

## Electrothermally-Assisted Capsulorrhaphy (ETAC) for Shoulder Instability

Anyone involved with athletes and dealing with shoulder complaints has likely heard of a relatively new alternative to traditional surgery for instability that involves "shrinking" the joint capsule. This procedure, used for approximately six years, has only recently been researched both from a basic science approach and in some short-term outcome reviews. Patients, in particular, athletes, often have questions about treatment options for their problems. Although it is not necessary to be an expert, it is important to be knowledgeable enough to give advice. Following is a short overview with emphasis on a generalized postsurgical rehabilitation approach.

The principle of electrothermally-assisted capsulorrhaphy (ETAC) is to apply enough heat to "loose" capsuloligamentous tissue to cause shrinkage of collagen fibrils through unwinding of the collagen triple helix. Disruption of hydrogen bonds transforms the tissue into a denatured state. ETAC can be applied using one of two sources of heat: laser or radiofrequency. The thermal energy is applied arthroscopically to tissue at a temperature of 65 degrees C. There are some disadvantages to using laser energy. Principally, it is more difficult to control the temperature and any tissue in the path of the laser beam is affected. For example, there are reported cases of osteonecrosis of the femoral condyle when used in the knee. Also, laser is more expensive.

Not all instability patients are good candidates for ETAC. The patient must have symptomatic shoulder instability that significantly affects the patient's lifestyle or occupation. These symptoms should be present for at least six months and the patient should have attempted a conservative approach for a minimum of three months prior to seeking any surgical solution. Patients who voluntarily dislocate; have psychiatric problems; chronic pain syndrome, reflex sympathetic dystrophy; or tumor, fracture or infection are not good candidates. Patients with other instability-related problems such as a Bankart lesion, labrum tears such as SLAP (superior labrum, anterior to posterior) lesions, or rotator cuff tears are occasionally treated with ETAC, usually having the damaged tissue repaired first, prior to application of thermal energy.

There is a sequential approach to the application of the thermal energy. Through arthroscopic portals, the inferior glenohumeral ligament and capsule are usually treated first. The anterior, middle, and superior glenohumeral ligaments follow this. Finally, the posterior capsule is treated. When treating the inferior pouch of the capsule, damage to the axillary nerve is possible. When tightening the posterior capsule, over-tightening may lead to impingement secondary to anterior-superior migration of the humeral head. There are few guidelines other than experience to determine how much shrinkage is enough. One general rule is to determine whether the arthroscopic probe can move easily from posterior to anterior and to view the passage visually from the scope. If it is easy to pass through the joint, surgeons refer to this as a positive "drive through" sign. Most surgeons use the elimination of this sign as an indicator of sufficient tightening.

A recent article outlined an approach used at one facility that has resulted in good outcomes for ETAC patients.<sup>1</sup> Postoperatively, patients use a sling for approximately 3-4 weeks. During the early years of ETAC surgery, patients were kept in a sling for only one week and, as a result, were more likely to have failure due to stretching of the weakened tissue. There is now an assumption that the

tensile strength of the treated tissue is not as strong, therefore, immobilization is longer and aggressive rehabilitation is not used. Early approaches include primarily range of motion and gripping exercises for the wrist and elbow. Pendulum exercises without weight may be used. Isometric shoulder exercise is performed at the side using a submaximal contraction building up to pain-free internal and external shoulder rotation isometric exercises. Stretching is reserved until about the fourth to sixth week with a focus on the posterior capsule. Gradually, through the 4<sup>th</sup> through 6<sup>th</sup> week, the goal is to reach about 45 degrees of external rotation and 70 degrees of abduction with 135 degrees of forward flexion.

During the 6<sup>th</sup> to 8<sup>th</sup> weeks, the goal is to increase abduction to about 90 degrees. It has been reported, though, that less than half of patients reached this goal after 12 weeks following ETAC. At about the two-month mark, strengthening exercises are incorporated in the scapular plane first, to avoid excessive tension on the anterior joint capsule. Use of elastic bands is valuable during this period due to the low load applied to the shoulder. It is important through even as late as the two-month postoperative period to avoid stretching beyond 90 degrees of external rotation. By the end of the second month post-op, it is usually the case that more sports-specific approaches and plyometrics may be begun.

Short-term results look encouraging. There are quite a number of professional athletes opting for this approach with short-term results that allow return to high levels of performance. The long-term results will require at least several more years of follow-up to determine.

1. Tyler TF, Calabrese GJ, Parker RD, Nicholas SJ. Electrothermally-assisted capsulorrhaphy (ETAC): a new surgical method for glenohumeral instability and its rehabilitation considerations. *Journal of Orthopaedic & Sports Physical Therapy*. 2000;30(7):390-400.

#### *Other References*

The Thermal Effect of Monopolar Radiofrequency Energy on the Properties of Joint Capsule. Hecht P, Hayashi K, Cooley J, et al. *Am J Sports Med* 26:6;1998, 808-814.

Histologic Evaluation of the Glenohumeral Joint Capsule After the Laser-Assisted Capsular Shift Procedure for Glenohumeral Instability. Hayashi K, Massa K, Thabit III G, et al. *Am J Sports Med*. 27:2;1999, 162-167

The Effects of Laser-Induced Collagen Shortening on the Biomechanical Properties of the Inferior Glenohumeral Ligament Complex. *Am J Sports Med*. 27:2;1999, 168-172.

*Thomas Souza, DC, DACBSP*  
*San Jose, California*  
[souzata@earthlink.net](mailto:souzata@earthlink.net)

NOVEMBER 2000