Arthroscopic Management of Multidirectional Shoulder Instability

Protocol of Essay

Submitted for fulfillment of master degree
in ***Orthopedic surgery***

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2011

Abstract

The glenohumeral joint is a multiaxial joint of ball and socket type. True multidirectional instability is a global type of instability. The anatomic abnormality found in MDI is a large, patulous inferior capsular pouch. MRA and arthroscopy are the tools of choice for diagnosing glenohumeral instability. Nonoperative therapy is the mainstay of treatment.
The efficacy of arthroscopic management of MDI has been documented.

Key words: Multidirectional Shoulder Instability

Acknowledgment

First of all I would like to thank God for helping me to finish this work. I will never forget my Father and my Mother for all their support throughout my life, I am also grateful to all the members of my family.

I would like to express my gratitude to Professor Dr. Ahmed Abdel Aziz Ahmed, Professor of Orthopedic surgery, Faculty of Medicine, Cairo University, for his most valuable supervision, faithful advice and continuous follow up of this work.

It also gives me a great pleasure to thank Dr. Mohamed Mahmoud Hegazy, Assistant Professor of Orthopedic surgery, Faculty of Medicine, Cairo University, who helped me in revising this work very meticulously.

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List of Abbreviations

ACLS	Advance Cardiac Life Support
AMBRI	Atraumatic Multidirectional Bilateral Rehabilitation.
CA	Coracoacromial ligament
CHL	Coracohumeral Ligament
CT	Computerized Tomography
CTA	Computerized Tomography Arthrography
EUA	Examination under Anesthesia
FEDS	Frequency Aetiology Direction Severity
IGHLC	Inferior Glenohumeral Ligament Complex
MDI	Multidirectional Instability
MGHL	Middle Glenohumeral Ligament
MRA	Magnetic Resonance Arthrography
MRI	Magnetic Resonance Imaging
PDS	Polydioxanone
PGA	Polyglycolic Acid
PLA	Polylactic Acid
RF	Radiofrequency
ROM	Range of Motion
SGHL	Superior Glenohumeral Ligament
SLAP	Superior Labrum Anterior Posterior
TUBS	Traumatic Unidirectional Bankart surgery

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Introduction

The shoulder girdle is a complex, multi-articulated functional unit capable of achieving great mobility. This mobility arises through the coordinated activation of numerous muscles, which act to simultaneously produce limb segment motion and maintain joint stability. Along with active neuromuscular control, the functional integrity of the glenohumeral joint is maintained through a variety of passive mechanisms, including negative intra-articular pressure, bony restraint and capsuloligamentous tension [(1)].

Multidirectional instability (MDI) of the shoulder is a condition in which symptomatic laxity is present in more than 1 direction: anterior, posterior, and inferior. It has been recognized with increased frequency since **Neer and Foster** ~ reported the first series of patients with MDI in **1980**. Since that time there has been an increased understanding of the anatomy and function of the restraints of the glenohumeral joint[(2)].

The cause of MDI is multifactorial and not completely understood. Many shoulders with excessive laxity are asymptomatic. A traumatic event, repetitive microtrauma, fatigue, or deconditioning of dynamic muscular stabilizers may cause an asymptomatic lax shoulder to become symptomatic. There is some evidence that MDI patients also have abnormal proprioception [(3)].

Despite an incomplete understanding of the pathophysiology of MDI, anatomic abnormalities can be recognized. Cadaver studies have shown that the inferior capsule and rotator interval resist inferior humeral translation and that laxity or injury of these structures leads to increased capsular volume, which is the underlying pathology of MDI [(4)]. Newer studies suggest that the pathology also includes abnormal labral morphology and perhaps inadequate neuromuscular control [(5)].

The patient with an unstable shoulder should be thoroughly evaluated through their history and specific clinical tests of the shoulder as well as the scapulothoracic joint. Often, shoulder instability can be classified after this primary evaluation. Magnetic resonance arthrography and arthroscopy are the gold standards in soft-tissue evaluation, whereas specialized radiographic examinations and computed tomography scans are used to assess bony defects(6).

Operative treatment is indicated for MDI that does not respond to an extended, intensive rehabilitation program. Surgical options include open or arthroscopic procedures, each of which has advantages and disadvantages(2).

More recently, the advent of shoulder arthroscopy has blazed the trail for minimally invasive techniques to correct multidirectional instability (7).

AIM OF WORK

Highlight on the multidirectional shoulder instability and its diagnosis.

Particular focusing on recent arthroscopic treatment of multidirectional shoulder instability.

Chapter I

Anatomy of the Shoulder

The shoulder is a ball-and-socket joint between the relatively large *head of humerus* and relatively small and shallow *glenoid fossa*, although the latter is deepened somewhat by the cartilaginous ring of the *labrum glenoidale*. The joint *capsule* is lax and is attached around the epiphyseal lines of both the glenoid and the humeral head. It extends down on to the diaphysis on the medial aspect of the neck of the humerus. The capsule is lined by *synovial membrane* which is prolonged along the tendon of the long head of the biceps as this traverses the joint. The synovium also communicates with the *subscapular bursa* beneath the tendon of subscapularis.[8]

The head of the humerus:

It is a large, globular bony structure whose articular surface forms one third of a sphere and is directed medially, superiorly, and posteriorly. The head is inclined 130 to 150 degrees in relation to the shaft (Fig. 1-1).[9] Retroversion of the humeral head can be highly variable both among persons and between sides in the same person. Pearl and Volk found a mean of 29.8 degrees of retroversion in 21 shoulders they examined, with a range of 10 to 55 degrees.[10] The average vertical dimension of the head's articular portion is 48 mm, with a 25-mm radius of curvature. The average transverse dimension is 45 mm, with a 22-mm radius of curvature.[11] The bicipital groove is 30 degrees medial to a line passing from the shaft through the center of the head of the humerus. The greater tuberosity forms the lateral wall, and the lesser tuberosity forms the medial wall of this groove.

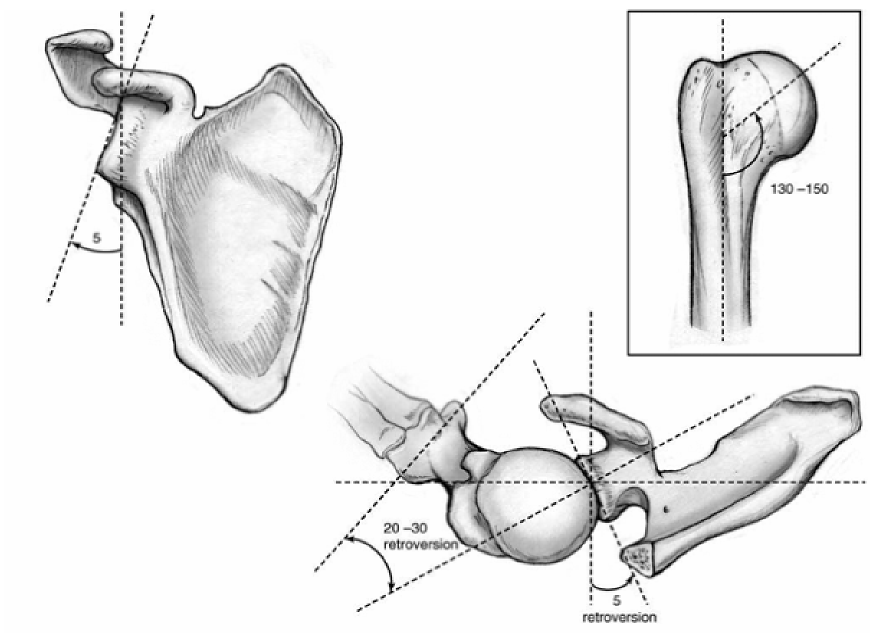

Figure (1-1): (Left) Superior tilt of the glenoid, (Center and right) Glenoid and humeral version, and neck-shaft angle of proximal humerus.[12]

The glenoid cavity:

It is shaped like an inverted comma (Fig. 1-2). Its superior portion (tail) is narrow and the inferior portion is broad. The transverse line between these two regions roughly corresponds to the epiphyseal line of the glenoid cavity.[13] The glenoid has a concave articular surface covered by hyaline cartilage. In the center of the cavity, a distinct circular area of thinning is often noted. This area, according to DePalma and associates, [13] is related to the region's greater contact with the humeral head, as well as to age (Fig. 1-2). The average vertical dimension of the glenoid is 35 mm, and the average transverse diameter is 25 mm. Previous studies by Saha[14-16] noted that the glenoid may be either anteverted or retroverted with respect to the plane of the scapula. He found that 75% of the shoulders studied had retroverted glenoid surfaces averaging 7.4 degrees and that approximately 25% of the glenoid surfaces were anteverted 2 to 10 degrees. With regard to vertical tilt, the superior portion of the superior/inferior line of the glenoid is angled an average of 15 degrees medially with regard to the scapular plane, thus making the glenoid surface on which the humeral head lies relatively horizontal (Fig. 1-3).

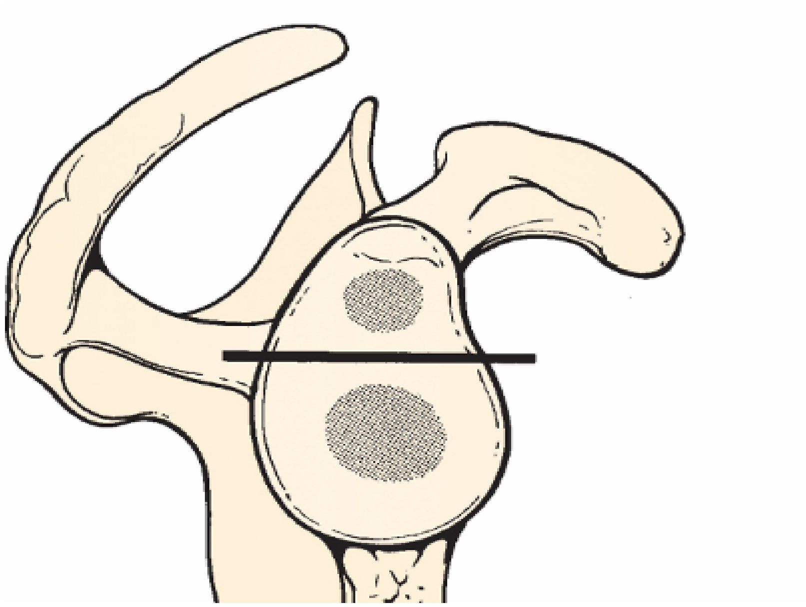

Figure (1-2) The glenoid cavity is shaped like an inverted comma. The transverse line corresponds to the epiphyseal line of the glenoid cavity.[9]

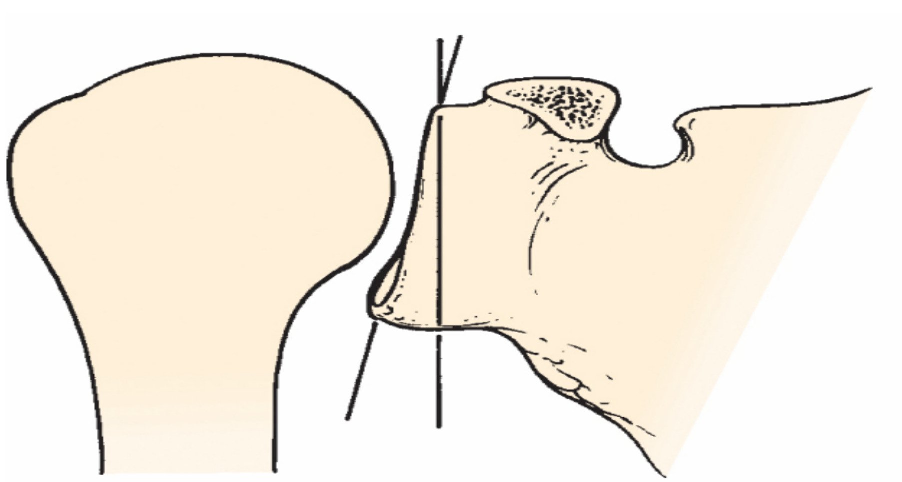

Figure (1-3) The superior portion of the superoinferior line of the glenoid is angled at an average of 15 degrees medially with regard to the scapular plane.[9]

The glenoid labrum:

It is a rim of fibrous tissue that is triangular in cross section and overlies the edge of the glenoid cavity (Fig. 1-4). It varies in size and thickness, sometimes being a prominent intra-articular structure with a free inner edge and at other times being virtually absent. Previously, the labrum was likened to the fibrocartilaginous meniscus of the knee; however, Moseley showed that it was essentially devoid of fibrocartilage, except in a small transition zone at its osseous attachment.(17)The majority of the labrum is dense fibrous tissue with a few elastic fibers. It is, however, important for maintaining glenohumeral stability.(18-24) The labrum is responsible for increasing the depth of the glenoid cavity by up to 50%, as well as for increasing the surface area contact with the humeral head.(20,23) It can also act as a fibrous anchor from which the biceps tendon and glenohumeral ligaments can take origin.

The long head of the biceps tendon passes intra-articularly and inserts into the supraglenoid tubercle. It is often continuous with the superior portion of the labrum.

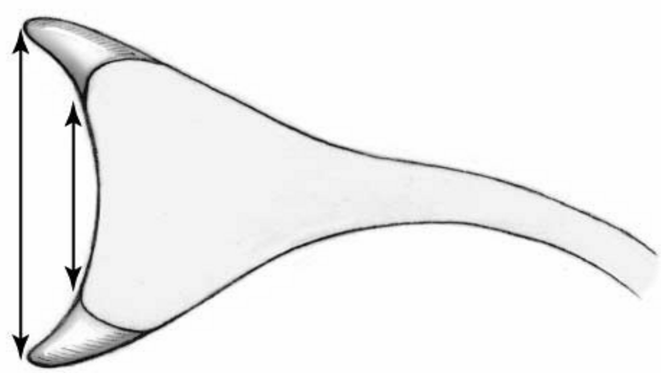

Figure (1-4) Glenoid labrum increases the surface area and depth of the glenoid socket.(25)

Fibrous capsule:

A fibrous capsule envelops the joint (Fig.1-5). It is attached medially to the glenoid margin outside the glenoid labrum, and encroaches on the coracoid process to include the attachment of the long head of biceps. Laterally, it is attached to the anatomical neck of the humerus, i.e. near the articular margin, except inferomedially, where it descends more than 1 cm on the humeral shaft. It is so lax that the bones can be distracted for 2 or 3 cm, which accords with the very wide range of movement possible at the glenohumeral joint. However, such unnatural separation requires relaxation of the upper capsule by abduction.