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# Syndesmotic Ankle Sprains in Football: A Survey of National Football League Athletic Trainers

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***Objective***: To obtain information regarding syndesmotic ankle sprains and to identify a specific treatment modality that reduces the recovery time for syndesmotic ankle sprains.

***Design and Setting***: A mailed survey conducted from the Sports Medicine Department of Tufts University.

***Subjects***: I sent a survey to the head athletic trainers of all 30 National Football League teams. Of the surveys mailed, 23 (77%) were returned.

***Measurements***: The survey consisted of 8 questions pertaining to syndesmotic ankle sprains with respect to mechanism of injury, playing surface, diagnostic tests, immediate and follow-up treatment modalities, best treatment, recovery time, and taping procedure.

***Results***: A variety of causes were noted as being responsible for syndesmotic ankle sprains; the most frequently described mechanism of injury involved a rotational component. Playing surface was not thought to be a factor in the incidence of syndesmotic ankle sprains. Most athletic trainers (96%) indicated that plain radiographs were part of the diagnostic process, while 52% noted that magnetic resonance imaging was also ordered for suspected syndesmotic ankle sprains. The most frequently used modalities during the acute stage were ice, electrical muscle stimulation, casting or bracing (or both), and nonsteroidal anti-inflammatory drugs. Proprioception training, ultrasound, and taping were the most commonly used modalities during follow-up treatment. Immobilization, corticosteroid injection, and ice and exercise were reported to be the best treatments for reducing recovery time of syndesmotic ankle sprains.

***Conclusions***: To date, no treatment plan or modality for syndesmotic ankle sprains has been shown to effectively provide an early and safe return to football. Therefore, the need is clear for prospective studies comparing treatment protocols and severity of injury.

***Key Words***: diastasis, distal tibiofibular syndesmosis

Most ankle sprains in football involve the lateral ligamentous structures,[1–3] resolution of which is generally quite rapid and usually without long-term sequelae. However, the syndesmotic ankle sprain is a unique and frustrating injury, one that is commonly misdiagnosed[4,5] and results in an extended recovery period.[3,6–15] The syndesmotic sprain is a high ankle sprain that involves the anterior and posterior tibiofibular ligaments, as well as the interosseous membrane. These structures are located above or more proximal to the lateral ligaments, which are more often injured than the syndesmosis.

I conducted a survey of National Football League (NFL) athletic trainers in an attempt to identify whether any particular treatment modality or modalities significantly reduced the recovery time of football players with syndesmotic ankle sprains.

## METHODS

I mailed a survey questionnaire to all 30 head athletic trainers of the NFL during the third week of October 1997; 77% (23/30) responded. NFL athletic trainers were chosen for this survey because the incidence of syndesmotic ankle sprain is thought to be greater in collision sports, such as football and ice hockey.[6]

My survey asked NFL athletic trainers to respond to questions pertaining to their experience in treating syndesmotic ankle sprains. However, it is not known whether responses were based on past experiences or on injuries currently being treated. The questionnaire included questions on syndesmotic ankle sprains with regard to the following: the most frequent mechanism of injury, playing surface, diagnostic tests, treatment modalities employed during immediate and follow-up treatment, the best treatment modality for reducing recovery time, length of time lost, and any special taping procedures used when returning athletes to practice or competition.

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## RESULTS

### Mechanism of Injury

NFL athletic trainers were asked to indicate what they believed to be the most frequent mechanism of injury of syndesmotic ankle sprains. A wide variety of causes of

syndesmotic sprains was reported. While most causes involved complex mechanisms, there were components common to most situations (Table 1).

## Playing Surface

NFL athletic trainers were asked whether they believed the type of playing surface had any effect on the incidence of syndesmotic ankle sprains. Sixty-one percent indicated that surface type was not a factor, 26% were unsure, and 13% felt that the incidence of syndesmotic ankle sprain was higher on artificial surfaces. One athletic trainer felt that the incidence was the same regardless of surface type; however, he felt that the severity of injury was greater on artificial turf.

## Diagnostic Tests

NFL athletic trainers were asked to indicate which diagnostic tests, other than clinical examination, were routinely ordered with syndesmotic ankle sprains. While all rely on the physical examination to identify this injury, other diagnostic tests were frequently obtained. Ninety-six percent routinely ordered plain radiographs, and 52% stated that magnetic resonance imaging was conducted for suspected syndesmotic ankle sprains. One NFL athletic trainer indicated that computed tomography scanning was part of the diagnostic process for this type of injury.

## Time Lost from Participation

The survey asked athletic trainers about the average length of time lost from participation using their present treatment protocol (Table 2). The responses to this question were quite varied, as noted by the fact that the range of time lost was 5 to 56 days. It is important to recall that NFL athletic trainers were not asked to compare time lost with the severity of injury. Rather, they were asked to compare average recovery time with their present treatment protocol.

## Treatment Modalities

NFL athletic trainers were specifically asked to indicate which therapeutic modalities were used during the immediate and follow-up phases of treatment. Additionally, I asked them to indicate the one modality they believed was the most important for reducing the recovery time of syndesmotic ankle sprains (Table 3).

**Table 1. Common Components of Injury Mechanisms**

| Component | Number of Responses |
|---|---|
| External rotation | 16 |
| Plantar flexion | 6 |
| Various mechanisms | 1 |

**Table 2. Average Recovery Time (Date of Injury to Date of Return) for Syndesmotic Ankle Sprains**

| Recovery Time | Time (days) |
|---|---|
| Range | 5–56 |
| Median | 30.5 |
| Mode | 28 |
| Mean | 27 |

**Table 3. The Most Important Modality for Reducing Recovery Time of Syndesmotic Ankle Sprains**

| Most Important Treatment | Number of Responses (N = 23) |
|---|---|
| Immobilization | 6 |
| Corticosteroid injection | 3 |
| Ice | 3 |
| Rest | 2 |
| Proprioception training | 2 |
| Corticosteroid injection and immobilization | 1 |
| Ice and exercise | 1 |
| NSAIDs | 1 |
| All modalities equally important | 1 |
| Fixation screw | 1 |
| None | 1 |
| "I wish I knew" | 1 |

Although many modalities were used initially, there does seem to be a common pattern of management of the syndesmotic ankle sprain. Modalities used in the immediate phase by more than 60% of athletic trainers responding included ice, electrical muscle stimulation, casting or bracing, and nonsteroidal anti-inflammatory drugs (NSAIDs).

The follow-up care also included a wide spectrum of modalities. However, proprioception training, ultrasound, and taping were used by at least 70%. Ice, electrical muscle stimulation, iontophoresis, NSAIDs, and stretching were used by at least 42% during the follow-up phase of treatment. Of the treatment modalities reported as being the best for reducing recovery time, immobilization, corticosteroid injection, and ice and exercise were indicated most often.

Other treatment choices indicated as the best included ice, rest, proprioception training, NSAIDs, and fixation screw; one respondent stated that all treatment modalities were equally important. Of note, one athletic trainer believed no treatment was really effective in reducing recovery time of syndesmotic ankle sprains, and another stated, "I wish I knew" about the best treatment.

## Taping Techniques

Sixty percent of responding NFL athletic trainers answered a question asking them to describe any special taping procedure they employed when returning the athlete to football participation after a syndesmotic ankle sprain. Although, as expected, the responses were all different, 26% indicated that they attempted to counter the force responsible for the injury. For example, if dorsiflexion and external rotation were thought

to be the causative forces, then these motions were restricted in the taping process. Compression of the distal tibiofibular syndesmosis above the malleoli was identified by 17% as part of their taping procedure.

Of note, semirigid cast tape was used by 3 athletic trainers as part of their taping technique for syndesmotic ankle sprains. Five athletic trainers used, in conjunction with tape, some form of brace or custom orthosis to counter rotational forces. One athletic trainer applied a back plaster over the injury site to promote circulation, in addition to adhesive taping. One athletic trainer stated that, in his experience, taping the syndesmotic ankle sprain increased pressure and pain; therefore, he did not tape these injuries.

## DISCUSSION

Since the syndesmotic ankle sprain represents damage to the ligaments of the distal tibiofibular syndesmosis, in particular the anterior and posterior tibiofibular ligaments, it would follow that a rotational force causing the talus to impinge on the distal tibia and fibula may be a primary cause for damage to the distal tibiofibular syndesmosis.

Various mechanisms have been reported as the causative factor for syndesmotic ankle sprains.[9] Our survey suggests that the most common mechanism involves external rotation of the foot. Many other researchers also believe that external rotation of the foot is the primary cause of syndesmotic ankle sprains.[5–9,15–17] Additionally, other authors suggest that a concomitant deltoid ligament injury usually accompanies a syndesmosis sprain, because it is their belief that eversion and external rotation of the ankle and foot are the mechanisms of injury for syndesmotic ankle sprains.[5,8,10,16]

Supporting the survey results, Boytim et al,[6] in a review of ankle sprains to professional football players, also concluded that neither surface nor shoe type was a factor in syndesmotic ankle sprains; rather, this particular injury was the result of the kind of considerable force that was most commonly seen in collision-type sports such as football or ice hockey (and was rarely seen in basketball). Guise,[8] similarly, in his study of rotational ankle injuries in professional football, could not find any connection between the severity of injury and the type of playing surface. However, he did suggest that footwear with a small sole surface on a large foot may predispose the foot to be easily supinated or pronated, or both, which may lead to ankle injury.

The clinical examination is believed to be the most reliable evaluative tool for diagnosing syndesmotic ankle sprains.[3,4,6,8,10,14–16] Clinical tests that clearly identify syndesmotic ankle sprains include the external rotation test, as described by Boytim et al,[6] the squeeze test, as described by Hopkinson et al,[9] and direct palpation of the ligaments associated with the distal tibiofibular syndesmosis.[3–6,8,10,13–16,18] The proximal fibula should also be evaluated to rule out a Maisonneuve fracture, which can be a consequence of rotational ankle injuries.[6,11,18]

Due to the nature of the syndesmotic ankle sprain and the considerable injuring force involved, radiographic studies should be obtained to rule out fracture. In those cases in which initial radiographs are normal, yet significant injury is suspected or pain persists, follow-up radiographs should be obtained to rule out heterotopic ossification or the development of a synostosis within the interosseous membrane.[3,5] Furthermore, stress radiographs are strongly suggested to rule out latent diastasis in cases of persistent pain and disability.[3,9,15] While 52% of the responding NFL athletic trainers indicated that routine magnetic resonance imaging is done for suspected syndesmotic ankle sprains, there is virtually no mention of this type of diagnostic testing for this particular injury in the literature. Instead, computed tomography and arthrography are mentioned as diagnostic tools in cases of suspected syndesmotic sprains.[3,4,9] The varied causes of syndesmotic ankle sprains would dictate that the athletic trainer and team physician evaluate all ankle sprains for potential injury to the distal tibiofibular syndesmosis and rule out pathology to the proximal fibula as well.

Unanimous agreement exists that sprains of the syndesmosis require an extended period of recovery before athletes can return to strenuous athletic activity and, even then, that symptoms may persist for months.[3,6–15] Why does the syndesmotic ankle sprain require such an extended recovery process? The answer to this question may lie in the biomechanics of the distal tibiofibular syndesmosis. During dorsiflexion, the distal fibula moves laterally away from the tibia, and, at the same time, it is pulled superiorly, which brings the fibers of both the tibiofibular and interosseous ligaments into a more horizontal alignment. When the ankle is plantar flexed, the opposite occurs, with the fibula being pulled inferiorly by the flexors of the foot, which causes the fibers of the anterior tibiofibular ligament to assume a more vertical alignment.[19–22] This position would tend to elongate the anterior tibiofibular ligament, causing pain in the presence of injury.

Additionally, the distal tibiofibular ligaments slightly overlap the mortise and can be nicked by the talus during plantar flexion and dorsiflexion.[19] This impingement of injured tibiofibular ligaments might well be exacerbated when they are swollen and inflamed, which may be why the athlete complains of pain with these motions.

Indeed, pain with pushing off is one of the major complaints preventing early return to sport of athletes with syndesmotic ankle sprains.[11,13,15] The development of heterotopic ossification or a synostosis alters the normal fibular biomechanics, resulting in continued pain and discomfort.[13,21,23,24] Hopkinson et al[9] suggested that extended recovery may be due to increased soft tissue swelling, while others noted that swelling is sometimes less with syndesmotic sprains than with lateral ligament sprains.[6,7,15] The most likely cause of extended recovery time, however, is stress on the syndesmosis during activity, which may account for persistent pain and discomfort even in those cases where heterotopic ossification or synostosis is not a factor.

**Table 4. Time Lost from Sport by Treatment**

| Treatment | Time Lost (days) | |
|---|---|---|
| | Mean | Range |
| Corticosteroid injection | 17 | 7–35 |
| Proprioception training | 20 | 5–28 |
| Ice | 22 | 21–24 |
| Immobilization | 25 | 7–42 |
| NSAIDs | 35 | 28–42 |

Ice, compression, and the early, normal use of the joint after lateral ankle sprains is a widely accepted treatment and has been shown to return the athlete quickly to sports.[4,23] Yet, in the case of syndesmotic ankle sprains, some period of immobilization, whether casting or bracing, may be of benefit. Guise[8] believes immobilization, for at least 2 to 4 weeks, is the appropriate treatment of ankle injuries resulting from pronation and external rotation and feels this plan of management returns players to activity most quickly.

Table 4 compares time lost from sport by treatment. Again, severity of injury is not taken into account. However, we cannot ignore the fact that 70% of NFL athletic trainers responding to this survey employed some form of casting or bracing in the management of syndesmotic ankle sprains.

With the development of NSAIDs, the practice of injecting corticosteroids into tendons and ligaments has decreased and become somewhat controversial.[25] Boytim et al[6] mentioned a number of treatment modalities, including corticosteroid injection, in the management of syndesmotic ankle sprains, while Jackson et al[26] did not believe that injecting anesthetic agents or corticosteroids, or using oral or systemic proteolytic enzymes, reduced recovery time in ankle sprains. It is interesting to note that 4 NFL athletic trainers listed corticosteroid injection as the best treatment for reducing recovery time.

As yet, no specific program of management has been described for syndesmotic ankle sprains that clearly returns the athlete to competition quickly and without residual symptoms. Brosky et al[7] outlined a very detailed 4-phase treatment and rehabilitation program after syndesmotic ankle sprain. However, while their program is very comprehensive, the length of time from injury to return to athletic participation is 4 to 8 weeks.

Early mobilization and normal use of the ankle are encouraged for lateral sprains, but the best management of syndesmotic sprains may require some period of rest and immobilization. Comparing specific treatment regimes and severity of injury may supply additional information as to how to best treat this injury. The frustration this injury presents athletes, coaches, and medical personnel clearly suggests the need for further prospective studies.

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