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Comparing Arthroscopic to Mini-Open RTC Repairs

ABSTRACT & COMMENTARY

Synopsis: *This retrospective analysis of one surgeon's experience compares the results of mini-open rotator cuff repair with arthroscopic repair and shows that the results are similar except for an increased incidence of shoulder fibrosis in the mini-open repair group.*

Source: Severud EL, Nottage WM, et al. All-arthroscopic versus mini-open rotator cuff repair: A long term retrospective outcome comparison. *Arthroscopy*. 2003;19(3):234-238.

ROTATOR CUFF REPAIR HAS EVOLVED FROM A CLASSIC OPEN Operative technique, which involved significant deltoid dissection and detachment, to a less invasive approach called the mini-open deltoid splitting approach. Long-term results were similar and rehabilitation was easier for patients who had the mini-open approach. Now more surgeons are repairing the rotator cuff with an all-arthroscopic technique, and this study compares Nottage's results with repairs done arthroscopically to the repairs they previously performed through the mini-open approach.

Severud and associates mined Nottage's surgical database to find 64 shoulders that underwent rotator cuff repair by either the mini-open or all-arthroscopic approach and that met the following inclusion criteria: surgically proven full-thickness tear no greater than 5 cm; no intra-articular pathology such as SLAP lesions or arthrosis; and no neurologic disorder. Seventeen patients of the original 82 were excluded from the study because they could not be located or they refused to participate in the study. All patients underwent arthroscopic examination of the shoulder joint and arthroscopic subacromial decompression, and 15 patients underwent clavicular coplaning. Both groups began passive range of motion postoperatively and progressed to active-assisted range of motion by 4 weeks. Resisted exercises were started at 3 months.

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Tear sizes in the mini-open group included 1 small tear (< 1 cm), 10 medium tears (1-3 cm), and 18 large tears (3-5 cm). The arthroscopic group included 3 small, 23 medium, and 9 large tears. There was no difference between the 2 groups in terms of patient age or steroid injections. There were 6 workman's compensation claims in the arthroscopic group compared to 3 in the mini-open group.

At a minimum 2-year follow-up, the UCLA and ASES scores for the mini-open group were 31.4 and 90, respectively, and for the arthroscopic group were 32.6 and 91.7, respectively. The outcomes were statistically similar, and there was no difference in outcome scores among the 3 groups of tear sizes. Range of motion was better at 6- and 12-month follow-up for patients in the arthroscopic group, but they were the same at final follow-up between the 2 groups.

The mini-open group included 4 patients who could not elevate their shoulders higher than 120° by 12 weeks postoperatively, and 2 of those patients underwent manipulation. The arthroscopic group did not have any fibrosis complications.

■ COMMENT BY JOHN C. RICHMOND, MD, AND MICHAEL CODSI, MD

Severud et al published a good comparison between 2 techniques of rotator cuff repair. Although it is retrospective, they used 2 outcome measures commonly used in the literature that allows the reader to easily compare their results with the many other published papers in the literature. They had good follow-up (78%), one surgeon did the repairs, and the post-op rehabilitation was the same for both groups. In addition, they appropriately described the patient characteristics that have been found to adversely affect rotator cuff repair outcomes, such as duration of symptoms, steroid injections, worker's compensation claims, and tear size. It is interesting that none of these factors played a role in their outcomes. They did not include massive tears in their analysis, which would likely show worse results in both groups. The small numbers in the study likely account for their inability to find a difference in these risk factors. Any comparison between 2 treatments should include a power analysis that specifies exactly how many patients need to be included to avoid a type II-beta error. Without this analysis, Severud et al cannot claim that there is no difference between the treatment groups.

Other studies have been published that show arthroscopic repair provides durable outcomes with similar UCLA scores at a minimum 2-year follow-up.¹⁻³ This study shows again that arthroscopic rotator cuff repair works well in general, but it does not show which preoperative characteristics will affect the outcome scores. The skill of the surgeon in arthroscopic techniques of rotator cuff repair is likely the most important determinant of which technique should be used. ■

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Capsular Shrinkage for MDI

ABSTRACT & COMMENTARY

Synopsis: *Early 2-year results of 32 multidirectional instability patients treated with arthroscopic thermal capsular shrinkage show encouraging results, but caution is advised.*

Source: Frostick SP, et al. Arthroscopic capsular shrinkage of the shoulder for the treatment of patients with multidirectional instability: Minimum 2-year follow-up. *Arthroscopy*. 2003;19(3):227-233.

MULTIDIRECTIONAL INSTABILITY IS A CONDITION that continues to challenge orthopaedic surgeons diagnostically and therapeutically. Originally described by Neer and Foster,¹ it includes patients who manifest symptoms of instability in directions additional to the common anterior instability. Supervised physical therapy should always be attempted first before surgical intervention is considered. Open capsular shift was first described with variable success rates. Arthroscopic reconstructions have been advocated recently, but clinical studies are just coming to fruition.

This study by Frostick and colleagues is one of the first to prospectively evaluate patients at 2-year follow-up. Thirty-two patients were operated on at 2 separate institutions. All had instability symptoms and a painful, positive sulcus sign. All diagnoses were confirmed by the 2 experienced senior authors. All patients were followed for 2 years, and Constant scores were obtained at 6-month intervals. Two separate groups eventually developed and were evaluated separately. The largest group was of patients who demonstrated multidirectional instability without a labral lesion, and a smaller group of 8 had an anterior inferior labral lesion as part of their pathology.

In the first group, Constant scores increased from 58 preoperatively to 76 at 6 months and 81 at 2 years. Three patients experienced instability for a 12% failure rate, and 1 patient developed adhesive capsulitis. Fifty-eight percent were completely satisfied, and 25% were improved but not completely satisfied. In the second group (patients undergoing labral repair in addition to thermal capsulorrhaphy), Constant scores increased from 73 preoperatively to 72 at 6 months and 91 at 2 years. No patient experienced instability, and all patients were satisfied. One patient developed adhesive capsulitis but regained full motion after an arthroscopic lysis of adhesions.

■ COMMENT BY COL PATRICK ST. PIERRE, MD

This paper is one of the first to evaluate the treatment of multidirectional instability by thermal capsular shrinkage alone. The strength of their study is the fact that they have 100% follow-up at 2 years. It is a prospectively collected study but only offers historical controls for comparison. Obviously, this screams for a prospectively randomized study comparing open-shift vs capsular shrinkage vs capsular plication in the future. The inclusion of the labral repair patients is not helpful. There were only 8 patients in this group, making statistical analysis impossible. Their preoperative Constant scores were significantly better (73 vs 58) and improved more slowly but to a higher degree than the labrum-intact patients. This only leads one to question whether these patients are of a different pathological group, and this study does not answer the question.

Therefore, I think we can only assess the results of the first, nonlabral injury group. Frostick et al state that their results of 12% failure compared favorably with the open 4% failure results of Pollock and associates.² I would suggest that there is still a considerable difference between them. Frostick et al add that 33% of the Pollock group had pain, but this still doesn't compare with the 42% of the patients not completely satisfied in the current study.

Fitzgerald and colleagues³ also reported 2-year results on patients with multidirectional thermal capsulorrhaphy. Their population also had patients with labral pathology and previous surgeries, and they reported a 24% failure rate.

Only 1 study has looked at multidirectional instability treated with arthroscopic capsular plication. McIntyre, and associates⁴ reported that they had only 1 patient out of 19 with a recurrent instability event 2 years after surgery.

Although the 2-year results presented are promising, they do not convince us that arthroscopic capsular shrinkage alone is as good as or better than an open anterior-inferior capsular shift or arthroscopic capsular plication. A prospectively randomized study is needed to compare these 3 techniques. ■

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Fixation Devices for Hamstring ACL Reconstruction

ABSTRACTS & COMMENTARY

Synopsis: *Either metal or absorbable cross pins provided the strongest fixation on the femoral side. On the tibial side, the IntraFix screw and sheath was markedly stronger than any other device, while interference screws were the weakest.*

Sources: Kousa P, et al. The fixation strength of six hamstring tendon graft fixation devices in anterior cruciate ligament reconstruction. Part I: Femoral site. *Am J Sports Med.* 2003;31(2):174-181; Kousa P, et al. The fixation strength of six hamstring tendon graft fixation devices in anterior cruciate ligament reconstruction. Part II: Tibial Site. *Am J Sports Med.* 2003;31(2):182-188.

RECONSTRUCTION OF THE ACL COMMONLY EMPLOYS Hamstring autograft, known to be the strongest and stiffest graft in load-to-failure testing. However, the weak link has been fixation. The fixation methods are even more important because it takes at least 3 months before there is much tendon-to-bone healing. In fact, subtle differences in stability between hamstring and patellotendon grafts may have to do with differences in fixation.

Kousa and colleagues performed a series of mechanical tests to examine which fixation devices provided optimal holding ability for the hamstring graft. All of the most commonly used fixation devices were tested. This included on the femoral side the closed looped EndoButton (Acufex Microsurgical, Mansfield, Mass), the Bone Mulch Screw (Arthrotek, Inc., Warsaw, Ind), RigidFix (Mitek Products, Norwood, Mass), and 3 interference fit screws, including the BioScrew (Linvatec Inc., Largo, Fla), SmartScrew (Bionx Implants, Blue Bell, Pa), and the metal RCI screw (Acufex). On the tibial side devices tested included the WasherLoc (Arthrotek), a screw and spiked washer (Acufex), the IntraFix screw and sheath system (Mitek), and 3 interference fit screws—the Bio-

Screw, the SmartScrew, and the metal SoftSilk interference fit screw (Acufex).

Each of the 6 devices were used to fix 10 quadruple human, semitendinosus-gracilis tendon grafts within tunnels drilled in porcine femurs and subsequently tibias. They were tested 10 times with a 1500-cycle loading test between 50-200 N at 1 cycle every 2 seconds. The specimens that survived the cyclic loading were then subjected to a single cycle load-to-failure test at a rate of 50 mm per minute.

On the femoral side, the Bone Mulch Screw (1112 N) was the strongest in the single cycle load-to-failure test, followed by the closed looped EndoButton (1086 N) and RigidFix (868 N). The interference fit screws were markedly worse in the 500-700 N range. On the tibial side, IntraFix was clearly both the strongest and the stiffest fixation device with 1332 N of strength on the load-to-failure test, followed by the WasherLoc (975 N). Again, the interference fit screws were markedly worse with fixation in the 400-600 range. Another important finding was that the interference fit screws allowed more displacement on cyclic loading, upwards of 4 mm, while the IntraFix had the lowest residual displacement at 1.5 mm. All of the devices did show some displacement over the first 10-50 cycles of loading that seemed to level out thereafter. This prompted Kousa et al's conclusion that preconditioning of the hamstring graft is important before tibial fixation is applied.

■ COMMENT BY DAVID R. DIDUCH, MS, MD

This is an excellent paper that provides much useful clinical information for several reasons. First, this uses all of the currently available and commonly used fixation methods. Furthermore, Kousa et al used very carefully controlled mechanical testing that looked at both single load-to-failure testing and, more importantly, cyclic loading. Their finding that there is a lot of creep in the hamstring graft construct emphasizes the need to preload the graft in tension as the knee is ranged multiple times before final fixation.

Any soft-tissue graft fixation falls into 2 broad categories: suspensory fixation, such as EndoButton or screw and washer constructs, or aperture fixation, such as interference fit screws. Although aperture fixation may help prevent joint fluid from migrating into the tunnel, which could prevent clot formation and slow healing, it was notable to see the problems with creep and elongation with the interference fit screws. The screw with the best fixation, the SmartScrew, was the one with the largest diameter shank and the shortest threads. One would assume that fixation is primarily being performed by a larger bulk screw to press the graft against the walls

of the tunnel. This concept is reinforced by the excellent outcome seen with the IntraFix, which is a screw within a sheath. A big advantage of this device is that the sheath separates each of the 4 hamstring bundles into a separate quadrant to independently tension and compress them against the tunnel margins. Bone plug fixation with interference screws is different in that deeper threads with a narrower diameter shank provide optimal fixation such that creep is not really a problem.

Suspensory fixation with either the EndoButton or the cross pins seems to yield less creep and stronger fixation. Although the Bone Mulch Screw was the strongest construct on the femoral side, one disadvantage is that the tunnel has to be wider than the graft to allow passing the graft up and over the top of the cross pin from below. The RigidFix pins can be used with a more tightly fit graft, which pierces them from the side, once the graft is pulled into place. This may enhance graft-to-bone contact and healing. Suspensory fixation with the EndoButton or a screw and washer construct on the tibia has been implicated in bungee cord effect or windshield wiper tunnel widening. None of these issues were studied by Kousa et al and may be important for a more loosely fitting graft.

In summary, it would appear that interference fit screws are not the best choice for hamstring graft or soft-tissue graft fixation. If one is to use the interference fit screw, one with a large shank diameter rather than deep threads would be best. Cross pins on the femur and IntraFix screw and sheath construct on the tibia provided optimal strength with minimal slippage. ■

Can Ginseng Boost the Immune System and Increase Performance?

ABSTRACT & COMMENTARY

Synopsis: *The pill form of ginseng was no better than placebo at enhancing performance or boosting the immune system in response to stressful exercise.*

Source: Engels HJ, et al. Effects of ginseng on secretory IgA, performance, and recovery from interval exercise. *Med Sci Sports Exerc.* 2003;35(4):690-696.

EXTRACTS OF PANAX GINSENG, BETTER KNOWN AS CHINESE or Korean ginseng, are used commonly as medicine in Asian countries. Western medicine has adopted the herb and has suggested that ginseng offers relief and protection against stress, upper respiratory infection, and

fatigue. Secretory immunoglobulin A (SIgA) is the primary immunoglobulin contained in secretions of the mucosal immune system, and its levels correlate with resistance to certain infection better than many serum antibodies. Therefore, this study examined the efficacy of a standardized ginseng concentrate (400 mg d-1 of G115; equivalent to 2 g of Panax ginseng C.A. Meyer root material) to modulate SIgA, exercise performance, and recovery from strenuous physical exertion for 8 weeks.

A double-blind, placebo-controlled, randomized design was used to study 38 active healthy adults who supplemented their diets with the above ginseng extract or placebo. Each performed 3 consecutive 30-s Wingate tests interspersed with 3-minute recovery periods before and after the intervention. Whole saliva samples were collected before and after exercise to calculate SIgA: protein ratio and SIgA secretion rates. Mechanical power output (W.kg-1) was measured, and exercise recovery heart rate was determined.

Twenty-seven subjects (12 placebo, 15 ginseng) completed the study. Compared with rest, S-SigA measurements and mechanical power output declined ($P < .01$) across consecutive Wingate tests showing the effect of fatigue on the test parameters. No changes were measured between ginseng and placebo groups, and no improvements were measured with the recovery heart rate. Therefore, Engels and associates concluded diet supplementation with ginseng fails to improve physical performance, heart rate recovery, or improve immune status of individuals undergoing repeated bouts of exhausting exercise.

■ COMMENT BY JAMES R. SLAUTERBECK, MD

I often get asked questions about supplements ranging from steroids to ginseng. Many athletes are looking for the best herb to take to get the competitive edge. The numbers of supplements available today in stores and online are too numerous to count. Ginseng is a common herb supplement patients are taking. The Chinese, Siberian or Asian ginseng is a sought-after supplement in the United States and is a common herb used in Asian medicine. Western alternative medical practices are strongly advocating its effect on immunoactivation and suggesting it has an ergogenic effect on athletic performance. This study addressed some of these reported claims.

First, maximum heart rate and heart rate recovery was not different from the placebo group. Second, the immune system, as tested by Engels et al, showed no benefit from ginseng use in a fatigue model. These findings suggest that this pill form of ginseng is not efficacious. However, it does not address the outcomes of consumption of the native root. True believers note positive effects from certain kinds of roots, many of which are difficult to find in

the United States. Additionally, the native root form contains other polysaccharides and ginsengoids that synergistically may have a positive effect not tested in this model.

So, how does this information help us as sports physicians? My answer is that the supplement pill form of the root is not effective at boosting the immune system and that performance is not positively affected. However, this study does not test the clinical effectiveness of the natural root. Now when asked about this supplement by patients, I have this new information to discuss with them. ■

Biomechanics of Soft-Tissue Interference Screw Fixation for Anterior Cruciate Ligament Reconstruction

ABSTRACT & COMMENTARY

Synopsis: When using bioabsorbable interference fixation with a soft-tissue ACL graft, increase the graft stiffness by reaming the tunnels smaller than the graft, dilating the tunnel to no more than 0.5 mm greater than the graft, and choosing a screw length and diameter that is maximal for the tunnel created. Interference fixation of a soft-tissue graft also depends upon the quality of the patient's tibial and femoral bone.

Source: Brand JC Jr, et al. Biomechanics of soft-tissue interference screw fixation for anterior cruciate ligament reconstruction. *Orthopedics*. 2003;26(4):432-439.

THIS ARTICLE REVIEWS INTERFERENCE FIXATION methods for soft-tissue grafts used for cruciate ligament reconstruction. As explained by Brand and associates, quadriceps and quadruple hamstring tendon grafts are becoming more popular as choices for ACL and PCL reconstructions, as they avoid the complication of not only anterior knee pain but also late patella baja.

In the past, soft-tissue grafts were fixed at the tunnel origin with staples, screws, and posts and various suspension fixation methods. In 1997, Pinczewski and colleagues¹ described fixation of a quadruple hamstring graft with a titanium metal interference screw. Shortly thereafter, Fu² reported use of a biodegradable interference screw for the same purpose, and Brand and associates³ described the use of this fixation device for a quadriceps tendon ACL graft. Such interference fixation improves the fixation stiffness above that of a post and washer or closed-loop endobutton fixation. According to Brand et al, interference fixation of a soft-tissue graft

results in direct-contact healing of the graft to bone instead of formation of a fibrous interface as seen with extraarticular fixation (post and screw, endobutton, staple, etc). Interference screw fixation for soft-tissue grafts has poor failure loads, especially with cyclical loading. To improve load to failure for biodegradable interference fixation of soft-tissue grafts, Brand et al's suggestions include using this type of fixation only when there is good quality bone, sizing the graft to within 0.5 mm of the bone tunnel and drilling smaller tunnels, dilating to the appropriate size, and using screws of maximal length and diameter for the tunnel created.

■ COMMENT BY LETHA Y. GRIFFIN, MD, PhD

Recent reports of patella chondromalacia secondary to patella baja following harvest of patella tendon grafts, added to the previously reported improved cosmesis for hamstring graft harvest, have heightened the interest in hamstring grafts for ACL reconstructions. However, in the last several years, various authors have reported on the poor stiffness and greater failure of interference fixation of soft-tissue grafts, especially with repetitive loading as seen with more aggressive rehabilitation programs. Brand et al provide suggestions to improve this fixation. Altering rehabilitation programs during the initial 3-6 postoperative weeks should also be considered. For example, avoid active quadriceps loading of the knee from 0° to 45° and consider partial weight bearing for the first several weeks postoperatively. ■

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ACL Avulsion Fracture Fixation

ABSTRACT & COMMENTARY

Synopsis: Arthroscopic reduction and fixation of ACL avulsion fractures of the tibia was effective at restoring a stable knee. Early motion and weight bearing were not a problem.

Source: Senekovic V, Veselko M. Anterograde arthroscopic fixation of avulsion fractures of the tibial eminence with a cannulated screw: Five-year results. *Arthroscopy*. 2003; 19(1):54-61.

LITERATURE SUPPORTS THAT TREATMENT OF FRACTURES of the tibial eminence with a single cannulated screw

and washer is considered stable enough to allow immediate mobilization and weight bearing. The purpose of this study was to evaluate the 5-year results of arthroscopic reduction and internal fixation of tibial eminence fractures with cannulated screws.

This is a retrospective review of 32 patients who were treated arthroscopically for type II, III, and IV fractures of the intercondylar eminence of the tibia. The fragments were reduced and fixed with a cannulated screw plus or minus washer under arthroscopic control. The intermeniscal ligament was interposed in the fracture site in 29 cases, and the anterior part of the medial meniscus prevented reduction in 3 cases, all requiring arthroscopic manipulation before fixation. Patients were mobilized on crutches with weight bearing as tolerated the day after the procedure. The range of follow-up was 16-69 months.

The average side-to-side difference for KT-1000 testing at final follow-up was 1.1 mm, flexion deficit was 1.2°, and extension deficit was 0.6°. The average Lysholm score was 98.8. All the implants were removed except in 1 patient.

Senekovic and Veselko concluded that arthroscopic fixation of fractures of the intercondylar eminence of the tibia with a cannulated screw or screw and washer is a simple, safe, reproducible, and effective procedure. They also determined that immobilization is unnecessary.

■ COMMENT BY JAMES R. SLAUTERBECK, MD

Entrapment of the meniscus or intermeniscal ligament is common in these types of ACL avulsion fractures. In this series and in another, interposition of the meniscus or intermeniscal ligament occurred in greater than 90% of patients. This should remind us that we need to fully visualize the fragment, especially the anterior edge, to obtain full reduction.

Loss of motion after this injury often occurs from prolonged immobilization with or without surgery or from improper screw placement with surgery. This article supports early operative intervention with proper screw placement and early weight bearing and rehabilitation. With this protocol, no significant loss of motion was reported. Therefore, prolonged brace or cast immobilization is not necessary in most cases.

Increased excursion in up to 30% of patients is reported after treatment of displaced tibial eminence fractures. This retrospective review had nearly symmetric KT 1000 numbers. Pivot shift results were not reported. Possibly, the entrapment of meniscus tissue and plastic deformation within the ligament may account for the increased laxity seen in nonoperatively treated patients.

This is a nice review of a simple surgical procedure to

treat a fracture common in children and a few adults. It avoids significant complications of other nonoperative and operative treatments and restores knee function by subjective Lysholm measurement and by objective KT 1000 measurements. I routinely see braced and limited motion for a short period of time postoperatively and now will consider a more aggressive early weight-bearing status with more motion to reduce some of the stiffness problems. ■

Testing for Glenoid Labrum Tears—Avoiding Surprises

ABSTRACT & COMMENTARY

Synopsis: Seven clinical examinations for shoulder labral tears were performed, and it was found that none of the examinations, either alone or in combination, was consistently reliable in diagnosing labral tears preoperatively.

Source: Guanche CA, Jones DC. Clinical testing for tears of the glenoid labrum. *Arthroscopy*. 2003;19(5):517-523.

WE ALL FREQUENTLY ENCOUNTER UNSUSPECTED labral tears (surprises) during shoulder arthroscopy. Guanche and Jones took a closer look at several common clinical tests for labral pathology with a goal of reducing the number of arthroscopic surprises. Sixty shoulders were prospectively examined prior to surgery. The preoperative diagnosis in these patients was roughly divided into 3 groups, including suspected labral tears (mostly SLAP tears), acromioclavicular DJD, and subacromial impingement. All patients had failed an appropriate course of nonoperative management and were indicated for shoulder arthroscopy. Guanche performed 7 examinations on each patient immediately prior to surgery: speed test, anterior apprehension maneuver, Yergason test, O'Brien test, Jobe relocation test, crank test, and bicipital groove tenderness.

Following examination, a thorough shoulder arthroscopy was accomplished, and labral findings were compared with the results of physical examination independently and in combinations with appropriate statistical tools. Fifty-three labral lesions were found in the study population (33 SLAP tears [including 11 type I and 19 type II tears] and 20 other labral tears [including 15 anterior labral tears]).

Of the 7 examinations performed, only the Jobe relocation test and the O'Brien test showed a statistically

significant correlation between a labral tear and a positive test. The sensitivities of these 2 tests (44% and 63%, respectively) were low, however, limiting their clinical utility. Combining the 3 most reliable tests (Jobe relocation, O'Brien, and apprehension) did not significantly improve the sensitivity. Guanche and Jones conclude that these 7 tests are not adequate for prospective diagnosis of labral tears.

■ **COMMENT BY MARK D. MILLER, MD**

I have several concerns that this study has highlighted. First of all, there is no way that almost 90% of my patient population has a labral tear at the time of arthroscopy. I feel that this highlights the essential dilemma—there is no gold standard in the diagnosis of labral tears. Findings at the time of arthroscopy, which is the gold standard for many diagnoses, are very subjective for the diagnosis of labral tears. This is because there is a great deal of variability in the normal anatomy of the labrum, and there are no clear criteria for what is “normal.” MRI or MR-Arthrography is also not completely reliable, and studies that report to show high sensitivity and specificity are compared with suspect arthroscopic findings.

Guanche and Jones correctly point out the importance of knowing the surgical pathology preoperatively in order to obtain a proper patient consent, to have the right equipment available, and for the surgeon to be prepared to address all pathology at the time of arthroscopy. Unfortunately, MRI and (as this study shows) physical examination findings do not consistently make that possible. ■

CME Questions

Sports Medicine Reports has changed its testing procedure. You will no longer need to return a Scantron answer sheet to earn credit for the activity. Please review the text, answer the following questions, check your answers against the key, and then review the materials again regarding any questions answered incorrectly. **To receive credit for this activity, you must return a CE/CME evaluation at the end of the testing term.**

This testing procedure has proven to be an effective learning tool for adults. If you have any questions about the new testing method, please contact Customer Service at 1-800-688-2421.

1. Which of the following is false?

- a. Arthroscopic repair of small and medium size rotator cuff tears results in similar outcomes when compared to mini-open repair

techniques at 2-year follow-up.

- b. Arthroscopic repair has consistently resulted in worse UCLA scores compared to mini-open repair.
 - c. Mini-open rotator cuff repair has an increased risk for shoulder stiffness requiring manipulation.
 - d. Worker's compensation, tear size, and duration of symptoms have been shown to correlate with poor outcomes in several classic studies of open cuff repair.
- 2. Failure or complications in the study of arthroscopic thermal capsular shrinkage were due to:**
- a. infection.
 - b. axillary nerve injury.
 - c. arthrofibrosis.
 - d. recurrent instability.
 - e. c and d
- 3. Panax ginseng C.A. Meyer root is a pill form of ginseng that in human studies:**
- a. improves sports performance.
 - b. hinders sports performance.
 - c. increases the rate of production of secretory immunoglobulin A, the primary immunoglobulin contained in secretions of the mucosal immune system.
 - d. None of the above
- 4. Which of the following soft-tissue graft fixation methods yielded the most creep or slippage of the graft?**
- a. EndoButton
 - b. Cross pins
 - c. IntraFix
 - d. Interference fit screws
- 5. Interference fixation of soft-tissue grafts to bone tunnels can be improved by:**
- a. drilling smaller tunnels and dilating them to the appropriate size.
 - b. making the final tunnel size no greater than 0.5 mm larger than the graft.
 - c. using screws of maximal length and diameter for the tunnel size.
 - d. selecting only patients with good quality bone stock for this type of graft and fixation method.
 - e. All of the above
- 6. Postoperative stiffness is less commonly seen for treatment of tibial eminence fractures treated in which manner?**
- a. Percutaneous pin fixation and cast immobilization
 - b. Multiple screw fixation and brace immobilization
 - c. Single screw placement and immediate range of motion
 - d. Suture over a bridge and brace immobilization
- 7. Shoulder labral tears can be correctly diagnosed preoperatively on a consistent basis with which of the following physical examinations?**
- a. O'Brien Test
 - b. Jobe Relocation Test
 - c. Combination of O'Brien and Jobe Relocation Test
 - d. None of the above

Answers: 1(b); 2(e); 3(d); 4(d); 5(e); 6(c); 7(d)

In Future Issues:

Long-Term Outcome of Microfracture for Cartilage Defects