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Technical Note

Arthroscopic Capsular Release for Painful Throwing Shoulder
With Posterior Capsular Tightness

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Abstract: Posterior capsular tightness with glenohumeral internal rotation deficit is usually considered to be an acquired condition of the throwing shoulder and is usually treated conservatively. However, because posterior capsular tightness is sometimes irreversible, we have performed arthroscopic capsular release for painful throwing shoulder with posterior capsular tightness. The true loss of internal rotation and posterior stiffness was confirmed by examination with the patient under anesthesia, and contracture of the posterior capsule and the posterior band of the inferior glenohumeral ligament was observed arthroscopically. Because an extensive adhesion between the capsule and the fascia of the external rotators was noted, a capsular release was performed from 6 o'clock to 11 o'clock (in the right shoulder) to completely expose the muscle belly of the external rotators. Of the first 16 consecutive patients, 4 had no concomitant lesions and underwent posterior capsular release alone. With a minimum of 2 years' follow-up, it was ascertained that the throwing pain completely disappeared in 14 patients and improved in 2. In all, 11 patients returned to their preinjury performance level, and 5 returned to a lower level of function. In the 4 patients who had no concomitant lesions, throwing pain completely disappeared, and all were able to return to their preinjury performance level. **Key Words:** Arthroscopic capsular release—Painful throwing shoulder—Posterior capsular tightness—Internal rotation deficit.

In throwing athletes, an increase in external rotation and decreased internal rotation in the dominant shoulder have been noted to occur with repetitive

throwing or overhand motion.^{1,2} The rotational change from increased retroversion of the humeral head often contributes to a bony adaptation.^{3,4} On the other hand, posterior shoulder tightness has long been regarded as an important cause of shoulder injury.⁵ Nevertheless, because posterior capsular tightness has not been regarded as a main cause of various throwing shoulder injuries, lengthy conservative treatments have been performed in most painful throwing shoulders. Therefore, the importance of this tightness as a main cause of throwing pain has been recognized only recently.⁶

Since July of 2000, when we recognized that the tightness of posterior structures of the shoulder joint was a lesion of great significance for throwing injury, we have performed arthroscopic capsular release for painful throwing shoulder with posterior capsular tightness. Additionally, among patients who had undergone arthroscopic removal of symptomatic Bennett

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Cite this article as: Yoneda M, Nakagawa S, Mizuno N, et al. Arthroscopic capsular release for painful throwing shoulder with posterior capsular tightness. *Arthroscopy* 2006;22:801.e1-801.e5 [doi:10.1016/j.arthro.2005.12.056].
0749-8063/06/2207-5222\$32.00/0
doi:10.1016/j.arthro.2005.12.056

lesions, several cases resulted in poor outcomes, which were believed to be related to posterior capsular tightness.⁷ Thereafter, capsular reattachment after removal of the bony spur was not performed on patients who had posterior capsular tightness. Currently, whenever tightness occurs, we always release the posterior capsule in the repair of a SLAP lesion or anterior instability or a partial rotator cuff tear. We present here the procedure of arthroscopic capsular release for painful throwing shoulder with posterior capsular tightness and report preliminary clinical results obtained with a minimum of 2 years' follow-up.

SURGICAL TECHNIQUE

The patient was positioned in a posteriorly tilted lateral decubitus position with the shoulder in 45° of abduction and 15° of flexion. Traction was placed on the forearm (4 kg) and on the upper arm (3 to 4 kg) for lateral traction so that a better view of the axillary pouch could be attained. First, posteroinferior joint space was arthroscopically examined through the anterior portal to check for narrowing of the space. Then, the posterior capsule and the inferior glenohumeral ligament were checked for elasticity and for the presence of pathologic fibrotic changes. A bipolar-type radiofrequency energy hook-probe was introduced through the posterior portal. After the posterior capsule had been incised horizontally from the posterior portal to its medial attachment, the posterior capsule and the posterior band of the inferior glenohumeral ligament were completely released at their attachments to the glenoid labrum from 6 o'clock to 11 o'clock (in the right shoulder) to expose the muscle belly of the infraspinatus and the teres minor in a T-shaped fashion (Fig 1). Capsular shortening, thickening, and extensive adhesion between the capsule and the fascia of the external rotators were noted in all joints (Fig 2). The normal posterior capsule is usually composed of elastic and membranous parts. As is typical, the posterior capsule was contracted and fibrotic in this case; however, it was very difficult for clinicians to distinguish the posterior capsule from the posterior band of the inferior glenohumeral ligament. Moreover, extensive capsular release was performed to completely expose the muscle belly of the external rotators and to remove the adhesion between the capsule and the fascia of the external rotators. The part around 6 o'clock that is closest to the axillary nerve was released carefully to avoid heat-induced damage to the nerve. The attachment of the long head of the

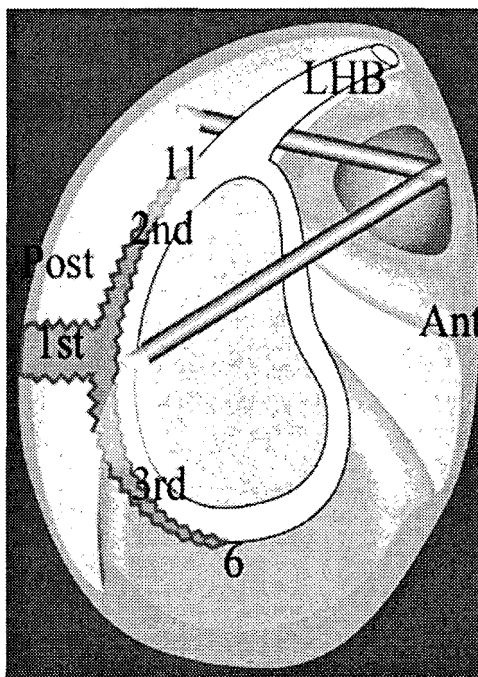


FIGURE 1. Schematic drawing of arthroscopic capsular release in T-shaped fashion (right shoulder). The posterior joint space was examined with a 30° scope introduced through the anterior portal and passed over the tendon of the long head of the biceps. First, the posterior capsule was incised horizontally from the posterior portal to its medial attachment (9 o'clock) with a radiofrequency hook-probe introduced through the posterior portal. Then, the release, which included the fascia of the cuff, was advanced longitudinally along the labrum from 9 o'clock to 11 o'clock until the muscle belly of the infraspinatus and the teres minor were completely exposed. Finally, the scope was moved under the biceps tendon to allow observation of the posteroinferior joint space and the posterior capsule; the posterior band of the inferior glenohumeral ligament from 9 o'clock to 6 o'clock was released carefully until the muscle belly of the external rotators was exposed. LHB, long head of biceps tendon; Ant, anterior; Post, posterior.

triceps had to be partially released in several patients with severe contracture of the joint.

Arthroscopic procedures for concomitant lesions included resection of a painful Bennett lesion (a bony spur on the posteroinferior glenoid rim that causes throwing pain) in 8 shoulders,⁷ a type 2 SLAP repair in 5, thermal capsular shrinkage to the anterior part in 4, and a repair in another part of the labrum in 1. A total of 4 patients had no concomitant lesion and underwent posterior capsular release alone.

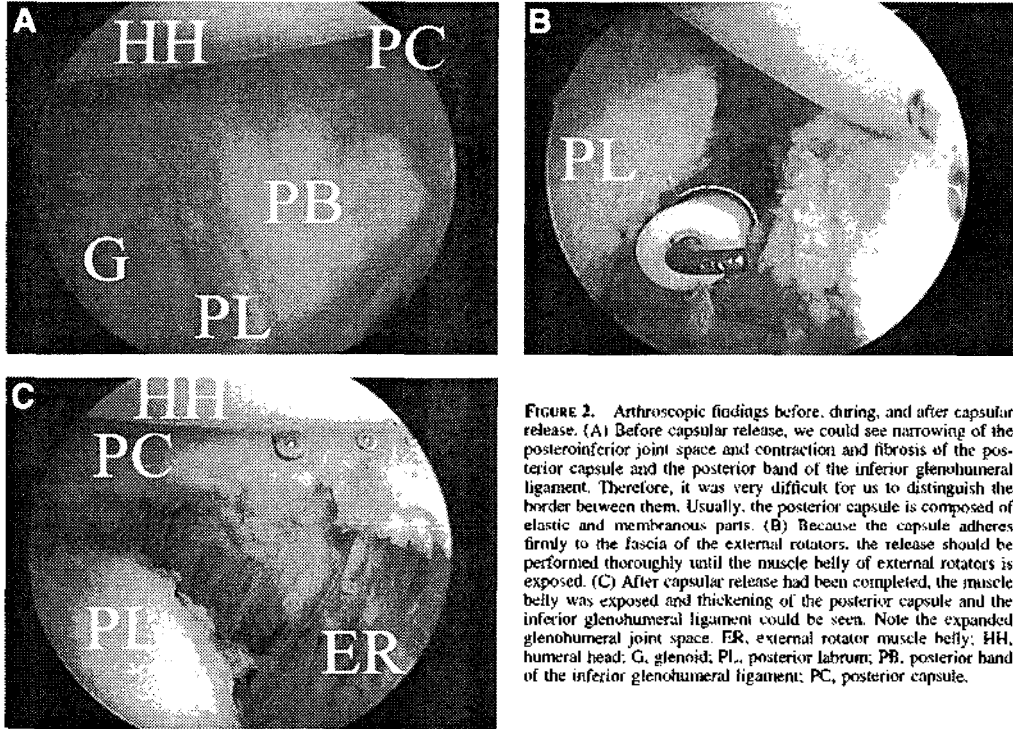


FIGURE 2. Arthroscopic findings before, during, and after capsular release. (A) Before capsular release, we could see narrowing of the posteroinferior joint space and contraction and fibrosis of the posterior capsule and the posterior band of the inferior glenohumeral ligament. Therefore, it was very difficult for us to distinguish the border between them. Usually, the posterior capsule is composed of elastic and membranous parts. (B) Because the capsule adheres firmly to the fascia of the external rotators, the release should be performed thoroughly until the muscle belly of external rotators is exposed. (C) After capsular release had been completed, the muscle belly was exposed and thickening of the posterior capsule and the inferior glenohumeral ligament could be seen. Note the expanded glenohumeral joint space. ER, external rotator muscle belly; HH, humeral head; G, glenoid; PL, posterior labrum; PB, posterior band of the inferior glenohumeral ligament; PC, posterior capsule.

Postoperatively, the shoulder was immobilized in the position of 0° of flexion and 0° or 90° of internal rotation, according to procedures used for concomitant lesions. On the first postoperative day, we started a self-stretching exercise program that used the hold-relax procedure of the proprioceptive neuromuscular facilitation technique for all patients. Depending on which procedures were used for concomitant lesions, a shoulder isometric strengthening program was instituted in the early postoperative days to strengthen external rotators and scapular stabilizers. Shadow pitching and plyometric exercise were begun 8 weeks after surgery. Following evaluation of pitching form, patients were permitted to play catch at 2 to 3 months and to return to competitive sports at 4 to 5 months.

CLINICAL RESULTS

Between July 2000 and December 2004, arthroscopic capsular release for posterior capsular tightness was per-

formed in 47 shoulders of 47 overhead-throwing athletes with painful throwing shoulder. Of the 47 patients, 16 (14 males and 2 females) were retrospectively reviewed through prospectively collected data with a minimum follow-up of 2 years after surgery. Patient age at the time of surgery ranged between 15 and 35 years; average age was 27 years. Patients were followed for an average time of 27 months (24 to 42 months); 12 patients participated in baseball, 2 in volleyball, 1 in badminton, and 1 in football.

Postoperatively, throwing pain completely disappeared in 14 patients and decreased in 2. Recovery of throwing power was reported by each patient with the use of the visual analog scale: 90% to 100% recovery was achieved in 11 patients, 70% to 80% in 4, and 50% to 60% in 1. A total of 11 patients returned to their preinjury performance level, and 5 returned to a lower level of function. In all 4 patients who had no concomitant lesions, throwing pain completely disappeared, throwing power was restored at 90% to 100%,

and complete return to preinjury performance level was accomplished.

The internal rotation deficit between the affected shoulder and the contralateral shoulder was reduced from an average of 28° preoperatively to 7° postoperatively in 90° of abduction, and from 24° to 5° in 90° of scaption. The total rotation arc in 90° of scaption increased from 145° on average preoperatively to 158° postoperatively, and the total rotation deficit in 90° of scaption decreased from 24° to 3°.

Although no joint instability occurred postoperatively in the posterior direction, anterior joint laxity increased in 1 patient, who was not satisfied with the surgical result. No neurovascular complication or infection was recognized in any patient during this study.

DISCUSSION

In this report, we describe our technique of arthroscopic capsular release for painful throwing shoulder with posterior capsular tightness and the favorable preliminary clinical results. In previous reports on arthroscopic posterior capsular release, Ticker et al.⁸ performed the procedure for patients with subacromial impingement syndrome and produced improved internal rotation and alleviation of other symptoms. For throwing shoulder, Burkhart et al.⁶ have described that they recommend the procedure for throwing athletes with type 2 SLAP lesion who do not respond to stretching exercises. However, we performed this procedure in a number of throwing athletes with posterior capsular tightness regardless of the presence of a type 2 SLAP lesion. Improvement in internal rotation and symptoms, as well as return to competition, was achieved in all patients. In addition, the 4 patients who underwent posterior capsular release alone without concomitant lesions recovered their throwing performance significantly. We believe these results suggest that posterior capsular tightness can be caused by a lesion of the painful throwing shoulder; the procedure described is effective for treating patients with this lesion. Although Burkhart et al.⁶ recommended continuous stretching exercises as postoperative therapy after a type 2 SLAP repair with posterior capsular tightness, we believe it may be better to perform capsular release simultaneously with the SLAP repair for early return to throwing activity.

The mechanism of shortening or thickening in the posterior capsule and the posterior band of the inferior glenohumeral ligament of overhead throwers remains

unclear. Burkhart et al.⁶ described that repetitive strong traction force to the posterior capsule in the follow-through phase causes its thickening. In our experience, extensive adhesions to the fascia of external rotator muscles in the posterior capsule and the posterior band of the inferior glenohumeral ligament, as well as thickening of the attachments to these structures, were frequently observed. Therefore, it is believed that the pain associated with posterior capsular tightness derived not only from direct tensile force to the capsule but also from indirect traction by adherent external rotators. Although external rotators are always active during throwing motion, their muscle bulk is much smaller compared with that of internal rotators, and no other muscles can substitute for their function. Therefore, external rotators can be easily overused with repetitive throwing motion, and such overuse might be the cause of pathologic changes related to posterior capsular tightness. Because extensive adhesions to the fascia of external rotator muscles in the posterior capsule were also believed to adversely affect the efficient shoulder isometric strengthening program for external rotators, removal of these adhesions combined with capsular release may be an important procedure in improving muscle power around the affected shoulder postoperatively.

After arthroscopic resection of a painful Bennett lesion with posterior capsular release, 1 patient showed aggravated anterior instability and was dissatisfied with the surgical result. Occasionally, a painful throwing shoulder occurs with posterior tightness as well as excessive anterior laxity. For such patients, anterior stabilization, such as that achieved with arthroscopic rotator interval closure, should be combined with posterior release to balance capsular tension.

This article provides a small retrospective chart review on a mixed group of patients who underwent arthroscopic posterior capsular release and various other surgical procedures. However, with throwing shoulder pain, several lesions often exist simultaneously and cause pain in the same shoulder, along with posterior capsular tightness. Therefore, patients who had posterior capsular tightness alone without concomitant lesions were far fewer in number than those who had tightness with several concomitant lesions. Not only is arthroscopic capsular release considered effective for patients with posterior capsular tightness alone, it can also be used to enhance improvement attained with operative treatment of several types of lesions, such as SLAP lesions, painful Bennett lesions, and so forth. Moreover, this additional procedure when

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used in treatment of patients with those lesions is believed to prevent recurrence of symptoms.

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