# Subpectoral Biceps Tenodesis for Bicipital Tendonitis With SLAP Tear

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## abstract

The purpose of this study was to evaluate the outcomes of patients undergoing subpectoral biceps tenodesis for bicipital tendonitis with a superior labral anterior-posterior (SLAP) tear. Patients undergoing primary subpectoral biceps tenodesis for arthroscopically confirmed SLAP tears with signs or findings of bicipital tendonitis were included. An independent observer collected data prospectively as part of a data repository, which was then analyzed retrospectively. Primary outcome measures were the American Shoulder and Elbow Surgeons (ASES) score and pain relief via visual analog scale (VAS). Secondary outcome measures included the Simple Shoulder Test (SST), Constant, Single Assessment Numeric Evaluation (SANE), and Short Form 12 (SF-12) scores. Twenty-eight patients with a mean±SD age of 43.7±13.4 years and a mean±SD follow-up of 2.0±1.0 years met inclusion criteria. Workers' compensation was involved with 43% of cases, and 46% of the included patients were manual laborers. Eight (32%) patients were athletes, and 88% of the athletes were overhead athletes. Intraoperatively, 15 (54%) patients had type I SLAP tears, 10 (36%) had type II SLAP tears, 1 (3%) had a type III SLAP tear, and 2 (7%) had type IV SLAP tears. Significant improvements were seen in the following outcome measures pre- vs postoperatively: ASES score (58±23 vs 89±18; *P*=.001), SST score (6.3±3.6 vs 10.6±3.3; *P*=.001), SANE score (54±24 vs 88±25; *P*=.003), VAS score (3.8±2.0 vs 1.1±1.8; *P*=.001), SF-12 overall score (35±6 vs 42±6; *P*=.001), and SF-12 physical component score (39±6 vs 50±10; *P*=.001). Overall satisfaction was excellent in 80% of patients. Subpectoral biceps tenodesis demonstrates excellent clinical outcomes in select patients with SLAP tears. [*Orthopedics*. 2015; 38(1):e48-e53.]

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Andrews et al[1] first described lesions to the superior labrum in 1985 in 73 baseball pitchers. Snyder et al[2] later coined the term SLAP as an acronym for superior labrum lesion with anterior and posterior extension, and they categorized this lesion into 4 distinct subtypes. Although management is controversial, it is generally accepted that the treatment of choice for type I and most type III lesions is debridement and for type II and IV lesions is repair; occasionally, tenotomy or tenodesis can be considered for type IV lesions when the biceps tendon is significantly damaged.[2-6] Despite this classification, decision making on the optimal treatment has remained a challenge due to significant inter- and intraobserver diagnostic variability and varied outcomes.[6-11] Further, patient satisfaction rates vary after SLAP repair depending on age, level of activity, athletic status (overhead vs non-overhead athlete), and workers' compensation status.[6,12,13]

Subpectoral biceps tenodesis has demonstrated excellent clinical outcomes for patients with primary biceps pathology, as well as failed SLAP repairs.[7,8,14,15] Currently there is a paucity of knowledge on the outcomes of subpectoral biceps tenodesis as a primary treatment for bicipital tendonitis and an associated SLAP tear. Although type I SLAP tears have been traditionally treated with debridement, this intervention does not treat frequently coincident bicipital tendonitis, and thus the authors have used subpectoral biceps tenodesis in patients with clinical signs of bicipital tendonitis (ie, tenderness to palpation in the bicipital groove) and type I SLAP tears. Subpectoral biceps tenodesis was used in favor of proximal biceps tenodesis because it allows treatment of concomitant bicipital tendon sheath pathology. The purpose of this study was to evaluate the clinical outcomes of patients undergoing primary subpectoral biceps tenodesis for bicipital tendonitis and a SLAP tear. The authors hypothesized that patients would demonstrate excellent clinical outcomes following subpectoral biceps tenodesis.

## Materials and Methods

Institutional review board approval was obtained for this study, and consent was obtained from each patient. This study is a retrospective review of data prospectively collected for a patient outcomes repository. Inclusion criteria included patients who (1) underwent mini-open subpectoral biceps tenodesis with a tenodesis screw and (2) had a SLAP tear diagnosed preoperatively with physical examination and/or advanced imaging and confirmed arthroscopically. Those who had a previous biceps and/or labral procedure, associated instability, and isolated biceps tendonitis and who underwent a concomitant labral repair were excluded. Patients who underwent concomitant labral debridement were included. Conservative management failed in all patients, including nonsteroidal anti-inflammatory medications, physical therapy, and, in some cases, injections of corticosteroid.

### Surgical Technique and Rehabilitation Protocol

All patients first underwent glenohumeral diagnostic arthroscopy with biceps tenotomy. The superior labrum was debrided back to a stable base at that time. Open subpectoral biceps tenodesis was performed at the conclusion of the arthroscopic procedure. During the approach, care was taken to place minimal if any retraction medially to avoid injury to the musculocutaneous nerve. In all cases, the tendon was secured with an 8×12-mm interference screw placed into an 8-mm unicortical hole drilled in the center of the bicipital groove and the junction of the middle and distal thirds of the intertubercular groove between the lesser and greater tuberosities with care taken to restore the anatomic length-tension relationship.

Postoperatively, patients wore a sling at night and in public places for the first 4 weeks. They typically began with passive range of motion but rapidly progressed to active-assisted and then active range of motion. They also participated in elbow range of motion and grip strengthening in therapy. Strengthening, particularly resisted elbow flexion and forearm supination, was prohibited for 6 weeks to allow the biceps tenodesis to heal.[15]

### Data Collection

Patients were considered for subpectoral biceps tenodesis instead of debridement or repair if there was preoperative clinical or radiographic evidence of bicipital tendonitis, specifically with tenderness to palpation in the bicipital groove or fluid in the bicipital sheath on magnetic resonance imaging (MRI). Hand dominance, athletic activity, occupation, workers' compensation status, and concomitant procedures were recorded for each patient. An independent observer collected outcome data prospectively, which were stored in a patient data repository. Intraoperative data were gathered from the dictated operative report. This repository was then retrospectively analyzed after hypothesis generation by another independent observer (E.L.K.). Primary outcome measures were the American Shoulder and Elbow Surgeons (ASES) score and pain relief via visual analog scale (VAS). Secondary outcome measures included Simple Shoulder Test (SST), Constant, Single Assessment Numeric Evaluation (SANE), and Short Form 12 (SF-12) scores and patient satisfaction on a 5-category scale (excellent, very good, good, fair, and poor).

### Statistical Analysis

All analyses were performed using SPSS version 18 statistical software (IBM Inc, Armonk, New York). Descriptive statistics were calculated. Kolmogorov-Smirnov analyses were performed for continuous variables, and all variables were normally distributed ($P>.05$) except for SST ($P=.007$), ASES ($P=.043$), SANE

Table 1

**Patients' Professions and Final Work Status in Cases of Workers' Compensation**

| Profession | Final Work Status |
|---|---|
| Gas mechanic | Full duty |
| Musician | Unknown |
| Processing technician | Full duty |
| Road commissioner | Full duty |
| Sprinkler fitter | Light duty |
| Restaurant server | Full duty |
| Patient care technician | Full duty |
| Physical therapist | Full duty |
| Carpenter | Full duty |
| Satellite dish technician | Unable to return |
| Building engineer | Full duty |
| Garbage collector | Full duty |
| Foreman for glass installer | Full duty |

Table 2

**Patients' Athletic Interests and Final Sport Status**

| Sport | Final Sport Status | Highest Level of Play |
|---|---|---|
| Volleyball, javelin, discus | Full return | Collegiate |
| Softball | Full return | High school |
| Basketball | Asymptomatic; status unknown | Recreational |
| Golf | Full return | Recreational |
| Pitcher | Full return | Collegiate |
| Softball | Asymptomatic; status unknown | Recreational |
| Swimming | Unable to return due to pain | Recreational |
| Baseball | Returned at lower level | Recreational |

($P$=.007), VAS ($P$=.013), and SF-12 mental component scores ($P$=.028). Pre- and postoperative normally distributed data were compared using paired-samples Student's $t$ tests. In non-normally distributed data, similar comparisons were made using related-samples Wilcoxon signed rank tests. A post-hoc comparison of postoperative outcome scores between type I and type II SLAP tears was performed using Student's $t$ tests and Mann-Whitney $U$ tests as appropriate.

## Results

Twenty-eight patients met the inclusion criteria. Mean±SD age was 43.7±13.4 years. Mean±SD follow-up was 2.0±1.0 years. The study group was 36% (n=10) female and 86% (n=24) right-hand dominant. The operative side was the right in 75% (n=21) of cases, and 79% (n=22) of surgeries occurred in the dominant extremity. Workers' compensation was involved in 43% (n=12) of cases, and 46% (n=13) of the included patients were manual laborers (**Table 1**). Eight (32%) patients were athletes participating in volleyball, softball, baseball, basketball, golf, and swimming; 5 (18%) were recreational athletes, 1 (4%) was a high school athlete, and 2 (7%) were collegiate athletes. Eighty-eight percent (n=7) of the athletes were overhead athletes (**Table 2**).

Preoperatively, 2 (7%) patients were planned for tenodesis. One patient was not planned for any intervention for the biceps tendon but was found intraoperatively to have an unstable type II SLAP tear for which he underwent tenodesis. The remaining 25 (89%) patients were planned for debridement vs repair vs tenodesis. Twenty-two (79%; 87% of the type I tears) of the 28 patients had preoperative tenderness to palpation at the bicipital groove, 6 (21%) had signs of tendonitis in the groove on MRI as demonstrated by increased signal update within the bicipital sheath, and 18 (64%; 66% of the type I tears) had intraoperative evidence of tenosynovitis extending into the groove.

Intraoperatively, 15 (54%) patients were found to have type I SLAP tears, 10 (36%) had type II SLAP tears, 1 (3%) had a type III SLAP tear, and 2 (7%) had type IV SLAP tears. Concomitant procedures were common, with all patients undergoing concomitant limited intra-articular debridement, 14 (50%) undergoing concomitant acromioplasty, 3 (11%) undergoing concomitant distal clavicle excision, 2 (7%) undergoing concomitant suprascapular nerve release, and 1 patient each undergoing rotator cuff repair (supraspinatus and subscapularis), chondroplasty of the humeral head, release of the rotator interval, and release of the coracoacromial ligament (14%). However, in 22 (78.6%) patients, treatment of the SLAP tear and biceps tendonitis was the primary pathology for which surgery was planned and for which surgery was indicated by the surgeon.

Significant improvements were seen in the following outcome measures pre- vs postoperatively: ASES (58±23 vs 89±18;

*P*=.001) (**Figure 1**), SST scores (6.3±3.6 vs 10.6±3.3; *P*=.001), SANE scores (54±24 vs 88±25; *P*=.003), VAS scores (3.8±2.0 vs 1.1±1.8; *P*=.001), SF-12 overall scores (35±6 vs 42±6; *P*=.001), and SF-12 physical component scores (39±6 vs 50±10; *P*=.001). Although there was an improvement in Constant scores (36±21 vs 78±29; *P*=.450) and SF-12 mental component scores (54±10 vs 57±5), these data did not reach statistical significance (*P*=.638).

Of the patients with workers' compensation, 8 (75%) were able to return to full duty, 1 (8%) returned to light duty, 1 (8%) was unable to return, and 1 (8%) had an unknown final work status. Of the athletes, 5 (50%) returned to their previous level of play, 1 (13%) returned to a lower level of play, 1 (13%) was unable to return due to a knee injury, and 2 (26%) had unknown final athletic status, although they were clinically doing well. Overall, 80% (n=22) of patients rated their satisfaction as excellent, 10% (n=3) rated it as very good, and 10% (n=3) rated it as good; no patients rated their satisfaction as fair or poor. Ninety percent (n=25) of patients stated that if given the opportunity they would undergo the same procedure for their condition. There were no complications associated with the surgery or with the interference screw fixation hardware.

Subgroup analysis revealed higher ASES, SST, SANE, Constant, VAS, SF-12, SF-12 physical component, and SF-12 mental component scores for type I SLAP tears than for type II SLAP tears, although these differences were only statistically significant for SF-12 mental component scores (*P*=.689, .178, .712, .388, .453, .069, .156, and .042, respectively) (**Figure 2**).

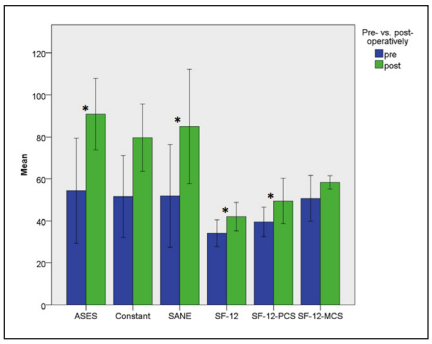


**Figure 1:** Mean pre- and postoperative outcome scores. Significant differences are marked with an asterisk. Abbreviations: ASES, American Shoulder and Elbow Surgeons; SANE, Single Assessment Numeric Evaluation; SF-12, Short Form 12; SF-12-PCS, Short Form 12 physical component score; SF-12-MCS, Short Form 12 mental component score.

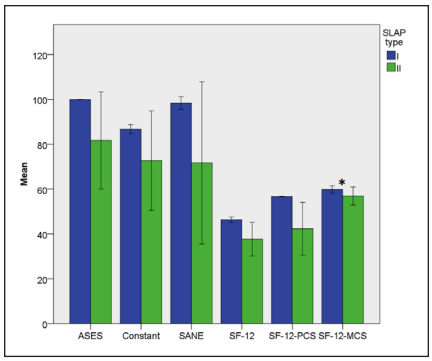


**Figure 2:** Mean postoperative outcomes scores for type I and type II superior labral anterior-posterior (SLAP) tears. Significant differences are marked with an asterisk. Abbreviations: ASES, American Shoulder and Elbow Surgeons; SANE, Single Assessment Numeric Evaluation; SF-12, Short Form 12; SF-12-PCS, Short Form 12 physical component score; SF-12-MCS, Short Form 12 mental component score.

## Discussion

The purpose of this study was to evaluate the clinical outcomes of patients undergoing subpectoral biceps tenodesis, an effective treatment for biceps pathology, as primary treatment for bicipital tendonitis and a SLAP tear. The findings support the authors' hypothesis that patients demonstrate excellent clinical outcomes with this surgical intervention. Postoperatively, significant improvements were seen in ASES (*P*=.001), SST (*P*=.001), SANE (*P*=.003), VAS (*P*=.001), SF-12 (*P*=.001), and SF-12 physical component scores (*P*=.001). To the authors' knowledge, this is the first study to evaluate the use of subpectoral biceps tenodesis as the primary treatment for varied types of SLAP tears with associated bicipital tendonitis.

Initially, SLAP tears were thought to be an uncommon cause of shoulder pain, with a reported incidence of between 4% and 6% of all shoulder arthroscopies. However, more recent studies have reported a much higher incidence when including all types of SLAP lesions (up to 26% of shoulder arthroscopies).[4,16] Onyekwelu et al[17] noted that the incidence of SLAP repairs has far outpaced the recent increase in ambulatory shoulder surgeries.

Controversy exists regarding the optimal management of patients with suspected SLAP tears. Most literature suggests that surgical intervention should not be considered until nonoperative management has failed.[5,13,17] Nonoperative treatment begins with rest, activity modification and anti-inflammatory drugs. Physical therapy may be initiated to address any scapular dyskinesis with open- and closed-chain exercises. In athletes with glenohumeral internal rotation deficit, stretching of the posterior capsule may be effective. However, the effectiveness of physical therapy in treating isolated SLAP tears is unpredictable and poorly defined in the literature.

When conservative treatment fails, operative management is considered. Currently, there is no absolute operative indication for SLAP repair. Evidence of suprascapular nerve compression by a cyst with associated weakness and atrophy of the supraspinatus and infraspinatus may be a relative indication for early intervention.[7,10] However, there are many patient-related factors that must be considered when making this decision, including age, occupation, preinjury athletic activity level, expected postoperative activity level, and workers' compensation status.[3,5,13] Thus, a joint patient-physician decision is key to a successful outcome.

An increasing body of evidence suggests that biceps tenodesis may be an ef-

fective treatment for SLAP tears because many have associated bicipital tendonitis.[7,8] In a comparative cohort series, Boileau et al[7] demonstrated greater improvements in Constant scores, patient satisfaction, and return to preoperative athletic activity in patients undergoing arthroscopic suprapectoral biceps tenodesis vs repair of isolated type II SLAP tears.[7] In a recent prospective cohort series, Gupta et al[8] demonstrated excellent clinical outcomes in patients undergoing subpectoral biceps tenodesis as a revision for failed type II SLAP tears. To date, there are no randomized, controlled trials comparing debridement, biceps tenodesis, and repair for SLAP tears. To the current authors' knowledge, their study represents the first report of primary subpectoral biceps tenodesis for bicipital tendonitis and a SLAP tear.

Most of the controversy regarding SLAP tears focuses on patients with type II SLAP tears. These patients tend to be younger and more active and are often overhead athletes. Patients with type I tears are often older and less active with overhead activities, whereas type III and IV injuries often occur acutely.[2,11,18,19] The patient cohort in the current study comprised varying types of SLAP pathology, with the majority of patients (53%) having type I SLAP tears consistent with degenerative fraying of the bicipitolabral complex.[2] Most surgeons perform debridement for this pathology.[2,19] Despite this commonly used intervention, the data to support it are lacking. In the setting of concomitant bicipital tendonitis, debridement alone may not address the entirety of the patient's pathology and therefore may provide inadequate pain relief. In the current study, this subgroup demonstrated excellent outcomes with subpectoral biceps tenodesis for type I SLAP tears with bicipital tendonitis. Thus, biceps tenodesis may be a viable alternative to type I tears. A post-hoc power analysis performed using mean ASES scores determined that 144 shoulders (72 type I and 72 type II SLAP tears) would be necessary to find a significant difference between types, should one exist. To date, there are no comparative studies evaluating biceps tenodesis vs debridement for this specific patient population. Given the findings of the current study, future comparative studies are warranted to determine whether debridement or tenodesis is more effective for type I tears. Such comparative studies will also require a cost-effectiveness evaluation with respect to longer-term outcomes.

Strengths of this study include its data collection by an independent observer, use of validated outcome instruments, and clinical relevance. Limitations include a lack of a control group for comparative purposes. Given that many of the patients in the study had type I SLAP tears, which are traditionally managed with debridement alone, comparative groups of patients undergoing debridement alone or continued conservative treatment would be necessary to conclude superiority of tenodesis over nonoperative treatment or debridement. In addition, concomitant procedures other than rotator cuff repair, such as acromioplasty and distal clavicle excision, were not controlled for. Given that these procedures have high clinical success in isolation, they may have contributed to the outcomes in this patient population. These independent variables could have positively influenced the outcomes if the patients' functional status and pain were in large part due to impingement or acromioclavicular arthritis, respectively. The short-term follow-up is also a limitation of the study, as is the lack of biceps-specific outcomes, such as the incidence of a pop-eye sign, bicipital cramping, and flexion/supination power. Inclusion of patients with workers' compensation may also have affected the outcomes.

One final limitation of this study is the imperfect clinical methods currently available for diagnosis of bicipital tendonitis. Although tenderness to palpation at the bicipital groove is a clinically accepted test for bicipital tendonitis,[14,15] the sensitivity and specificity of this test remains unknown, as does the diagnostic accuracy of MRI and intraoperative assessment of the tendon. The authors attempted to improve their ability to diagnose bicipital tendonitis by combining the currently available clinical, radiographic, and intraoperative tests, with a positive in any one of these tests denoting a diagnosis of bicipital tendonitis and indicating the patient for biceps tenodesis. An alternative method would be to consider the patient to have a diagnosis of bicipital tendonitis and thus be indicated for biceps tenodesis only with clinical, radiographic, *and* intraoperative evidence. Their method of combining clinical tests, the *or* method, as opposed the alternative *and* method, maximizes sensitivity and reduces the likelihood of a false negative but compromises specificity and thus may lead to a higher prevalence of false positives. Given the low morbidity of biceps tenodesis using this technique[14] and the risk of continued pain if the diagnosis is missed and left untreated,[8] the authors feel that, in this case, their method of test combination provides their patients with the best possible clinical care.

## Conclusion

Subpectoral biceps tenodesis demonstrates excellent clinical outcomes in select patients with SLAP tears. Further study in a larger, less heterogeneous group with long-term follow-up is necessary to confirm these findings.

## References


1. Andrews JR, Carson WG Jr, McLeod WD. Glenoid labrum tears related to the long head of the biceps. *Am J Sports Med*. 1985; 13(5):337-341.
2. Snyder SJ, Karzel RP, Del Pizzo W, Ferkel RD, Friedman MJ. SLAP lesions of the shoulder. *Arthroscopy*. 1990; 6(4):274-279.
3. Coleman SH, Cohen DB, Drakos MC, et al. Arthroscopic repair of type II superior labral anterior posterior lesions with and without acromioplasty: a clinical analysis of 50 patients. *Am J Sports Med*. 2007; 35(5):749-753.

4. Denard PJ, Ladermann A, Burkhart SS. Long-term outcome after arthroscopic repair of type II SLAP lesions: results according to age and workers' compensation status. *Arthroscopy*. 2012; 28(4):451-457.
5. Friel NA, Karas V, Slabaugh MA, Cole BJ. Outcomes of type II superior labrum, anterior to posterior (SLAP) repair: prospective evaluation at a minimum two-year follow-up. *J Shoulder Elbow Surg*. 2010; 19(6):859-867.
6. Kim TK, Queale WS, Cosgarea AJ, McFarland EG. Clinical features of the different types of SLAP lesions: an analysis of one hundred and thirty-nine cases. *J Bone Joint Surg Am*. 2003; 85(1):66-71.
7. Boileau P, Parratte S, Chuinard C, Roussanne Y, Shia D, Bicknell R. Arthroscopic treatment of isolated type II SLAP lesions: biceps tenodesis as an alternative to reinsertion. *Am J Sports Med*. 2009; 37(5):929-936.
8. Gupta AK, Bruce B, Klosterman EL, McCormick F, Harris J, Romeo AA. Subpectoral biceps tenodesis for failed type II SLAP repair. *Orthopedics*. 2013; 36(6):e723-e728.
9. Katz LM, Hsu S, Miller SL, et al. Poor outcomes after SLAP repair: descriptive analysis and prognosis. *Arthroscopy*. 2009; 25(8):849-855.
10. Park S, Glousman RE. Outcomes of revision arthroscopic type II superior labral anterior posterior repairs. *Am J Sports Med*. 2011; 39(6):1290-1294.
11. Gobezie R, Zurakowski D, Lavery K, Millett PJ, Cole BJ, Warner JJ. Analysis of interobserver and intraobserver variability in the diagnosis and treatment of SLAP tears using the Snyder classification. *Am J Sports Med*. 2008; 36(7):1373-1379.
12. Alpert JM, Wuerz TH, O'Donnell TF, Carroll KM, Brucker NN, Gill TJ. The effect of age on the outcomes of arthroscopic repair of type II superior labral anterior and posterior lesions. *Am J Sports Med*. 2010; 38(11):2299-2303.
13. Verma NN, Garretson R, Romeo AA. Outcome of arthroscopic repair of type II SLAP lesions in worker's compensation patients. *HSS J*. 2007; 3(1):58-62.
14. Mazzocca AD, Cote MP, Arciero CL, Romeo AA, Arciero RA. Clinical outcomes after subpectoral biceps tenodesis with an interference screw. *Am J Sports Med*. 2008; 36(10):1922-1929.
15. Mazzocca AD, Rios CG, Romeo AA, Arciero RA. Subpectoral biceps tenodesis with interference screw fixation. *Arthroscopy*. 2005; 21(7):896.
16. Enad JG, Gaines RJ, White SM, Kurtz CA. Arthroscopic superior labrum anterior-posterior repair in military patients. *J Shoulder Elbow Surg*. 2007; 16(3):300-305.
17. Onyekwelu I, Khatib O, Zuckerman JD, Rokito AS, Kwon YW. The rising incidence of arthroscopic superior labrum anterior and posterior (SLAP) repairs. *J Shoulder Elbow Surg*. 2012; 21(6):728-731.
18. Cook C, Beaty S, Kissenberth MJ, Siffri P, Pill SG, Hawkins RJ. Diagnostic accuracy of five orthopedic clinical tests for diagnosis of superior labrum anterior posterior (SLAP) lesions. *J Shoulder Elbow Surg*. 2012; 21(1):13-22.
19. Weber SC, Martin DF, Seiler JG III, Harrast JJ. Superior labrum anterior and posterior lesions of the shoulder: incidence rates, complications, and outcomes as reported by American Board of Orthopedic Surgery. Part II candidates. *Am J Sports Med*. 2012; 40(7):1538-1543.