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INSIDE

*Arthroscopic
repair of
shoulder
instability*
page 62

*Respect the
headache!*
page 63

*Neuromuscu-
lar response
to ACL stretch*
page 64

*Tunnel
widening
after ACL
reconstruction*
page 65

*Shoulder pro-
prioception*
page 66

Shock Wave Therapy for Calcific Tendonitis

ABSTRACT & COMMENTARY

Synopsis: *Thirty-seven patients with calcific tendinitis were treated successfully with shock wave therapy. Shock wave therapy is a safe, effective, and noninvasive treatment of calcific tendinitis of the shoulder.*

Source: Wang CJ, et al. Shock wave therapy for calcific tendonitis of the shoulder. A prospective clinical study with 2-year follow-up.
Am J Sports Med. 2003;31(3):425-430.

THE INCLUSION CRITERIA FOR THIS STUDY WERE PATIENTS WITH shoulder pain attributable to calcific tendinitis who had failed to respond to nonoperative treatment. Thirty-nine shoulders were involved in the study group and 6 in the control group. Groups were not randomized; only patients who agreed to participate as control subjects were involved in this group. In the study group, the mean follow-up was 2 years, while it was only 8.6 months in the control group.

For the study group, any other treatment was stopped 2 weeks before the beginning of the shock wave treatment. Local anesthesia was injected in the subacromial space before the procedure. Repeated application at 30-60 days was provided if necessary. In the control group, sham treatment was performed with a dummy electrode. Patients were sent home the same day with an ice pack and painkiller; no anti-inflammatory drugs were prescribed.

The evaluations were performed over 2 years by an independent observer blinded to whether patients were in the study or control group. The evaluation was done using the Constant score. In the control group, all 6 patients decided to seek alternative methods of treatment including surgery after a mean of 6 months of follow-up. For the study group, the improvement was statistically significant regarding pain, activity, and motion score. Twenty shoulders were complaint-free, 10 were significantly better, 1 was slightly better, and 2 were unchanged. There were no systemic or local complica-

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tions. Radiographic assessment demonstrated that the elimination of calcium deposits was complete in 19 cases, partial in 5, and unchanged in 9. Studies have shown that results of both nonoperative and surgical treatment may be inconsistent and unpredictable. When compared with surgery, shock wave therapy is safe, cost-effective, and without the risk and complications entailed by surgery.

■ **COMMENT BY J.P. WARNER, MD, AND PHILIPPE CLAVERT, MD**

Many treatments of calcific tendinitis of the shoulder are available. This paper shows a new treatment with good results. Both the pathogenesis and method of improvement of calcific tendinitis of the shoulder remain unclear. The hypothesis is that the calcium deposit is eliminated through a molecular mechanism of absorption, which is induced by the improvement of the local circulation at the bone-tendon junction after shock wave therapy. That is why the effects of shock wave therapy appear to be cumulative and time-dependant. The radiographic results of this study confirm that there is a poor correlation between

the radiographic aspects of the calcium deposit and the clinical outcome. Some patients remain asymptomatic with persistent calcium deposits after a long period of time.

On the other hand, it is hard to state that the results of shock wave therapy for calcific tendinitis are highly significant because there is a disproportion in the number of patients in the 2 groups. Furthermore, there is no randomization to select patients for the study and the control group. Patients belonged to the control group only if they agreed to it; they may not be fully objective in their follow-up evaluation. Furthermore, Wang and colleagues highlight the fact that the patients' review was done by a blind and independent observer. Since the patient knows in which group he belongs, he may influence the observer.

Lastly, the average time of follow-up in the 2 groups is not the same. We know that pain related to calcium deposits varies over time and is not related to the radiographic aspect of the deposit. A longer follow-up of the control group may have shown improvement with the conservative treatment. Moreover, the conservative treatment used for the control group is not clearly described in the manuscript. We may wonder if this treatment was appropriate and if the patients were compliant. ■

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Arthroscopic Repair of Shoulder Instability

ABSTRACT & COMMENTARY

Synopsis: *Arthroscopic repair of the posterior capsulolabral complex is an effective means of eliminating symptoms of pain and instability associated with posterior Bankart lesions of traumatic origin.*

Source: Williams RJ 3rd, et al. Arthroscopic repair for traumatic posterior shoulder instability. *Am J Sports Med.* 2003;31:203-209.

POSTERIOR SHOULDER INSTABILITY MAY ARISE FROM A posterior Bankart lesion (detachment of the posterior capsule and labrum below the glenoid equator), posterior capsular laxity, or both. A variety of open surgical procedures for posterior instability have been described with good results. However, the role of

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Questions & Comments

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arthroscopic repair in the treatment of posterior shoulder instability remains poorly defined. The present study evaluates the clinical results of arthroscopic repair of posterior Bankart lesions in patients with traumatic posterior shoulder instability.

Williams and associates retrospectively reviewed 27 shoulders in 25 patients (all male, mean age, 28.7 years) who underwent arthroscopic repair of a posterior Bankart lesion using bioabsorbable tacks (Sure-Tac, Acufex Microsurgical, Andover, Mass). All 26 patients recalled a specific traumatic event (athletic injury in 20 of 27 shoulders) leading to the onset of their symptoms. The mean interval from injury to surgical repair was 2.4 years (range, 2 weeks to 16 years). Patients with concomitant anterior instability or those who had undergone previous or concurrent capsular stabilization were excluded. Patient evaluation at follow-up consisted of a physical examination, radiographs, functional scores (L'Insalata shoulder rating score and SF-36 physical and mental component score), and subjective satisfaction questionnaire.

The mean interval to follow-up was 5.1 years (range, 2.0-11.7 years). All patients had full range of motion in the affected shoulder preoperatively and at follow-up. Prior to the procedure, 23 of 27 shoulders (85%) demonstrated a positive posterior load and shift test that improved to 2 of 27 shoulders (7%) after the arthroscopic repair. Preoperatively, supine stability testing revealed gross posterior instability (2+ or greater, 0-3+ scale) in 14 of 27 shoulders (52%). All shoulders improved to an instability grade of 1+ or less after the repair. Two patients had isolated external rotation weakness (grade 4/5). One of these 2 patients had undergone a subsequent open posterior stabilization after the arthroscopic repair. The mean follow-up L'Insalata and SF-36 physical and mental scores were 90 ± 13.9 (range, 50-100), 50.4 ± 7 (range, 37-61), and 53.9 ± 9 (range, 31-63), respectively. Subjective symptoms of pain and instability were eliminated in 24 patients (25 shoulders [92%]). Overall satisfaction was high, with 96% reporting the procedure to be successful and willing to undergo the surgery again.

Two patients (8%) failed the arthroscopic posterior Bankart repair. One patient underwent a successful open posterior stabilization 12 months after the initial repair due to persistent instability. The second reported mechanical symptoms with sports activities 8 months after the arthroscopic repair. MRI revealed a persistent posterior labral detachment and the patient underwent labral debridement 13 months after the initial repair and was subsequently able to return to full sports activity.

■ COMMENT BY BRIAN J. COLE, MD, MBA, AND STEPHEN J. LEE, BA

Due to the difficulty in diagnosis and management, posterior shoulder instability remains a challenging clinical entity for orthopedic surgeons. The findings of this study suggest that arthroscopic repair of the posterior capsulolabral complex is an effective means of treating posterior shoulder instability in a specific patient population—those with a history of a distinct traumatic episode, presence of a posterior Bankart lesion, and minimal posterior capsular laxity. We agree with Williams et al's acknowledgement that a successful posterior stabilization requires a complete evaluation of all etiologic factors, including the degree of capsular laxity and competency of the posterior band of the inferior glenohumeral ligament complex. We also believe that with the addition of suture plication, coexisting pathology can more easily be addressed, and possibly success rates will improve in a larger patient population amenable to arthroscopic treatment compared to isolated treatment with a single-point fixation device. ■

Mr. Lee is a Research Fellow in Sports Medicine at Rush Presbyterian Medical Center.

Respect the Headache!

ABSTRACT & COMMENTARY

Synopsis: *Those athletes with persistent headache beyond 7 days postconcussion likely have not sufficiently recovered given worse neurocognitive testing, slower reaction times, and reduced memory performance.*

Source: Collins MW, et al. Relationship between post-concussion headache and neuropsychological test performance in high school athletes. *Am J Sports Med.* 2003;31(2):168-173.

MANY HIGH SCHOOL ATHLETES RECEIVE CONCUSSIONS during their sporting events. The significance of a high school athlete having a persistent headache after a sports-related concussion is not well studied. Many grading systems and return-to-play parameters exist. This study was designed to determine if athletes sustaining a concussion and reporting a headache at 7 days post injury differed from a group of athletes sustaining a concussion but with headache cleared by the seventh day.

This is a prospective study of 109 high school athletes who had sustained a concussion and who were divided into 2 groups: those reporting headache 7 days after injury and those reporting no headaches. The 2 groups

were compared by an on-field exam and cognitive tests approximately 7 days after injury. The results showed that athletes reporting a post-traumatic headache 7 days after the concussion demonstrated significantly worse performance on reaction time and memory cognitive scores. Additionally, these athletes reported more concussion symptoms other than headache and were more likely to have demonstrated on-field anterograde amnesia.

Collins and colleagues concluded that high school athletes reporting a postconcussion headache 7 days after injury are likely to have an incomplete recovery after concussion.

■ COMMENT BY JAMES R. SLAUTERBECK, MD

So what are these kids, coaches, and parents doing? Are all the aforementioned “players” and injured athletes informed about the potential repercussions of a lingering concussion as evidence by postconcussion headaches and other symptoms? How many Muhammad Alis do we need to see before we open our eyes and realize the potential additive injury of rising from the 10 count just in time to be knocked down again? How many concussions should our youth sustain before it is unsafe to return to play contact sports? So many questions . . . So few answers!

This is good article from a respected group identifying effects of a concussion that may be far more significant than originally perceived. Those athletes with a moderate-to-severe headache 7 days postinjury had worse neurocognitive function than others. Any athlete with a headache at day 7 had more postconcussive symptoms and demonstrated significantly slower reaction times and reduced memory performance on testing.

Many athletes show up to Saturday morning injury clinic with a headache after a playing in the game and receiving a head blow. Some rules are more liberal at returning to play, and other guidelines require waiting 7 days after the headaches are gone. None of the widely used guidelines use neuropsychological testing to help determine when an athlete should return to sport. Maybe we need to create and validate a simple test to administer preseason and compare to postconcussion to help determine when one is ready to return to sport.

All in all, I think it is important to respect the postconcussion headache. It is probably best to err on the side of conservatism when one determines the best time to safely return a postconcussion high school athlete to play when they have a persistent headache at 7 days. Many more studies need to be initiated with pre- and postneuropsychological testing to better determine the short- and long-term effects of concussions and to determine when cognitive function returns to normal. ■

Neuromuscular Response to ACL Stretch

ABSTRACT & COMMENTARY

Synopsis: *Following a laboratory-induced stretch of the ACL, a significant neuromuscular change is induced in the knee. This work supports the neuromuscular role of the ACL and the subsequent neuromuscular changes that result from injury. These findings substantiate the theory that injury to the ACL results in a risk of instability not only due to a mechanical increase in translation, but also due to a temporary neuromuscular disorder initiated by a stretch of the ligament.*

Source: Chu D, et al. Neuromuscular disorder in response to anterior cruciate ligament creep. *Clin Biomech.* 2003;18(3):222-230.

VARIOUS AUTHORS HAVE INVESTIGATED THE SENSORIMOTOR role of the ACL in the last decade ranging from histological to clinical studies. This study attempted to show that the application of prolonged static stretch to the ACL would induce creep and have a significant effect on the reflexive activation of the associated musculature in a way that would decrease knee stability and increase the risk of injury.

Twenty healthy subjects (10 men and 10 women) participated in the study. Patients were seated in a chair with arms crossed and EMG was affixed to the rectus femoris and biceps femoris. The knee was placed at the reference angle (90° or 35°), and a load cell was applied to measure force. A linear placement potentiometer was fixed to the thigh to measure ACL creep via anterior tibial displacement. During testing, a maximum effort isometric extension and flexion contraction was executed. This was followed by the application of the anterior tibial load (150N for women and 200N for men) × 10 minutes. Max effort isometric contraction was repeated following removal of the load. EMG and force measures were reported as changes pre- and postcreep.

Chu and associates reported a significant increase in quadriceps EMG activity with isometric knee extension following ACL creep ($P < .01$) without increase in hamstring coactivation. A trend toward increased quad force was noted but not significant. However, females had significantly greater increase in quad torque than males ($P = .04$). There was also a significant increase in hamstring EMG activity with isometric knee flexion following ACL creep ($P < .02$). There was no increase in quad coactivation and only a trend of increased hamstring torque. An average of 3-6 mm of creep was noted following the application of the load. ACL displacement following

creep was significantly greater with the knee flexion angle at 35° than 90° ($P < .05$), and a trend of greater translation in women compared to men ($P < .09$) was noted.

■ **COMMENT BY TIMOTHY E. HEWETT, PhD, AND MARK V. PATERNO, MS, PT, SCS, ATC**

Overall, Chu et al have done a good job advancing the current knowledge base on the neuromuscular function of the ACL and potential neuromuscular deficits that can result from prolonged static stretch to the ligament. The most notable findings included the increased EMG activity in the agonistic muscle and the failure to demonstrate a subsequent coactivation of the antagonistic muscle group following creep in the ACL. These results suggest that stretch to the ACL will result in a transient neuromuscular disorder causing an inability to generate cocontraction of the thigh musculature, which is believed to protect the ACL in functional activities. The article also provides support for the belief that the ACL has a significant mechanical and neuromuscular role in the stability of the knee joint.

There are several weaknesses in the study. From a methodological standpoint, the question arises regarding the decision to provide different amounts of anterior tibial stress to males and females. With respect to the results and discussion, the intuitive leap is made that the ability to contract in an open kinetic chain position correlated to closed-chain functional activities. Considering the extensive support in the literature that success in open kinetic chain activities fails to equate to success in closed kinetic chain activities, there needs to be some link between knee extension and closed kinetic chain positions, which is where most injuries occur, to make these statements regarding injuries. ■

Dr. Paterno is a Research Associate in Sports Medicine at the University of Cincinnati.

Tunnel Widening After ACL Reconstruction

ABSTRACTS & COMMENTARY

Synopsis: *Two studies examining the issue in different ways confirmed that suspensory fixation yields more tunnel widening than outlet fixation.*

Sources: Klein JP, et al. The incidence and significance of femoral tunnel widening after quadrupled hamstring ACL reconstruction using femoral cross pin fixation. *Arthroscopy*. 2003;19(5):470-476; Barber FA, et al. The effect of outlet fixation on tunnel widening. *Arthroscopy*. 2003;19(5):485-492.

TUNNEL WIDENING FOLLOWING ACL RECONSTRUCTION has been reported with all types of grafts and fixa-

tion methods. Although the amount of widening can be rather dramatic in some cases, the clinical importance outside of difficulty encountered at potential revision surgery remains unclear. Nevertheless, avoiding large bone cavities with possible graft attachment compromise seems desirable. The present 2 papers in the same issue of *Arthroscopy* examine this issue in different ways.

Klein and colleagues measured femoral tunnel widening following metal cross pin fixation (Slingshot, Mitek, Norwood, Mass) of quadruple hamstring grafts. Tibial fixation was with the Intrafix device (Mitek). Approximately half of the eligible 57 patients were evaluated after at least 1 year (mean, 18 months) with standardized x-rays, clinical exams, KT testing, and IKDC and Lysholm scores. Every single patient had at least 10% tunnel widening, and all but one had 20%. The mean widening was 65.5% at the greatest diameter, or 5.4 mm. There was no correlation between the amount of tunnel widening and knee stability or clinical outcome.

Barber and colleagues studied tibial outlet fixation of bone-patella tendon-bone grafts with an absorbable interference screw (BioScrew, Linvatec, Largo, Fla). If the tendonous length of the graft was greater than 45 mm, they folded over the bone plug onto the tendon to shorten the construct. Thus, the graft was fixed as close as possible to the tibial tunnel outlet in the joint. Using basically the same evaluation tools at a mean of 30 months, they found 90% of the full-length (unfolded) grafts had at least 2 mm of tunnel widening, while none of the flipped grafts had any widening. In fact, the flipped-graft group, which effectively had fixation right at the articular tunnel outlet, had shrinkage of the tunnel to obliteration in almost half of the knees. Once again, no effect on clinical scores or laxity was demonstrated.

■ **COMMENT BY DAVID R. DIDUCH, MS, MD**

You can argue if you want about tunnel widening not appearing to matter based on clinical scores, etc. Revise just one of these and you'll know this can be a big deal. How can it possibly be good to have large cystic cavities within the knee, for graft healing and for the future?

These 2 studies look at a common problem in different ways, which is fine since the problem is affected by several factors. We know from several studies that the worst combination appears to be allograft, soft-tissue grafts, distal or suspensory fixation, and ethylene oxide sterilization. The first paper demonstrates suspensory fixation with a metal cross pin. While initial fixation strength is ideal, graft motion (windshield wiper) and stretch (bungee cord) can potentially erode bone and diminish healing. The motion can also create a pumping action for joint fluid up into the tunnel. Joint fluid pre-

vents clotting, which is the first step in fracture healing within the tunnel. I personally think that joint fluid is one of the main culprits, and I strive for the tightest fit possible with my hamstring grafts. I also use autograft tissues, as subtle immune rejection has been implicated in this process. Most suspensory cross pin fixation systems require a somewhat loose fit in order to pull the graft up and over the pin. The absorbable Rigid-Fix (Mitek) is the exception, which skewers the graft in the tunnel with 2 pins much closer to the joint.

Aperture or outlet fixation eliminates graft motion, increases stiffness, and shortens the construct. Interference screws may not always seal the tunnel opening to joint fluid, however. This may not matter with bone plugs as they are in direct contact with the tunnel wall and heal quickly. Barber et al nicely describe their procedure to flip the graft when the tendon is long. This achieves a graft fixed close to the joint line and avoids problems with graft-tunnel length mismatch.

Surgeons can make several decisions regarding graft choice and fixation methods, each of which will affect potential tunnel widening and future problems. The general principles we can learn from these 2 studies and others are as follows: Keep the working length of the graft as short as possible, with rigid fixation close to the joint line. Achieve a tight fit with a barrier to joint fluid within the tunnels. Use autograft tissues or avoid any graft sterilized with ethylene oxide. ■

Shoulder Proprioception in Rehabilitation

ABSTRACTS & COMMENTARY

Synopsis: *The study prospectively evaluated shoulder proprioception in patients with traumatic anterior instability who underwent anterior shoulder repair.*

Sources: Edmonds G, et al. The effect of early arthroscopic stabilization compared to non-surgical treatment on proprioception after primary traumatic anterior dislocation of the shoulder. *Knee Surg Sports Traumatol Arthrosc.* 2003;11:116-121; Zuckerman JD, et al. The effects of instability and subsequent anterior shoulder repair on proprioceptive ability. *J Shoulder Elbow Surg.* 2003;12(2):105-109.

IN 1994, LEPHART AND COLLEAGUES FIRST COMPARED the shoulder proprioception of patients who underwent surgical repair to that of healthy subjects, demonstrating that anterior shoulder stabilization procedures appeared

to restore proprioception.¹ Since Lephart et al did not perform a prospective, randomized trial, nor did they measure the same patients both before and after surgery, the effect of these procedures on proprioceptive function remains uncertain. The 2 studies reviewed here prospectively evaluated shoulder proprioception to address this question. Edmonds and colleagues studied patients with initial traumatic anterior shoulder dislocation treated with arthroscopic stabilization, and Zuckerman and colleagues used recurrent traumatic anterior instability patients treated with open stabilization.

Edmonds et al performed a prospective, randomized study comparing a nonoperative control group (n = 13) that underwent sling immobilization for 3 weeks followed by rehabilitation and another group who had first time, traumatic anterior dislocations (n = 11) treated by an arthroscopic, transglenoid multiple suture technique followed by the identical rehabilitation program. Measurements were performed (mean, 19 months; range, 3-36 months) with the use of a modified Cybex™ dynamometer. Both threshold to detection of passive motion (TTDPM) and detection of passive motion (RPP) were measured at 90° abduction at both 30° and 60° of external rotation. Both tests were performed at 2° per second with the patient in the supine position. The re-dislocated subjects (1 of 11 surgical, 3 of 13 conservative) were not excluded from the study. Results showed that there were no significant differences between these 2 groups in either TTDPM or RPP.

In the second study, Zuckerman et al prospectively evaluated shoulder proprioception both before and after anterior shoulder stabilization surgery in patients with recurrent traumatic anterior instability. Thirty consecutive patients with multiple episodes of anterior dislocations (range, 5-12) were evaluated. Both TTDPM and RPP for the direction of shoulder flexion, abduction, and external rotation position were measured a week before surgery. Both tests were performed at 2° per second. Flexion and abduction were tested with patients in a seated upright position, whereas external rotation was tested in a standing position. All patients had open anterior capsulorrhaphy combined with capsulolabral repair. The subjects were retested both at 6 and 12 months after surgery.

Before surgery, significant deficits in both TTDPM and RPP were found when comparing the affected side to the unaffected side. Six months after surgery, RPP showed improvement of approximately 50% but still differed significantly from the unaffected side, while TTDPM was no longer significantly different from the uninvolved shoulder. One year after surgery, both TTDPM and RPP were equivalent to those of the uninvolved shoulder.

■ COMMENT BY ED MCFARLAND, MD, AND
ATSUSHI YOKOTA, MD, PhD

The importance of these papers lies in the fact that they are among the first to have a prospective design, and the Edmunds paper was the first to have a control group. These studies demonstrated that proprioception may recover with or without surgery for anterior instability. However, this conclusion warrants further study due to limitations of these studies.

The study by Edmonds et al provides a valuable contribution to this field by suggesting that the surgical re-tensioning of the anterior capsule for patients with initial dislocation may not be a necessary condition for the restoration of shoulder proprioception. They found that their results did not change whether the patients who failed treatment (9% of surgical, 23% of conservative) were included in the statistical analysis. This suggests that either the measures were not discriminating or that the numbers were not adequate. Another weakness of this study was that Edmonds et al did not do a side-to-side comparison between the normal and unstable side. The published rate of redislocation after conservative therapy (23%) in this study was low compared to the other reports and may indicate that the patient groups were not equivalent. The use of a large number of subjects in the next phase of this study may resolve some of this uncertainty.

The strength of the study by Zuckerman et al was that it is a prospective study of shoulder proprioception both before and after surgery. Zuckerman et al confirmed the findings of previous studies, which have shown that shoulder proprioception is compromised in patients with recurrent anterior instability. In addition, they showed that proprioceptive function was restored equivalent to the unaffected side after the surgical procedure followed by a standard postoperative rehabilitation. The limitation of this study is that it remains uncertain whether the major cause of restoration of shoulder proprioception is surgical stabilization or postoperative intensive rehabilitation. The study by Edmonds et al would suggest that a nonoperative control group should be used for comparison. Furthermore, the effect of prolonged morbidity on the proprioceptive function is still uncertain. Although this study did not demonstrate that patients with more episodes had more loss of proprioception, it is possible that repetitive dislocation causes further damage to the mechanoreceptors surrounding the shoulder, which could deteriorate proprioceptive function.

The results of both studies suggest an important role of postoperative rehabilitation for restoration of shoulder proprioception. The recent study by Swanik and associates clearly demonstrated the efficacy of plyometric

training for improvement of shoulder proprioception.² Although it is still unknown whether the deficit of proprioception is a part of a primary pathology or a secondary phenomenon, restoration of proprioception is an important part of therapy for traumatic shoulder instability. Therefore, intensive rehabilitation should be performed for all patients.

When one tries to compare the results of previous studies concerning shoulder proprioception to those studies, one difficulty is interpreting the numerous parameters used for the measurement of proprioception, such as patients' position (eg, upright position or supine position), starting position (eg, arm-at-side position or abduction and external rotation position), test speed, and method of immobilization of extremity. A major concern is that these factors could significantly affect the reported values for many of the measurements. Future studies will hopefully determine the most accurate and reproducible methods for measurement of shoulder proprioception. ■

Dr. Yokota is a Research Fellow in Orthopaedic Surgery at Johns Hopkins University.

References

1. Lephart SM, et al. Proprioception of the shoulder joint in healthy, unstable, and surgically repaired shoulders. *J Shoulder Elbow Surg.* 1994;3(6):371-379.
2. Swanik KA, et al. The effects of shoulder plyometric training on proprioception and selected muscle performance characteristics. *J Shoulder Elbow Surg.* 2002; 11(6):579-586.

Bo Knows Hips

ABSTRACT & COMMENTARY

Synopsis: *The study reports a series of 8 American football players with acute traumatic posterior hip subluxation diagnosed with obturator oblique Judet views. Early hip joint aspiration should be considered in this patient population.*

Source: Moorman CT III. Traumatic posterior hip subluxation in American football. *J Bone Joint Surg.* 2003;85-A(7): 1190-1196.

WHAT REALLY HAPPENED TO END BO JACKSON'S stellar football career? Like other lesser-known football players, he suffered a hip subluxation that

eventually lead to devastating avascular necrosis of his hip. Moorman presented a series of 8 American football players who sustained a traumatic posterior hip subluxation. They characterized the mechanism of injury, pathoanatomy, diagnostic features, and recommended treatment for football players with this injury.

In 6 of the 8 players studied, the mechanism of injury was a fall on a flexed knee with the hip adducted and flexed. None of the players was able to return to play following the injury. Radiographs (obturator oblique Judet views) demonstrated a posterior acetabular lip fracture in all 8 patients. Magnetic resonance imaging (done in 7 of the 8 players) demonstrated a hemorrhagic joint effusion and bone marrow edema in the area of the posterior acetabular lip fracture, as well as disruption of the iliofemoral ligament (Y-ligament of Bigelow). Patients were treated with crutches and toe-touch weight bearing only for 6 weeks. Two patients with excruciating pain on presentation to the emergency room were treated with hip joint aspiration. Despite the relatively low energy trauma involved, 2 patients went on to develop osteonecrosis. Neither of the 2 patients with hip joint aspiration developed osteonecrosis. Moorman believes that intracapsular tamponade may have played a role in this process, as well as leading to the development of post-traumatic chondrolysis, which also occurred in 1 of these players.

■ **COMMENT BY MARK D. MILLER, MD**

Although a case series by its very nature precludes unambiguous establishment of cause and effect, it is obvious that American football players who sustain a seemingly minor hip “sprain” may instead have a much more serious injury. Obturator oblique (Judet) views must be obtained in patients with significant hip injuries because routine plain films will be normal. Early hip aspiration should be encouraged to reduce the risk of intracapsular tamponade. It is unclear why the disruption of the iliofemoral ligament (part of the hip capsule) did not result in decompression of the capsule, but, as Moorman suggests, perhaps part or most of the capsule remained intact. Hip joint aspiration in this setting is similar to what Dr. Mark Swiontkowski recommends in patients with intracapsular hip fractures, and it makes good sense. Protected weight bearing is also a reasonable treatment recommendation. If nothing else, this paper should serve to heighten our awareness of this injury in American football players. ■

8. Regarding shock wave therapy for calcific tendinitis of the shoulder, which statement is true?

- a. It eliminates completely the calcium deposit.
- b. Systemic complications may be observed after shock wave therapy.
- c. Results after shock wave therapy or after surgery are comparable.
- d. Results after shock wave therapy are time-dependent.

9. Which of the following contributes to posterior shoulder stability?

- a. Posterior capsulolabral complex
- b. Capsular tension
- c. Posterior band of the inferior glenohumeral ligament complex
- d. All of the above

10. Athletes with a moderate concussion who exhibit a headache 7 days postinjury have:

- a. less cognitive testing abnormalities than a similarly injured athlete whose headache lasted for 1 day postinjury.
- b. more cognitive testing abnormalities than a similarly injured athlete whose headache lasted for 1 day postinjury.
- c. less cervical spine tenderness than a similarly injured athlete whose headache lasted for 1 day postinjury.
- d. more cervical spine tenderness than a similarly injured athlete whose headache lasted for 1 day postinjury.

11. Which of the following has not been associated with tunnel widening after ACL reconstruction?

- a. Suspensory fixation
- b. Absorbable screws
- c. Loose tunnel fit
- d. Joint fluid within the tunnel
- e. Ethylene oxide sterilization

12. After a laboratory-induced stretch on the ACL, which of the following occurs?

- a. Significant increase in the EMG activity in the agonistic musculature
- b. Significant increase in the EMG activity in the antagonistic musculature
- c. Significant decrease in the EMG activity in the agonistic musculature
- d. Significant decrease in the EMG activity in the antagonistic musculature

13. Posterior hip subluxation in American football players can best be diagnosed with:

- a. history alone.
- b. plain (AP and Lateral) radiographs.
- c. obturator oblique (Judet) views.
- d. MRI scan.

14. Proprioception can be restored in cases of shoulder instability:

- a. by surgery alone.
- b. by rehabilitation with or without surgery.
- c. only if the shoulder stability is restored.
- d. Never

Answers: 8(d); 9(d); 10(b); 11(b); 12(a); 13(c); 14(b)