

# The Trainer's Wrap

Volume 1, Issue 1

## About this Newsletter:

The athletic training staff of Ben Davis High School will try to use this news letter to inform coaches of the township about common injuries that they may see every day. As this newsletter develops we hope to include articles from other experts in the field such as dietitians or strength and conditioning coaches. If you have a particular subject that you would like the staff to address, please contact Mark Lahr at mark.lahr@wayne.k12.in.us or call Mark at 227-4191.

Previous issues:

Concussions—September '99

## Ankle Injuries

Ankle sprains vary in severity from very mild to very severe. Most athletes have experienced the mild ankle sprain that is painful but does not stop them from continuing in his/her sport. On the other end of the severity meter are those sprains that inhibit an athlete's ability to function at full speed for months. As common as ankle sprains seem, many coaches are not able to determine the severity of the injury until the ankle is swollen and the athlete is unable to participate.

Most ankle sprains occur to the lateral side of ankle and foot, but injuries to the medial side of the ankle and the ligaments that hold the tibia to the fibula (the high ankle sprain) may also occur. It is important to recognize the difference between these three types of ankle injuries at the time that the injury occurs because of the subtle differences in treatment. For the most part medial side injuries and high ankle sprains are considered more severe due to the structural

problems that they create. In this article, the recognition, treatment, rehabilitation, and return to play for each injury will be detailed so that coaches will recognize the type of ankle injury and take the appropriate action.

### Mechanism and Recognition of the Injury Types

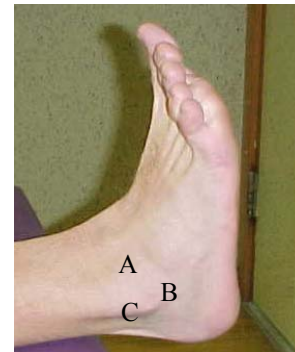
The common lateral side ankle sprain occurs when the foot is forced into inversion or a combination of inversion and plantar flexion (Figures 1 a & 1b). This occurs from athletes landing on the side of the foot when running or jumping, landing on another player's foot, stepping in a hole, or having the foot stick to the turf and falling to the opposite side of the body. Three ligaments stabilize the lateral side of the ankle: Anterior Talofibular Ligament (ATF), Calcaneofibular Ligament, and Posterior Talofibular Ligament (Figure 2). The Anterior Talofibular ligament is the most commonly



Figure 1a—Ankle Inversion



Figure 1b—Ankle Inversion with Planter Flexion



talofibular Ligament (Figure 2). The Anterior Talofibular ligament is the most commonly

Figure 7—Ligaments of the Lateral side of the ankle. A— Anterior Talofibular Ligament, B— Calcaneofibular Ligament, C— Posterior Talofibular Ligament

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## Athletic Trainer Visits the Junior Highs

Coaches can have their injured athletes evaluated by contacting Mark Lahr. Mark's office phone number is 227-4191 and his e-mail is mark.lahr@wayne.k12.in.us. To have an athlete evaluated by Mark please call his office or e-mail him before 12:00 on the day that he visits the athlete's school.

Currently, the visitation schedule is set up as follows:

Monday 1:00—Ben Davis Junior High,  
 Tuesday 1:00—South Wayne Junior  
 Wednesday 1:00—Fulton Junior High  
 Thursday 1:00—Ben Davis Junior High  
 Friday 1:00—South Wayne Junior

Special arrangements to bring an injured athlete to the high school after 4:30 by contacting Mark at the same office number. We encourage the parents to participate in this

injured. This ligament is put on stretch during inversion and planar flexion (Figure 1b). When the ATF ligament is severely stretched or partially torn, the foot is allowed to slide forward from under the lower leg and the ankle feels very unstable. The Calcaneofibular ligament is injured when the ankle is rolled into isolated inversion (Figure 1a) or when the ATF ligament is severely damaged and stress has occurred to the Calcaneofibular ligament. The Posterior Talofibular ligament is very rarely sprained unless the ATF and Calcaneofibular ligaments are torn or the ankle has been dislocated.

Recognition of this injury is fairly easy. The ankle may swell quickly over the lateral side of the ankle and the initial pain will concentrate over the location of each of the damaged ligaments. It is very helpful to press down (palpate) the area directly over each ligament. The damaged ligaments will illicit sharp pain when palpated. Once the ankle swells, the pain becomes more general and exact location of the damaged ligaments is more difficult. Observe the athlete's ability to move the ankle (active range of motion). An uninjured or mildly injured ankle should have the same range of motion as the unaffected ankle. Ask the athlete to move the foot in four basic motions: plantar flexion, dorsiflexion, inversion and eversion. (Figure 3) Those who have moderate and severe



Figure 3— From upper left— Active Plantar Flexion, Active Dorsiflexion, Active Inversion and Active Eversion

sprains will not have equal range of motion between the two ankles. In severe cases the range of motion appears abnormal or somewhat unnatural. Two tests that stress the stability of the ankle are the anterior drawer test and the talar tilt test. Well-trained hands will be able to assess the amount of damage done to the ligament based on the movement created by these two tests. The anterior drawer test is performed by pulling forward on the heel. The talar tilt test is done by turning the ankle into inversion with a little over pressure. (Figure 4) With a mild injury, the anterior drawer test will be painful, but will not create any forward movement of the heel bone and foot. A moderate injury will allow movement with both the anterior drawer and talar tilt test. However, there is a definite endpoint for the movement in each test. With severe in-



Figure 4—Anterior Drawer Test : Pull Forward on the heel to test the ATF. Talar Tilt Test : Roll the ankle into passive inversion and push medially to look for ankle laxity

juries to the ATF and Calcaneofibular ligaments, there is no endpoint feeling with an anterior drawer test. After testing the ankle with specific tests, the examiner should check that athlete's ability to bare weight if the examiner determines that the injury is not severe. Most of the time walking is possible with a mild sprain; however, walking is very difficult or impossible with moderate or severe sprains. Also, remember that each person has a different reaction to being injured. Pain that inhibits some athletes does not affect others as much.

Injuries to the medial side of the ankle damage a large thick ligament known as the deltoid ligament. This injury occurs less often than lateral ankle sprains because it is very difficult to force the ankle in to eversion (turning the bottom of the foot away from the other foot – figure 5). The eversion mechanism can occur from stepping on another player's foot with the outside portion of the foot or may be predisposed to those athletes who are very flat footed and knock kneed. When an athlete has a medial ankle sprain, the function of the foot has been compromised, because the deltoid ligament is stretched each time that the arch flattens to absorb shock during weight bearing. Therefore, most medial ankle sprains are graded as moderate or severe. It is important for the deltoid ligament to be properly healed before the athlete resumes activity.



Figure 5—Ankle rolled into eversion.

Evaluation of the medial ankle sprain is very similar to the lateral ankle sprain. However, instead of the areas of pain being over the three lateral side ligaments, the pain will be located over the deltoid ligament and the distal end of the tibia bone on the medial side (Figure 6). The anterior drawer test may illicit pain over deltoid ligament, but should not create an unstable movement. This time "passive" eversion of the ankle will cause pain and may unnatural create movement. Active inversion and eversion will also create pain. (Figure 3) Weight bearing will be very painful particularly if the athlete



Figure 6—Location of the Deltoid Ligament on the medial side of the ankle.

is bare footed. If a deltoid ligament injury is recognized immediately, then the athlete should use crutches from the very onset of the injury.

The **High Ankle Sprain** has received increased attention over the past three years. This injury is not as much an injury to the ankle as it is an injury to the lower leg. The mechanism of this injury is a twisting motion of the foot or extreme plantar or dorsiflexion with another person landing on the foot. Regardless of the mechanism, the damage is done then the two lower leg bones (tibia and fibula) are forced

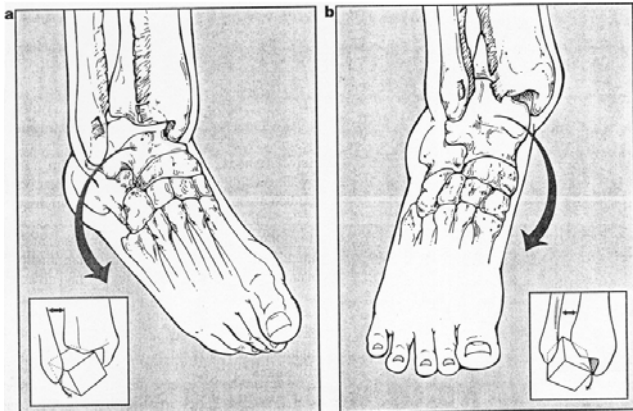


Figure 7—Two of the mechanisms of this injury demonstrate how the talus bone turns to spread the tibia and fibula apart and damages the anterior tibiofibular ligament. (Diagram reproduced from the article "Syndesmosis Ankle Sprains").

apart damaging the distal tibiofibular joint - a syndesmosis joint (figure 7). This action sprains the Distal Anterior Tibiofibular Ligament and can damage the interosseous membrane that holds the tibia against the fibula.

The high ankle sprain can be deceiving. Initially the injury will be very painful, and the athlete will fall to the ground. After about 2 minutes, the pain will diminish while the athlete is non-weight bearing. Many times the athlete will be willing to attempt to bare weight and may have initial success. However, as the swelling between the tibia and fibula increases more stress is placed on the distal Anterior Tibiofibular ligament and the pain will increase. Keep in mind that weight bearing will also place pressure on the Anterior Tibiofibular ligament as the talus bone is forced between the tibia and fibula. The injury can be positively identified from



Figure 8—External Rotation of the foot to test for a high ankle sprain. This motion applies pressure to the anterior tibiofibular ligament

the location of the pain with palpation. The anterior tibiofibular ligament is located on the front of the lower leg just above the foot. Its location is higher up the leg than the traditional lateral ankle ligaments and thus it has

been described as a high ankle sprain. The anterior drawer test may be painful but will NOT create any forward movement because the anterior talofibular ligament is intact. The most reliable test for the high ankle sprain is externally rotating the foot on the end of the leg (figure 8). This action will mimic the mechanism of the injury and will spread the tibia and fibula apart to recreate pain. This test can be used throughout the time of the injury rehabilitation and will be most helpful in determining when the injury has resolved itself.

### When to send an athlete to the doctor

Ankle injuries of mild type do not necessarily need to be examined by a doctor. Moderate and severe injuries should be X-rayed and examined by a sports medicine doctor. All medial ankle sprains and high ankle sprains should be sent to a sports medicine doctor because most coaches will not have the protective materials needed to treat these injuries.

The following list are times that the athlete should be sent to get an X-Ray immediately: 1) There is definite deformity of the injured ankle. 2) The athlete feels that the ankle is "broken". 3) The ankle is too tender to move even when non-weight bearing. 4) The swelling is immediate. 5) There is point tenderness along one of the bones of the lower leg or foot. Waiting for an X-ray may allow the ankle to swell, which may make the X-rays unreadable.

At the high school, there may be times when a doctor does not evaluate the ankle until the next day. In those cases the athletic training staff will stabilize the ankle in such away to protect a possible fractured bone.

One mistake that is made with mild and moderate ankle injuries is to put a certain time restraints when the ankle should be 100%. Each of the three types of injuries can vary in severity and recovery time. Do not get caught up in assuming that a particular injury should recover within a specific time period. Athletes will heal at different rates. However, if an athlete seems to be making no progress in his/her recovery, do not hesitate to send the athlete to a sports medicine doctor for a through examination. Sometimes small bone chips can inhibit recovery.

### Treatment of Ankle Sprains

Treatment of all ankle injuries use the acronym "PRICES" which stands for Protect, Rest (Active), Ice, Compression, Elevation and Strengthen. However, each type of ankle sprain has its own area that needs protected and strengthened.

Protecting lateral and medial ankle sprains can be accomplished a few ways: Crutches – used when the athlete cannot walk without pain or limp-



Figure 9—Ankle Boot Devise for high ankle sprains



Figure 9—Ankle Boot Device for high ankle sprains

ing and Plastic Ankle Stir-up like an Air Cast, APG Brace or Active Ankle. The main feature with both of these protective features does not allow the ankle to turn into inversion or eversion again to disrupt the healing process. Use of arch supports with medial ankle sprains will also take tension off the deltoid ligament when the foot is placed on the ground. When treating a high ankle sprain, it is imperative that Protection and Rest be absolute. The best treatment for a high ankle sprain begins by placing the ankle in a “walking boot” (figure 9) and using crutches for a minimum of two weeks. The athlete must avoid any motion of the ankle while the interosseous membrane and the Distal Anterior Tibiofibular ligaments heal.

*Rest* is not an accurate term for injury recovery because the athlete needs to maintain cardiovascular fitness and controlled stress to the ligament helps the healing process. The meaning of rest here refers to not working the ankle to point of pain. Early in the treatment procedure, it is important to return the range of motion back to the ankle for lateral and medial ankle sprain. This can be done a variety of ways such as passive calf stretching with a towel, ankle pumps, writing the alphabet with the foot, ankle circles, and towel sweeps. (See page 5).

*Ice* is used to control swelling and decrease pain. There are different ways to apply ice to an injury. An ice pack or a frozen “package of peas” may be the easiest home application. Ice should be applied for 20 minutes every two hours during the first 24 hours of the injury. Avoid sleeping with ice applied to any body part. Periods of icing longer than 30 minutes are not effective. After the first 24 hours, icing should continue 4-5 times daily for a time period of 15 minutes. Sometimes it is wise to ice after range of motion and strengthening activities to avoid post activity swelling. Even when the high ankle sprain is left in the walking boot, ice should be applied to control pain and swelling.

*Compression* is used to keep the ankle joint from filling with fluid. It has been found that using a foam or felt “horseshoe” placed over the lateral side of the ankle has been effective for reducing swelling over the lateral side of the joint. (Figure 10) The horseshoe should be held in place with a 4” elastic wrap. Begin wrapping at the end of the foot (leave the toes exposed) and work up toward the ankle. The wrap should be tighter lower and looser above the ankle to force the swelling up the leg. In general, the wrap and horseshoe should be worn at all times for 72 hours except when icing or showering. The horseshoe may create swelling over the lateral side of the lower leg (fibula) that is acceptable because that moves the swelling out of the ankle joint. If the foot or ankle begins tingling, then take the wrap off until the tingling stops and reapply with less pressure. Compression combined with elevation is an effective way to control swelling.



Figure 10 -The horseshoe is cut out of 3/8” felt. The horseshoe should be 6”-8” long and 3” wide. The horseshoe is applied on the lateral side of the ankle so that the open part of the “U” is around the lateral ankle bone.

*Elevation* should be maintained as much as possible particularly when swelling occurs immediately after the injury. The injured ankle must be elevated above the level of the torso of the body. To ensure that the ankle maintains elevation during sleep, have the athlete place a rolled up blanket or sleeping bag under the foot of the mattress. Using the raised mattress instead of resting the ankle on pillows will help avoid the foot falling back down to the same level as the torso. Elevation coupled with gravity helps the body drain the swelling back into the rest of the circulatory system.

*Strengthening* will be progressive. Initially, the strengthening exercises will be range of motion exercises such as writing the alphabet, performing ankle pumps, or actively moving the foot from inversion to eversion. As weight bearing increases, resistance of the ranges of motion by using manual resistance (hands on work) or rubber tubing can be very effective. Eventually, exercises such as heel raises, toe raises, balancing, walking and jogging can be added. Diagrams on page 5 are the typical activities for ankle rehabilitation. Advancing an athlete through these exercises depends on how painful the previous exercise was.

## Return to Play

As pain and swelling decrease, the ankle’s function should begin to return. As strength increases, activity such as walking, jogging, running and cutting will also return. The most difficult decision to make is when to return an athlete to the full activity. The use of a functional progression will give the best indication of when an athlete can return to play.

The functional progression begins with the basic skills such as walking without a limp (400 yards), jumping on both feet (25 reps), hopping on the injured ankle (25 reps), jogging without a limp (400 yards), and progressive sprints from half speed, to three quarters speed, to full speed (20-40 yards – 4 reps of each). Each of these activities must be done in a pain-free manner with no limping. After the sprinting is successful, the next phase of testing force the ankle to function in more stressful conditions. Running figure eights is one way to test the ankles ability to turn to the left and right. Zigzag cuts will test the ankle’s ability to change direction. Side shuffle and carioca will test the ability to push to the lateral side. After those activities are successful, sport specific test such as backpedaling, hopping in a circular direction, shooting jump shots or lay-ups can help determine if the athlete is ready to return to practice and games.

Caution must be taking when dealing with the high ankle sprain. As pain decreases and the functional progression begins, the athlete may feel that the ankle is more stable than it actually is. It is not unusual for a pain free high ankle sprain to become painful again when running resumes. Remember that weight bearing puts pressure on the Anterior Tibiofibular ligament. Do not rush these injuries. The high ankle sprain will take much longer to heal than other ankle injuries. (At some point in the future an entire newsletter will be dedicated to functional progressions for various sports and body parts.)

## Using Ankle Braces

The use of ankle braces and taping have been argued for a long time. At one time, it was believed that any taping was better than any brace that is on the market. However, today's braces are comfortable, durable and functional. There are basically two braces that are used today: Lace-up braces made of vinyl with crossing straps that use velcro and Plastic Stir-up Braces similar to that developed by Air Cast. Products that are made of simple elastic material cannot be considered braces because they do not restrict any motion. Suggesting that athletes wear braces for injury protection or to help support an injured ankle may be better than attempting to tape an athlete. The athlete will have more control over the fit of the brace and the brace can easily be tighten during a break in the action.

We generally use the plastic braces as post injury braces that support the ankle during the early stages of the injury (protection). As the ankle heals, the athlete is then given the option to continue using the plastic brace or changing to a lace-up brace or tape. At times, acute injuries will require both taping and bracing. *Please keep in mind that braces are not to be used as a substitute for good rehabilitation and strengthening..*

Currently, we use the APG brace for post injury support and Donjoy's Ankle Stabilizer for support during activity. In general, braces can be purchased at Galyan's, CVS pharmacies, and Microbiometrics (located on west 79th St.).



The APG ankle brace and the Donjoy Ankle Stabilizing Brace.

## Credits and Bibliography

### Special Thanks to:

Drew Phillips—Ankle Model  
Rick Peters of Athletic Protection Gear

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“Syndemosis Ankle Sprains”, The Physician and Sports Medicine; Dean C. Taylor, et al. Volume 21, No. 12, December 1993.

“The ankle: Basic injury care and prevention”, The First Aider; Dale F. Blair, Volume 57, No. 4, January/February 1988.

### Visual Health Information Products

Copies of these materials are available in the athletic training room at Ben Davis.

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