Seminars in
Arthroplasty

Anterior Instability Should Be Treated Arthroscopically—Affirms

Michael Reyes, MD, and Ken Yamaguchi, MD

Arthroscopic instability repair now is fast becoming the treatment of choice for surgical treatment. In comparison to open techniques, modern arthroscopic repair offers the same failure rates while providing several documented and theoretical advantages. These include the absence of a subscapularis tendon takedown, decreased effects to the proprioceptive function of the capsule, easier revisions, decrease range of motion loss, improved cosmesis, and decreased perioperative morbidity.
Semin Arthro 18:2-6 **© 2007 Elsevier Inc. All rights reserved.**

KEYWORDS shoulder instability, arthroscopic repair, capsular imbrication, glenoid labrum

Glenohumeral instability results from a continuum of pathology of the structures about the shoulder joint. Instability may present as subtle subluxation to frank dislocation. It may be the result of a single or recurrent traumatic episode or atraumatic etiology. The current knowledge has evolved since its initial descriptions in the literature well over 100 years ago. With the evolution of our understanding of the pathoanatomy so has the surgical strategy evolved. The historical gold standard has been open stabilization techniques, which have shown high rates of success. With the advancement of arthroscopic technology and technique, arthroscopic stabilization has become increasing utilized in the treatment of glenohumeral instability.

Anatomy of Glenohumeral Stability

The glenohumeral joint is the most mobile joint of the human body. A precise balance must exist between mobility and stability to maintain a functional shoulder. For normal use of the shoulder, it is critical that the humeral head be centralized in the glenoid and coracoacromial arch. Several mechanisms exist to maintain the relatively large humeral head on the shallow and small glenoid.

Department of Orthopaedic Surgery, Washington University School of Medicine, St. Louis, MO.
Address reprint requests to Ken Yamaguchi, MD, Department of Orthopaedic Surgery, Washington University School of Medicine, Suite 11300 West Pavilion, One Barnes-Jewish Hospital Plaza, St. Louis, MO 63110. E-mail: yamaguchik@wustl.edu

Stability is provided by the combined influence of static and dynamic structures. The osseous anatomy and articular surfaces, shoulder musculature, and capsuloligamentous complexes all contribute to glenohumeral stability. Version and adhesion–cohesion properties of the articular surface augment stability of the shoulder joint. These properties of the articular surface, however, play a relatively minor role in the pathogenesis of instability. The articulation between the concave glenoid and the humeral head leads to marginal congruency, effectively stabilizing the shoulder joint. As glenoid concavity increases, the inherent stability of the articulation increases by requiring greater displacing forces to cause subluxation or dislocation of the humeral head relative to the glenoid. Glenoid concavity is created by three components: the osseous glenoid, the articular cartilage, and the labrum. Normal development of the glenoid results in a concave structure. The articular cartilage further enhances concavity by having thicker margins around the periphery of the osseous glenoid. The labrum additionally deepens the glenoid concavity and provides a greater surface area for articulation. By increasing the depth, the labrum acts as a "chock block," preventing the humeral head from sliding or rolling over the glenoid rim.

The shoulder musculature, including the rotator cuff and biceps, contributes significantly to stability. These muscles provide the compressive force across the glenohumeral joint throughout range of motion. The forces of the muscles along with the scapular anatomy lead to concavity compression.[1] With the combined compressive forces and concave constraints, higher displacing loads or forces are required to displace the glenohumeral articulation.[1,2] Concavity compression is especially important in the midrange of glenohu-

1045-4527/07/$-see front matter © 2007 Elsevier Inc. All rights reserved.
doi:10.1053/j.sart.2006.11.012

meral motion since the capsuloligamentous structures are lax.

The capsuloligamentous structures play a complex role in shoulder stability and supplement the effects of the osseous anatomy and muscular forces. The contribution to stability is highly dependent on the position of the glenohumeral joint. This has been elucidated by multiple biomechanical studies.[3,4] As the glenohumeral joint is abducted, stabilizing function shifts inferiorly in the capsuloligamentous structures.[3] The superior glenohumeral ligament plays a critical role in the adducted shoulder. In this position, it restrains inferior translation. The middle glenohumeral ligament resists translation and rotation in the mid- and lower ranges of abduction. The inferior glenohumeral ligament complex acts as the primary restraint to translation when the arm is abducted or externally rotated. In addition to limiting translation, the ligaments prevent excessive humeral rotation at the extremes of motion. With this limitation the musculature is maintained within its optimal working length. When the musculature is stretched beyond its maximal working length, the ligaments experience increased tensile forces, which translate into compressive forces, thus substituting for loss of muscle force contribution.

The capsule also provides this protective effect. The rotator interval between the supraspinatus and subscapularis provides compressive forces where there is no musculature and in the adducted position.[5] Studies have shown that addressing the rotator interval increases stability but can lead to decreased range of motion. Gerber and coworkers[6] showed that capsular placation of the rotator interval decreased external rotation by 30°. Gartsman and coworkers[7] promoted far lateral closure in select cases of instability to avoid restricting external rotation.

Pathoanatomy of Instability

Historically the classic and essential lesion of glenohumeral instability has been the Bankart lesion. The Bankart lesion corresponds to the detachment of the inferior glenohumeral ligament (IGHL) and labral complex. Neviaser[8] noted that the detached labroligamentous complex healed in a medial position on the glenoid neck. This lesion is referred to as the anterior labroligamentous periosteal sleeve avulsion (ALPSA) lesion. Being inferior to the equator of the glenoid and its involvement of the IGHL, the ALPSA lesion destabilizes the shoulder, especially when in a position of abduction and external rotation. The ALPSA lesion effectively reduces the “bumper” or chock–block effect of the anterior labrum[8,9] and reduces the concavity–compression of the glenohumeral articulation.[1]

The current understanding of shoulder instability goes beyond labral injury alone and is multifactorial. Speer and coworkers[10] demonstrated that an isolated labral detachment did not lead to instability, but that a Bankart lesion in addition to capsular stretching was sufficient in producing subluxation. Transection of the inferior glenohumeral ligament in cadavera minimally increased anterior translation of the glenohumeral joint.[10] Bigliani and coworkers[11] found that the IGHL fails in one of three locations: at the glenoid, midsubstance, or humeral insertion. They also demonstrated plastic deformation of the ligament. The findings of stretch injury and redundancy in the capsuloligamentous complex demonstrated the complex nature of instability and the need to address all pathoanatomy leading to instability.

In addition to the soft tissue, pathology there may be osseous lesions leading to instability. Loss of bone stock from the glenoid and/or the humerus (Hill–Sachs lesion) may further destabilize the shoulder articulation. Glenoid erosion alters the anatomy of the articulation by inverting the normal pear-shaped morphology of the glenoid. This leads to a shorter arc of motion by which it can resist loads. Rim fractures essentially decrease the resistance to shear by decreasing rim load. Deficiencies of the humerus may also destabilize the shoulder. Hill–Sachs lesions can either be engaging or nonengaging. Hill–Sachs lesions may engage the anterior glenoid when the long axis of the lesion parallels the glenoid rim.[12] On the other hand, when the axis of the lesion lies diagonal to the rim, the lesion is nonengaging. The former is prone to recurrence in arthroscopic repair, while the latter has been treated effectively with arthroscopy.[12]

Principles of Treatment

The goal of any treatment is to restore stable functional range of motion of the glenohumeral joint. The detached labrum must be mobilized and repaired to the glenoid rim so that restoration of the stabilizing forces can be achieved. In addition to addressing the labral pathology, associated capsular and/or osseous deficiencies must be dealt with to prevent persistent or recurrent instability. Retensioning of the inferior glenohumeral ligament complex as well as eliminating capsular redundancy or laxity with capsular shifts is critical to the restoration of functional mobility of the shoulder.

Patient selection plays a crucial role in determining whether treatment will be successful. A thorough history and physical examination along with indicated imaging studies is necessary to provide the correct diagnosis and to identify all associated causes of instability. By elucidating the pathoanatomy the surgeon can select an appropriate surgical procedure. Typically, surgical intervention is indicated if mechanical factors such as capsuloligamentous deficiency, muscle imbalance, or glenoid deficiencies are identified since these can be specifically addressed by a targeted procedure.

With a broader knowledge of the pathoanatomy of instability, surgeons have developed modern techniques to address all the pathologic features of instability. Historically open procedures have been the standard of care for the treatment of shoulder instability; however, advancements in arthroscopic surgery have propelled this technique to the forefront of glenohumeral stabilization.

The classic Bankart repair[13] or capsular shifts described by Neer have been the traditional approaches in open surgical techniques. With the discovery that labral and capsular lesions are involved in the pathoanatomy of instability and dislocation,[10] combination procedures of labral repair and capsular tightening were subsequently utilized. With open

Download English Version:

https://daneshyari.com/en/article/4094400

Download Persian Version:

https://daneshyari.com/article/4094400

Daneshyari.com