Syndesmotic Sprains in a College Football Athlete

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Abstract

Background: Ankle injuries are extremely common injuries occurring in athletes with the severity of these injuries vary depending on the ankle complexity and structure. Syndesmotic or high ankle sprains can occur less often, but often require an athlete to experience a longer recovery period. A 20 year-old (185 cm and 104 kg) Division IA football athlete received a high ankle sprain during the third quarter of competition and needed assistance off the field. The mechanism of injury was the athlete's contralaterlateral knee rolling up on the right foot causing the fibula to separate from the tibia in dorsiflexion and external rotation. The athlete was point tender at the anterior tibiofibular ligament and interosseous membrane causing extreme pain with the need to be carted off the field. Initial evaluation and X-ray revealed no bone deformities, but extreme pain on the anterior tibiofibular ligament. Pain was experienced, during active ROM, single leg calf raises, standing Kleiger's test, and dorsiflexion-external rotation during evaluation. The athlete was immobilized in a large boot Aircast with the use of crutches to assist with ambulation. The athlete was advised to report to treatment and follow up the next day of onset. **Differential Diagnosis**: Maisonnueve Fracture, Webber Fracture, Deltoid Ligament Sprain, and Anterior Talofibular Ligament Sprain. **Treatment**: Athlete began treatment with the athletic training staff the following day of onset. The athlete reported to treatments three times a day until further progression following a designed rehabilitation protocol. Athlete was referred to team physician where he underwent further physical evaluation and MRI. MRI revealed a complete syndesmotic sprain tear of the right foot with no bone deformities. A rehabilitation plan with short and long term goals were established for the athlete. Athlete was treated conservatively with therapeutic exercises, modalities, and prescription medicine. This treatment was designed into four phases that implemented a gradual return to play progression designed by the sports medicine staff and physicians. During the return to play process, the athlete sustained a mild set back during the last phase of his protocol in which he accumulated an extra 13 days of time loss. This set back was sustained on the athletes first full participation practice where vigorous cutting and full contact was presented. The medical staff revised the rehabilitation protocol where the return to play process was then continued based on the athletes ability. **Uniqueness:** Evidence suggested that syndesmosis sprains typically require 6 to 8 weeks of treatment and rehabilitation for recovery. With the athlete receiving a complete anterior tibiofibular ligament rupture, surgery was not obtained due to a longer recovery time. The athlete was able to return to full participation within 43 days with a mild set back during his rehabilitation protocol. The short period of recovery was accumulated due to the thorough rehabilitation protocol and persistent treatments. **Conclusion:** The results of this case report suggested that a complete rupture of the tibiofibular ligament will not lengthen recovery time if surgery is not advised. With advanced rehabilitation equipment and protocols, the athlete was able to return to full participation after 43 days. During the rehabilitation process, the athlete reported 3 times a day where multiple modalities and therapeutic exercises were implemented. With the exception of a 13 day time loss, no other set backs were acquired during the rehabilitation process. This study is a broad explanation of a complex injury and the recovery process from a Division IA athlete and institution that will provide insight for multiple clinicians.

Introduction

Ankle injuries are among the most common injuries affecting athletes in all sports. "An estimated 28,000 ankle injuries occur in the United States each day." (Kaminski, 2013) Even though lateral ankle sprains are more common than syndesmotic injuries, syndesmotic ankle sprains result in a larger amount of missed playing time. Syndesmotic ankle sprains are more difficult to diagnose than a lateral or medial ankle sprain, and makes recovery complicated for the athlete and medical staff. The following information will explain the mechanism of injury, clinical assessments, radiographic findings, diagnosis, treatments and return to play to provide additional information to this athlete's unique injury.

Purpose

The purpose of this case report was to introduce a 20 year-old Division IA football athlete who received a complete tibiofibular ligament rupture during competition. Even though he experienced a complete rupture, he vetoed surgical procedures to avoid an even lengthier recovery process. An overview of this unique injury is presented to obtain additional information and a better understanding regarding the complete injury of a syndesmotic ankle sprain, from onset to return to play of a Division IA football player.

Anatomy

Understanding the anatomy in relation to the syndesmosis of the ankle is essential in understanding the injury and radiographic findings. The distal fibula connects with the distal tibia to form three major ligaments. These three ligaments are known as, the anterior tibiofibular ligament (ATIFL), posterior tibiofibular ligament (PTIFL), and the interosseous ligament that helps stabilize this structure. The ankle joint also involves a wide talar dome that can also contribute to the fate of these ankle pathologies. The talus acts as a wedge within the ankle joint when forceful dorsiflexion is performed. It promotes widening of the ankle and separates the tibiofibular articulation that adds to the syndesmotic injury mechanism. The syndesmosis is very stable but allows for movements in coronal, sagittal, and transverse planes. During these motions that common sports mimic in high-speed and torque forces, pathologies can occur.

Case Report

Patient: This Division I football player is a 20 year-old (104 kg and 185cm) athlete that received a high ankle sprain during the third quarter of competition. The following information will explain the mechanism of injury, clinical assessments, radiographic findings, diagnosis, treatments and return to play to provide additional information to this athlete's unique injury.

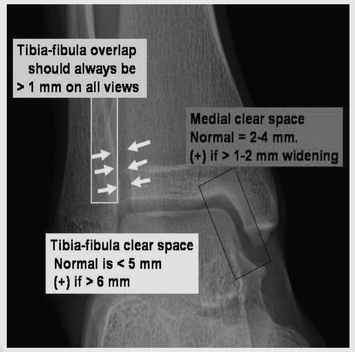
Mechanism of Injury: Knowing that syndesmotic ankle sprains can occur in all sports, collision sports have been found to cause more injuries. "In a study of 60 athletes with syndesmotic sprains, Nussbaum et al (16) found that 55% of sprains were caused by a collision while the foot was planted and externally rotated, resulting in a forward fall that caused further dorsiflexion." (Hunt, 2015) During the competition the linebacker was defending a pass play by tackling the running back while running laterally. As he was initiating the tackle, the athlete's bi-lateral knee forcefully rolled up on his right foot causing the fibula to separate from the tibia in dorsiflexion and external rotation. This forceful external rotation resulted in the widening of the ankle mortise that pushes the fibula laterally from its articulation with the tibia that resulted in this injury.

Clinical Examination: Prior to the athlete being assisted off the field during the third quarter, an on the field assessment was performed. Upon arrival to the athlete, he was presented lying supine and favoring his right ankle. The assessment reveled pain on his fibula and through his syndesmotic joint. No obvious deformity and no apparent pain or injury to his knee was observed. Athlete also stated that he did not recall hearing or feeling a "pop." Upon further evaluation off the field by the team physician, the athlete was tender to palpation over his anterior tibiofibular ligament as well as pain along the lateral side of his fibula. Passive and active range of motion was decreased due to pain in each motion.

During the clinical special testing for this injury, the athlete tested positive when performing the standing Kleiger's test, external rotation stress test, and squeeze test due to excruciating pain. Having the athlete perform the standing Kleiger's test by standing on both feet with his knees bent, mimicked forceful dorsiflexion and external rotation to the side of injury. This performed test was positive due to pain and the inability to perform fully. External rotation stress test was performed while the patient sat at the edge of the table while the examiner stabilized the leg while the other hand placed an external rotation load to the foot. This movement rotated the talus externally that promoted lateral displacement of the fibula and resulted in a positive sign because of pain at the anterolateral aspect of the tibiofibular ligament. The squeeze test was the last special test performed that also resulted in a positive sign. This test promotes separation of the distal aspect of the tibiofibular ligament by squeezing more proximal to the syndesmotic joint.

Radiographic Findings: The team physician within the athletic training room performed initial x-rays. These x-rays were taken to show bone deformities and widening of his syndesmotic joint in a non-weight bearing position. The results of the MRI found the athlete received a complete grade III anterior tibiofibular ligament tear on his right ankle. No bone deformities or syndesmotic ankle joint widening was found.

Clinical Examination: . During physical examination, swelling and tenderness during palpation was inspected. Pain was diffuse, and located at the distal end of the tibia and fibula ankle joint. Clinical tests used to evaluate syndesmotic ankle injuries included the squeeze, external rotation stress, and standing Kleiger's test. None of these tests were accurately diagnostic, but the reliability was found to be high towards the conclusion of a syndesmotic ankle sprain. The results of the MRI however, confirmed that the athlete suffered a complete grade III anterior tibiofibular ligament tear on his right ankle. Grade III is the most severe grade where a total rupture of the ligament causes symptoms that contain severe swelling, bruising, and pain. With the athlete experiencing a grade III syndesmotic ankle sprain, the choice of surgical procedure was given to the athlete. The athlete resorted to non-surgical rehabilitation, and began treatment immediately.



Rehabilitation and Results

Following the decision of vetoing surgical repair of the complete rupture of the anterior tibiofibular ligament, conservative treatment is usually recommended for athletes with syndesmotic ankle sprains. With this patient, the sports medicine staff devised a rehabilitation protocol in which the athlete was to follow for 5 weeks. The protocol was designed with four phases with particular criteria's for the athlete to progress to the next phase. Phase I criteria consisted of diminishing pain and inflammation, restoring range of motion, maintaining muscular strength and flexibility of involved and uninvolved muscle groups. In order to reduce inflammation, besides the use of modalities and treatment, the team physician prescribed anti-inflammatory for the athlete until inflammation decreased. In order for the athlete to progress to phase II, minimal pain, range of motion limitations, and normal gait with crutches must be normalized. Phase II goals were to restore pain-free range of motion, progress to full weight bearing with normal gait, and progressively increase muscle strength and endurance. Criteria to progress to phase III was minimal pain during phase II, full pain free range of motion, and normalized full weight bearing gait and minimal pain during jogging in anti-gravity treadmill/Hydroworx. With the progression of the athlete to begin land running/jogging, the athlete was custom fitted into an Ankle Foot Orthosis brace. This brace prevents rotational and shearing forces that will protect the syndesmosis from separating. The athlete was able to complete both phases within 14 days in order to progress to phase III with no setbacks. Phase III goals consisted of restoring the muscular and cardiovascular endurance, and optimized neuromuscular control. Before phase VI was progressed, minimal pain and normalized running gait at sub max speeds was reached. The athlete surprisingly reached phase VI one week before the rehabilitation protocol advised due to advanced progression. Once phase VI was reached, the return to functional levels in sport specific drills was applicable under the completion of all phases of the rehabilitation protocol. Unfortunately, the athlete experienced a setback during individual linebacker drills 30 days after injury. He was forced to return to phase III in which he returned to full participation following the final completion of phase VI after a total of 43 days missed.

Discussion and Summary

Syndesmotic or high ankle sprain injuries are very rare and frequently misdiagnosed. These injuries can occur in all sports that produce collision and high velocity forces that require a long recovery period. "The range of time lost was 5- 56 days with the importance between the severity of injury." (Doughtie, 1999) Not all ankle sprains are alike because of severity and mechanism, which is important to consider when individualized treatment plans and injury preventions are established. The mechanism of injury may be created in a different manner, but similarly consists of forced dorsiflexion and external rotation of the ankle relative to the leg. Physical examinations that include proper palpitations, special tests, and clinical findings are imperative in a correct diagnosis. Once a diagnosis is hypothesized, radiographic findings maybe necessary for some patients depending on severity and confidence of the diagnosed injury. Conservative treatment is followed and created with a rehabilitation protocol from the sports medicine staff.

This injury process was accurately assessed similarly during the injury of the Division I linebacker. The uniqueness of this athlete was the complete tear of his anterior tibiofibular ligament that did not result in surgical procedure. From the initial onset to full functional return to play, the athlete followed the assigned rehabilitation protocol from the sports medicine staff where the time lost resulted in only 43 days. Injuries to the syndesmosis are relatively uncommon in certain athletic populations but it is important to understand the sequence, severity, and significance associated with injury to the syndesmosis to provide a better understanding of such a complex and diverse injury that will assist the athlete in returning in a faster time period.

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