ARTHROSCOPIC MANAGEMENT OF PRIMARY FROZEN SHOULDER

ESSAY

SUBMITTED FOR FULFILLMENT OF MASTER DEGREE IN ORTHOPAEDIC SURGERY

BY

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Tarek Nabil El-Geidy.

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Introduction

Frozen shoulder is defined as idiopathic global limitation of glenohumeral motion resulting from contracture and loss of compliance of the glenohumeral joint capsule **(Harryman et al., 2000)**.

Frozen shoulder is a common but poorly understood syndrome of painful shoulder stiffness. Despite years of investigation, little agreement exists to its exact etiology **(Griggs et al., 2000)**.

This syndrome could occur insidiously in the absence of a known specific cause, in which case it is termed primary "idiopathic" frozen shoulder or adhesive capsulitis. In other instances, the syndrome may occur secondary to a known pathology (secondary frozen shoulder), which could be intrinsic in the shoulder itself, or extrinsic outside the joint **(Rodosky and bigliani, 1997)**.

It has been claimed that the prolonged disuse and immobilization allow an opportunity to develop ligamentous and musclo-tendinuous contractures with loss of tissue visco-elasticity, resulting in motion restriction **(Harryman et al., 2000)**.

The basic pathology in all cases of frozen shoulder is scarring and contracture of capsuloligamentous structures of the glenohumeral joint, especially in the rotator interval capsule, thus holding the humeral head tightly against the glenoid fossa and restricting glenohumeral movement in all directions **(Ozaki et al., 1989)**.

Clinically, the disease started with insidious onset of intense pain without actual passive limitation in the range of motion. Throughout the course of the disease, the extent of actual stiffness increases, while that of

pain diminishes and becomes limited to the extremes of possible motion. The end result is a “frozen” shoulder **(Rodosky and biglini, 1997)**.

This syndrome is generally considered to be self-limiting condition; the best management has been the subject of extensive investigation. Prevention remains the best way to resist stiffness **(Harryman et al., 2000)**.

A variety of different treatment modalities have been recommended to shorten the duration of the disease and to avoid any residual stiffness, and numerous studies have demonstrated successful results. The types of treatment include analgesics and non-steroidal anti-inflammatory drugs, intra-articular corticosteroids, physiotherapy, fluid distension, manipulation under anesthesia, and open or arthroscopic release of the contractures **(Harryman et al., 1997)**.

Abstract

Primary frozen shoulder is common disorder but its exact cause is still unknown. The main complaint of the patient is pain with progressive limitation of movement.

There are many treatment modalities such as conservative treatment (anti-inflammatory, local injection and physiotherapy) and surgical treatment (manipulation under anesthesia, open release and arthroscopic release.

Arthroscopic release has many advantages such as it is safe with ability to complete release and rapid return to function unlike the open method.

Keyword: frozen shoulder.

Arthroscopic anatomy of The shoulder joint

The shoulder joint is a multiaxial joint possessing a wide range of freedom of motion between the roughly hemispherical humeral head and the shallow scapular glenoid cavity. The term spheroidal is preferred to ball and socket as it emphasizes the fact that both the humeral head convexity and the glenoid concavity only resembles but are not truly a sphere **(Sarrafain, 1983)**.

Shoulder arthroscopy offers a good delineation of both normal and pathologic intra-articular structures. It does not cause damage to the joint for visual access and the magnification achieved provides a better view of the joint than can be obtained during open surgery **(Andrews et al., 1984)**.

I- Glenohumeral joint

1. Head of humerus:

The humeral head is three to four times the size of the glenoid with the majority of intra-articular portion being covered by articular cartilage. The exception is the postero-lateral bare spot. This must be distinguished from Hill-Sachs lesion that results from recurrent anterior glenohumeral dislocations; this lesion is impacted with a base of cancellous bone and is not fenestrated **(Levy et al., 1991)**.

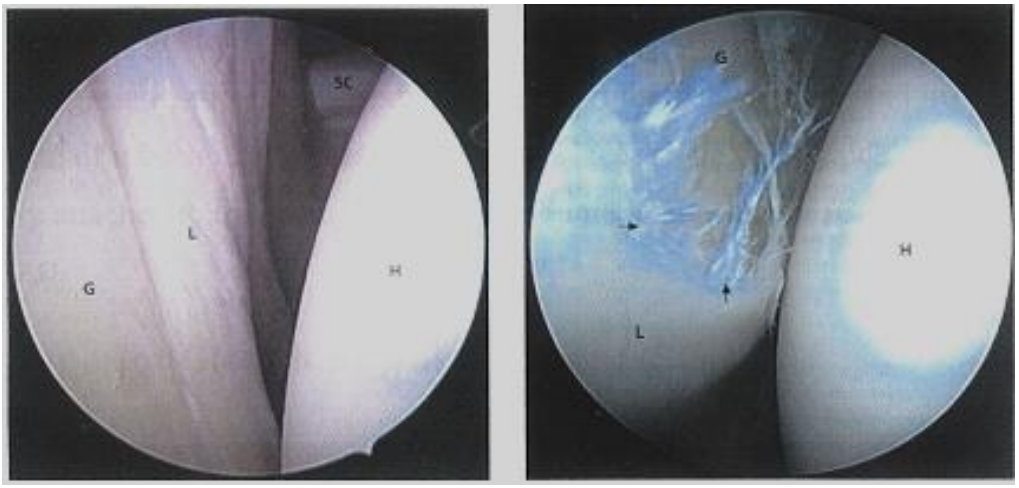
2. Glenoid:

The intra-articular glenoid fossa is ovoid in shape and is described as an inverted comma when viewed through the arthroscope. The

majority of the articular surface can be visualized posteriorly with the view enhanced with traction **(Cooper et al., 1992)**.

3. Labrum:

The labrum represents an extension of the glenoid serving to broaden and deepen the glenoid fossa. It is continuous with the capsule and the glenohumeral ligaments through which these structures attach to the glenoid rim. The labrum blends with the anterior glenoid neck periosteum and can form a smooth transition with the articular surface in a meniscus-like fashion with degeneration in old age, (Fig.1) **(Cooper et al., 1992)**.



(A) **(B)**

Fig. (1): The labrum variations

(a) Normal labrum. (b) Degenerated labrum, **Cooper et al., 1992.**

4. Biceps tendon:

The biceps tendon serves as orientation upon entry into the glenohumeral joint. Its entrance is through the rotator cuff at the bicipital groove beneath the transverse humeral ligament. It courses posterior to the superior glenoid region attaching to the supraglenoid tubercle and the

anterior superior labrum. It is smooth and cylindrical in shape and approximately 7-10 mm in diameter with synovial reflections or vincula may be present as it enters the joint. Biceps tendon inflammation and tearing can occur in isolation or be associated with superior labral tears, (Fig.2) **(Johnson et al., 1992)**.

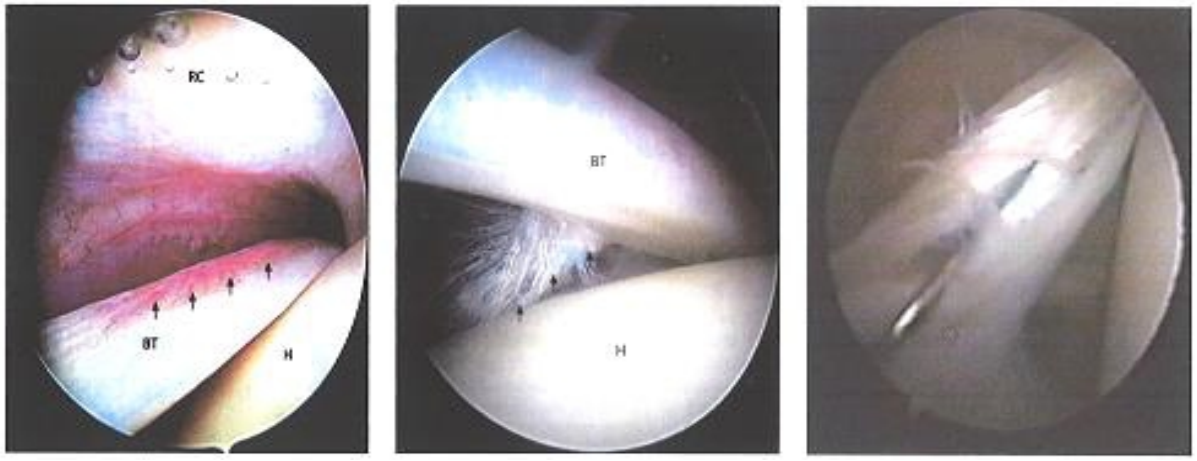


Fig. (2): The biceps tendon. A) Normal. B) Fraying. C) Longitudinal tear, **Johnson et al., 1992.**

5. Glenohumeral capsule:

The glenohumeral joint capsule is a cylinder of fibrous tissue connecting the glenoid to the humerus. It is continuous with defect only to allow egress of the biceps tendon at the intertubercular groove and in the region of subscapularis bursa. The capsule is less than 1 mm thick and firmly attached to the rotator cuff near its humeral attachment **(Clarke et al., 1990)**.

6. Glenohumeral ligaments:

1) The superior glenohumeral ligament (SGHL):

It originates from the supraglenoid tubercle. It runs laterally parallel to the adjacent biceps tendon, and inserts the anterior aspect of the anatomical neck of the humerus. It is poorly seen at arthroscopy

because its subsynovial position is anterior, and parallel to the biceps tendon, (Fig.3) **(Chams and Snyder, 2001)**.

2) The middle glenohumeral ligament (MGHL):

It courses between the mid to inferior lesser tuberosity of the humerus, obliquely to the mid superior glenoid rim. This has many variants and is absent in up to 30% of shoulders. It can have the appearance of thick band or a discrete cord with great variations of this ligament, (Fig.3) **(Clark et al., 1990)**.

3) The inferior glenohumeral ligament (IGHL):

It was first described as a triangular-shaped thickening of the anterior shoulder capsule. In fact, the inferior glenohumeral ligament is a broad sling continuous with the anterior and posterior glenoid labrum, which acts to support the humeral head in the glenoid fossa. There are two-band thickening within this inferior glenohumeral ligament complex with an interposed axillary recess. Viewing the joint arthroscopically, the anterior band is the most consistently seen with its anteroinferior glenoid attachment, (Fig.3) **(Morgan, 1991)**.

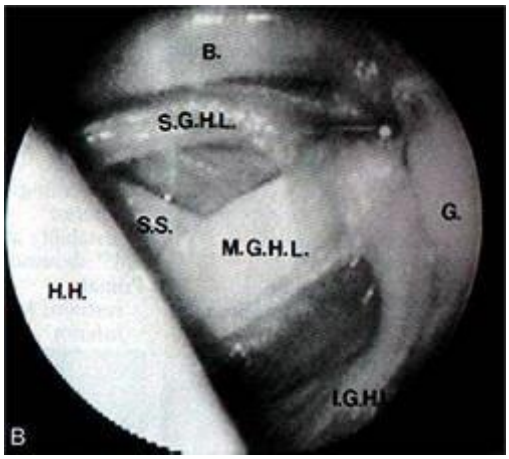


Fig. (3): The glenohumeral ligaments.
Humeral head (H.H), glenoid (G), superior glenohumeral ligament (S.G.H.L), middle glenohumeral ligament (M.G.H.L.), inferior glenohumeral ligament (I.G.H.L), subscapularis (S.S), and biceps tendon (B), **Morgan, 1991.**

7. Synovium:

The entire joint is covered with a fine lining of synovial tissue, which is normally not reddened or thickened. It may become indurated or thickened in certain pathological conditions such as crystalline synovitis and inflammatory conditions **(Nottage, 1993)**.

8. Synovial recesses:

Synovial recesses are found consistently throughout the shoulder joint, characteristically in the anterior capsule of the shoulder, and represent capsular openings to allow communication between the glenohumeral joint and subscapularis bursa. Variations have been noted, with synovial recesses both above and below the middle glenohumeral ligament in varying degrees.

Additional normal glenohumeral joint recesses include the inferior recess or axillary pouch in the shoulder, characteristically showing the inferior capsule in its attachment to the humeral head and glenoid and that may hide loose bodies or synovitis. The normal posterior recess reflects the drop-off posteriorly behind the glenoid, and the reflection of the posterior capsule, best visualized from the anterior portals **(Nottage, 1993)**.

9. Rotator interval:

The rotator interval is the area between the supraspinatus tendon superolaterally, and the subscapularis tendon inferolaterally. This triangular area, which contains both the coracohumeral and superior glenohumeral ligament, has its medial boundary, the coracoid process. The rotator interval is an integral part of the cuff and the capsule, and can be distinguished only by sharp dissection. The most important retaining

structure in this area is the portion of the shoulder capsule thickened by the coracohumeral ligament and the edges of the subscapularis, and supraspinatus tendons **(Burkhead et al., 2000)**.

10. Rotator cuff:

The rotator cuff is made up of the subscapularis, supraspinatus, infraspinatus and teres minor muscles. When viewing the rotator cuff from within the joint, the layers seen include the synovium, thickened capsule, and common tendinuous cuff **(Morgan, 1991)**.

The subscapularis muscle is distinct from the other muscles of the rotator cuff in its intra-articular appearance. It has a superior free edge and the glenohumeral ligaments obscure its attachment onto the proximal humerus.

Tearing of the rotator cuff may initially be manifested as a fraying or tearing of the synovium and the capsule near the humeral attachment in the region of biceps tendon. Inability to full distend the glenohumeral joint or to distend the rotator cuff from the biceps tendon are indicative of rotator cuff tear, (Fig.4) **(Morgan, 1991)**.

Fig. (4): Rotator cuff (RC) at the humerus viewed from within the joint.

Morgan, 1991.

II- Subacromial anatomy:

a. Bursa:

The subacromial space is large, but the subacromial bursa is relatively small and can be difficult to enter if normal. It is located anterior related to the humeral head and glenohumeral joint in the region of the coraco-acromial ligament. It is adherent superiorly to the acromion and inferiorly to the supraspinatus tendon. It is a synovial lined, smooth structure with variable thin bands or plica surrounded by a fatty areolar tissue **(Clark et al., 1990)**.

b. Rotator cuff:

The superior tendinuous portion of the rotator cuff is visualized in the subacromial space. Only the supraspinatus tendon is easily visualized through the bursa but also infraspinatus and teres minor can also be seen with resection of the bursa and rotation of the arm **(Clark et al., 1990)**.

c. Acromion:

The coracoacromial ligament attaches from the coracoid process to the anterior border and undersurface of the acromion. The ligament is visible through the bursa anteriorly and superiorly. The medial aspect of the ligament is associated with acromial branches of the thoraco-acromial trunk, which originates from the second part of the axillary artery that may be encountered during the time of resection **(Michael & Paul, 1995)**.

d. Acromioclavicular joint:

The acromioclavicular joint is not readily visible when viewed through the subacromial bursa. It is located at the medial acromion and is

obscured by the surrounding areolar and fatty tissue. The joint is palpable subcutaneously and placement of the needle through the joint into the subacromial space aids in determining its exact location that is evident by its glistening white joint capsule **(Michael &Paul, 1995)**.

Diagnosis of primary frozen shoulder

The successful treatment of any disorder of the shoulder requires an accurate diagnosis. To achieve this, all pieces of information related to the patient's complaint need to be collected and analyzed **(Hawkins and Bokor, 2000)**.

Clinical history and examination is effective in differentiating rotator cuff tears, impingement and frozen shoulder. Restriction of glenohumeral joint motion, particularly in external rotation, with no abnormality on X-ray is strongly suggestive of the diagnosis of frozen shoulder **(Bhargav and Murrell, 2004)**.

I-Clinical picture:

1. History:

In cases with primary frozen shoulder the patients usually present with a complaint of both pain, and limitation of shoulder movement **(Esch, 2001)**.

A) Age:

The age incidence is generally between 40 and 60 years. It is unusual to develop primary frozen shoulder in patients younger than 40 years age unless insulin-dependent diabetes has been present since childhood **(Solomon et al., 2001)**.

B) Sex:

The typical patient of primary frozen shoulder is a woman between 40 and 60 years of age with painful shoulder "frozen" at her side **(Esch, 2001)**.