniques and modalities in a creative and judicious manner, the physical therapist can do much to enhance the speed and degree of recovery from frozen shoulder, more controlled studies, however, are needed comparing the effects of different forms of treatment.

Despite over a hundred years of treating this condition the most efficacious treatments are still largely unclear, more research is required to establish the effectiveness of each treatment strategy. However, this information should assist health-care practitioners who treat patients with this disorder.

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**Figure 01: stretching & strengthening exercises for a frozen shoulder**

 <p>Pendulum stretch</p>	 <p>Towel stretch</p>	 <p>Finger walk</p>	 <p>Cross-body reach</p>
 <p>Armpit stretch</p>	 <p>Outward rotation</p>		 <p>Inward rotation</p>

**Table 01: Stages of frozen shoulder and their duration**

S.No	Stages	Duration
01	Stage 1: Inflammatory stage	0 to 3 months
02	Stage 2: Freezing stage	3 to 9 months
03	Stage 3: Frozen stage	9 to 15 months
04	Stage 4: Thawing stage	15 to 24 months

**Table 02: advantages of the arthroscopic release**

1.	Joint does not have to be opened up fully only two small incisions are made
2.	There are fewer traumas and less scarring, due to smaller incisions.
3.	It is especially useful for professional athletes, who frequently injure knee joints and require fast healing time.
4.	Irrigation fluid is used to distend the joint and make a surgical space.
5.	This reduces recovery time.
6.	Increase the rate of surgical success.

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