



# Hughston Health Alert



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## Knee Injuries in Basketball

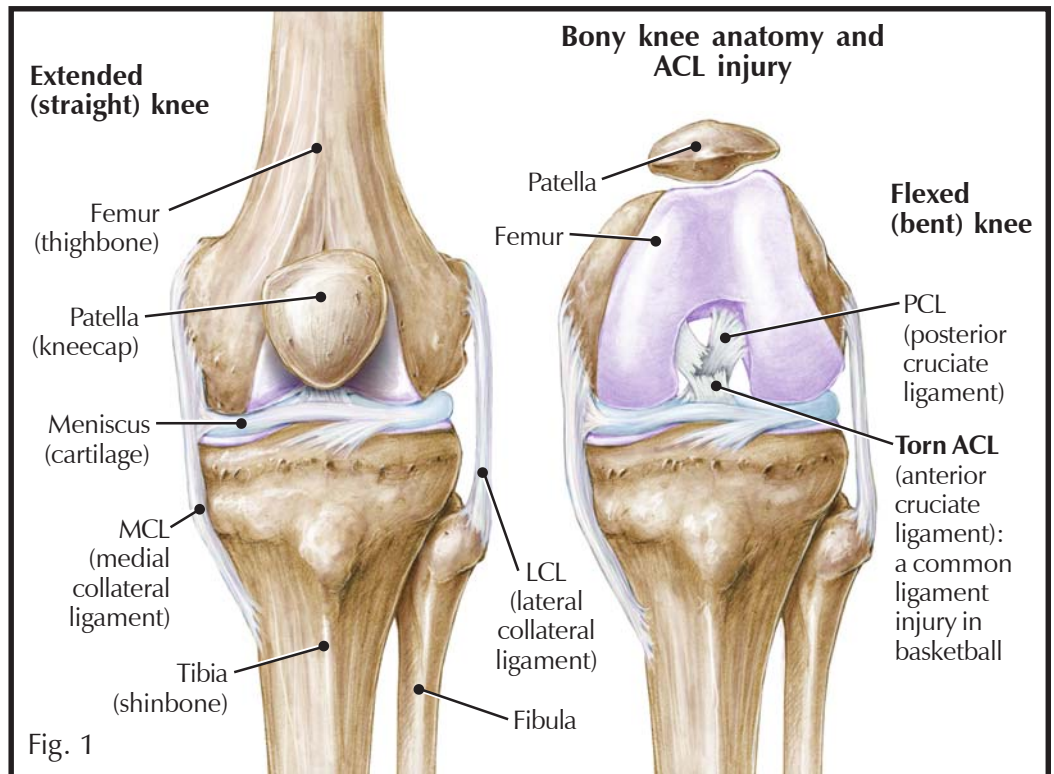
### The sprains and strains of the game

Basketball is an exciting, fast-moving sport. Unfortunately, what makes the game exciting to watch and exhilarating to play also makes it a high-risk sport for knee injuries. Running with sudden stops, cutting side to side, jumping, and pivoting can injure your knee. Although there are risks of knee injury, it's still a great game, so before you jump in, you should know the risks and what you can do to prevent injury.

The largest joint in the body, the knee, is made up of the lower end of the femur (thighbone) and the upper end of the tibia, or shinbone. The patella, or kneecap, slides in a groove at the end of the femur.

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- Glenn C. Terry, MD



Ligaments at the end of the femur and tibia connect the bones and help stabilize and support the knee (Fig. 1). Tendons connect the muscles to the bones, and the cartilage inside the joint helps to cushion and absorb shock to the joint and to give stability to the knee.

A sprain or strain can occur when there is a direct blow to the knee or when there is a sudden, stressful movement that affects the knee. A sprain or strain can also develop from overuse of the joint or when you place too much stress on the knee for a long period of time. Often, with a

sprain or strain the tissues become irritated, causing pain and swelling.

### Sprains

A *sprain* is a stretch or tear of a ligament. More serious sprains involve complete tears of one or more of the knee ligaments. A common knee sprain involves the anterior cruciate ligament (ACL) (Fig. 1). Changing direction rapidly or stopping abruptly while running can cause the twisting motion that tears the ACL.

If you sprain your knee, you may hear a popping or snapping sound at

the time of injury. Afterward, pain seems to come from within the knee, especially with movement. You will not be able to bear weight on that leg, and you can experience swelling and fluid behind the kneecap. You may also hesitate to place weight on the knee because it feels loose or unstable.

## Strains

*Strains* are defined as a partially or completely torn muscle or tendon. With knee strains, you may feel symptoms similar to a sprain and may see bruising around the injured area.

*Patellar tendinitis*, or jumper's knee, is a common strain that usually results from overuse. Jumper's knee is an inflammatory condition that causes pain in the front of the knee. The extensor mechanism, which includes the quadriceps muscle and patellar tendon, connects the patella (kneecap) to the femur (thighbone) and the tibia (shinbone) (Fig. 2). Patellar tendinitis begins as inflammation of the patellar tendon where it attaches to the patella. It can worsen by continual tearing or from degeneration of the tendon.

## Treatment

You should rest your knee at the first sign of a sprain or strain. Immediately after injury, apply the RICE (rest, ice, compression and elevation) method. You should rest your knee as much as possible, apply ice packs for a couple of days to bring down the swelling, use compression, such as an ACE bandage, and elevate the leg on a pillow. For inflammation and pain, your doctor may prescribe anti-inflammatory medications such as aspirin or ibuprofen.

Treatment for knee injuries, such as severe sprains or strains (where a ligament or tendon is more seriously

stretched or torn), may involve using a knee splint, immobilizer, or cast, and using crutches for a few weeks or months.

Depending on the injury, your doctor may suggest rehabilitation for your knee injury. Working with a physical therapist, you will do specific exercises designed to take your knee

through its range of motion to prevent stiffness and scarring as your knee heals. You may also need to do regular exercises to strengthen the muscles surrounding the knee.

## Injury prevention

To prevent knee injuries, always wear appropriate protective equipment during practices and competition. Kneepads and shinguards will help to protect your knee from injury. You'll also want to make sure you wear supportive shoes that are in good condition and are appropriate for the basketball court.

During workouts, always warm-up and cool down, and remember to increase your training intensity slowly. You might try weight lifting to strengthen your muscles and use stretching exercises to improve your flexibility because strong flexible muscles help support and protect joints. Warm-up with jumping jacks, a stationary bike, or running or walking in place for 3 to 5 minutes. Then slowly and gently stretch, holding each stretch for 30 seconds. After an intense workout, practice, or competition, slow down your heartbeat and stretch

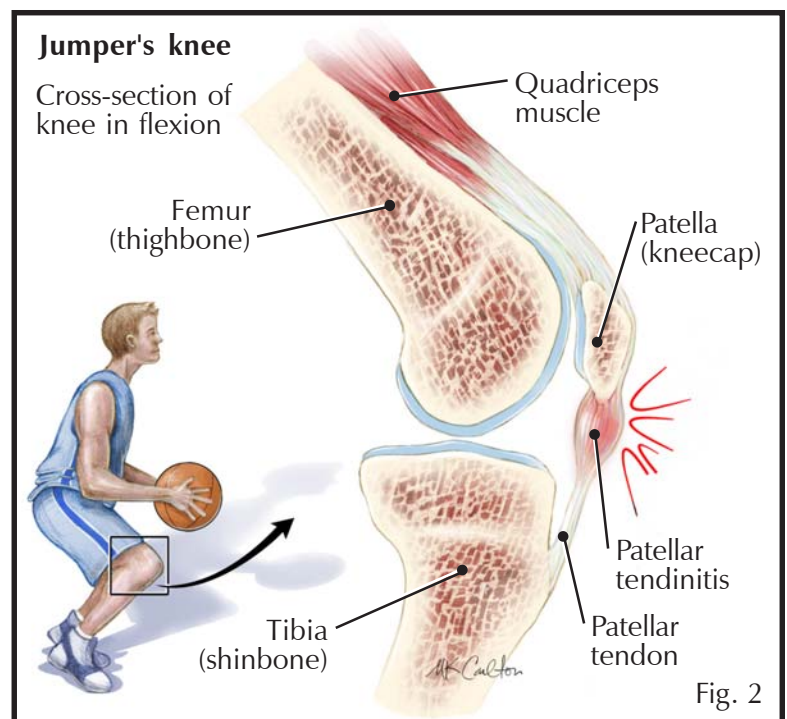


Fig. 2

your muscles again to cool down. Do not suddenly increase the intensity or duration of your workout because it can lead to an overuse injury. If you play only one sport, maintain coordination and balance by training year-round even if it's at a lower intensity than during your competitive season.

The way you move can also help to prevent knee injuries. When you jump, bend your knees when you land to take pressure off the ACL. When you cut laterally or pivot, crouch at the hip and bend your knees to reduce your chance of ligament injury.

Never play through the pain of a sprain or strain. A minor injury can become a more serious injury that requires surgery if left untreated. A minor sprain or strain may keep you off the basketball court for a few weeks, but a major injury may keep you out of the game the entire season. Always see your doctor at the first sign of knee injury. You'll be glad you did.

Glenn C. Terry, MD  
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## Finger Injuries in Basketball Players

Finger injuries occur in almost all sports and are particularly common in basketball players. Injuries to the fingers in basketball players range from minor injuries requiring little or no treatment to severe fractures and dislocations that can require surgery. The key to correctly assessing and treating these injuries is to determine the exact diagnosis and initiate treatment as quickly as possible. Time is of the essence in achieving a good result.

Finger injuries can result in a variety of symptoms including pain, swelling, stiffness, deformity, and change in position. However, the severity of the symptoms does not always correlate with the severity of the injury. A minor injury requiring minimal treatment can produce significant pain and swelling, and in some instances, the symptoms of a major injury are minimal pain,

swelling, and stiffness. Consequently, it is important that an orthopedist or hand specialist evaluate all finger injuries.

A physical examination and x-rays are two key components that help to accurately assess and diagnose finger injuries that occur during sporting events. Preferably, this evaluation should take place within the first 24 to 48 hours after the injury occurs. Taping an injured finger, followed by a doctor's visit weeks later when symptoms do not resolve, delays appropriate treatment and often results in a poor outcome and can lead to surgery that would have otherwise been unnecessary.

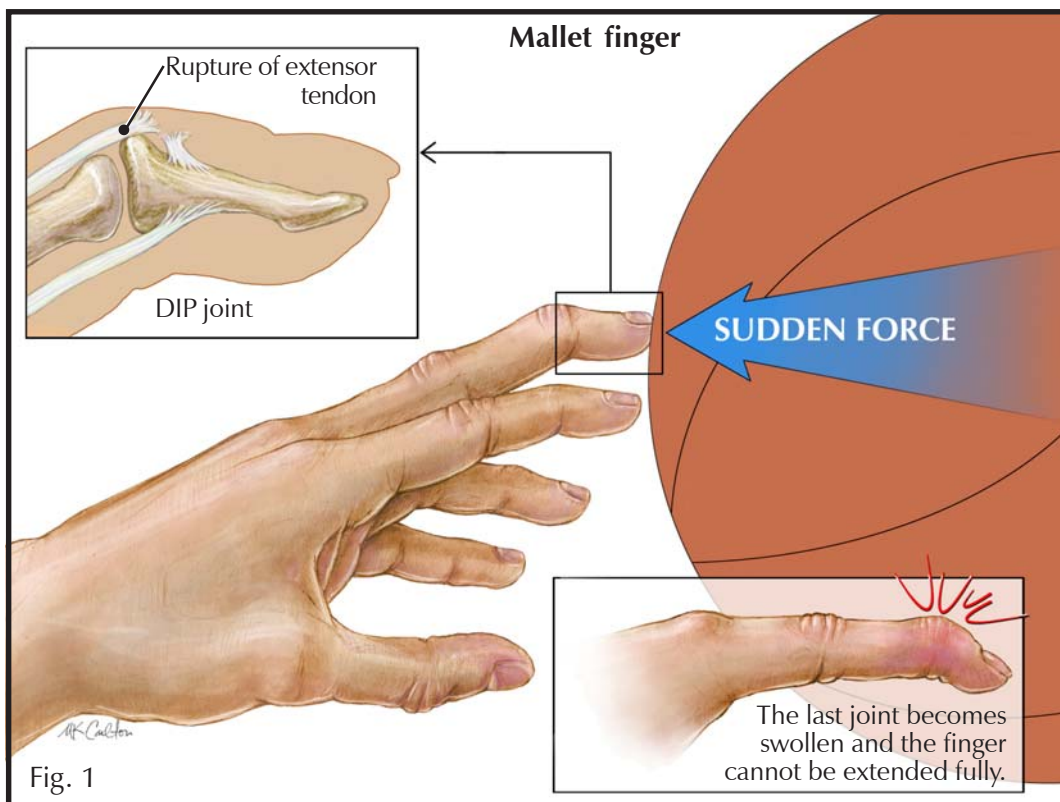
RICE (rest, ice, compression, elevation) and immobilization with a splint are essential, immediate treatments for almost all finger injuries. Continued immobilization, however, is not appropriate for all injuries and can be detrimental for certain injuries because it can lead to unnecessary stiffness. The only way to determine the type of treatment

needed is to obtain a physical examination and x-rays. A patient with an injury significant enough to cause pain, swelling, stiffness, or deformity (such as a bent or crooked finger tip) should have an x-ray.

One of the most common injuries in basketball players is known as a *mallet finger* (Fig. 1). This injury typically occurs when the ball hits the end of the extended (straight) finger causing a sudden and forceful flexion (bending) of the distal interphalangeal (DIP) joint (the last joint of the finger). This mechanism results in a rupture, or tearing, of the extensor tendon from the bone. It is followed by pain and swelling at the DIP joint and a bent position with the inability to extend the tip of the finger. A mallet finger will not heal without appropriate treatment. If left untreated, the injury can lead to permanent swelling, deformity, discomfort, and can cause additional problems in the finger.

The proximal interphalangeal (PIP) joint (middle knuckle joint of the finger) is the site of many serious injuries including ligament and tendon tears, fractures, and dislocations. These injuries can often be accompanied by avulsion or chip fractures, which occur when a small piece of bone is torn away from the remaining larger bone by a tendon or ligament (Fig. 2, pg. 4). These small fractures are indicators of a major ligament or tendon injury and often have different treatment protocols than routine fractures. In many cases, continued immobilization of an avulsion or chip fracture is not indicated and can even be harmful.

The PIP joint and the metacarpophalangeal (MP) joint (knuckle joint) are often dislocated. The dislocated joint can often be reduced (put back in



place) on the playing field; however, all dislocated joints require further evaluation and x-rays to assess for tendon, ligament, joint, and bone injury that may not be immediately apparent. Any joint that cannot be reduced should be considered an emergency and requires immediate attention. One of the most common injuries to the PIP joint occurs on the palm side of the hand to a large, strong ligament known as the volar plate. Any injury that causes hyperextension can result in a sprain (tear) of the volar plate with or without a small avulsion or chip fracture. This injury can lead to significant long-term pain, stiffness, and swelling if not treated appropriately.

On the basketball court or on the football field, there is no sure way to differentiate a significant injury from a minor injury. Taping an injured finger is not always the answer and minor swelling and pain does not always mean a minor injury. For that reason, finger injuries should be evaluated by an orthopedist within the first 24 to 48 hours after injury.

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## Basketball and the Foot and Ankle

Basketball is a sport that's increasing in popularity both in the US and abroad. New developmental (minor) leagues are forming, and, certainly, at the high school level we see many more athletes participating in the sport. This year alone, over 1.6 million injuries will occur in people playing basketball. These injuries may be either acute or chronic. Proper treatment of both types is important to prevent long-term disability.

Acute injuries are those events that occur traumatically at a specific point in time. Chronic or overuse injuries occur over a much longer period of time and the athlete often cannot point to a direct situation or cause of the problem.

### Ankle anatomy

The ankle is made up of 3 main bones; the lower end of the tibia, or shinbone, and the fibula, or outer bone of the ankle, and the talus that lies between the tibia and the fibula. Holding these structures together are

the ankle ligaments that connect one bone to another. Holding the shinbone to the talus bone on the inside of the ankle is a very strong tissue called the deltoid ligament. On the outside of the ankle are 2 smaller ligaments holding the fibula to the talus bone, and 1 ligament from the talus to the calcaneus (Fig. 1, pg. 5). Also not to be forgotten are the muscles that surround the ankle that help propel it and allow athletes to run and jump.

### Achilles tendinitis

*Achilles tendinitis* is the most common injury of the

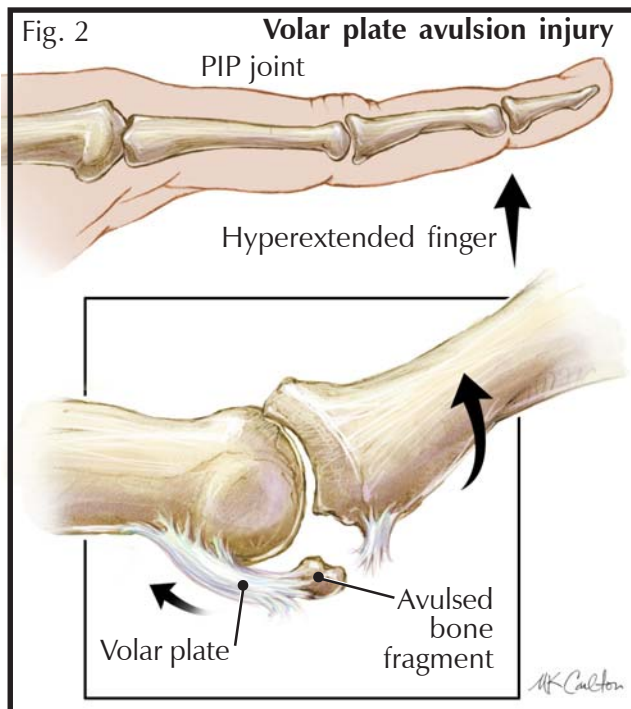
foot and ankle. At the point where the calf muscles combine, they form the strong, rope-like Achilles tendon that inserts on the back of the heel bone (Fig. 1, pg. 5). This tendon allows the calf muscles to push the foot and toes downward, allowing a person to run or jump. In running or jumping sports, such as basketball, this tendon can become irritated and cause chronic problems. Repetitive overuse of this tendon can cause the overlying sheath of the tendon to become inflamed. This results in chronic pain and tightness of the tendon, which is Achilles tendinitis.

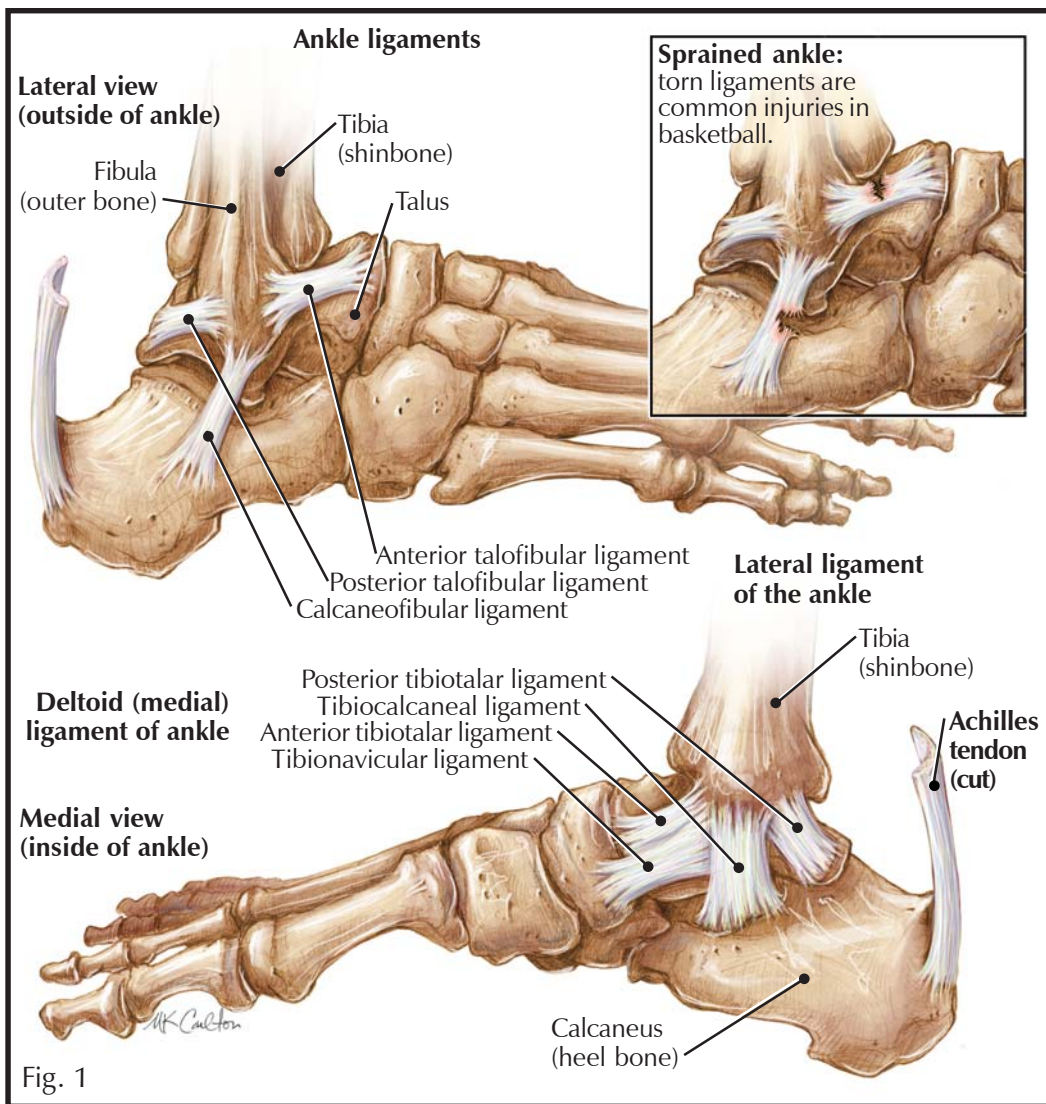
Achilles tendinitis usually develops slowly, frequently resulting from a change in training, such as adding mileage or hill running. The problem is usually an excessively tight muscle in the Achilles tendon muscle group that causes inflexibility. This causes the tendon to become stretched, which can lead to inflammation and swelling. If the problem persists, it can lead to microtearing or complete tears of the tendon. Symptoms include pain when the muscle is stretched, both during and after an activity, and visible swelling. If symptoms persist, a small scar tissue nodule can form within the tendon and cause severe pain.

Treatment for Achilles tendinitis includes rest until the acute inflammation subsides, ice to the affected area, and anti-inflammatory medications such as ibuprofen. A small heel lift can be used to reduce tension on the Achilles tendon. A stretching and strengthening program of the muscles influencing the Achilles tendon is vital for long-term benefits.

### Ankle instability

The ligaments of the ankle undergo a tremendous amount of stress during basketball maneuvers. One of the most common injuries in basketball is the *ankle sprain*, where the ligaments





are stretched or torn after the foot is rolled inward (Fig. 1). Ligaments heal but remain loose after an injury; therefore, multiple sprains can result in chronic ligament laxity. As the ligaments become more and more stretched after an inversion injury, the ankle has a feeling of giving away even with minimal motion. The ankle may be swollen, and the injured person will often say that he or she cannot pivot or twist on the ankle.

Rehabilitation exercises are often used to condition the muscles around the ankle to help maintain stability. The ankle muscles themselves can help make up for the stretched ligaments. A brace can also be placed around the ankle to help

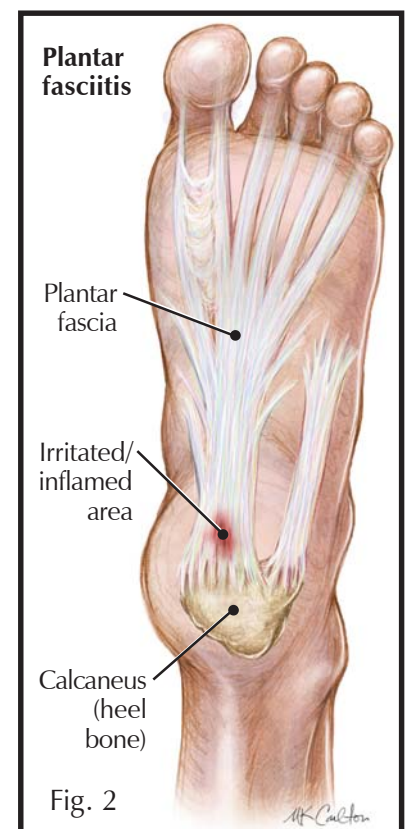
support the ligaments if the looseness is not too severe. If these treatments are not effective, surgery may be necessary.

### Plantar fasciitis

The plantar fascia is the hammock that connects the bottom of the heel bone to the bottom of the toes. This hammock of fibrous tissue provides structural support for the bottom of the foot. An excessive amount of stress on this area can cause extreme pain at the weakest point of the hammock, where the plantar fascia attaches to the heel bone. This also causes swelling of the hammock, which is known as *plantar fasciitis* (Fig. 2). Indications include pain with the first few steps after rising from a seated

position. Pain seems to quickly subside after movement begins. However, these symptoms may worsen over time and occur for longer periods after rising. Plantar fasciitis is probably the result of inflexibility somewhere else in the foot or ankle. For example, if the Achilles tendon is too tight or inflexible, this force is transmitted to the plantar fascia hammock and scar tissue and inflammation will result. A physical examination reveals tenderness on the bottom of the heel as the examiner pushes on this area. The patient feels shooting pain that sometimes goes down into the toes. In general, the Achilles tendon is tight, and other portions of the foot may prove to be inflexible as well.

Treatment for plantar fasciitis includes a period of rest, inflammatory medication, and an aggressive stretching program to help remove the excessive force placed across the plantar fascia



hammock. Once treated, inflammation, swelling, and other symptoms will go away.

### Stress fractures

*Stress fractures*, also called fatigue fractures, can be disabling problems for athletes. Stress fractures in the lower extremities are related to overuse. In the foot and ankle, they most often occur in the distal shinbone, or tibia, or at the base of the fifth metatarsal, or in the lateral (outside) foot bone. A stress fracture is a phenomenon whereby multiple, repeated stresses can easily lead to a fracture. It is important to recognize stress fractures early on. If a stress fracture is missed, it could potentially lead to a complete fracture with devastating consequences.

Symptoms of stress fractures include pain directly over the bony area, such as the shinbone, with swelling and inflammation. X-rays are often negative because the bones have not completely broken. Often, a bone scan or a MRI is required to diagnose these injuries. Once diagnosed, there should be a period of immobilization and no weight should be placed on the injured body part.

Rehabilitation exercises will be required to ensure optimal flexibility in the area. Once symptoms have subsided and once flexibility is again attained, the athlete can generally return to play without difficulty.

Basketball is a demanding sport, but with a good strengthening and flexibility program, most basketball players can continue to play at the level they desire.

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## Sudden Death in Athletes

In 490 BC, Phidippides, a young Greek messenger, ran 26.2 miles from Marathon to Athens delivering the news of the Greek victory over the Persians, and then he collapsed and died. This is probably the first recorded incident of sudden death of an athlete.

The possibility that young, well-trained athletes at the high school, college, or professional level could die suddenly seems incomprehensible. It is a dramatic and tragic event that devastates families and the community. Sports, per se, are not a cause of enhanced mortality, but they can trigger sudden death in athletes with heart or blood vessel abnormalities by predisposing them to life-threatening heart irregularities.

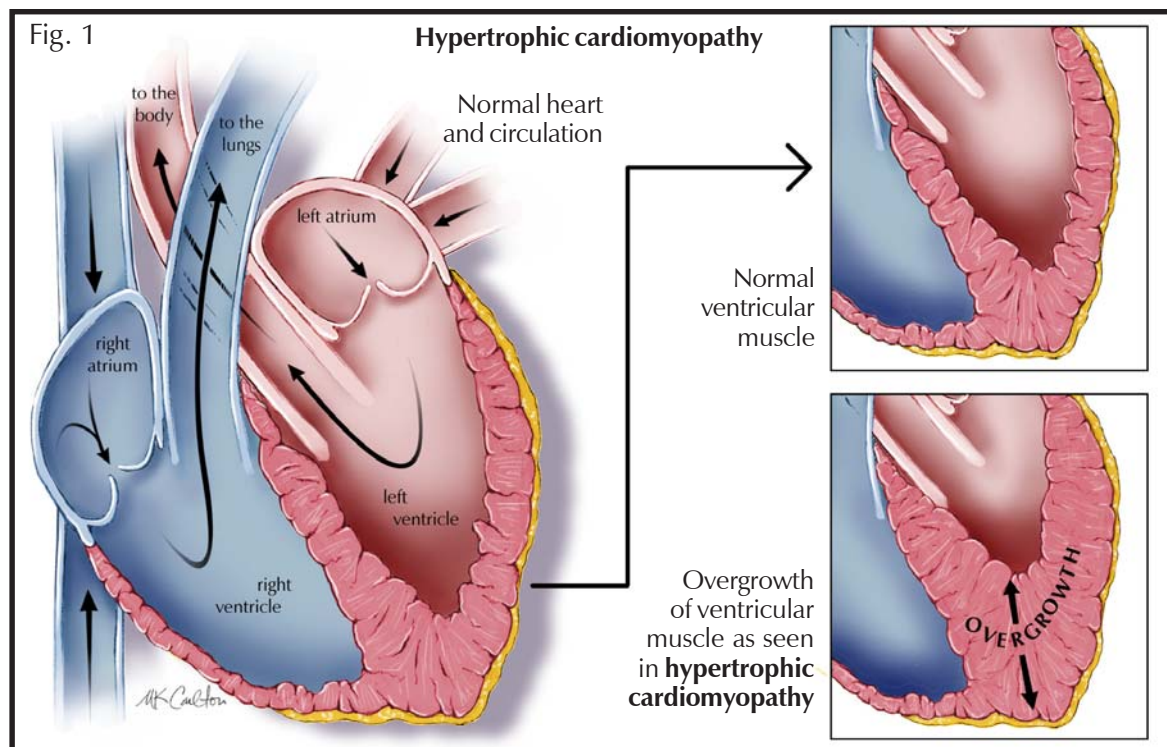
Sudden death most commonly occurs in football or basketball, accounting for two-thirds of sudden death of athletes in the US. In the

rest of the world, soccer is the sport most commonly associated with sudden death. Sudden death occurs in 1 to 2 in 200,000 athletes annually and predominately strikes male athletes.

Some well-known athletes who have been victims of sudden death include marathon runner Jim Fixx (1984), Olympic volleyball star Flo Hyman (1986), NBA basketball star Hank Gathers (1990), Olympic figure skater Sergei Grinkov (1995), all pro NFL player Korey Stringer with the Minnesota Vikings (2001), and Darryl Kile, all-star pitcher for the St. Louis Cardinals (2002). In my hometown, Jed Bedford, captain of the Columbus State University basketball team and NCAA Division II leader in 2002 for 3-point shots, collapsed during practice and died one hour later on December 14, 2003.

### Cardiac causes

The most common causes of sudden death are congenital abnormalities of the heart and blood vessels, or those that are present at



birth. These abnormalities usually produce no symptoms and are disproportionately prevalent in African-American athletes. The most common cause of sudden death is hypertrophic cardiomyopathy (Fig. 1), an excessive thickening of the heart muscle that can lead to an irregular heart rhythm called *ventricular fibrillation*. During ventricular fibrillation, numerous chaotic electrical discharges to the chambers of the heart (400+ per minute) result in no blood being pumped.

The second most common cause of sudden death in athletes is abnormal coronary arteries (the blood vessels that supply oxygen to the heart muscle). Often, coronary arteries originate from an abnormal location or have an acute twisting angle that slows the blood flow. Other cardiac abnormalities that can cause sudden death are heart valve abnormalities, electrical conduction abnormalities of the heart, and rupture of the aorta (the large blood vessel that carries the blood from the heart to the body).

Another cause of sudden death among athletes is *Marfan syndrome* (Fig. 2). Marfan syndrome affects approximately 1 in 20,000 of the general population. People who have this medical condition are usually tall, slender, and loose-jointed. It is a hereditary disorder of the connective tissue, which is the basic substance that holds blood vessels, heart valves, and other structures together. Olympic volleyball star Flo Hyman had Marfan syndrome. On June 8, 2004, Florida State basketball player Ronald Pierce died from an aorta rupture that was a result of this syndrome.

Most sudden death in athletes over the age of 30 is due to a heart attack, or blockage of the coronary arteries. The otherwise normal arteries are occluded with lipid plaque. Athletes who are older than 30 are at increased risk for heart attack if they smoke, have high blood pressure,

diabetes, elevated abnormal lipids, or a strong family history of heart disease. Darryl Kile, pitcher for the St. Louis Cardinals, died suddenly at age 33. (His father died of a heart attack at age 44).

### Noncardiac causes

A blow to the chest in the area of the heart, called *commotio cordis*, or cardiac concussion is the most common cause of sudden death in athletes who have no heart abnormality. This condition often occurs in children or adolescents with a nonpenetrating—and usually innocent appearing—blow to the middle of the chest, such as when a baseball, hockey puck, lacrosse ball, softball, or karate blow strikes the athlete's chest.

### Screening

High school and college athletes usually have a physical examination by a physician before participating in organized sports. Athletes with a family history of sudden death, Marfan syndrome, or heart disease at a young age, a history of exercise-induced syncope (fainting), a loud heart murmur, or previous heart surgery require further evaluation by a cardiologist. The preparticipation sports history and physical examination is often not sensitive enough to pick up rare heart conditions. Screening probably does identify 3% to 15% of athletes at risk.

### Signs and symptoms

Chest pain, syncope (fainting), dizziness, palpitations (sensation of a rapid or irregular heart beat), fatigue, and excessive or prolonged shortness of breath can be innocent sensations that can accompany intense exercise. Nevertheless, they should be evaluated by a physician because they could be a sign of a heart or lung disorder.

Although sudden death in athletes is devastating, it is very rare and the

### Marfan syndrome

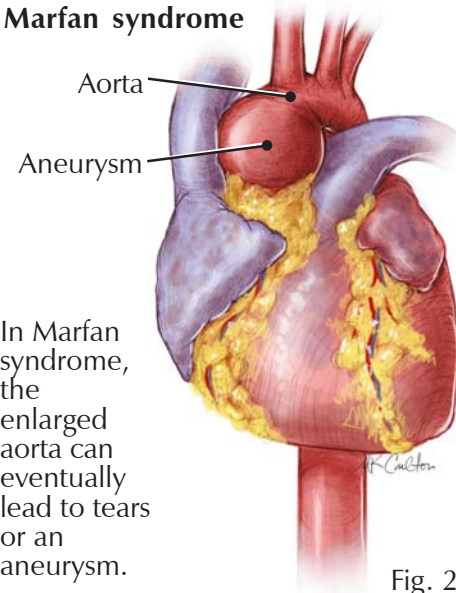


Fig. 2

benefits of exercise for all ages are recognized by improved lipid levels, glucose (sugar) tolerance, enhanced self-assurance, and improved overall quality of life. There are many things we can do to help prevent exertional related illness or death. Exercise in the morning or evening during warm months, drink plenty of fluids, and avoid alcohol and caffeinated beverages. Be sure to inform your physician if there is a family history of heart disease, stroke, or sudden death. If you are over 30 years of age and are starting an exercise program, seek advice from your primary care physician. Don't smoke, avoid anabolic steroids and stimulants, and report any chest pain, fainting, dizziness, unusually rapid heartbeat, fatigue, and excessive or prolonged shortness of breath to your health care provider.

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**Glenn C. Terry, MD** graduated from Southern Methodist University and earned his medical degree at Southwestern Medical School. After completing his orthopedic residency at Bexar County Hospital in San Antonio, Texas, he completed a sports medicine fellowship at The Hughston Clinic. For additional training he visited Boston University, the University of Linkoping in Sweden, the University of Amsterdam in Holland, and Bern and Bruderholz Hospital in Switzerland.



Dr. Terry served as a physician supporting the United States team at the Barcelona Olympic Games and has trained as a crew chief for the United States Olympic Committee drug control program. He was also a volunteer physician, The Athletic Care Coordinator for the track and field venue at the 1996 Atlanta Olympic Games, and Sports Medicine Person of the Year for 1998.

Certified by the American Board of Orthopaedic Surgery, he holds memberships in the American Medical Association, the International Society of the Knee, the International Arthroscopy Association, the American Orthopaedic Society for Sports Medicine, Olympic Sports Medicine Society, The American Laser Society, The American Orthopaedic Association, and The Herodicus Society. His specialties include orthopedic surgery, sports medicine, arthroscopy, laser surgery, and the treatment of complex knee and shoulder problems.

The *Hughston Health Alert* is a quarterly publication of the Hughston Sports Medicine Foundation, Inc. The Foundation's mission is to help people of all ages attain the highest possible standards of musculoskeletal health, fitness, and athletic prowess. Information in the *Hughston Health Alert* reflects the experience and training of physicians at The Hughston Clinic, PC, of physical therapists and athletic trainers at Hughston Rehabilitation, of physicians who trained as residents and fellows under the auspices of the Hughston Sports Medicine Foundation, Inc., and of research scientists and other professional staff at the Foundation. The information in the *Hughston Health Alert* is intended to supplement the advice of your personal physician and should not be relied on for the treatment of an individual's specific medical problems.

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