



SPORTS / EXERCISE / FITNESS

Extremity Concerns in Top Athletes: Rehab & Prevention

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A timely return to competition is a primary concern for athletes. Being injured and having to sit on the sidelines is not only physically painful, but also emotionally challenging. Lower extremity injuries are the most common athletic injuries in non-contact, contact and collision sports. Knowing what the most common injuries are and understanding the physiology behind the cause of the injury can help the athlete spend less time on the sidelines and more time doing what they love to do: compete!

Exploring Injury Mechanics

When engaging in most sports, an athletic position is required to help the athlete react quickly and efficiently. The athletic position is accomplished with the feet shoulder-width apart, weight on the balls of the feet, and the knees bent at 30 degrees of flexion. It is in this position that the body reacts appropriately, timely and efficiently.



When an athlete changes positions in response to action, what happens next determines whether or not an injury occurs. To prevent injury and failure, it is imperative that the musculoskeletal structures are adequately conditioned and the foot foundation provides the necessary support to allow a smooth progression from heel strike to the toe-off phase of the gait cycle. If one or both of these areas are not functioning properly, failure will result and an injury will most likely occur.

Top Musculoskeletal Injuries

The top two musculoskeletal injuries in the athlete, at any level, involve the ankle and the knee. Addressing technical issues within the feet, increasing strength and improving reaction time are the keys to injury prevention and recovery.

Seventy percent of ACL injuries are non-contact in nature.¹ These injuries result from a lack of intrinsic strength, coordination, balance and reaction time. During the gait cycle, the foot strikes the ground and a cascade of events happen throughout the kinetic chain. The result is proper support or failure at the ankle, knee and/or hip, depending how the foot responds at impact.

In order to help the athlete reduce the risk of injuries to these areas, the practitioner must gain an understanding of simple lower extremity anatomy and biomechanics, and then incorporate specific evaluation and rehab protocols for the lower extremity.

A detailed evaluation of both feet is the first step in the prevention and rehab of lower extremity injuries. The foot is the keystone of the body's foundation. During weight-bearing inspection, begin by evaluating the feet to determine the foot type. Pronation in varying degrees is a common finding

among athletes. With pronation, the tibia rotates and the knee collapses medially, causing a genu valgus deformity.

Laser 3D scanning technology provides state-of-the-art evaluation of the feet. This advanced technology provides a simple, but detailed visual, allowing the athlete to see and understand the vital link between the foot and its impact on the kinetic chain. A custom-made foot orthotic supporting all three arches of the foot can be a game changer when it comes to supporting the natural architecture of the foot, which in turn can prevent many lower extremity and spine issues.

Ankle Injuries

The most common injury in the ankle is a sprain of the anterior talofibular ligament.² The No. 1 risk factor in developing a second ankle sprain is a first ankle sprain. Therefore, developing strength, coordination, balance and reaction time is of vital importance when it comes to injury prevention and recovery.

A key muscle affected by an ankle sprain is the peroneus longus muscle and its role as a positioner during the gait cycle. With this injury, the peroneus longus is commonly compromised, resulting in a 50 percent reduction in both contraction intensity and muscle response time.

During the swing phase of the gait cycle, the peroneus longus muscle contracts and positions the foot to strike the ground securely. When this muscle is compromised, the risk of landing improperly increases dramatically. If an ankle sprain is not rehabilitated properly, the compromised peroneus longus will persist indefinitely, increasing the risk for a repeat injury.

Knee Injuries

Regarding [knee injuries](#), the most commonly injured ligament in the male athlete is the medial collateral ligament; for the female athlete, it is the anterior cruciate ligament.³ There are special considerations in the female athlete, namely anatomical and neuromuscular issues, that make the ACL more at risk for injury.

It should be noted that the ligaments are *not* the primary stabilizers of the knee. Rather, it is co-contraction of the quadriceps and hamstring muscles that provides dynamic stabilization of the knee. Maximum co-contraction occurs in the athletic position where the knees are flexed to 30 degrees. When these two muscles work together, the knee is dynamically supported and the patella tracks vertically, reducing stress on both the intrinsic ligaments of the knee and the patellar tendons.

The goal for knee injury prevention and rehab is to reduce the stress on the ligaments of the knee by addressing muscular strength deficits and alignment issues.

Evaluating the Lower Extremity

So, what are some effective ways to evaluate the lower extremity? A simple, but valuable test is to have the athlete/patient perform a single-leg-stance (SLS) exercise. With the athlete standing upright, have him/her balance on one leg and bend the weight-bearing knee to 30 degrees. Note the presence of any dynamic genu valgus when performing this exercise.

If present, the dynamic genu valgus results from one or two issues: a technical issue with the foot,

such as pronation; and/or a lack of co-contraction between the quadriceps and hamstring muscles. Both of these issues need to be addressed.

Corrections for Rehabilitation and to Reduce Injury Risk

Foot pronation may require a custom orthotic with corrections for all three arches to support the natural architecture of the foot. This will keep the lower extremity aligned properly and allow the foot to absorb and disperse energy at impact, reducing the transfer of impact up the kinetic chain.

Lack of co-contraction between the quadriceps and hamstring requires specific rehabilitation exercises. The following are proprioceptive, strengthening and flexibility exercises each athlete should routinely perform in order to reduce the risk of ankle and knee injuries:

Single-Leg Stance: Using a stability trainer, stand upright and balance on one leg for one minute. Perform three sets for one minute apiece daily.

Single-Leg-Stance 30-Degree Squat: Using a stability trainer, stand upright, balance on one leg and slowly bend the weight-bearing knee to 30 degrees, focusing on keeping the patella tracking in line with the second toe. Maintaining knee alignment is critical. If necessary, have the patient gently hold on to something while doing the exercise until they can achieve alignment without assistance. Perform three sets of 10 reps daily.

Ball Wall Squats: With or without hand weights, position an exercise ball behind the back and against a wall. With the feet shoulder-width apart, push into the ball and squat to 30 degrees. Perform three sets of 10 reps daily.

Hamstring Muscle Stretch: There are two effective stretching techniques for the hamstring muscle. A passive stretch is a slow, progressive stretch. A PNF or contract-relax stretch is the procedure of choice for increasing both passive and active flexibility. This type of stretch involves elevating the target muscle to tension and then performing an isometric contraction of the hamstring using 20 percent of a maximum voluntary contraction.

After holding this contraction / stretch for 10 seconds, elevate the target muscle to a new point of stretch and repeat the process, allowing pain to be your monitor.

The hamstring muscle crosses the knee joint and is therefore intimately connected to the knee. Increasing hamstring muscle flexibility helps the athlete maintain a more upright posture and reduces compression forces on the knee. Ninety degrees of hamstring flexibility is a reasonable goal. Perform hamstring stretches daily. PNF stretching techniques can be performed once per week to help maintain the flexibility gains. Perform three reps on each side. To passively stretch the hamstring, sit on the floor with the back as flat against the wall as possible, and then fully extend the knees. Sit in this position for 5-10 minutes daily.

Clinical Takeaway

Proprioceptive training is the rehab procedure of choice in addressing lower extremity injuries. This type of training will develop strength, balance, coordination and most importantly, reaction time. Developing this type of kinesthetic sense is the key to injury prevention and post-injury recovery. Treating your athletes' lower extremity issues thoroughly and efficiently will get them back in the

game with confidence, restoring their physical and emotional health.

References

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