Eminence-Based Medicine Versus Evidence-Based Medicine: When Can the Athlete With a Sprained Ankle Return to Play?

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Abstract: When can the athlete with a sprained ankle to return to play? The medical literature provides no definitive answer to this question, so we surveyed 500 experts in sports medicine, and asked them if they agree with the following statement: "For patients with an acute ankle injury, the ability to hop on the sidelines is sufficient evidence to allow the athlete to return to the field." Overall, the experts did not endorse this statement. Further, a review of the medical literature failed to lend support for the statement. Taken together, some level V (expert opinion) evidence emerges, namely, that a patient's ability to successfully complete the hop test is not necessarily sufficient evidence to allow a return to play. That finding does not mean that a physician must shun the test; rather, the conclusion is that it cannot be relied on in isolation. The hop test, used in context with other findings, along with a consideration of the risks and benefits of continued play, may help the physician on the field reach a reasonable conclusion. To date, however, there is no single, easily applied test that can correctly determine whether an athlete is safe to return to the field.

Keywords: ankle injury; return to play; sports medicine

Introduction

Ankle sprains are common sports injuries. In one systematic review[1] of articles reporting on > 200 000 patients with sports injuries, the ankle was frequently injured in many sports, including volleyball, football, field hockey, handball, squash, rugby, soccer, volleyball, handball, and basketball. As such, the sports medicine practitioner must frequently consider the question: When can the athlete with a sprained ankle return to play?

Because the medical literature does not provide a definitive answer to this question, we surveyed[2] 500 experts in sports medicine, asking them if they agreed with the statement "For patients with an acute ankle injury, the ability to hop on the sidelines is sufficient evidence to allow the athlete to return to the field." Respondents were asked to register agreement or disagreement with the statement according to a 7-point, centered and symmetrical scale ranging from "The statement is false" (1 point) to "The statement is true" (7 points). For answers to the statement, the mean score was 3.2 points, signifying that "This statement is probably false." The mean score was slightly higher for orthopedic surgeons (3.6 points) compared with other respondents (3.0 points). The distribution of the responses is shown in Table 1.

The purpose of our article is to assess the issues implicit in the statement about return to play after an ankle injury; to share what the literature has to say on the topic; and to attempt to interpret the expert responses in context.

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The Question

A team physician on the sidelines has to be both sensitive and specific[3] in his or her sideline diagnoses. To start, the physician must be certain that athletes whose continued play would place them at risk are excluded from return to play. On the other hand, there is an obligation[4] to make sure that only those athletes who need to be excluded are indeed kept from play.

The difficulty encountered is that increasing sensitivity and increasing specificity are conflicting goals. That is, if the only concern were to prevent further damage to the athlete, all athletes who even appeared injured should be excluded. This represents perfect sensitivity. Similarly, if the sole concern were to label as ineligible only the cohort that is truly at risk, all injured athletes should be allowed return to action empirically, with those who are truly at risk declaring their disability *ex post facto* by failing the trial. This represents perfect specificity. Of course, neither approach is perfect overall; the former will exclude too many and the latter, too few.

Ankle injuries can be particularly vexing to the on-field physician. Structurally mild injuries can be quite painful, or at least very tender, whereas complete ligament ruptures may be less painful, and with equipment on, not even very swollen or unstable.[5] The questions this leads to are: 1) For a player who has just twisted his or her ankle, when is it safe to return to play? and 2) Who is at risk for propagation of the injury with continued play?

The rationale behind the statement discussed here is that if an athlete can hop on the affected limb, there is at least some semblance of structural stability and intact proprioception. The simple act of hopping (ie, propelling oneself upward and then landing on the plantar surface of the foot) is no trivial matter, despite how trivial it may look.[6] Many systems have to work well to be able to hop. There must not be "neuromuscular deficits….impaired balance, reduced joint position sense, slower firing of the peroneal muscles to inversion perturbation of the ankle, slowed nerve conduction velocity, impaired cutaneous sensation, strength deficits and decreased dorsiflexion range of motion."[7] The question, therefore, is whether the hop test is sufficiently sensitive to exclude these losses and detect all athletes at risk.

The Literature

A wide spectrum of athletic foot and ankle injuries have been described in the medical literature, ranging from sprains and strains of the toes, midfoot, and ankle, to fractures and dislocations. While those with more severe injuries are typically easier to diagnose and designate for the disabled list (an inability to bear weight makes both jobs easier), athletes with less severe injuries present greater challenges.

The National Collegiate Athletic Association (NCAA) Injury Surveillance System (ISS) was started in 1982 and keeps record of the injuries sustained by college-level athletes in all NCAA sports. Data from the ISS have demonstrated that between the years 1988 to 2004, 50% of all athletic injuries occurred in the lower extremity and that ankle sprains were the most frequent sports injury, representing 14.9% of these injuries.[8] In the younger, high-school population, it has been estimated[9] that approximately 40% of all athletic injuries are to the foot and ankle, with sprains being the most common.

Data gleaned from the ISS are generally used to implement rule changes and equipment and training modifications. The ISS data can also be useful in guiding the community of sports medicine physicians on methods of athletic injury prevention, diagnosis, and treatment. Thus far, however, information from the ISS has not led to recommendations for return to play immediately after ankle sprains.

Perhaps the most well-established rules for evaluating ankle injuries are the Ottawa Ankle Rules.[10] These guidelines state that if tenderness is absent at the distal 6 cm of the posterior edge of both the tibia and fibula and if the patient can fully bear weight for 4 steps, then ankle radiographs can be omitted. These rules have been validated and widely used, however, they are less than helpful for guiding the clinician regarding return-to-play treatment decisions because the Ottawa Ankle Rules address a different question altogether. The rules can help identify patients in whom radiographs are going to be negative (and therefore worthy of omission) and having negative radiographic findings does not necessarily clinically correlate with a safe return to play for the sports participant. Put another way, an athlete who fails the Ottawa Ankle Rules test certainly should not be allowed to play, but it is not clear that if he or she met the guidelines for need of

Table 1. Distribution of Responses to the Statement "For Patients With an Acute Ankle Injury, the Ability to Hop on the Sidelines Is Sufficient Evidence to Allow the Athlete to Return to the Field" (N = 500)

"The statement is false," %	"The statement is very likely to be false," %	"The statement is probably false," %	"The statement may be true/false; 50–50," %	"The statement is probably true," %	"The statement is very likely to be true," %	"The statement is true," %
32	15	9	10	18	11	5

radiographs, it would be sufficient to indicate a safe return to play.

The hop test, previously mentioned, has been evaluated by only a few investigators. Caffrey et al[11] looked at 2 groups of patients: 30 high-school athletes without any ankle symptoms, and 30 athletes with functional ankle instability (FAI), which was defined as the feeling and experience of the ankle chronically giving way. There were no patients with acute injuries in the study. Both groups of patients' ankles were tested (injured and uninjured sides for the FAI group) under 4 different hopping tests that each athlete became familiar with and practiced. The study hop tests included: 1) figure-8 hop, 2) side hop, 3) 6-meter crossover hop, and 4) square hop. Results demonstrated statistically significant differences ($P < 0.05$) between the control and FAI groups and also between the injured and uninjured ankles within the FAI patient group. Specifically, for each functional performance test, the patient limb with FAI performed significantly worse than the contralateral uninjured limb. Additionally, the subset of patients with FAI who also had a sensation of giving way performed worse than the remaining patients with FAI, as well as the control group in 3 of the 4 functional performance tests. The performance deficits, however, were relatively small, and the authors could not comment on the clinical meaningfulness of their findings.

A case-control study[12] comparing functional performance and self-assessed disability scores among individuals who had sprained their ankles with or without chronic ankle instability found that hop-test performance did not differ between groups. Another set of investigators[13] also looked at college students to see how patients with FAI performed a hurdle and hop test. In their cohort of 20 controls and 20 patients with FAI, Buchanan et al[13] found no significant difference in performance between the patient groups, but did report that some patients with FAI perceived their ankles to be unstable during the test. Sharma et al[14] also evaluated 62 athletes and compared controls with patients with FAI. Functional performance was assessed with the single-limb hop test, figure-8 hop test, side-hop test, single-limb hurdle test, square-hop test, and single-hop test. Interestingly, the investigators found significant functional performance deficits in the FAI patient group in all tests except the single-hop test.

It must be stressed that none of the studies investigating hopping in the setting of ankle instability addressed the acutely injured athlete[15–18]—none of the studies addressed the issue of return to play. Thus, while the studies do provide evidence that hop-test results can be informative for the task of identifying abnormal ankles, nothing directly is offered from the results about the use of the hop test for the purposes of determining the validity of the statement, namely "For patients with an acute ankle injury, the ability to hop on the sidelines is sufficient evidence to allow the athlete to return to the field." Accordingly, the available medical literature provides no evidence beyond expert opinion about the hop test as an acute screening examination.

The Experts

As shown in Table 1, the mean physician to our survey question response tended toward declaring the statement to be false. The option "The statement is false" was selected by 32% of voters. Orthopedic and nonorthopedic sports medicine specialists had fairly similar answers, but the orthopedic surgery group was a little less sure of the reliability of the statement. What makes the responses of the experts harder to evaluate is that the statement did not make specific reference to the athlete's level of play, and in turn, the relative costs and benefits of being wrong and right, respectively.[19] In particular, among recreational athletes, concerns about safety may be paramount, whereas among professional athletes, the cost of being falsely labeled "disabled" might have profound costs to both the athlete and the team. That is, in a high-stakes environment, passing the hop test may be more than sufficient for the athlete to return to play, whereas among recreational athletes, more caution needs to be used. Simply put, high benefits justify high costs. To illustrate the point with an ankle-injury example, Boston Red Sox pitcher, Curt Shilling, had subluxating peroneal tendons sutured percutaneously, allowing him to pitch in game 2 of the 2004 World Series. This remedy is not recommended for Little League pitchers, or as the Red Sox physician could have said, "Don't try this at home!"

It must be noted further that allowing an athlete to return to play is not tantamount to saying that there is little risk of developing a chronic condition. For example, in an epidemiologic study in military cadets, Gerber et al[20] found that of 96 patients with ankle sprains, 95% of the patients had returned to participating in sports and high-level activity by 6 weeks; however, 55% of these respondents reported intermittent pain. It is possible, thus, that some patients with ankle injuries are stable enough for sports,[21] but are not possibly stable enough to stave off traumatic arthropathy.

Thus, the question, "When has the athlete with a sprained ankle return-to-baseline risk for a second acute injury?" is perhaps distinct from the questions, "When has the athlete with a sprained ankle returned to baseline performance

levels?" and "When has the athlete with a sprained ankle returned to baseline risk for developing a chronic degenerative condition?"

Future Research

The statement posed in this article—"For patients with an acute ankle injury, the ability to hop on the sidelines is sufficient evidence to allow the athlete to return to the field"—is not supported by scientific evidence. Indeed, no standard has been articulated. Yet of course, athletic trainers and sports medicine providers have been making these decisions for years and will continue to do so. Studying the accuracy of these decisions is very difficult. For one thing, perceived instability is not an objective sign.[22] Furthermore, we will never know how those athletes who were excluded would have fared had they been allowed to play, and similarly, we never could be sure that second injuries or degenerative conditions seen in those allowed to return to play were the consequence of the first injury. That is to say, there is no direct evidence available that a decision to restrict a player was correct, nor any evidence suggesting in retrospect that a decision to allow a return to play was wrong. Neither decision is ironclad.

To fully answer the question of when a player with a sprain is safe to return to play, a well-designed randomized controlled trial of adequate sample size would be needed.[23] Unfortunately, to do this would require an experimental group of individuals who have injuries and are allowed to return to play, perhaps against the better judgment of the sideline evaluator. If we do not allow these athletes to play, we can never discover whether current standards are too strict. In fact, it may be that seemingly aggressive return to play is better.[24] Knowingly allowing athletes to endanger themselves is ethically dubious,[25] even if they were to consent, and it is certain that this study will never be performed with institutional review board approval. A so-called natural experiment studying some athletes' return to play against medical advice may provide some information, but it would be, of course, open to questions about confounding.

The most feasible line of research is probably the collection of data on a variety of sideline tests, with correlations offered between those findings and athlete functional status, magnetic resonance imaging findings,[26–27] if any, and medium- and long-term outcomes. The NCAA ISS may be the best vehicle for such data collection, although other groups may be able to collect meaningful information. These studies may dovetail with other efforts to define the best prevention[28] and treatment measures.[29]

Conclusion

Our expert panel did not place confidence in the hop test as means of discerning those athletes safe to return to play from those who should not. The medical literature does not refute that belief, yet it must be noted that the literature is lacking evidence to support any clinical decision rule regarding the return to play following on-field ankle injuries. Because some guidelines are needed,[30] it may be reasonable to change the typical burden of proof and consider some reasonable, conceptually valid test to be operational until proven otherwise. Our expert panel has rejected the hop test as the one to use, but others may be proposed and tested similarly: we do need something.

Conflict of Interest Statement

David Pedowitz, MD, Fotios P. Tjoumakaris, MD, and Joseph Bernstein, MD, disclose no conflicts of interest.

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