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Adhesive capsulitis and current update

Dr. Khalid Eqbal, Dr. Jawed Eqbal and Dr. Tabassum Jahan

Abstract

Joints pain is more common problem among older age peoples, generally known as arthritis. The term arthritis refers to more than 100 diseases and conditions affecting the joints. Pain is the most prominent symptom in most people with arthritis. Pains are associated with various factors, such as; metabolic disorders (Gout, adhesive capsulitis), immunological (Rheumatoid, psoriatic arthritis), age related (Osteoarthritis), lifestyle (Gout, osteoarthritis, cervical spondylitis), occupational (Sciatica, lower back pain), infectious (Syphilitic, tubercular arthritis). One out of such condition frequently observed among elderly peoples known as adhesive capsulitis. Adhesive Capsulitis (Frozen shoulder syndrome), is a condition characterized by limitation of motion of the shoulder joint with pain at the extremes of motion.

Keywords: Adhesive capsulitis, arthritis, wajaul mafasil, frozen shoulder, unani medicine

Introduction

Adhesive capsulitis, also known as frozen shoulder, is an inflammatory condition characterized by shoulder stiffness and pain ^[1]. Presently various term has been used to describe frozen shoulder such as; adhesive capsulitis, pericapsulitis, periartthritis, adherent bursitis, obliterative bursitis, shoulder periartthritis adherent sub acromial bursitis, hypomobile syndrome ^[2, 4].

Adhesive capsulitis is also known as Frozen Shoulder Syndrome. It is a condition characterized by limitation of motion of the shoulder joint with pain at the extremes of motion ^[5]. The initial presentation is pain, which is generalized and referred to the upper arm, back, and neck. As the pain increases, loss of joint motion ensues. The process is generally self-limiting and in most cases resolves spontaneously within 10 months, unless there is an underlying problem ^[6].

Unani description

In the literature of Unani system of medicine diseases of joint are mentioned under the title of “*Waja ul Mafasil*” (*waja* = pain, *mafasil* = joint) which means painful joints ^[7, 12]. Adhesive capsulitis as such a disease is not found in the Unani literature, but its relative symptoms are observed in diseases of joint, particularly in shoulder joint which is of Osteoarthritis in nature, and all such description was dealt under the heading of *Waja ul Mafasil* ^[13]. The term *waja ul mafasil* denoted certain term to the part involved, such as *waja ul zahar* (lower back pain), *Waja ul wirk* (hip joint), *Waja ul qutun* (backachae), *niqras* (gout), *irqunnasa* (sciatica), but some of the joints have not specified with any term rather considered as *waja ul mafasil* of such involved joints. Therefore, Adhesive Capsulitis (Frozen Shoulder Syndrome) is considered as a type of *wajaul mafasil* of shoulder which has been correlated with *Tahajjur-e-Mafasil* ^[14, 15].

Anatomy

The glenohumeral joint is a *synovial*, multiaxial, spheroidal joint between the roughly hemispherical head of the humerus and the shallow glenoid fossa of the scapula ^[16].

Articulating surface

The articular surfaces are reciprocally curved and or really ovoid. The area of the humeral convexity exceeds that of glenoid concavity such that only small portion opposes the glenoid in any position. The remaining capitular, articular surface is in contact with the capsule so,

that contact on the glenoid fossa is much, more uniformly distributed over the articular surface [17].

Glenohumeral ligaments

Three *glenohumeral ligaments*, best visible from within the joint [18].

Coracohumeral ligament

The *coracohumeral ligament* is attached to the *dorsolateral* base of the *coracoids* process and extends as two bands which blend with the capsule [19].

Transverse humeral ligament

The *transverse humeral ligament* is a broad band which passes between *humeral tubercle*, and attached superior to the epiphyseal line [20].

Synovial membrane

The *synovial membrane* lines the capsule and covers parts of the anatomical neck. The long tendon of bicep traverses the joint in a *synovial* sheath which continues into the intertuberosulcus as far as the surgical neck of the *humerus* [17].

Movements at the shoulder (Glenohumeral joint)

The shoulder is capable of any combination of flexion and extension, adduction and abduction, medial and lateral rotation all occurs at the shoulder [18].

Name of the muscle involved in movement

The muscles are involved producing movements such as; *deltoid*, *pectoralis major*, *latissimus dorsi* and *teres major*. These long muscles all have coverage on the humerus. A group of short muscles such as; *subscapularis*, *supra spinatus*, *infra spinatus* and *teres minor* which are attached near to the joint [6].

The shoulder joint is a ball and socket joint between the head of humerus (the upper arm bone) and the scapula (shoulder blade). A membrane (*synovial membrane*) lining the non-articulating surfaces constantly secretes and reabsorbs a slippery lubricant, *synovial fluid*; the articulating surfaces are covered with smooth cartilage; and the whole is enclosed in a flexible fibrous capsule, which is attached to bone at the margins of the articulating surfaces, but not to the articulating surfaces themselves. In some other joints, the capsule has an important stabilizing function-for example at the knee, where, at the sides, the capsule is condensed into the tough collateral ligaments that prevent side to-side movement [17, 23]. But this is less so at the shoulder, where the capsule must be relatively lax to allow for mobility in all directions. This laxity, which gives the joint a surprisingly large capacity-a normal shoulder joint holds 10-30 ml of fluid is greatest underneath the joint in the axilla (armpit), where it forms the redundant axillary fold. The other aspects of the joint capsule blend with the tendons of the rotator cuff, the shoulder's deep stabilizing and controlling muscles. Specifically, the tendons of *teres minor* and *infraspinatus* lie behind (posteriorly) and merge with the rear of the capsule; the tendon of *supraspinatus* lies above (superiorly) and merges with the top of the capsule; and the

tendon of *subscapularis* lies in front (anteriorly) and merges with the front of the capsule. There is no clear demarcation between the tendons, which merge with each other as well as the capsule, except anteriorly, between *supraspinatus* and *subscapularis*, where there is a deficiency in the rotator cuff called the rotator interval. At the shoulder joint, stability is a dynamic affair, brought about by interplay between the rotator cuff components and other muscles. The rotator cuff is separated from the bone, ligament and muscle overlying it by a bursa (a sac lined with *synovial membrane* which, like *synovial membrane* inside the joint, secretes slippery *synovial fluid*). This bursa which, at about the size of the palm of the hand, is the largest in the body, prevents friction between the rotator cuff and its adjacent structures. In some circumstances the bursa is unable to fulfil this role, and allows painful pinching of the soft tissues between bony protuberances on the humerus (the humeral tuberosities) and the arch of bone and ligament above them (the acromion process and the *coraco-acromial* ligament) which extends from the scapula. This is subacromial or outlet impingement, which can lead to erosion of the rotator cuff. Other types of impingements can occur inside the shoulder joint, especially in sportspeople who forcibly move their shoulders to the extremes of range, menacing the deep surface of the rotator cuff tendons among other structures. The various impingements are the main intrinsic causes of shoulder pain, and therefore important differential diagnosis from contracted (frozen) shoulder. Neck problems are a common extrinsic cause, of shoulder pain, which is why neck movements should be screened as part of a shoulder assessment [21, 22, 23].

Epidemiology

The prevalence of FSS is 2-5% in a normal population. It is more common in females and between the ages of 40 to 60 years. A genetic factor is also reported although the direct mechanisms by which genes influence soft tissue disorders are still unknown. Contra lateral shoulder involvement reported in up to 20-30% of patients and recurrence in ipsilateral shoulder is unusual [4, 5, 23, 24].

Incidence

The incidence of adhesive capsulitis is around 3% in the general population. It is rare in children, and peaks between 40 and 70 years of age. Women are more prone than men, but there is no known genetic or racial preference. It is common in those persons with insulin-dependent and non-insulin-dependent diabetes, and in those with pre-diabetes (glucose intolerance). Persons with a history of adhesive capsulitis are at increased risk of developing the condition on the contralateral side. Recurrence on the affected side is also possible, especially in patients with diabetes [19, 20, 21].

Etiology

There are various etiological factors responsible for the adhesive capsulitis, such as: Metabolic Disorders, Injury, Cardiac Diseases, Neurological Disorder or any other Systemic Disease but the causes of frozen shoulder are not fully understood. There is no clear connection to arm dominance or occupation. Frozen shoulder usually presents unilaterally and the incidence of subsequent involvement on the contralateral side is 20 percent. It has been described as the most disabling of the common musculoskeletal

manifestations of metabolic disorder. A few factors may be responsible for the developing frozen shoulder [26, 27, 28, 29, 30].

Diabetes

The relationship between adhesive capsulitis and diabetes mellitus (DM) is well documented, with the incidence of adhesive capsulitis being two to four times higher in diabetics than in the general population. It affects about 20% of people with diabetes and has been described as the most disabling of the common musculoskeletal manifestations of diabetes [71]. One another study reported that, there is no difference was found in level of pain and disability level between frozen shoulder patients with and without diabetes [31, 32].

Hyperthyroidism

A nationwide longitudinal population-based study reported that hyperthyroidism is a risk factor for developing Adhesive Capsulitis of the Shoulder [33].

Hypothyroidism

Bowman CA *et al* reported that euthyroid, autoimmune and biochemical hypothyroidism is the only predisposing factor for bilateral adhesive capsulitis of the shoulder, oligoarthropathy and rapidly progressive proximal myopathy [34, 35].

Parkinson's disease

One study revealed that Frozen shoulder syndrome was found in 14 of 30 Parkinson disease patients affecting 19 shoulders, including bilateral involvement in five and unilateral involvement in nine. That study also cleared that there is a significant positive correlation between the parameters of sonography findings and frozen shoulder syndrome (i.e., thickness of bicipital effusion and tendon thickness of the subscapularis and supraspinatus) and mean ipsilateral Unified Parkinson's Disease Rating Scale (UPDRS) III and its subscores (tremor, rigidity, and bradykinesia scores) [35, 36].

Sex (Gender)

The incidence of frozen shoulder syndrome affects females slightly more than males and especially among obese female [37, 38].

According to *Ibn Sina* there are two major causes of *Waja ul Mafasil* (adhesive capsulitis/frozen shoulder syndrome) [10-14].

1. *Asbabe Fa'ilah*
2. *Asbabe Munfa'ilah*

1. *Asbabe Fa'ilah*

Asbabe Fa'ilah are the primary or causative factors such as *Sue mizaj* (altered temperament) and *mawade fasidah* (acid humours) liable to produce *waja* (pain) and most oftenly *sue mizaj barid sada* and *khilte balgham* is involved [12].

2. *Asbabe Munfa'ilah*

These are the predisposing factors enhance susceptibility of joint to be affected accrue matter, this susceptibility is augmented due to weakness of joint either congenitally or acquired through *Sue Mizaj mustahkam* and over production of heat supported by movements and other external factors [13, 14].

Ismail Jurjani considered *Ibn Sina* classification of aetiology as *asbabe asli* and *asbabe aa'rzi* (*asbabe unfa'ilah*), and further sub categories *asali* into three and *aarzi* into seven (*Jurjani*) others have many more viz [12, 13, 14].

1. *Asbabe Asli*

- Increased movements of the joints
- Increased heat within the joint space
- Impaired utility and excretory abilities of the joints

2. *Asbabe Aa'rzi*

- Lack of exercise
- Enfeebled of the stomach
- Erratic dietary habits
- Drug abuse/intoxicating agents
- Use of alcohol
- Physical/sexual act immediately after full stomach (after meal)
- Cold and catarrh
- Secondary to Colic
- Cessation of Reposes such as such as Menstrual, Haemorrhoidal blood etc./deviation from the habit of eliminations (*Istefragh*) like *Fasd*, *Ishaal* etc. [15]
- Trauma and Injury

Hakeem Akbar Arzani supported the concept and understanding of the disease with reference to *Ibn Sina* with meger deviation in the *Sababe Munfailah* [7, 9, 12]. *Akbar Arzani* also favours the opinions of *Ibn Sina* and *Jurjani* and believed that the cause of *waja ul mafasil maddi* is quite common is weakness of joint due to *sue mizaj mustahkam*, trauma or excessive mobility and various factors for accrue of *mawad* as mentioned in the a *sbabe munfa'ilah* or *asbabe aa'rzi* [7].

Predisposing factors for adhesive capsulitis

- Immobility of the arm for a long period of time leading to muscle imbalance, as occurs in post-myocardial infarction, diabetes, hemiplegia and in some chronic mental illnesses
- Tendinitis of the rotator cuff
- Biceps tendinitis and tenosynovitis of its long head
- Congenital deformity in the shoulder girdle
- Scapulo-costal cementing (fixation)
- Ligamentous injury
- Osteoarthritis
- Sub-scapular muscular fibrositis
- Nutritional deficiencies
- Other diseases such as: diabetes mellitus, thyroid disease, reflex sympathetic dystrophy syndrome, coronary artery, scleroderma and avascular necrosis of the humeral head [39, 40].

Pathophysiology

While the aetiology of adhesive capsulitis remains indefinable, the understanding of its pathogenesis is increasing [41]. Generally, three schools of thought have emerged: an inflammatory process, a fibrotic process and an inflammatory process with subsequent reactive capsular fibrosis [41]. Adhesive capsulitis has been described as having three stages: a painful stage, a freezing stage, and a thawing or recovery stage. There is, although, no evidence to validate this classification, and its clinical utility is questionable. Pain and limited range of motion can occur in

all phases of adhesive capsulitis, which often does not follow a stepwise course. Pain and decreased range of motion can persist for one to two years, and up to 10% of patients never recover full range of motion. However, this loss of motion is seldom functionally limiting [23, 37, 39, 40].

Clinical features

The hallmark of adhesive capsulitis is decreased range of motion and shoulder pain. There often is no identifiable

cause or trigger. The pain is often described as a poorly localized, deep ache. If the pain is localized, it is usually in the area of the anterior or posterior capsule. The pain may radiate to the biceps area. Patients may have progressive pain and stiffness when reaching overhead, away, and behind the back. Weakness is often related to pain or concomitant tendinopathy [5, 6, 41].

Table 1: Three stages of classification (Reeves 1975)

The Three stages of adhesive capsulitis Progression	
Painful Stage	Shoulder pain is the hallmark of this stage. It starts gradually and progressively worsens.
Frozen Stage	Pain may reduce in this stage, although shoulder stiffness and restriction increase. Shoulder range of motion is dramatically reduced.
Thawing Stage	This stage is characterized by spontaneous "thawing." The motion will gradually increase and the shoulder will be more responsive to stretching exercises and treatment.

Freezing

In the freezing stage, patients have more pain. As the pain worsens, shoulder loses range of motion. Freezing typically lasts from 6 weeks to 9 months [2, 3, 34].

Frozen

Painful symptoms may actually improve during this stage, but the stiffness remains. During the 4 to 6 months of the frozen stage, daily activities may be very difficult [3, 4].

Thawing

Shoulder movement slowly improves during the thawing

stage. Complete return to normal or close to normal strength and motion typically takes from 6 months to 2 years. The pathologic anatomy of frozen shoulder includes *synovial* inflammation, joint capsule hypertrophy, and a resulting development of fibrous structures [37-39].

Neviaser *et al.* (1987) have described an arthroscopic four stage classification and stressed the importance of an individual treatment plan based on an understanding of the clinical stages of the disease. However, more recently, Hannafin *et al.* (1994) have elaborated a correlation between the arthroscopic stage, the clinical examination and the histological appearance of the tissues [33, 40].

Table 2: Four stages of classification (Neviaser and Neviaser 1987)

Stage I	Pre-adhesive stage
0-3 months	A fibrinous <i>synovial</i> inflammatory reaction is detectable only by arthroscopy. The patients usually present with signs and symptoms of impingement syndrome. The main complaint is pain and minimum deficit in range of motion is detected.
Stage II	Adhesive stage
4-9 months	The acute <i>synovial</i> inflammation is apparent on physical evaluation. Arthroscopic findings demonstrated that the normal spacing between capsular fold, humeral head and biceps tendon, glenoid and humeral head diminish significantly. The patient experiences severe pain and loss of motion. (Neviaser and Neviaser (1987) do not give this stage a name but compared to other classifications it appears to be equivalent to the Adhesive stage).
Stage III	Maturation stage
10-15 months	This stage is evident by the maturation of the inflammatory process. The dependant fold is only half its original size and adhesions between various structures are formed.
Stage IV	Chronic stage
16-24 months	Capsular adhesions are fully mature and markedly restricted. Clinically, the shoulder is „frozen.“

Diagnosis

The diagnosis of adhesive capsulitis should be based on clinical examination findings with limited dependence on specific laboratory findings or radiological examinations. Most references therefore suggest only a plain X-ray to be requested. Often these might be reported as normal. These X-rays can also assist in excluding other potential causes of a stiff shoulder, such as glenohumeral arthritis, calcific tendonitis or rotator cuff disease [4, 5, 40].

Clinicians should recognize that patients with adhesive capsulitis present with a gradual and progressive onset of pain and loss of active and passive shoulder motion in both elevation and rotation [24, 27].

Basically the diagnosis of AC is mostly clinical. In general, the scapular rotation occurs at 60 degrees with active abduction of the shoulder. In an unaffected person, the shoulder can be passively abducted to 90 degrees even when the physician holds the scapula. Inability to achieve the 90

degree arc with scapular stabilization is the clue to the diagnosis in both primary and secondary adhesive capsulitis. It is important to assure that the scapula is secured when assessing passive range of motion [24, 45, 41].

Goniometry

The term goniometry is derived from two Greek words, gonia meaning angle and metron, meaning measure. Thus, a goniometer is an instrument used to measure angles and the total amount of available motion at a specific joint. Goniometry can be used to measure both active and passive range of motion [43, 42].

Procedure

The patient is positioned in the recommended testing position. While stabilizing the proximal joint component, the clinician gently moves the distal joint component through the available range of motion until the end feel is

determined. An estimate is made of the available range of motion and the distal joint component is returned to the starting position [2, 3, 43].

The clinician palpates the relevant bony landmarks and aligns the goniometer. A record is made of the starting measurement. The goniometer is then removed and the patient moves the joint through the available range of motion. Once the joint has been moved through the available range of motion, the goniometer is replaced and realigned, and a measurement is read and recorded [1-5, 37, 40].

Table 3: Active ranges of motion of the shoulder joint (AROM)

Joint	Action	Degrees of motion
Shoulder	Flexion	0-180
	Extension	0-40
	Abduction	0-180
	Internal Rotation	0-80
	External Rotation	0-90

Differential diagnosis

The diagnosis of adhesive capsulitis or Frozen Shoulder Syndrome is generally based on clinical aspect. [2, 3, 33, 42] Other conditions that should be considered in a patient who

presents with a stiff, painful shoulder include acromioclavicular arthropathy, autoimmune disease (e.g., systemic lupus erythematosus, rheumatoid arthritis), biceps tendinopathy, glenohumeral osteoarthritis, neoplasm, rotator cuff tendinopathy or tear (with or without impingement), cervical disk degeneration, and subacromial and subdeltoid bursitis. It includes conditions that can mimic adhesive capsulitis, but may also occur concomitantly. Adhesive capsulitis in the presence of associated conditions is most appropriately described as painful shoulder syndrome [26, 34, 43].

Management

Initially, shoulder stiffness is treated non-operatively. A large variety of non-operative treatments, such as medications, corticosteroid injection, and physical therapy, showed satisfying results in 60% to 80% of cases. For patients who do not respond to non-operative treatment, surgical treatment options are available. Due to recent advances in arthroscopic techniques, arthroscopic release of the joint capsule has shown promising results comparable with other treatment options [1, 2, 3, 44, 43].

Table 4: Clinical stages of adhesive capsulitis and guideline recommendations for the diagnosis and management of adhesive capsulitis according to clinical stage [33, 37].

Stage*	Pain*	Range of motion	Imaging guidelines [§]	Management guidelines*
I (Painful Stage) 2–3 months	Pain is the dominant feature Severe pain Pain at rest, night pain	Gradual loss of ROM (especially external rotation)	X-Ray indications: • Red flags • To differentiate FS from OA Ultrasound indications: • If clinical suspicion of rotator cuff pathology	Intra-articular GHJ corticosteroid injection (by experienced clinician)
II (Frozen Stage) 3–12 months	Pain gradually decreases Night pain resolves Pain at end limits of motion only	Stiffness is the predominant feature, especially external rotation (also elevation and internal rotation/HBB)		Once the acute pain has settled: Supervised treatment by recognised provider to improve ROM if required
III (Thawing Stage) 6–12 months	Little/no pain	Gradual return of ROM		

Abbreviations

ROM, range of motion; FS, frozen shoulder; OA, osteoarthritis; GHJ, glenohumeral joint; HBB, hand-behind-back.

*Diagnosis and Management of Soft Tissue Shoulder Injuries and Related Disorders.

§Referral Guideline for Imaging in Patients Presenting with Shoulder Pain.

Exercise

Shoulder motion is the primary treatment for adhesive capsulitis. It is important to continue to use the arm as much as can be tolerated while healing. If the shoulder is overly protected from motion the condition will worsen [3, 4, 40, 41].

The application of a hot pack or warm shower prior to performing these exercises, and the application of an ice pack to the shoulder afterward will make the exercises more tolerable. While keeping the shoulder active is good at preventing the progression of this malady, moving the shoulder through all of the planes of motion is required to fully recover. The exercise program that follows is intended to increase motion in all planes of shoulder motion [27, 33, 37-42].

Pharmacotherapy

It is reported that most patients with adhesive capsulitis will recover with nonsurgical treatment. Immobilization should be avoided. The best initial treatment depends on the

duration and severity of the condition [18, 19, 20]. Acetaminophen and non-steroidal anti-inflammatory drugs [NSAIDs] are first line options for pain relief in patients without any contraindications. However, there is little evidence of their effectiveness. For more cruel cases, a tapering course of oral prednisone is frequently prescribed, generally over 2 to 3 weeks [2-5, 37]. Generally starting dosages range from 40 to 60 mg per day, and are tapered by 10 mg every four to seven days. Oral corticosteroids provide short term benefit in pain relief and improved range of motion (up to six weeks) in patients with adhesive capsulitis, but they have not been proven to shorten the duration of the condition [3, 33, 37]. However, there are no well-designed studies that clearly revealed that benefit over observation or medical therapy alone. Some study reported that physical therapy in combined with corticosteroid injections is more effective than physical therapy alone Subacromial corticosteroid injection can be adopted if concurrent rotator cuff or subacromial bursitis is controversial or suspected. Another study revealed that when compared with oral glucocorticoid therapy, intraarticular corticosteroid injections provide better short-term pain relief and improved range of motion in patients with isolated adhesive capsulitis for longer period [1-5, 22, 27, 40, 42].

One systematic review reported that sodium hyaluronate injection into the glenohumeral joint significantly improves shoulder range-of-motion, constant scores, and pain at short-

term follow-up following treatment of adhesive capsulitis. Isolated intra-articular hyaluronate injection has significantly better outcomes than control. Isolated intra-articular hyaluronate injection has equivalent outcomes compared to intra-articular corticosteroid injection. Intra-articular hyaluronate injection was safe, with no reported complications^[34-42].

Some clinical trial demonstrated that Unani formulation are highly effective for the management of musculoskeletal disorders either single or compounds formulations orally or locally such as; Habbe Muquill, Habbe Asgand, Habbe Suranjan, Habbe Gule Aak, Habbe Asabi, Habbe Bish, Habbe Azaraqui, Majoon Muquill, Majoon Chobchini, Majoon Ushba, Majoon Azaraqui, Safoof Chobchini, Rogan Dhatura, Roghan Haft Berg, Roghan Surkh, Roghan Azaraqui, Roghan Baboona, Roghan Shifa, Roghan Sambhalu, Roghan Chahar Berg, Roghan Kunjad, Roghan Zaitoon etc.^[10-15, 46-50]

Conclusion

Adhesive capsulitis, also known as frozen shoulder, is an inflammatory condition characterized by shoulder stiffness and pain. The majority of patients have significant loss of passive range of motion, a feature which is key for diagnosis. The exact pathophysiology is unknown. The most commonly accepted hypothesis states that inflammation initially occurs within the joint capsule and *synovial* fluid. There is no laboratory testing indicated for diagnosis. If there is a concern for underlying systemic disease, test as needed. Imaging is not indicated. The diagnosis of adhesive capsulitis is primarily clinical. If there is a concern of an alternative diagnosis, such as evaluating for a fracture, then imaging such as a shoulder X-ray may be useful. Frozen shoulder is a self-limiting condition and if diagnosed early has a favorable outcome. However, physical therapy must be a key part of treatment to achieve satisfactory outcomes. Unani Medicine is highly effective for the management of Adhesive Capsulitis when treatment was given both forms i.e. externally and orally.

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