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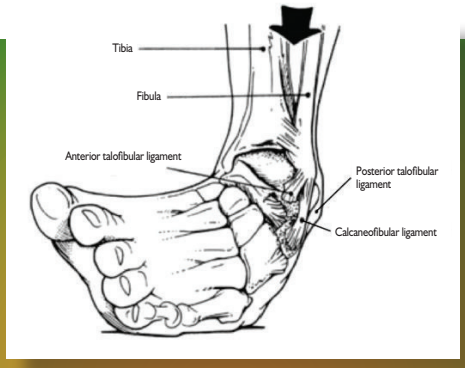

The Inversion Ankle Sprain

Use an evidenced-based approach to non-operative treatment and rehabilitation.

BY ALICIA CANZANESE, DPM

Goals and Objectives

1) To understand the non-operative treatment of inversion ankle sprain

2) To learn that 80-85% of inversion ankle sprains can be treated non-operatively

3) To understand the evidence-based approach to the treatment of the inversion ankle sprain

4) To think critically about ankle sprain treatment protocol

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Anatomy, Mechanism of Injury, and Risk Factors

As a brief review of the lateral ankle ligament anatomy: Both the anterior talofibular ligament (ATFL) and the posterior talofibular ligament (PTFL) are capsular, while the calcaneofibular ligament (CFL) is extracapsular (Figure 1).[3] The ATFL is both the shortest and the weakest, and therefore the most commonly injured. Approximately 65-70% of inversion ankle sprains are isolated ATFL injuries, and 20% are combined ATFL and CFL injuries.[4,5] The ATFL is taut in plantar flexion while the CFL is taut in dorsiflexion. The PTFL is the strongest of the three and is therefore the least frequently injured. An important thing to note in the functional anatomy of the ankle joint is that the closed packed posi-

Both the anterior talofibular ligament (ATFL) and the posterior talofibular ligament (PTFL) are capsular, while the calcaneofibular ligament (CFL) is extracapsular.

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tion of the ankle joint is full dorsiflexion. The closed packed position is the point in the joint's motion where there is the most congruency of the articular surfaces and therefore the highest degree of stability.

From a treatment perspective, knowing that dorsiflexion is the most stable and congruous position of the ankle joint: this reminds us that when bracing, splinting, casting, or immobilizing patients after acute injury, you should be placing them in full dorsiflexion as it is the position most conducive to proper healing and comfort following an ATFL injury. From an injury mechanism standpoint, this helps substantiate that the most common position at time of injury is plantar flexion and inversion as plantar flexion. This is the open packed/least stable position of the ankle and when the ATFL is most taut and vulnerable.

Ankle sprains are most common in cutting motion and contact sports, such as soccer, lacrosse, and football, the most common being basketball.[2] Injury often involves contact with a ball or another player. While there is still some debate in the literature as to the strength of certain risk factors, one of the stronger risk factors is previous inversion ankle sprain, especially if untreated, improperly treated, or if there was too early a return to sport. Other risk factors include participation in contact sports, level of play, poor conditioning, poor technical skills in sport, cavo-varus foot type, STJ instability, and an increased eversion to inversion strength ratio. Proper recognition and treatment are imperative to prevent complications from acute inversion ankle sprains, such as recurrent ankle sprains, chronic ankle instability, and sinus tarsi syndrome.[6] Among the most common reasons for recurrent ankle sprains and chronic instability are improper treatment and too soon of a return to sport.[7]

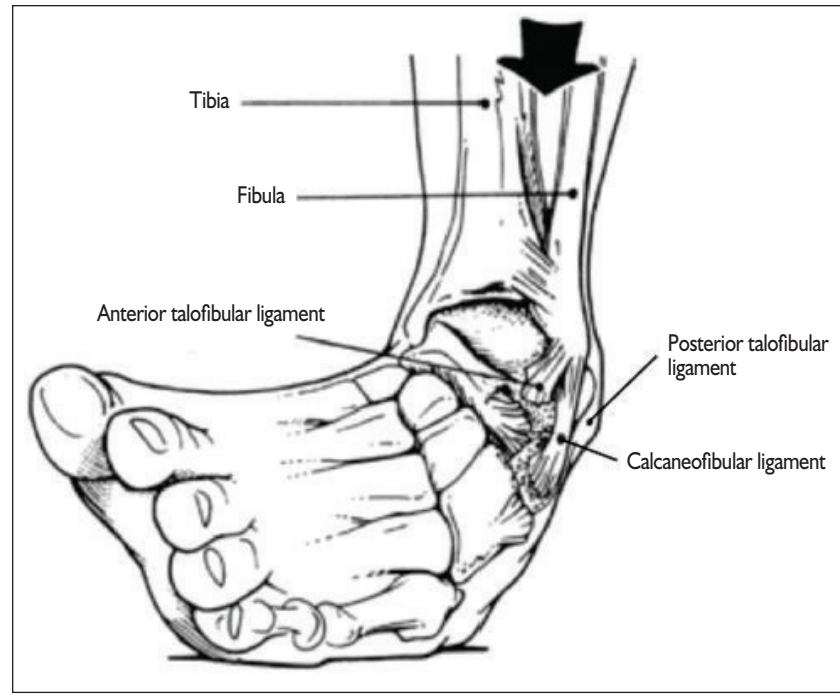

Figure 1: Lateral Ankle Ligament Anatomy.*
**Source: R Fowler, MD "The Weekend Athlete: Common Foot and Ankle Injuries." Consultant: Volume 53—Issue 12—Dec 2013*

Evaluation and Diagnosis

Proper treatment begins with proper history-taking and diagnosis. Briefly reviewing the essential physical exam principles: it is important to perform proper range of motion, manual muscle testing, and targeted palpation of the foot and ankle. It is important to properly diagnose an inversion ankle sprain but also avoid being so focused on the lateral ligament complex that other inversion injuries are not missed or overlooked, such as peroneal tendon injuries, 5th met base fractures, and anterior calcaneal process fractures. Also, a syndesmotic squeeze test and a forced dorsiflexion and eversion maneuver should be performed to rule out a syndesmotic injury. Certain special tests are important to the diagnosis of ankle sprains, including the anterior drawer and talar tilt tests. Classically, these tests are described under x-ray to measure the excursion of the joint; however, without radiographs, clinically these tests can offer important information in the office setting. When performing these tests, it is important to perform them bilaterally for comparison.

80-85% of acute inversion ankle sprains can be successfully treated non-operatively.

For the anterior drawer, the patient's ankle is placed in slight plantarflexion while one hand grasps the lower 1/3 of the leg just proximal to the syndesmosis to stabilize the leg. The other hand grasps the back and bottom of the heel, placing a posterior to anterior force on the heel and looking for the amount of translation at the ankle joint as well as looking for a dimpling at the area of the STJ. The anterior drawer primarily tests the laxity of the ATFL. Then, with the same hand positioning, distract the ankle slightly and put an inversion stress on the ankle joint and then an eversion stress. The inversion talar tilt evaluates the integrity of the CFL while the eversion talar tilt evaluates the medial deltoids. For both of these tests, the true definition of a positive test is laxity when compared to the contralateral limb, but when documenting, it is important to differentiate if they are positive for pain and/or laxity.

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To help guide treatment, various classification systems are used. There is quite a bit of variability between what constitutes Grade 1 vs. Grade 2 and 3 injuries among the classifications systems in the literature. The classifications which offer more useful data are those that help drive treatment decisions. One way to help drive treatment decisions is to determine how stable vs unstable the injury is. One classification that has been somewhat validated in the literature is more of a "Modified O'Donoghue" (Figure 2).[8] In a review by McGovern and Martin, they noted that this classification did offer useful information in terms of predicting length of time needed to recover and time to treat (Figure 2).[9]

It is important to note that in the classification system in Figure 2, radiographs and MRI are not needed to classify injury severity and are often not needed to drive initial acute and subacute treatment decisions, unless other pathology is suspected. Following an inversion ankle sprain, radiographs are only needed if there is concern for a fracture. To help determine if x-rays are medically necessary, one can recall the Ottawa rules (Figure 3). X-rays are indicated if there is pain in the malleolar zone, midfoot zone, and/or the inability to bear weight, both immediately and upon initial evaluation for four steps. Studies show us that the Ottawa ankle rules have a sensitivity of 98% (99.6% during first 48 hours) and specificity of 32%.[10] It is important to consider both foot and ankle radiographs if there is pain in the midfoot zone, especially if there is concern for a 5th metatarsal base or anterior process calcaneal fracture following an inversion mechanism.

Full dorsiflexion is the closed packed/most stable position of the ankle.

MRI is most often not necessary following acute inversion sprains. The recent literature shows that acute MRI is not a good clinical predictor for recovery and that physical exam findings are more reliable for acute and subacute treatment progression.[9] A study by Polzer, et al. found that a physical exam is sufficient to evaluate and classify acute inversion sprains as stable or unstable and that acute physical exam and delayed physical exam (3-5 days post-injury) have a sensitivity of 96% and specificity 84%.[11] MRI exams are considered in scenarios where a patient is not responding appropriately to a proper functional rehabilitation program and/or if there is concern for other pathology, such as osteochondral lesion, a peroneal tendon injury, or a syndesmotic injury.

FIGURE 2:

Classification System for Acute Inversion Ankle Sprains

Grade 1	Average Time to Recovery*
No loss of function, no ligament laxity Negative Anterior Drawer, negative Talar tilt Mild or no: ecchymosis, edema, loss of motion Stable	7.2 days
Grade 2	
Some mild loss of function + Ant Draw, neg Talar tilt + Ecchymosis, swelling, decreased ROM Mildly Unstable	15 days
Grade 3	
Loss of function, + ligament laxity + Ant Draw + Talar tilt Sig Ecchymosis, swelling >2cm, Decreased ROM of >10deg** Unstable	30.7–55.4 days

*McGovern RP, Martin RL. Managing Ankle Ligament Sprains and Tears: Current Opinion. Open Access Journal of Sports Medicine. 2106:7;33-42.

**Compared to contralateral limb

Treatment

It is important to note that 80-85% (some may argue much higher) can be treated successfully non-operatively.[1] While there is some debate in the current literature, there is no significant evidence to recommend surgery over non-operative treatment following acute sprains. A study by Pihlajamaki, et al. showed that long-term effects of surgical treatment of acute sprains are comparable to non-operative treatment. Polzer, et al. showed "conservative treatment is at least as effective as operative treatment without the related possible complications,"[11] while a meta-analysis by Kerhoffs, et al. failed to show that either treatment was superior.[12] With some limited data, surgery has been shown to have decreased risk of re-injury and objective stability, but increased risk of complications such as post-trau-

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matic arthritis, decreased range of motion (ROM), scar, and infection. It was also found to have higher cost and longer downtime compared to non-operative treatment.

Historically, ankle sprains were treated with RICE (rest, ice, compression, and elevation), immobilization, and non-weight-bearing for 10-14+ days. Recent literature shows that the research no longer recommends prolonged immobilization and strongly supports a functional progressive treatment with limited non-weight-bearing (NWB), early protected ROM, protected weight-bearing, limited or no immobilization, and early therapeutic exercise with a functional rehabilitation progression. There is a growing body of evidence that supports limited to no immobilization. Immobilization can lead to joint adhesion, contracture, and disuse atrophy. Studies show that within the first week of immobilization, approximately 3-4% of strength is lost each day.[13]

Following any joint injury, a process referred to as arthrogenic muscle inhibition occurs in which a painful edematous distended joint causes reflex inhibition of the surrounding musculature in order to stabilize the injured segment. Immobilization further accentuates this inhibition and early therapeutic intervention can help "reactive" the musculature surrounding the ankle joint to improve outcomes.[14] Given the severity/grade of injury and pain level, a short period of immobilization and NWB may be needed, but this should be limited to as few days as possible, and patients should progress to partial weight-bearing (PWB) as soon as they can tolerate it. In the study by McGovern and Martin in relation to injury grade, no immobilization/NWB is recommended with Grade 1 injuries, limited to 2-3 days if needed with Grade 2, and patients can benefit from a short period of immobilization of 7-10 days with Grade 3 injuries.[9]

It is important to state that in any injury grade, transitions directly from NWB and immobilization directly to full activity are never recommended. Avoiding prolonged immobilization is supported in a growing body of literature. Ardèvol, et al. completed a randomized controlled trial comparing cast immobilization with functional management in an athletic cohort.[7] They found that patients managed with a functional protocol were able to return to sporting activity sooner, had fewer symptoms at three and six months, and reported less ligamentous laxity radiographically.[7] Karlsson, et al. reported that early functional treatment could significantly reduce the time required to return to work or pre-injury sport.[7] Additionally, Kerkhoffs, et al. performed a meta-analysis of randomized controlled trials comparing rigid immobilization and functional management of acute lateral ankle sprains. They found there was a higher return to sport percentage, faster return to work, better range of motion, lower prevalence of persistent swelling, and decreased ligamentous laxity at intermediate follow-up in patients managed with functional protocols when compared to patients treated with rigid immobilization. The meta-analysis concluded that early weight-bearing with support improved overall resolution of symptoms.[8]

Range of motion should be performed first in a rehabilitation program.

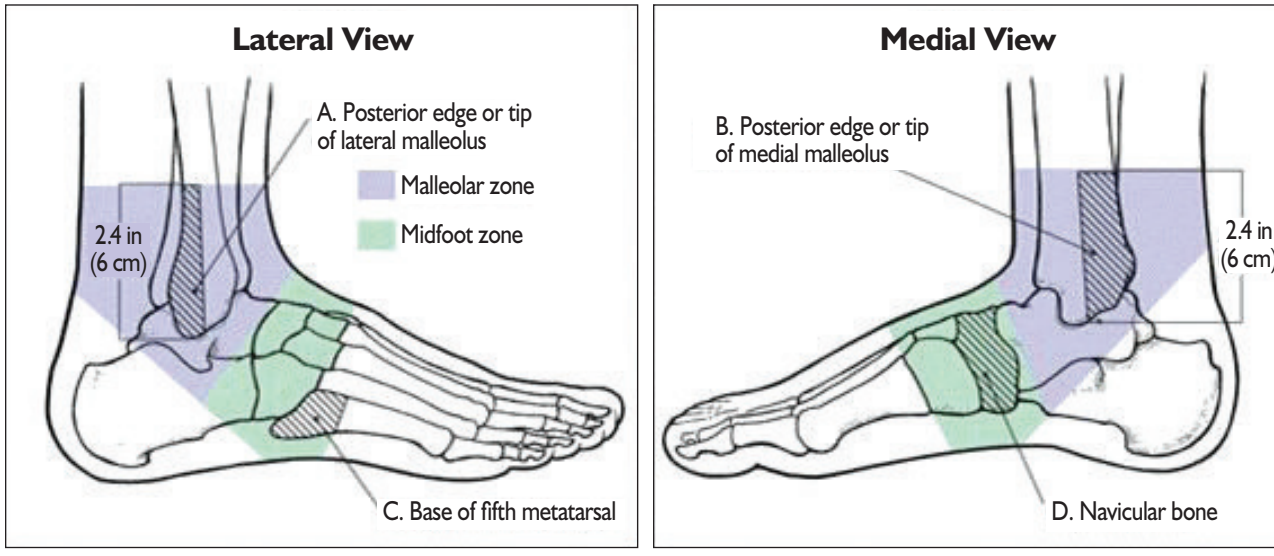

Figure 3: Ottawa Ankle Rules *
**Source: J Tiemstra, MD. Update on Acute Ankle Sprains. Am Fam Physician. 2012 Jun 15;85(12):1170-1176.*

Acute Management

If a patient presents to the office within the initial 72 hours following an inversion ankle sprain, the focus should be on not just RICE,

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FIGURE 4:

Ankle Brace Options

Stirrup Style Brace

Lace Up Style with figure 8 strapping

Lace Up Brace with rigid removable stays

Elastic figure 8 Brace

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but PRICE with the P standing for protection; it is important to limit and protect the patient from frontal and transverse plane motion. For the initial "protection," as previously discussed for Grade 1 and 2 injuries, if the patient cannot tolerate WB from a pain control standpoint, a short period of PWB and immobilization of no more than 2-3 days can be considered, and for Grade 3 injuries 7-10 days in a removable cast boot. During this time, the patient should be immobilized in the closed packed position of dorsiflexion even if using crutches; and the crutches can be taken away as soon as the patient no longer needs them for pain control.

Following immobilization, or in lieu of it, the patient can transition to "protected" weight-bearing utilizing an ankle brace. It is important to note that depending on the type of brace utilized, (Figure 4) the brace may not offer any compression. Edema control is important for pain control and to prevent range of motion restriction. In acute injuries, the key in brace selection appears to be both compression and support for overall advantage. For example, if a stirrup style ankle brace is utilized, an ACE bandage or a compression sleeve should be under the brace to add compression. Lace-up-style ankle braces and elastic figure 8 type braces do have some inherent compression but lack the semi-rigid frontal plane control of a stirrup brace. Therefore, utilizing a lace-up-style brace with removable rigid medial and lateral stays can combine the desirable qualities of both types of braces.

For an evidence-based approach to brace selection, bracing has been shown more cost-effective and to have better outcomes when compared to taping or wrapping.[12] There is also limited evidence to support the use of a lace-up-style ankle brace when compared with a semi-rigid stirrup support device.[12] During the acute phase immediately following injury, controlled sagittal plane motion can be performed to prevent adhesion and contracture. Within the first 48-72 hours after an injury, the patient can start easy passive ROM, but in dorsiflexion (DF) and plantar flexion (PF) only. It is important to not initiate circumferential ROM exercises in the initial acute phase because at this phase, you want to protect against inversion/eversion.

To perform passive DF/PF, the patient can be instructed to use a towel wrapped around the forefoot and, with even pressure from both hands, gently and slowly dorsiflex the foot using care to maintain subtalar neutral position and isolate the sagittal plane motion (Figure 5). There has been data to show that early initiation of a protected ROM can improve outcomes. In 2010, there was a randomized control trial in the *British Journal of Sports Medicine* that evaluated the effects of an accelerated rehabilitation program on functional outcomes following acute ankle sprains.[14] The authors compared the standard PRICE treatment with delayed physical therapy to an accelerated intervention that

No immobilization/NWB is recommended with Grade 1 injuries, limited to 2-3 days if needed with Grade 2, and patients can benefit from a short period of immobilization of 7-10 days with Grade 3 injuries.

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incorporated early therapeutic exercise during the first week following Grade 1 and 2 injuries. They found early exercise within the first week post-injury can significantly improve early functional outcomes with increased activity and function and can facilitate early return to work requiring low intensity activity.

This study was able to illustrate the effects of early motion to help prevent arthrogenic muscle inhibition. Additionally, this study also showed a low re-injury rate compared to other studies (4% vs 34-42%) for both groups. The authors postulated that this was due to the standardized functional physical therapy program that was eventually completed in both groups—thus supporting the idea that a proper rehabilitation program is key in the management of acute ankle sprains.[14]

Sub-acute Treatment/Functional Rehabilitation Progression

Following the initial acute management, it is important to understand the principles of a proper evidence-based therapeutic exercise program, especially if you are managing your patients' home physical therapy programs. Even if you are sending your patient to formal physical therapy, it is important to understand these principles so that you can help guide proper return to sports/activities and determine a timeline for response for treatment. When determining a home versus formal physical therapy setting, there is some early and limited data showing outcomes are better with a supervised program. Van Os, et al. published a review demonstrating that functional treatment with concomitant supervised physical therapy could yield superior recovery results when compared with functional treatment alone, specifically with regard to persistent swelling and time for return to work.[7]

Figure 5: Towel Stretch for Passive Dorsiflexion and Plantar Flexion ROM*
**Source: https://rtpr.com/10-exercisesstretches-healthy-feet/2-towel-stretch*

When sending your patients to formal physical therapy, it is important to know your physical therapists and athletic trainers and what their

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FIGURE 6:

Rehabilitation Pyramid for Specific Sequencing

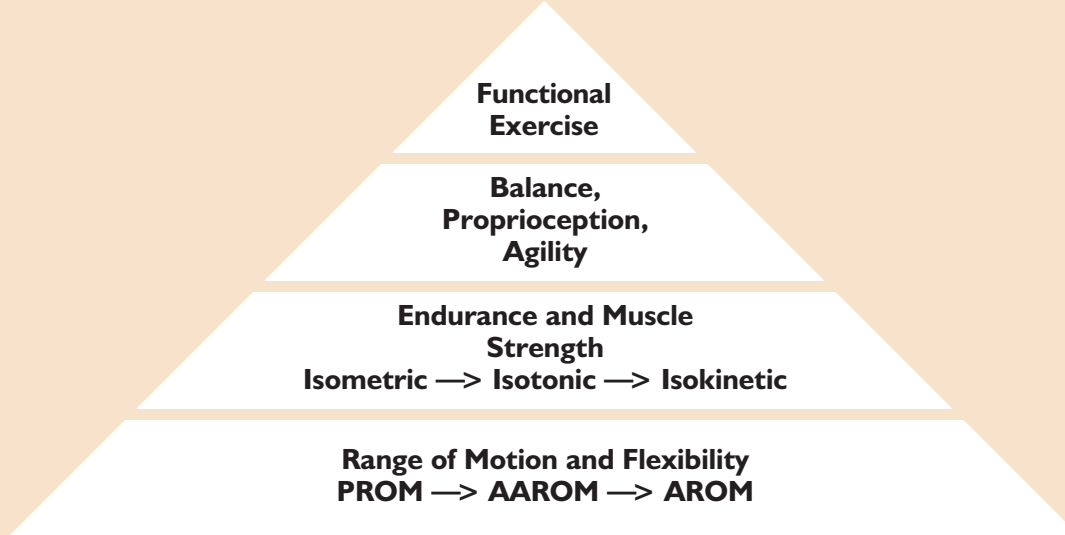

Figure 6: Rehabilitation Pyramid for Specific Sequencing
*Passive ROM (PROM), Active-Assisted ROM (AAROM), Active ROM (AROM)
**The Isotonic strengthening can be further broken down into concentric before eccentric and open chain before closed chain strengthening

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ankle rehabilitation protocol is. While most physical therapy locations are great, unfortunately, not all are created equal. This is especially important when considering if a patient has failed non-operative treatment and for making treatment decisions for chronic ankle instability. When considering surgery on a patient who has failed physical therapy, it is important to ask the patient not just how long they did physical therapy, but what they did in physical therapy. Many of us have been in scenarios where we ask this question and the answer is that the patient has been doing only bike, ice, E-Stim, and 4-way Thera-band for 6-8 weeks and never progressed through a functional program. This raises the question, did that patient "fail" physical therapy or did they not participate in a proper program? The other common scenario involves patients who progress through the early phases of a therapy program, but once they become pain-free with range of motion and basic elastic band strengthening, they stop going. It is crucial to educate patients on the importance of completing the functional rehabilitation program to prevent repetitive sprains because strength and ROM alone are not the only deficits following injury.

Therapeutic Rehabilitation

Therapeutic rehabilitation texts often outline the basic principles of rehabilitation. These include avoiding aggravation, timing, specific sequencing, intensity, individualization, patient compliance, and considering the entire patient, not just the injured segment.[13] With quality rehabilitation, one needs to initiate the proper exercises in the correct sequence for the best results. While the initial stages of a rehabilitation program will be similar for most patients, in the later stages and when determining return to play/activity, considering the individual patient's needs and functional demands are key. For example, a patient who is a soccer player will need to be able to cut and change directions quickly; therefore, agility drills will be imperative for their recovery.

Non-athletes' functional demands post-injury are equally as important; a package delivery truck driver will need to be able to ascend and descend steps while carrying loads, so balance and strength are necessary. Looking at the entire kinetic chain is important as well. There is a growing body of scientific evidence that suggests clinical tests of core/hip strength and stability can help predict risk of lower extremity injury in athletes and should be addressed in prevention and rehabilitation programs.[15] EMG studies show us that core and hip muscles activation is coordinated with lower extremity muscle activation.

In a 2006 *Journal of Athletic Training* study, the authors looked at hip abductor weakness after inversion ankle sprains.[16] The authors found that patients with chronic ankle sprains had a high percentage of ipsilateral hip extensor and hip abductor weakness. This study also noted that initially after acute injuries, altered hip muscle recruitment has been demonstrated. A study by McGuine, et al. reported that high school basketball players who sustained acute ankle instability events demonstrated considerably greater postural sway. Doherty, et al. showed that those who developed chronic ankle instability had impaired proximal hip function compared to those who recovered from their ankle injury.[17] The findings of these studies support the need to address hip and core weakness following ankle sprains in order to increase kinetic chain stability and prevent re-occurrence.

Initiation of proper exercises in the correct sequence is one of the most vital principles when designing a rehabilitation program for a patient. After a musculoskeletal injury, the following are affected: range of motion, joint mobility (considering the role of edema and scarring), flexibility, muscle activation, strength (including both power and endurance), neuromuscular patterns, balance, and proprioception.[13] The progression of a functional rehabilitation program can be best thought of as a pyramid. One has to build the pyramid from the ground up in a stepwise fashion, just as one has to have the proper building blocks before they can progress to the next phase of physical therapy to prevent aggravation or re-injury (Figure 6). When designing a rehabilitation program, the main building block is range of motion, starting with passive ROM and progressing toward active range of motion.

In addition in PRICE, passive dorsiflexion/plantarflexion can be initiated within the first 48-72 hours after the injury.

It is important to regain pain-free passive ROM before progressing to strengthening. Consider, if concentric isotonic strengthening is initiated before a joint regains full range of motion, that strengthening with resistance in a restricted ROM can cause undue strain on an injured joint and lead to muscular imbalance. As we move up the pyramid, the next step is muscular strength and endurance. This is especially essential in sports that involve repetitive motions because if the muscles surrounding a joint fatigue during activity, this increases the susceptibility of the static stabilizers (ligaments) to injury if the muscles are not able to dynamically stabilize the segment. Within this step of the pyramid, it is important to initiate isometric strengthening (contraction without joint motion) before progressing to isotonic exercises in order to assist with muscle re-activation.

Once isotonic exercises begin, this is further broken down to starting concentric (resistance with muscle shortening) before beginning eccentric (resistance during muscle elongation) exercises.[13] As previously discussed, when considering inju-

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ry patterns, certain directions of motion for ROM and strengthening exercises can be initiated before others in the rehabilitation program. For inversion ankle sprains, dorsiflexion/plantarflexion ROM and strengthening progression can be initiated much sooner before inversion/eversion motions can begin.

In a functional rehabilitation progression, closed chain eccentrics should be initiated last.

When moving up the pyramid, the next step is balance, proprioception, and agility. There are many studies that illustrate the importance of proprioceptive training following any joint injury in both the upper and lower extremity, especially in sports. Imagine a soccer or basketball player who needs to be able to quickly cut, change directions, and pivot on one leg during play. If that player has not regained proprioceptive control and has difficulty with static single leg balance, those cutting and pivoting motions are going to be difficult to perform effectively.

An example of a rehabilitation progression in this block of the pyramid is starting with single leg balance on a stable surface, then single leg balance on a unstable surface, then single leg balance while performing a sport-specific activity (such as throwing and catching a ball), then side-to-side hopping on both feet, and then progressing to single leg hopping. Finally, the last stage in the pyramid is functional exercise. This includes more dynamic motions in multiple planes and sport-specific activities. In the athletic training setting, for example, often before allowing an athlete to return to full play, that athlete would perform controlled, monitored cutting and sprinting drills.

From an evidence-based medicine standpoint, there are multiple studies that support a functional rehabilitation program. In a 2016 review in the *Open Access Journal of Sports Medicine,* McGovern and Martin evaluated the importance of functional outcome measures to assess the effectiveness of treatment. They found if a program included a combination of ROM, strength, neuromuscular control, and proprioception measures, there was a significant improvement in lower extremity function.[9] Additionally, a study by Holme, et al. found that re-injury rates were reduced significantly at one year when the treatment group included balance and strength training.[12]

It is also important to consider the pyramid in Figure 6 when deciding if a patient is able to return to play. As previously mentioned, following an ankle sprain, patients who are monitored throughout their treatment progression can have more positive results. If you are monitoring your patients' rehabilitation home program, it is important to re-evaluate them at intervals before progressing them through their rehabilitation to prevent aggravation. When determining if a patient is able to return to activity, what is seen clinically is that time since injury, ROM, pain level, and weeks in therapy are not good clinical indicators for readiness to play because those criteria have no bearing on functional ability. Instead, looking at their ability to perform functional activities should be the key.

Ability to perform balance and agility tests is the best criteria for determining the ability to return to sports following an ankle injury.

For athletes, communicating with their physical therapist or athletic trainer about how they are progressing is important. Asking them if the patient has progressed to and can perform balance and agility exercises (knowing that if they have progressed to this stage, the other building blocks should be complete) is beneficial. There are some simple tests a physician can perform in the office as well to assess return to play. These include: single leg balance, single leg squatting, side-to-side/front-to-back hopping exercises.

Summary

In conclusion, in the current literature, non-surgical treatment is preferred for the majority of acute inversion ankle sprains. There is a large body of evidence that supports treating these sprains with early protected ROM, limited or no immobilization, early weight-bearing, bracing, and a monitored functional rehabilitation program in order to prevent recurrent and chronic ankle sprains. There is also strong data to support that the functional rehabilitation program should involve the entire kinetic chain, including a strong emphasis on balance and proprioception. It is also important to consider and monitor all aspects of the rehabilitation program: ROM, strength, balance, proprioception, agility, and the ability to perform functional activities when determining return to play/activity criteria following injury. **PM**

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CME EXAMINATION

SEE ANSWER SHEET ON PAGE 129.

1) Which of the following ligaments is extracapsular?
- **A) ATFL**
- **B) PTFL**
- **C) CFL**
- **D) TN**

2) According to current literature, what percentage of acute inversion ankle sprains can be successfully treated non-operatively?
- **A) 60-65%**
- **B) 70-75%**
- **C) 80-85%**
- **D) 90-95%**

3) What is the closed packed/most stable position of the ankle?
- **A) Full dorsiflexion**
- **B) Full plantarflexion**
- **C) Dorsiflexed and everted**
- **D) Plantarflexed and inverted**

4) Which of the following should be performed *first* in a rehabilitation program?
- **A) Isometric strengthening**
- **B) Agility**
- **C) Balance**
- **D) Range of motion**

5) All of the following are included in the Ottawa ankle Rules *except*:
- **A) Swelling greater than 2cm circumference when compared bilaterally**
- **B) Pain in the malleolar zone**
- **C) Pain at the base of the 5th metatarsal**
- **D) Inability to bear weight immediately**

6) All of the following are strong indications for an MRI following an ankle sprain *except*:
- **A) A Grade 2 injury that is not responding to the recommended rehabilitation program**
- **B) An acute Grade 3 ankle sprain**
- **C) Chronic ankle instability with concern for an osteochondral lesion**
- **D) Concern for an associated peroneal tendon injury**

Continued on page 128

Continuing Medical Education

CME EXAMINATION

7) According to the classification discussed in this article, following a Grade 2 inversion ankle injury, how long should the patient be immobilized and non-weight-bearing?

A) 2-3 days
B) 3-5 days
C) 7-10 days
D) 10-14 days

8) Within the first 48-72 hours after the injury, in addition in PRICE, what therapeutic exercise can be initiated?

A) ABCs
B) Active dorsiflexion/plantarflexion
C) Passive dorsiflexion/plantarflexion
D) Ankle circles

9) In a functional rehabilitation progression, which of the following exercises should be initiated *last?*

A) Isometric
B) Closed chain eccentrics
C) Concentric
D) Open chain isotonic

10) Among the following choices, which is the *best* criteria for determining the ability to return to sports following an ankle injury?

A) Time since injury
B) Weeks in physical therapy
C) Ability to perform balance and agility tests
D) Negative anterior drawer and pain level

SEE ANSWER SHEET ON PAGE 129.

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EXAM #4/20
The Inversion Ankle Sprain (Canzanese)

Circle:

1.	A	B	C	D	6.	A	B	C	D
2.	A	B	C	D	7.	A	B	C	D
3.	A	B	C	D	8.	A	B	C	D
4.	A	B	C	D	9.	A	B	C	D
5.	A	B	C	D	10.	A	B	C	D

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Strongly agree [5]	Agree [4]	Neutral [3]	Disagree [2]	Strongly disagree [1]

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6) What overall grade would you assign this lesson?

A B C D

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