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Emergency Planning in Athletics

ABSTRACT & COMMENTARY

Synopsis: *Each institution or organization that sponsors athletic activities must have a written emergency plan.*

Source: Andersen JC, et al. *Journal of Athletic Training.* 2002;37:99-104.

THIS POSITION STATEMENT BY THE NATIONAL ATHLETIC Trainers' Association informs those responsible for organization of sports medicine delivery systems about the need for emergency planning. Andersen and colleagues identify education and training, maintenance of emergency equipment and supplies, appropriate use of personnel, and the formation and implementation of an emergency plan as the critical components of preparation for emergencies. The Statement includes 12 points that should be considered in the development and implementation of an emergency plan. These points are based on an extensive review of the literature, and have been thoroughly reviewed by experts on emergency planning.

The Statement describes the components of an emergency plan as implementation, personnel, equipment, communication, transportation, venue location, emergency care facilities, and documentation. The keys to implementation are that the plan must be committed to writing, must involve education of key personnel, and must be rehearsed on a regular basis. All personnel involved in the plan should be trained to work together as a team and to use the equipment necessary to carry out the plan. The equipment should be on-site, quickly accessible, and in good working order. Access to a suitable telecommunications device must be assured, and essential emergency phone numbers readily available. A system for transporting the injured participant should include having an ambulance on site at high-risk events, and adequate accessibility to one at all other events. The venue location should be considered as related to accessibility to emergency personnel, the communication system, equipment, and transportation. The plan should incorporate access to an emergency care facility suitable for the nature of the injury. The written plan should include documentation of the

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plan itself, regular rehearsal of the plan, training of personnel, and maintenance of equipment.

COMMENT BY DAVID H. PERRIN, PhD, ATC

One would think any physician or allied health care provider responsible for the administration of a sports medicine program would realize the necessity of having an emergency plan. Andersen et al cite in the statement recent statistics from the National Collegiate Athletic Association that at least 10% of member institutions do not maintain any form of an emergency plan. Moreover, less than two thirds of institutions provide adequate personnel for sports such as cross-country and track. The recent death of a Pennsylvania State University pole vaulter is a painful reminder of the importance of having appropriate medical personnel at all athletic events. The care provided to high school athletes and the need for emergency planning at this level of athletic participation should receive no less attention that at the collegiate level.

Andersen et al point out that failure to have an emergency plan can be considered negligence. In support of this statement, they reference several legal claims and suits in which defendants acted negligently and carelessly for not providing an appropriate emergency response. Andersen et al opinion that sports medicine professionals have both a professional and legal obligation to develop, implement, and evaluate emergency plans for sponsored athletic programs is well-taken.

This position statement by the National Athletic Trainers' Association should be required reading for anyone involved in the delivery of sports medicine care. Reprints may be obtained by contacting the National Athletic Trainers' Association, Communications Department, 2952 Stemmons Freeway, Dallas, TX 75247. ■

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Radiofrequency Energy vs. Mechanical Debridement of Patellar Chondral Lesions

ABSTRACT & COMMENTARY

Synopsis: *At 2 years, bipolar radiofrequency energy had superior clinical outcome compared to mechanical debridement of patellar grade 2 or 3 chondral lesions.*

Source: Owens BD, et al. *Arthroscopy.* 2002;18:151-155.

MECHANICAL DEBRIDEMENT IS AN ESTABLISHED treatment for patellar chondral lesions. Radiofrequency energy is a relatively new device that is able to smooth cartilage surface, and Owens and colleagues cite that bipolar radiofrequency energy is both safe and effective.[1,2] The present study compared the clinical treatment outcomes of radiofrequency energy and mechanical debridement of patellar chondral lesions.

In a prospective, clinical study, 39 consecutive patients undergoing arthroscopy for symptomatic, isolated, patellar cartilage lesions were randomized into radiofrequency energy and mechanical debridement groups. All patients had failed conservative therapy, which included lifestyle modifications, a course of nonsteroidal anti-inflammatory drugs, and physical therapy. Patients with evidence of instability, malalignment, or patellar tracking dysfunction were excluded. All patients were evaluated with preoperative plain radiographs, magnetic resonance imaging, and Fulkerson-Shea Patellofemoral Joint Evaluation Score.

The chondral lesions were characterized by grade and location, and patients with Outerbridge grade-4 lesions were excluded from the study. Standard mechanical debridement was performed with a mechanical shaver (Dyonics EP-1 Shaver, Smith &

Nephew, Andover, Mass). The bipolar radiofrequency energy device (VAPR, Mitek, Westwood, Mass) was set at 20W in nonablative mode, and the side effect probe was passed over the lesion in a side-to-side motion until a smooth contour was visualized.

Nineteen patients (mean, 37.5 years) underwent chondral debridement using a mechanical shaver and 20 patients (mean, 36.9 years) underwent chondral debridement using bipolar radiofrequency energy. The preoperative scores were 59.2 for the mechanical debridement group and 59.6 for the radiofrequency energy group. At 12 months postoperation, the mechanical debridement group had a mean score of 80.0 and the radiofrequency energy group had a mean score of 87.9 ($P = 0.0031$). Postoperative scores at 24 months follow-up were 77.5 for the mechanical debridement group and 86.6 for the radiofrequency group ($P = 0.0006$).

Both groups demonstrated clinical improvement, but patients treated with radiofrequency energy had statistically significant improvement at 1-year follow-up and 2-year follow-up. Owens et al felt that radiofrequency energy was able to produce better long-term clinical results due to less destruction to surrounding healthy chondrocytes and to the production of a smoother rim of tissue. The present study presents superior clinical outcomes of patellar grade 2 or 3 chondral lesions with the use of bipolar radiofrequency energy vs. mechanical debridement.

COMMENT BY BRIAN J. COLE, MD, MBA

Over the past several years, radiofrequency energy has received considerable attention for its use in thermal chondroplasty. At this point, the application of radiofrequency energy is investigational, and further studies are required before this treatment modality is acceptable in patients. Several studies have been published that demonstrate both monopolar and bipolar radiofrequency energy cause significant chondrocyte death when evaluated with cell viability staining and confocal laser microscopy. Bipolar devices can cause 2-3 times the depth of chondrocyte death, often to the level of subchondral bone, compared to monopolar devices.[3,4] In an ovine model, the effects of monopolar radiofrequency energy were evaluated immediately and up to 6 months after treatment by scanning electron microscopy and confocal laser microscopy. These studies determined that the smooth surface and chondrocyte death at the time of treatment persisted throughout the evaluation period.[5]

It is thought that radiofrequency energy may improve the stability of damaged cartilage by reducing the release of proteoglycans and collagen fragments to ultimately slow the progression of joint degeneration. Interestingly, Owens et al observed that the improvement in clinical outcome was more or less preserved between the first and second years in the radiofrequency energy group but showed signs of deterioration in the mechanical debridement group. However, it is important to bear in mind that Owens et al used the bipolar radiofrequency energy on patellar lesions, and their results cannot necessarily be applied to other areas of the knee. The patella may prove to be a relatively safe area for this technology given its inherently thick cartilage surface. No postoperative MRIs were performed on these patients, which we believe would be a critical component to rule out any effect on the subchondral bone. Further basic science and long-term clinical studies are required to demonstrate the efficacy and safety of this treatment modality. ■

Author Acknowledgments: The reviewer would like to acknowledge Shane J. Nho, MS, for his assistance in preparation of this report.

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Shrinking the ACL

ABSTRACT & COMMENTARY

Synopsis: *Eleven of 18 patients failed electrothermal shrinkage of the ACL at an average of 4 months due to rupture. Of the 7 with successful results, 6 were acute injuries in native ligaments. Use of electrothermal shrinkage is cautioned in partial ACL tears and probably contraindicated for ACL grafts or chronic laxity.*

Source: Carter TR, et al. *Am J Sports Med.* 2002;30:221-226.

RADIOFREQUENCY, OR ELECTROTHERMAL ENERGY, has enjoyed rapid acceptance and widespread applications despite a major lack of scientific studies supporting its clinical use for specific indications. The ability to shrink collagen is visually impressive. And it is to be expected that it would be used to try to address partial ACL injuries or lax ACL grafts after reconstruction.

Dr. Tom Carter and colleagues in Arizona critically

evaluated the success of this treatment in 18 persons, including 7 with previous reconstructions and 11 with native ligaments. Half of the group had acute and half had chronic (> 3 months) laxity. All patients were demonstrated on arthroscopy to have loose ligaments which were in continuity, and KT-1000 differences ≥ 5 mm with loose Lachman exams but a firm end point. Patients were treated with monopolar radiofrequency (Oretec device, Menlo, Calif) at 67° and 40 watts of power by painting the ligament on 3 sides until tight. They were immobilized in extension for 4 weeks then gradually rehabbed with level running held until 3 months and return to sport not until 4 months. They were evaluated on a monthly basis, including KT-1000 arthrometry.

All patients initially demonstrated tighter knees after shrinkage with improvement of KT values basically to the normal range. Unfortunately, at a mean of 4 months, 11 of 18 patients suffered a clinical failure, with increased laxity on exam and by KT compared to preoperative values. Examining the failures more closely revealed that only 1 of 9 with chronic laxity had a favorable outcome. Six of 8 patients with acute laxity had stable knees. Only 1 of 7 ACL reconstructions had a favorable outcome after shrinkage. These reconstructions were basically half patellar tendon and half hamstring autografts. All 11 patients who failed went on to reconstruction due to symptomatic laxity. Histology of failed ligaments revealed disorganized collagen and poor vascularity, in contrast to a biopsy of a successful second-look biopsy at 15 months.

COMMENT BY DAVID R. DIDUCH, MS, MD

Heat kills. We have seen it before and, unfortunately, we will see it again. Surgeons must be extremely cautious when using radiofrequency energy to shrink tissues as the initial results do not portend to final outcome in all cases. The temperature zone for safe shrinkage without necrosis is quite narrow at 65-75°C, but necrosis can occur even at low temperatures with excessive exposure time. The results of heat shrinkage are to disrupt collagen crosslinkages and unwind the triple helix, allowing the collagen to contract. At this point, fibroblasts must make new collagen on this shortened lattice framework before the collagen is stretched out again. This takes at least 3 months, with the tissue quite vulnerable in the interim.

The big issue, however, is vascularity. Shrinkage kills fibroblasts in the area, and without adequate blood supply, new fibroblasts cannot come in to repopulate the area and create healthy, healing tissue. Dr. Carter saw a distinct difference in outcomes for patients with native ligament partial tears treated acutely, when there would be an acute inflammatory response with associated increased vascularity. They conclude that this may be the only proper indication for this treatment but should be used with caution even then. Clearly, further studies are needed. Although most failures occurred by 4 months, longer follow-up may reveal these early successes are at risk to rupture over time. And clearly, this treatment should not be used on existing ACL grafts or chronic partial tears where the vascular supply is marginal.

This study was carefully constructed and carried out, and Carter et al are to be congratulated for an honest presentation of unfavorable results from which we can all learn. The differences in outcome from the only other published paper on the same topic by Thabit are difficult to explain,[1] although the present study was more rigorous and complete. Again, this further supports the need for more studies before adapting this technology into clinical practice. ■

Reference

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Incomplete Bicruciate Injuries: Fix only the ACL

ABSTRACT & COMMENTARY

Synopsis: *A retrospective, nonrandomized study of 18 patients with an interesting injury pattern of a complete ACL tear and a partial PCL tear (previously described as an incomplete bicruciate injury) were treated with BTB ACL reconstruction and observation of the PCL injury. Long-term follow-up revealed excellent stability (11/18 with a negative lachman, 4/18 patients with a 1+ lachman, average lysholm score 93). Substantial evidence is given for managing this injury with ACL reconstruction alone.*

Source: Wolf RS, Lemak LJ. *The Journal of Arthroscopic and Related Surgery.* 2002;18:264-271.

THIS STUDY DOCUMENTS THE FUNCTIONAL OUTcome associated with arthroscopically assisted anterior cruciate ligament (ACL) reconstruction in the specific injury pattern of an incomplete bicruciate knee. Wolf and Lemak report on 18 patients followed for an average of 60 months (range, 10-92 months)

treated by Dr. Lemak in Birmingham, Ala, from 1990 to 1998. They confirm the previously described injury pattern of complete ACL tear and partial posterior cruciate ligament ([PCL] incomplete bicruciate injury) with PCL injury ranging from 0 to 2+ (9 grade 0 partial PCLs, 4 grade 1 PCLs, and 2 grade 2 PCLs). No patient sustained a documented knee dislocation nor were there any grade 3 PCL injuries. Three patients were lost to follow-up with 13 of 15 seen postoperatively after undergoing an isolated ACL reconstruction. Two patients underwent a combined ACL reconstruction and posteromedial corner repair. PCL surgery included only arthroscopic evaluation, occasional debridement, and no radiofrequency treatment. At long-term follow-up, patients fared remarkably well with an isolated ACL reconstruction with an average Lysholm score of 93 with only 1 patient with a score less than 80, and in that patient completion of the PCL tear occurred with a second injury. Wolf and Lemak performed extensive postoperative testing including IKDC, KT-2000, stress radiographs, and isokinetic strength testing.

Wolf and Lemak note overall good results with isolated treatment of the ACL tear in the incomplete bicruciate knee injury and observation of the PCL injury. Symptomatic chronic posterior instability was low and only occurred in 1 patient (6%). No failures of ACL reconstruction were noted at long-term follow-up. Wolf and Lemak hypothesize one reason for the long-term durability of the nonoperative PCL treatment. They suspect the mechanism of injury to be hyperextension, which in theory completely tears the ACL and the posteromedial bundle of the PCL; hence, sparing the anterolateral bundle of the PCL which is more important at 90° of knee flexion (ie, posterior drawer testing).

COMMENT BY ROBERT C. SCHENCK, Jr., MD

Controversy exists over clinical decisionmaking and timing of surgery in multiple ligamentous injuries of the knee. Wolf and Lemak present a long-term follow-up of one subset of multiple ligamentous injuries, namely the incomplete bicruciate knee injury.[1] This injury pattern involves a complete tear of the ACL, partial PCL, and variable involvement of the collateral ligaments. Although Wolf and Lemak noted no patient with a documented knee dislocation, Cooper and colleagues described the PCL intact knee dislocation occurring with a normally or partially torn PCL.[2] In those case reports, isolated ACL reconstruction gave satisfactory long-term knee stability. The reader should be cautioned, however, and should proceed carefully with the treatment of a bicruciate injury, be it incomplete or complete. The need for a careful knee exam under anesthesia in combination with a preoperative MRI is crucial to determine the degree of injury to the PCL. As described in the paper by Wolf and Lemak, the majority of patients had a normally functioning PCL and only MR or arthroscopic evidence of PCL injury. The presence of a complete bicruciate injury (for all intents and purposes, a knee dislocation) must be treated with initial management of the PCL followed by ACL reconstruction (delayed or simultaneous). The clinician reconstructing the complete bicruciate injury with an ACL reconstruction alone has a significant risk of tibiofemoral subluxation on tensioning of the ACL graft. In contrast, the incomplete bicruciate injury has a functioning PCL providing the foundation for a successful ACL reconstruction which was shown nicely by Wolf and Lemak. ■

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Tendon Healing in a Bone Tunnel With Biodegradable Interference Screw Fixation

ABSTRACTS & COMMENTARY

Synopsis: *In this 2-part study presented as back-to-back articles, Weiler and colleagues showed that biodegradable interference screws provided good fixation for soft tissue grafts in tunnels. Biomechanically, the weak link during the early healing period was the graft at its tunnel entrance site. Weiler et al also demonstrated that screw degradation did not compromise graft fixation. Histologically, biodegradable interference screws allowed direct bony insertion without the development of a fibrous interzone, which has been shown to occur with nonaperture fixation.*

Sources: Weiler A, et al. *Arthroscopy.* 2002;18:113-123; Weiler A, et al. *Arthroscopy.* 2002;18:124-135.

THE DEBATE RAGES ON REGARDING THE BEST FIXATION method for soft tissue grafts. Some authors have implicated nonaperture fixation as a cause of laxity in hamstring ACL reconstructions. Other authors have suggested that aperture fixation with biodegradable fixation is not as strong as fixation with other devices. Weiler et al studied the biomechanical and his-

tological results of aperture fixation of soft tissue grafts in a sheep model.

Thirty-five skeletally mature sheep were assigned to 5 groups of 7 animals each. ACL reconstructions using ipsilateral half split Achilles tendon grafts were accomplished at time zero. All grafts were fixed with a poly-(D,L-lactide) biodegradable interference screw. The animals were sacrificed at 6, 9, 12, 24, and 52 weeks based on the group they were randomly assigned to. At the time of sacrifice, the grafts were tested mechanically with Drawer and Failure tests after cross-sectional areas were measured. Histologic analysis was performed using conventional stains and fluorescence microscopy to look at bone ingrowth. Five animals had to be excluded because of surgical failure in 2 and unrelated death in 3.

Drawer testing demonstrated that the grafts were most lax at 6 weeks, but this laxity gradually returned to normal at 52 weeks. Cross-sectional measurements demonstrated graft atrophy at 6 weeks and hypertrophy at 12 weeks. Failure testing demonstrated graft pull-out from the tunnels at time zero (done on contralateral control limbs), and midsubstance failure at 6 and 9 weeks. Two-thirds of the 6 week group specimens and all of the 9-week group specimens failed near the insertion sites. In the 12-, 24-, and 52-week groups, failure occurred by osteocartilaginous avulsion at the tibial or femoral insertion sites. The tensile strength of the graft was less than 10% of its original strength at 6 and 9 weeks, but gradually increased to approximately two thirds of its original strength at 52 weeks.

Histologic findings demonstrated that a partial fibrous interzone was present at 6 weeks with a mature, intratunnel, tendon-bone interface at 9-12 weeks. A normal ligamentous insertion was seen at 24 and 52 weeks. Using fluorescence microscopy, Weiler et al showed that direct healing to both the tunnel and the surface could occur without tunnel enlargement.

COMMENT BY MARK D. MILLER, MD

This is an interesting and well-designed study on biodegradable interference screws for soft tissue fixation. It would have been an even more valuable study if Weiler et al compared aperture and nonaperture fixation. It is important to point out that Weiler et al used poly-(D,L-lactide) screws. This is a different screw than is commonly used in the United States—the Poly-L-lactide screw—with absorption characteristically occurring at approximately 24 weeks vs. several years for the poly-L-lactide. The fact that the grafts were less than 10% of their original strengths at 6 and 9 weeks is concerning. Was this caused by the screws? Unfortunately, the study design precludes us from making this conclusion, but it is still a major consideration. It is not clear whether the screw itself or its insertion causes this weakness, but it did not result in graft rupture, at least in the animal model. Nevertheless, reduction of graft strength to less than 10% of its original strength within the first 2 months postoperatively certainly forces us to reconsider our rehabilitation protocols! Screw degradation occurred between 12 and 24 weeks and did not result in failure mode or loss of mechanical strength. We have little experience with this particular screw, but it appears to have an advantage over conventional PLLA screws.

The histologic findings demonstrating that there was direct healing both within the tunnel and at the tunnel surface was also interesting. This is likely a beneficial effect of interference screws. Fluorescence microscopy demonstrated bone formation much earlier than other studies have demonstrated. Weiler et al suggest that this is a result of anatomic interference fit fixation and propose that this is because of neutralization of graft motion. They also propose that this can reduce tunnel enlargement. Again, a comparative study design would help to substantiate this conclusion.

A final concern that I have regarding these studies is that the tibial interference screw was placed from inside out. Weiler et al state that cadaver pilot work and outside-in screw placement resulted in a weak fixation. It is unclear how much this modification affected their results. Nevertheless, this paper provides interesting information and more room for further research. Perhaps a future animal study comparing "anatomic" aperature fixation with extracortical fixation may provide more answers. ■

Shock Waves for Plantar Fasciitis

ABSTRACT & COMMENTARY

Synopsis: *Low-energy shock waves improved night pain, walking and rest pain, patient satisfaction, and reduced the need for surgery in patients with plantar fasciitis.*

Source: Rompe JD, et al. *J Bone Joint Surg Am.* 2002;84-A(3):335-341.

PLANTAR FASCIITIS IS NOT AN UNCOMMON CAUSE OF foot pain in recreational and competitive athletes

that can be quite disabling. Pain is typically the worst with the first steps in the morning. Stretching and NSAIDs, possibly with corticosteroid injections, are the mainstay of conservative management, and the condition frequently persists for several months. Surgery to release the plantar fascia origin from the calcaneus is occasionally recommended for refractory cases.

Extracorporeal shock waves have been explored as a treatment modality for a variety of musculoskeletal conditions, including tennis elbow or tendinopathies at various sites, and plantar fasciitis for which it is now FDA approved. This is similar to the technology used to break up kidney stones. Rompe and his colleagues from Germany used 3 treatments of 1000 low-energy shock waves each spaced a week apart and compared it to a control group receiving only 10 impulses each time. Flouroscopy was used to position the shock wave beam. All patients had failed nonoperative treatment first, including various combinations of physical therapy, NSAIDs, injections, inserts, and night splints.

One hundred twelve patients were randomized prospectively and the observers were blinded. Confounding treatment variables were controlled and limited for 6 weeks before and during the study period. At 6 months, the rate of good or excellent outcomes as measured by the Roles and Maudsley pain score were 47% better for the treated group than the nontreated group. Half of the treated group could walk without pain compared to none of the nontreated group. At 5 years, 58% of the nontreated group had required surgery and 23% were still undergoing conservative treatment of some form, compared to only 13% having surgery in the treated group and none having ongoing conservative treatment. These differences at both time points were statistically significant.

COMMENT BY DAVID R. DIDUCH, MS, MD

Lithotripsy for plantar fasciitis? How does this work? Not even the investigators know. But there is mounting evidence, including this well-designed study, that it does work. Rompe et al demonstrated measurable differences in pain, walking ability, need for surgery, and need for continued nonoperative therapy. It was prospective, randomized, and blinded for the observers although not blinded for the patients. Confounding treatments were well controlled. It would appear that there is something to this. Other studies, especially in Europe, support its use as well. The FDA has now approved this technique for treatment of heel pain in the United States. But, Rompe et al emphasize that it should not be considered a first-line treatment modality.

The fact that these were low-energy shock waves is important as some applications use higher energy impulses. Studies such as this are important to help determine how this actually works and what other applications are appropriate. We are about to begin a similar prospective, multi-center, randomized, controlled trial with this technology for rotator cuff tendonitis and bursitis. We will see. One thing is for sure, this shock wave can hurt. I tried it on myself and can attest to that. Rompe et al called it "unpleasant," but for the high energy impulses, I would use a stronger word. Patient compliance may be a concern, so more studies to help determine how much is enough are indicated. ■

Dental Injuries in Hockey Players

ABSTRACT & COMMENTARY

Synopsis: *A definite reduction in the incidence of facial and dental injuries was seen when protective face protection was used. Protective face and dental guards are to be encouraged at a minimum.*

Source: Lahti H, et al. *Med Sci Sports Exer.* 2002;34: 400-402.

Dental injuries are common in hockey players and are more common in athletes not wearing face or dental protection. The purpose of this study was to determine the incidence and cause of facial and dental injuries in ice hockey games. Age was used to evaluate the effect of mouth or facial guards. A retrospective review of mouth and facial ice hockey injuries in Finland was studied over a 2-year period. Injury data were collected from the insurance company or from the team injury report. A total of 479 injured ice hockey players sustained 650 injuries. The most common injury was a noncomplicated crown fracture, of which 70% occurred in the games. All 6 maxillofacial fractures occurred during games. The most common mechanism of injury was a blow from the ice hockey stick occurring during a game. Ninety percent of injured players did not wear any kind of protective guard. Lahti and colleagues conclude, "mandatory use of mouthguards and face masks or tightened rules for protection to decrease the high number of maxillofacial and dental injuries in the ice

hockey games should be considered."

■ **COMMENT BY JAMES R. SLAUTERBECK, MD**

Many studies have shown that face guards reduce the number of face and mouth injuries in ice hockey. Since in Finland all players younger than age 18 wear face or mouth guards, injuries to the face and mouth could be studied by age. This study suggests that the masks provided protection because the number of injured players was less in those younger than 18. This is even more significant because more athletes participate in hockey in the younger than 18-year-old age group.

Additionally, of the face injuries, dental injuries occurred most commonly and were associated with hitting high with the stick. The increased aggressive play in games may account for this. However, athletes sustained less injures in games if protective face wear was used.

In my opinion, athletes participating in hockey should wear masks to protect their face. Rules should be modified to decrease hitting the face with the stick. If our goal is to provide the safest environment for athletes to participate in their sport, then we should consider these modifications to the sport for successful injury prevention strategies. Hockey athletes would in the short-term benefit by participating more effectively during the season. Additionally, long-term dental care resulting from tooth loss in youth would be minimized. ■

CME Questions

29. What was the location of the grade 2 or 3 chondral lesions that were debrided with either radiofrequency energy or a mechanical shaver?

a. Medial femoral condyle
b. Lateral femoral condyle
c. Medial tibial plateau
d. Lateral tibial plateau
e. Patella

30. Radiofrequency energy shrinkage of partial ACL tears showed the most favorable outcome in which group of patients?

a. Chronic partial tears
b. Acute partial tears
c. Chronic loose ACL grafts
d. Acute loose ACL grafts

31. The following are essential features of an emergency care plan for athletics *except*:

a. access to a suitable telecommunications device must be assured.
b. an ambulance and physician must be on site at all events.
c. the venue location should be considered as related to accessibility to emergency personnel, the communication system, equipment, and transportation.
d. the plan must be rehearsed on a regular basis.

32. Incomplete bicruciate injuries of the knee are best managed with which of the following operative procedures?

a. Simultaneous allograft bicruciate reconstruction
b. Staged cruciate reconstructions with initial treatment of the PCL
c. Acute repair of all injured structures
d. Isolated ACL reconstruction with bone tendon bone autograft
e. Isolated collateral ligament repair

33. Low-energy shock waves for plantar fasciitis were shown to:

a. reduce the need for surgery.
b. reduce walking pain.
c. reduce the need for ongoing nonoperative treatment.
d. All of the above

34. Fixation of a soft tissue graft with a PLDA biodegradable interference screw results in:

a. decreased tensile strength early with increasing strength thereafter and direct contact healing to bone.
b. decreased tensile strength that does not improve and direct contact healing to bone.
c. no decrease in tensile strength and direct contact healing to bone.
d. decreased tensile strength early with increasing strength thereafter and healing to bone with a wide fibrous interzone.
e. decreased tensile strength that does not improve and healing to bone with a wide fibrous interzone.

35. Dental injuries in ice hockey players are:

a. prevented by penalizing players more significantly for fighting.
b. prevented by wearing protective face gear.
c. prevented by rules affecting skating speed.
d. prevented by not allowing the players to raise the stick above their heads.

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