Treatment of Lateral Ankle Instability

Proper diagnosis and treatment will lead to the best clinical outcomes.

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Goals and Objectives

After completing this CME, the reader should be able to:

1) Recognize the causal factors that lead to lateral ankle instability.

2) Understand the relationship of lateral ankle instability to chronic ankle sprains.

3) Appreciate the value of early conservative intervention

4) Be familiar with the diagnosis, treatments, and procedures which will result in the best clinical outcomes.

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*Following this article, an answer sheet and full set of instructions are provided (pg. 144).—**Editor***

Lateral ankle sprains or "sprained ankles" are among the most common lower extremity injuries treated in a sports podiatrist's office. 30% of all sport injuries involve the ankle and 15-20% are sprains.[1] On any given day, one person in 10,000 sustains an ankle sprain.[1] Ankle sprains are more common in younger patients (ages 15-35) and comprise the most common time-lost injury in sports.[1]

The lateral ankle ligaments consist of the anterior talo-fibular (ATF), calcaneo-fibular (CF), and the posterior talo-fibular ligaments (PTF) (Figure 1). The inferior anterior tibio-fibular ligament (AntTF) is also a major stabilizing component of the ankle and is often injured in a lateral ankle sprain, especially when torque is combined with lateral imbalance(-Figure 1).[2]

The peroneal tendons act as active stabilizers for the lateral ankle, and are

Continued on page 136

Ankle Instability (from page 135)

commonly injured (Figure 2).[2] Syndesmotic sprains (high ankle sprains) involving the AntTF ligaments are the most debilitating injuries and require longer treatment times for resolution.[3] In general, a lateral ankle sprain involves the ATF, CF and PTF (less common), but the AntTF and peroneals can also be involved.[2]

In severe injuries, the Achilles', styloid process of the 5th metatarsal, anterior process of the calcaneus, tibia, fibula, and the cuboid and/or navicular articulations may also be affected.[2]

Injury to the lateral ankle may occur acutely (like stepping in a deep hole) or chronically (repeated sub-maximal sprains like repeatedly tripping on a small pebble). In an acute sprain, an inversion stress commonly caused by uneven terrain or poor balance causes rapid foot and ankle supination. This inversion stress may be accentuated by structural (lower extremity varus) or postural imbalance (poor proprioception).

The net effect is stress on the lateral ankle ligaments that may be sufficient to stretch, attenuate or tear one or more of the lateral ligaments. While initial treatment of acute or chronic injuries may be similar, long-term sequelae can occur due to improper or truncated treatment.[4]

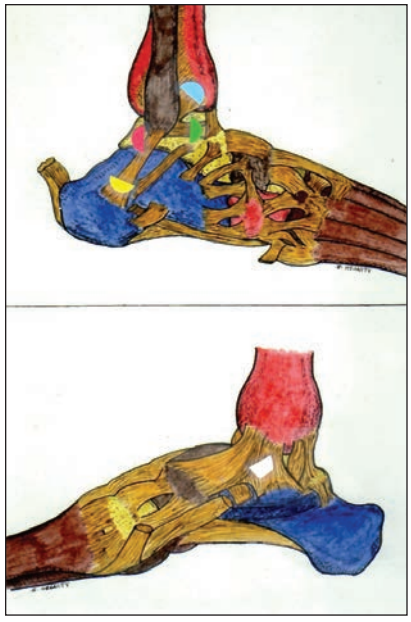

Figure 1:
Top—MARKER in Light Blue=Anterior Inferior Tibio-Fibular Ligament (Ant.Tib.Fib.):
Green=Anterior Talofibular Ligament (ATF):
Yellow=Calcaneofibular Ligament:
Red=Posterior tibiofibular ligament (PTF)
bottom—MARKER in White=Deltoid ligament

Chronic Ankle Instability

Chronic ankle instability is often the result of an acute injury that was not treated properly in the acute stage. Age may also play a part. As we mature, the cumulative stress on the lateral ligaments combined with deterioration of the individual's ability to balance and have proper proprioception can predispose one to lateral ankle overload.[4]

While poor treatment is often the cause of chronic ankle problems, about 10-30% of sprains become chronic despite early and proper treatment.[3]

Figure 2: The lateral side of the ankle showing the peroneal tendons (most notably seen the peroneus brevis) that act to stabilize the ankle against inversion sprains and are often injured in the process. Loss of peroneal strength is a key factor in lateral ankle instability.

Figure 3: A picture of a severe sprain of the lateral ankle about 24 hours old. A compressive bandage and ice bags had been used. Note the severe ecchymosis in the heel and ankle and the edema of the leg, ankle, and foot. Treatment should be started immediately and consist of PRICE, An acronym for protected weight-bearing, relative rest, ice, compression and elevation. A home program may be complemented by physical therapy at an outside facility.

Diagnosis and Symptoms of the Acute Ankle Sprain

When examining an acute sprain, the physician should obtain a good history regarding the mechanism of injury. Was it due to outside forces (a tackle, a hole, a bad shoe, etc.), or did it seem to occur without provocation (a poor step or loss of balance, etc.)? Physical examination should include searching for any edema, ecchymosis, redness, hematoma or other physical signs of injury over the lateral ligaments or appurtenant structures (Figure 3).

The ability to weight-bear is important from both a diagnostic and treatment perspective.[5] Inability to bear any weight usually portends a more serious injury. Patients may be able to weight-bear with a significant limp, a mild limp, without a limp, or sustain a toe-toe gait, depending on the severity of the injury.

The Ottawa rules for ankle injury state that diagnostic x-rays are required only when the patient cannot walk at least four steps, or if there is pain in the malleolar area or common sites of fracture following a sprain.[1] Range of motion (ROM) should be assessed. The quality of motion can be fully restricted, to having no apparent restriction. There may be no pain until the end ROM, or pain throughout the range.

Gradation of Acute Ankle Sprains

The first step in treatment of an acute sprain is assessing the grade of injury. Historically, two systems have been used, but they are commonly combined into one.[5] The West Point and Chapman systems both grade on a one to three scale (Figure 4).

Some clinicians feel that physical assessment has severe limitations and suggest adding physical testing as

Continued on page 137

Ankle Instability *(from page 136)*

well. The anterior drawer test can be performed with or without an x-ray. To perform this test, a hand is placed over the anterior aspect of the tibia while another cups the heel bone. The examiner then pushes backward on the tibia while pulling forward on the calcaneus. Anterior migration of the talus, with or without "clicking", is considered a positive sign.

A variation of this test measures the anterior migration of the talus on x-ray. A 5mm anterior shift from a resting to stress view is considered positive. Talar tilt is another physical test deemed important by some clinicians. It is performed while stabilizing the tibia just above the malleoli and gripping the heel bone from below. The hand on the calcaneus then places an inversion stress on the ankle while the tibia is stabilized. Laxity of the lateral ligaments will allow increased inversion of the ankle joint.

Radiographically, a talar tilt (measured by an angle formed by lines parallel to the inferior surface of the tibia to the superior surface of the talus) of 10 degrees or more is a significant finding.

Hopkinson's Sign

Hopkinson's sign can be used to assess syndesmotic ankle sprains.[6] The clinician stabilizes the tibia above the malleoli with one hand and the calcaneus plantarly with the other. A rotational twist is applied by turning the hands in opposite direction simultaneously. A positive sign is excessive motion and pain in the ankle mortice or lateral fibula. There are many other tests that can be used to assess ankle injuries. The tests above are the most commonly used and clinically significant.

Treatment of Acute Sprains

Once the injury has been assessed and graded, treatment can begin. The pneumonic PRICE is a good way to remember the key points of treatment.

P = stands for protected weight-bearing. This may be as simple as wearing a good shoe, to the use of crutches or walking boots.

It has been shown that early protected weight-bearing shortens disability and speeds the healing process. Extended periods of rest allows edema to persist, limits circulation, produces poorer quality of scar tissue, and can lead to decreased ROM and poor proprioception.[7]

R = stands for rest. Few dispute that in more severe injuries rest may be needed initially to allow the pain, edema, and inability to stand to subside. Early mobilization of an injury has long been a hallmark of treatment in sports medicine.[5] Time has proven its efficacy and it now has become the standard of care for most patients. The question of how long an injury should be rested depends on many factors. Most authorities agree that weight-bearing should be encouraged as soon as practical.

Hopkinson's sign can be used to assess syndesmotic ankle sprains.

I = stands for ice. Control of edema is essential to allow healing to progress as rapidly as it should. A simple method can be the use of an ice bag or bath. An Ace® bandage, Unna boot, Jobst® compression, or hands-on physical therapy can all be successful.[5,7] Alternately, eschewing modalities that warm tissue such as heating pads, hot packs, ultrasound, etc. are discouraged.

C = stands for compression. Control of edema is very important. Significant edema can prevent proper circulation, decrease needed ROM, limit the ability to weight-bear and increase pain. Ice and early gentle compression help the body to launch the "healing cascade" that encourages collagen formation (Figure 5).

E = stands for early mobilization and early aggressive rehabilitation. Early mobilization has been shown to form stronger and more elastic scars due to faster and higher quality collagen formation.[5,7] Early and aggressive physical therapy with emphasis on strength, flexibility, and proprioceptive training protocols speed healing and help prevent recurrence.[4,5,7]

Functional Ankle Instability

In 1965, M.A.R. Freeman brought attention to the role of functional instability as both a cause and effect of severe ankle sprains.[4] While not the first to notice that ankle instability

Continued on page 138

FIGURE 4:

Combined West Point and Chapman Grading

Grade 1 = No tear: minimal edema and almost full ability to weight bear without assistance

Grade 2 = Partial tear: moderate edema and weight bearing with a significant limp with or without assistance

Grade 3 = Complete tear= severe edema and no ability to weight bear without assistance

Ankle Instability (from page 137)

often followed a significant sprain, he emphasized that structural imbalance together with proprioceptive deficiency often combined to enhance lateral ankle instability. This was especially true in chronic ankle sprains.

A high arched or cavus foot is often implicated (Figure 6). Structural imbalances such as tibia or sub-talar varum, rigid or plantarflexed 1st ray, and loss of ankle or sub-talar joint (STJ) motion were well known in contributing to chronic sprains.[5,7]

The role of mechanoreceptors in the ankle capsule was less obvious. Freeman suggested that severe or chronic sprain of the ankle with concomitant damage to the ankle capsule and mechanoreceptors often leads to loss in proprioception.[4] A stretched out capsule might fail to initiate enough pressure to trigger the position sense organs. This could lead to delayed response in triggering proprioception.

In essence, the ankle joint would be past its balance point before proprioception was triggered. The more often the ankle was "sprained", the more lax the ligaments and the slower the response. This could result in the tendency toward chronic sprain. If we accept this as we should, then treatment of any ankle sprain should include balance or proprioceptive training in addition to strength and flexibility protocols and PRICE.

A simple home exercise for balance can be the modified Romberg's test (Figure 7).

Figure 6: Structural deformities in the lower leg, ankle, and foot may accentuate proprioceptive loss and can contribute to lateral sprain. Biomechanical factors like the cavus (high arched) foot type above cause lateral overload (supination) and strain on the lateral stabilizers of the ankle. Strengthening the peroneals, balance training, stretching, proper shoe selection, and use of laterally stable orthotics can lessen lateral overload and help prevent sprains.

Figure 5: Part of aggressive early treatment of an ankle sprain is the control of edema. PRICE is an acronym used to describe this. The "C" refers to compression or wrapping of the ankle (as shown above). Wrapping helps to support, control eccymosis, reduce edema, reduce pain, and allow earlier weight-bearing.

A simple home exercise for balance can be the modified Romberg's test.

Delayed, Improper or Inadequate Treatment of Ankle Sprains

The early and aggressive treatment of an acute sprain is essential in the prevention of chronic ankle instability.[4,5,7,8] It is commonly held that this treatment includes the proprioceptive protocols above, combined with strength and flexibility training. Loss of strength and guarding in the peroneal muscles, especially the peroneus longus (PL) and peroneus brevis (PB), is a common sequel to ankle sprain.[5,7,8]

This is underscored by the common finding of splits, tears, or scars in these structures on MRIs of the ankle.[7] These findings are seen even in routine MRIs not taken to assess ankle sprains. Home remedies using a tension or resistance band and eversion of the foot and ankle help strengthen the ankle (Figure 8).

Physical therapy with the use of resistive bands, isokinetic machines, or even isotonic contracture against the therapist's hand to inhibit eversion is a common rehabilitative tool. Flexibility of the calf must be re-established following injury to the ankle.[5,7,8] In both acute and chronic sprains, the perceived ankle instability is countered by the patient tonically contracting the gastrocsoleus muscle to offload the injury. The imbalance that ensues needs to be addressed to ensure full ankle mobility.

Active wall stretch of the calf isolating each leg and holding under stretch for 10 seconds with the ankle straight, then bent, repeated 10 times is a good home exercise. Physical therapy may employ active, passive, or proprioceptive neurofacilitative stretch (PNF) to achieve this goal.

Balance training should be instituted as soon as possible. The "modified Romberg's" balance test (Figure 7) can be used at home or in therapy, but therapy usually includes the use of a balance board or proprioceptive platform as well. When we are dealing with athletes with ankle instability, sport-specific training and the use of a brace are sometimes required as a return to sport protocol. Other ancillary measures to prevent sprain include emphasis on the use of properly constructed shoes and foot orthotics (Figure 9).

The Need for Surgical Intervention for Ankle Instability

A common misconception about ankle instability is that surgical correction is commonly needed and provides better stability with fewer sequelae. This has NEVER been the case. Brostrom (1964-6) outlined the treatment of lateral ankle sprains in a series of articles culminating in 1966.[9] Despite years of controversy, his research has consistently been

Continued on page 139

Ankle Instability *(from page 138)*

shown to be correct and remains the standard of care. Summarizing his research, ankle sprains of any magnitude are best treated by early mobilization and protected weight-bearing.

In acute injury where conservative protocols fail, Brostrom showed that delayed secondary ligament repair yielded the same functional results as early primary repair.[9] Many researchers since have noted a 10-30% recurrence of sprain, regardless of method of treatment.[2,8,10] A prospective study of 146 patients with Grade III sprains were treated with early protected weight-bearing and showed return to activity six weeks earlier than a group that underwent surgery.[8] No difference was noted between groups in re-injury rate or joint laxity seen in stress x-rays at the two-year mark.

Chronic ankle instability and/or pain is seen in 10-30% of sprains.[2,8,10] This instability can be mechanical, structural, or positional (poor biomechanics, lower leg alignment or balance problems). **It is important to note that there is no correlation between mechanical/structural and functional instability.** They can exist apart or together. Rehabilitation is the preferred route of treatment. It has been shown that the combination of peroneal strength, proprioception, and the use of properly constructed orthotics can control most chronic problems.[10] Surgery should be reserved for those patients who have at least six months of proper rehabilitation, and where symptoms persist and cause the inability to perform normal activities of daily living.

Figure 7: The modified Romberg's test shown above can be used to test for proprioceptive deficiency AND/OR rehabilitate an unstable ankle. The patient is asked to stand on the affected ankle and balance. Failure to maintain balance for 5 seconds with the eyes open is indicative of proprioceptive loss. To build balance, have the patient stand in a door frame for 5 seconds. When this is possible, add 5 second intervals until it is able to be done for 30 seconds. Progress to 5-30 seconds with eyes closed. The door frame prevents injury, and increasing time builds balance.

Surgery to Correct Recalcitrant Lateral Instability

When it has been determined that conservative treatment is insufficient to control lateral instability, surgery is often a last resort.

The procedure that is chosen is often the key to a successful surgical result. The Gould modification of Brostrom's original imbrication procedure is considered by many to be the "gold standard".[11,12] For this procedure to be successful, the injured lateral ligaments must have sufficient length and strength after injury to allow plication without undue tension. When the damage to the lateral ligaments causes the tissue to look like the end of a mop, or where not enough viable tissue exists to allow anastamosis, reconstruction of the ligament may be necessary.[11,12]

There are a myriad of procedures designed for this purpose. Watson-Jones described a procedure where the full peroneus brevis tendon was passed through the fibula and neck of the talus to supplant the normal ligament.[11] Lee's modification recommended only passing the tendon through the fibula before suturing.[11]

Elmslie suggested a full graft split into halves, one put through

Continued on page 140

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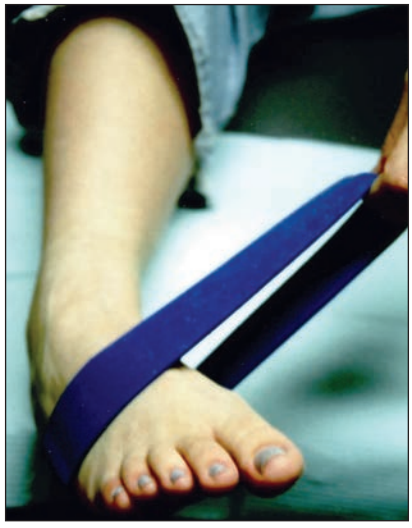

Figure 8: A key element in treatment and prevention of chronic ankle instability is strength of the peroneus longus and brevis muscles. Patients can be taught home use of a tension or resistance band to accomplish this goal. Aggressive physical therapy protocols will commonly use resistance on specially designed machines.

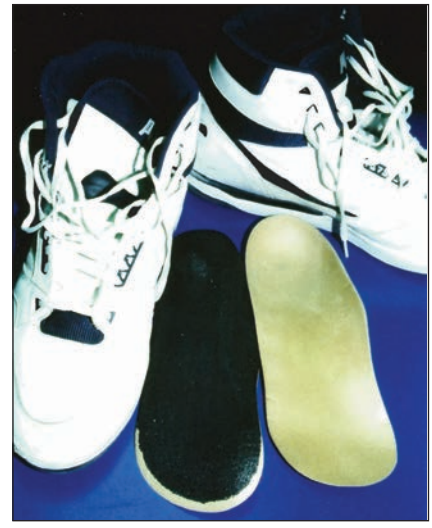

Figure 9: Use of properly constructed shoes and foot orthotic devices (FODs) can reduce the morbidity of chronic instability. Shoes that resist torque and have a stable midfoot, among other features, lessen lateral instability. Non-rigid, laterally posted FODs can help to control biomechanically unstable feet.

Ankle Instability (from page 139)

the fibula, the other attached to the heel bone.[11] Chrisman-Snook used a split graft. One half remained in place, the other half went through the fibula and was sutured into the heel bone.[11] Evan's procedure seems to be in vogue today. He suggested a full graft that went from anterior to posterior through the fibula (the opposite direction of most other procedures) and then was sutured to the fibula.[11,12]

There is no reliable evidence that any one procedure is better than another in re-establishing ankle stability. It has been said by some that many of the lateral ankle stabilization procedures work because they produce scar formation over the lateral ankle. The scar acts to limit abnormal motion and triggers a more rapid proprioceptive response. While logical, this has never been proven. In cases where tissue is not viable, surgery has failed, or the imbalance is too severe, ankle implantation or fusion may be considered.

Chronic ankle instability is usually the result of poorly timed or inadequate treatment of an acute sprain.

Syndesmotic Ankle Sprain

About 10% of ankle injuries involve the inferior anterior tibio-fibular syndesmotic ligaments (Ant. TF). This injury is often termed a "high ankle" sprain. The mechanism of injury involves ankle plantar flexion, and lateral stress as in a normal "sprain", but is complicated by rotational stress as well.[13] This results in an injury that is more severe. Lateral sprains commonly result in .04 games and 1.1 practices missed on average, while "high ankle" sprains result in 1.4 games and 7.3 practices missed.[13,14] Physical signs and symptoms:

The physical signs above are often evaluated along with diagnostic tests such as x-rays (commonly negative) which initially sometimes show interosseous calcification; or ankle spurring six months to one year post-injury (Figure 11). An MRI is a better diagnostic tool, especially immediately post-injury. It can evaluate both bone and soft tissue trauma (Figure 12).[13,14]

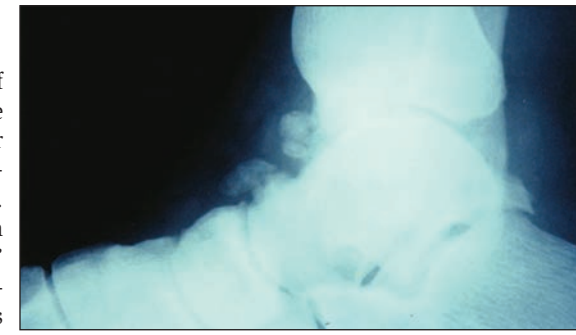

Figure 11: Severe or chronic lateral instability or syndesmotic injuries often leave radiographic evidence behind. Calcification interosseously or peri-crurally on radiographs can help confirm previous injury. The calcification on the talar head and neck and anterior surface of the tibia on the above radiograph are indicative of repeated trauma.

FIGURE 10:

Signs of Syndesmotic Sprain

(+) Kleiger sign (pain on external rotational stress of foot on ankle)

(+) "thump" test (pain when the plantar aspect of the calcaneus is struck smartly by the examiners fist)

(+) Hopkinson's squeeze sign (pain in ankle or leg when squeezing the fibula against the tibia)

– Pain at or above the ankle mortise on palpation or compression

– Swelling over the anterior or posterior lateral ankle

– Pain anterior or posterior in the ankle on ROM

Generalized Ligamentous Laxity

The presence of generalized ligamentous laxity (GLL) is commonly overlooked in evaluating soft tissue deformity or injury to the foot. This is a mistake that can have serious repercussions. When an individual with GLL has a soft tissue injury or is about to undergo a soft tissue surgery, it is good practice to evaluate the individual's joint hypermobility. Individuals with high GLL scores are more prone to recurrent injury or return of deformity post-rehabilitation or surgery when positional (soft tissue) corrections are done in lieu of structural (boney) correction. The reader is referred to the Contompasis method of evaluation as described by McNerney and Johnston.[15] In essence, it evaluates six points of laxity. A short synopsis is contained below:

Sprain with Fracture

While it is beyond the scope of this paper to delve deeply into ankle fractures involving the ligaments, a brief discussion is warranted. About 1-2% of the most troublesome sport injuries involve ankle fracture.[16] Treatment depends on the type, severity, and timing of treatment. There are many classification systems to guide treatment. Older classification systems may still have

Continued on page 141

Ankle Instability *(from page 140)*

some validity, and newer systems are often complicated.

Danis-Weber classifies ankle fractures according to the level of fibular fracture to the ankle mortise, Lauge-Hansen by the mechanism of injury.[17] One could describe a fracture as being above, below, or at the level of the ankle mortise, according to Danis-Weber. Lauge-Hansen would describe the fracture by describing the foot position and motion of the leg at the time of injury. Examples are supination with external rotation (SER), supination with adduction (SAD), or pronation with adduction (PAD), to name a few.[17]

Fracture classification is necessary not only to facilitate proper treatment, but to help predict possible sequelae. Addenda to the above fracture classification systems as well as many new systems are in vogue. The reader is encouraged to explore them in greater depth, where warranted.

Shoe and Orthotic Design

Lateral ankle instability can be enhanced by proper shoe selection or the use of foot orthotic devices (FODs). Conversely, improperly chosen shoes or poorly designed FODs can make instability harder to control. Shoes designed for lateral instability generally incorporate some or all the following design features (Figure 14)[18]:

- 3/4 high top cut is superior to below-ankle at ankle stabilization;
- Full high top adds NO extra stability over 3/4 high cut style;
- Resistance in the heel counter is required;
- Torsional stability through the midsole is essential (Figure 14);
- Shoe should bend easily through the forefoot;
- Shoe should bend or collapse minimally through the arch;
- Cleated shoes must have cleats throughout the arch (not just in the heel and forefoot) (Figure 14);
- Cleated shoes should have reinforced arch in the midfoot;
- Cushioning throughout the shoe should be compliant but not "bottom out" to create instability.

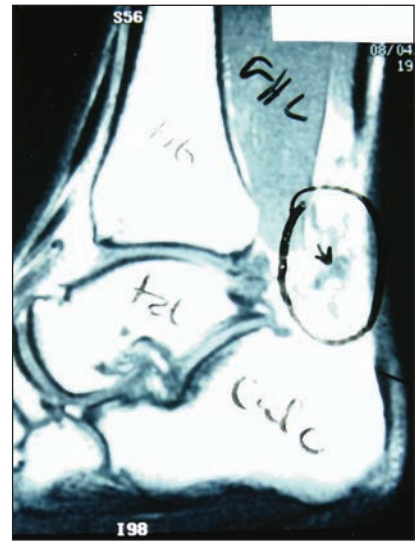

Figure 12: Magnetic Resonance Imaging (MRI) is better than x-ray at accessing soft tissue damage. The image above shows damage to the Achilles tendon, a common ancillary injury in chronic ankle instability of the ankle.

Just as shoes can help stability, properly designed FODs can help foot support and guidance. When there is a structural imbalance in the lower extremity, FODs designed to lessen foot supination can protect against lateral overload. Orthotics designed for this purpose might include the following modifications (Figure 15):

- A deeper heel cup of 18 mm or higher (normal is 14-16 mm.);
- Increased lateral forefoot posting (valgus wedge or post);
- A lateral clip (extension of the lateral heel cup to the 5th metahead);
- Full arch contour—do not allow lab to arch fill or lower the arch;
- Use semi-rigid or semi-flexible materials to prevent arch avoidance or reflex over-supination generally associated with harder materials;
- Make all forefoot support extend to the toe sulcus to support the foot throughout the push-off phase of gait (Root-style FODs are not as effective in late stance because the post ends behind the metaheads);
- Use minimal heel lift. Lifting the heel supinates the foot and results in greater lateral instability;

Continued on page 142

FIGURE 13:

Evaluation of Generalized Ligamentous Laxity[15]

1) Thumb to wrist-flex the wrist and try to pull the thumb down to touch the fore arm. Normal = thumb barely touches forearm

2) 5th metacarpal extension- with the hand on a supportive surface try to pull the 5th metacarpal backward on the hand. Normal = a 90 degree ankle of finger to hand, more than 90 degrees is (+)

3) Elbow hyperextension = try to extend the elbow as far backward as possible. Normal = the elbow extends to 180 degrees or straight (not beyond)

4) Knee hyperextension = try to hyperextend the knee. Normal is the knee at 180 degrees or straight (no genu recurvatum)

5) Palms to floor = Bend at the trunk with the knees locked. Normal = One should be able to touch fingertips to the ground. (not the wrists or palms)

6) Calcaneal valgus = View the calcaneus from behind. Normal = the perpendicular bisector of the heel should not form a valgus angle to the lower leg.

Ankle Instability *(from page 141)*

• Minimal to neutral rearfoot varus posts to decrease lateral off-loading;

• FODs made over a plaster cast with accurate rearfoot to forefoot measurements; good arch contour and minimal alterations in the fabrication by the lab work best.

Summary

Lateral ankle instability can be a sequela to ankle injury, even when proper treatment is timely. In many cases, treatment of a sprain is delayed, inadequate, or neglected completely. An estimated 10-30% of individuals who sustain an ankle sprain fall into that category. Proper treatment must involve not only the weakened structures but also the impaired proprioception. Chronic ankle instability is usually the result of poorly timed or inadequate treatment of an acute sprain.

The most common mistakes are inadequate strength training for the peroneals, failure to regain adequate ROM, neglected balance or proprioceptive protocols, or the failure to recognize ancillary problems such as structural abnormalities, GLL, gastroc-soleus inflexibility, or secondary injuries (i.e. base of 5th fracture, etc.).

Early protected weight-bearing (PRICE), relative rest, edema control, and aggressive rehabilitation are keys to limiting morbidity. Properly selected shoes (mid-cut, torsionally stable) and properly constructed FODs (lateral clip with deep heel cup) can lessen biomechanical instability. Surgery should be a last resort. It is unpredictable with high failure rates (30-40%). The current gold standard is the Brostrom-Gould; in failed surgery, the Evans modification of Watson-Jones is suggested. Joint implant or joint fusion can be used as salvage procedures.

This article is not meant to be an all-inclusive look at lateral ankle instability, but rather to act as a primer. It is written from the author's perspective and experience with this injury. The reader is encouraged to look deeper into the subject to flesh out any inadequacies or ambiguities that may still persist in his or her mind.

Figure 14: Shoes can be used to aid lateral ankle instability. The criteria for stability rated shoes are in the text. This picture demonstrates many important criteria: torsional stability (this shoe does not resist torque), midsole stability (this shoe has poor midsole stability) and proper cleat placement (this shoe lacks cleats throughout the arch). This shoe would be deemed unsuitable for field sports.

Figure 15: Properly stabilized foot orthotics (FODs) can be an aid to prevention of lateral instability. They should be semi-flexible or semi-rigid (as shown), contour the arch perfectly, have a deep heel cup and/or lateral clip (as shown), extend beyond the metaheads (esp. for athletes), and be laterally stable (valgus posting in the forefoot).

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SEE ANSWER SHEET ON PAGE 145.

1) Which of the following are true about lateral ankle injuries?
   A) They are commonly seen in sports.
   B) They occur more often as an individual ages.
   C) They are often due to balance or proprioceptive difficulty.
   D) All of the above.

2) The lateral ligaments of the ankle include:
   A) The anterior talo-fibular ligament.
   B) The posterior talo-fibular ligament.
   C) The calcaneo-fibular ligament.
   D) All of the above.

3) Which of the following can be a common cause of lateral ankle sprains?
   A) Uneven terrain.
   B) Structural imbalance in the foot or lower leg.
   C) Proprioceptive loss.
   D) All of the above.

4) Chronic ankle instability is the result of:
   A) Weak peroneals.
   B) Age.
   C) Subtalar joint varus.
   D) All of the above.

5) Which of the following are characteristics of acute ankle sprains?
   A) Eccymosis.
   B) Edema.
   C) Rubor, calor, and dolor.
   D) All of the above.

6) The most correct statement regarding Ottawa Rules for ankle sprain is_____
   A) Diagnostic x-rays are always required.
   B) Diagnostic x-rays are never required.
   C) Diagnostic x-rays are required if a patient cannot walk at least 4 steps.
   D) Diagnostic x-rays are required only if there is significant loss of range of motion.

7) Gradation of ankle sprains ALWAYS _____
   A) Are based on x-ray findings.
   B) Requires a positive talar tilt or positive anterior drawer sign.
   C) Requires a Hopkinson's test.
   D) Requires a visual assessment of the injury.

8) Treatment of a lateral ankle sprain should generally include:
   A) Protected weight-bearing.
   B) Relative rest.
   C) Compression.
   D) All of the above.

9) Functional or chronic ankle instability may be due to:
   A) Poor biomechanics.
   B) Impaired proprioception.
   C) Uneven terrain.
   D) All of the above.

10) The best protocols for treating an acute ankle sprain:
   A) Institute early aggressive treatment.
   B) Institute strength, balance, and flexibility protocols early.
   C) Employ sport-specific training for athletes.
   D) All of the above.

11) When considering lateral ankle surgery for instability:
   A) Surgery is commonly the best treatment.
   B) Surgery provides better stability with fewer sequellae.
   C) Brostrom's (1964-6) ligament repair is outdated.
   D) All of the above.

12) All of the following are methods of lateral ankle stabilization repair:
   A) Evans procedure.
   B) Chrisman-Snook procedure.
   C) Watson-Jones procedure.
   D) All of the above.

13) Which of the following statements are true of syndesmotic ligament sprains?
   A) They are often termed "high" ankle sprains.
   B) X-rays are generally negative.
   C) The mechanism of injury often involves rotational stress.
   D) All of the above.

14) Evaluation of generalized ligamentous laxity (GLL) after an ankle sprain:
   A) Is generally valid as long as one joint is tested.
   B) Has no significance in the rehabilitation of a sprain.
   C) Can negatively impact rehabilitation when present.
   D) Is currently a common test done by most foot and ankle specialists.

15) Which of the following are true of ankle sprains involving fracture?
   A) They can be classified by the level of the fracture.
   B) They can be classified by the mechanism of injury.
   C) There are many systems of fracture classification.
   D) All of the above.

Continued on page 144

16) When considering selection of foot gear post-ankle sprain, which statement is most FALSE?
A) The higher on the ankle the shoe rises, the better stability it provides.
B) Midsole torsional stability is a key feature.
C) Heel counter resistance is necessary.
D) Cleated shoes should have cleats through the entire arch

17) Orthotics (FOD) that are designed to be used post-ankle sprain in athletes have the desired features below, EXCEPT:
A) They must be rigid.
B) They should have a lateral flange.
C) Forefoot posting should extend beyond the metaheads.
D) They should contour the arch as perfectly as possible.

18) Which of the statements below are true?
A) About 10-30% of all lateral ankle sprains can become troublesome despite early, aggressive proper treatment.
B) One element of proper treatment involves the use of proprioceptive (balance) treatment.
C) Calf flexibility is needed to regain full range of motion.
D) All of the above.

19) In general, which of the following statements is the MOST true regarding lateral ankle injury?
A) Early mobilization always leads to more sequelae.
B) A lower leg cast is required for most sprains.
C) Swelling or edema is not commonly seen in sprains.
D) Weight-bearing is often difficult post-acute sprain.

20) Which of the following statements is true regarding lateral ankle sprain?
A) All sprains heal well without intervention.
B) Sprains always cause problems unless treated.
C) Most sprains heal inadequately unless properly treated.
D) Most sprains require surgery to heal fully.

SEE ANSWER SHEET ON PAGE 145.

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EXAM #7/15
Treatment of Lateral Ankle Instability
(McNerney)

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1.	A	B	C	D	11.	A	B	C	D
2.	A	B	C	D	12.	A	B	C	D
3.	A	B	C	D	13.	A	B	C	D
4.	A	B	C	D	14.	A	B	C	D
5.	A	B	C	D	15.	A	B	C	D
6.	A	B	C	D	16.	A	B	C	D
7.	A	B	C	D	17.	A	B	C	D
8.	A	B	C	D	18.	A	B	C	D
9.	A	B	C	D	19.	A	B	C	D
10.	A	B	C	D	20.	A	B	C	D

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