# Hughston Health Alert

6262 Veterans Parkway, PO Box 9517, Columbus, GA 31908-9517 • www.hughston.com/hha

FRACTURES AND YOU

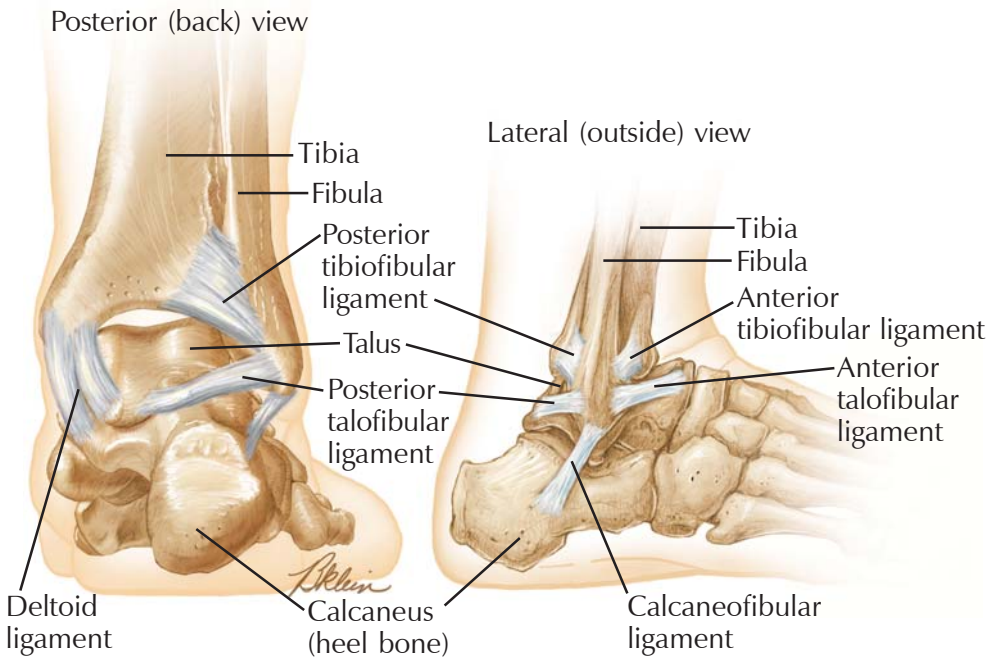
Volume 19, Number 2 - Spring 2007


## Inside...



## Ankle Fractures

Fig. 1. Normal anatomy of the ankle




Ankle fractures often occur in athletes who play in pivoting sports such as football, basketball, and soccer. However, simple movements while doing common, everyday activities can cause ankle fractures. Activities, such as stepping off a curb and turning your ankle, falling off your kitchen stool and twisting your ankle, and falling from a ladder and fracturing the ankle at impact can cause mild to serious ankle fractures. The ankle is a ginglymus (hinge) joint that connects the foot and leg. If a fracture, or break, occurs in any of the 3 bones (tibia, fibula, and talus) or if a combination of the 3 bones are cracked, or broken, the injury is considered an ankle fracture. An ankle fracture can be painful and it can keep you from doing the things you enjoy, so prompt diagnosis and treatment is necessary.

The ankle is made up of three bones (Fig. 1). The large shinbone, or tibia, bears 92% of the body's weight. The smaller, outer bone of the ankle is called the fibula and it bears about 8% of the body's weight. Finally, the talus, is a square bone that rides within the contours of the tibia medially (inner) and above and the fibula laterally (outer), and articulates with the leg bones to form the ankle joint. Multiple rope-like structures, called ligaments, connect each of the bones to one another. At the outside of the ankle, there are 3 smaller ligaments that connect the fibula to the talus. On the inside of the ankle, 1 large, strong ligament, called the deltoid ligament, connects the tibia to the talus. In the back of the ankle, also connecting the tibia and fibula are the syndesmotic ligaments. The ankle is one of the strongest joints in the body because the shape of the bones and the strength of the ligaments provide excellent joint stability.

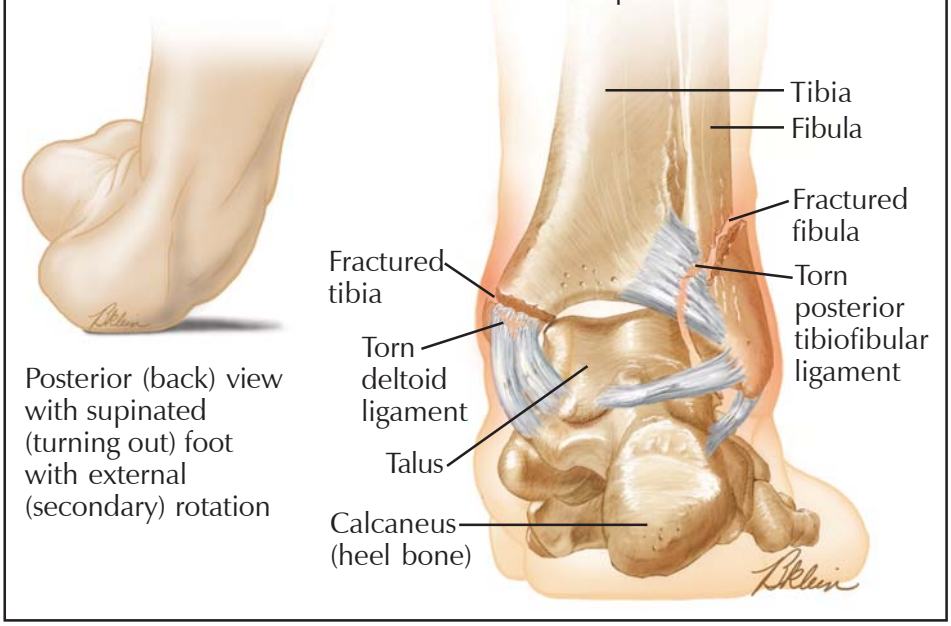
One of the most important considerations when dealing with ankle fractures is the articular cartilage (covering on the ends of bones), or gristle caps. The articular cartilage in the ankle can withstand multiple times a body's weight with each step taken. In light of this fact, articular cartilage is of extreme importance in dealing with ankle fractures. Since it has no blood supply and withstands some of the greatest forces, over any other joint in the body, articular cartilage is easily damaged and has poor healing potential. If any articular cartilage is lost, arthritis develops. Arthritis occurs when raw bones rub against each other causing pain, inflammation, and often dysfunction. Therefore, articular cartilage must be thought of as the weak link in any type of injury to the ankle and priority must be given to it in any discussion involving fractures about the ankle.

### Ankle injury

The pattern of injury to the ankle depends on many factors, including the age of the patient, the quality of the

bone, the position of the foot at the time of injury, and the direction, magnitude, and rate of any loading forces. The bones in and around the ankle will fracture in a predictable pattern, depending on the force applied to it and the way the force is exerted. The bones can be broken separately, or in combination (Fig. 2). These fractures can be simple, with only 1 or 2 cracks in the bone. They can also be very complex injures, where the bone has broken into multiple pieces and have moved far apart from one another. The vast majority of these injuries represent a turning in or turning out of the foot, with a secondary rotational component.

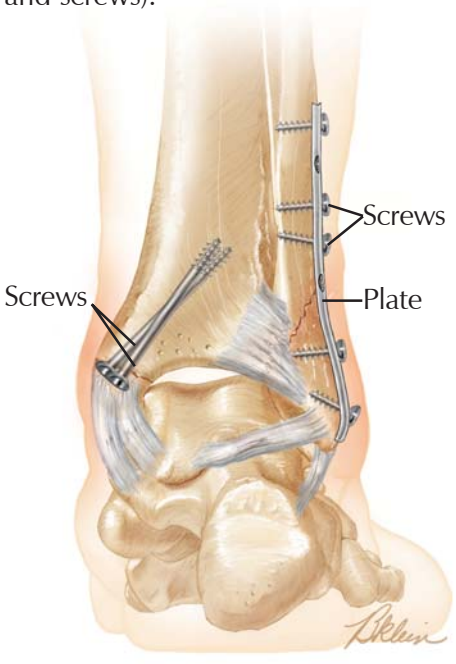
Fig. 2. Complex ankle fracture




## Treatment

The goals of treatment are to move the bones back to where they belong, to keep the bones stable and in place until the fracture heals, and to return the patient back to his or her pre-injury level of function, with a painless, mobile ankle. Anatomic alignment of the fractures after an ankle has been broken helps minimize the chance of degeneration of the articular cartilage. This also helps ensure that long-term, normal range of motion of the ankle can be maintained as well. Non-operative treatment is reserved for fractures that are either non-displaced, or can be easily placed in position by manipulating them. A splint or cast is then applied, frequent x-rays are taken, and the fracture often heals in 6 to 8 weeks. Stable fractures often do very well with casting, rehabilitative exercise, and gradual resumption of normal activities. Fractures that are unstable are those that cannot easily be placed in their normal positions, or fractures that once placed into a normal position, move back out of position.

Fig. 3. Reduction and placement of fractured ankle bones into normal position with internal fixation (plate and screws).




The 2 goals for any surgical outcome to be considered successful are reduction and placement of the bones in their normal position and maintaining the position so the bones can heal. Pins, plates, screws, wires, and other orthopaedic implants are used to help maintain the reduction once it has been made (Fig. 3). Incisions are generally placed directly over the fractured bones. The surgeon is then able to piece the bones back together, much like a jigsaw puzzle using the appropriate implant (plates, screws, or other devices) to hold the bones in their desired position until they heal.

The first reported writings on ankle surgery appear in the 5th century, BCE. The general goal of treatment, to obtain and maintain the correct anatomic position of bones, has not changed much throughout history. However, percutaneous (through the skin) plating, a new technique, allows plates and screws to be applied underneath the skin or placed in small pockets under the skin, allowing for less soft tissue violation and, hopefully, a speedier recovery. Additionally, biological implants, which are absorbed over time, are showing promising results in the treatment of ankle fractures as well.

Finally, rehabilitation plays a very important role in the management of ankle fractures. Once the ankle gets to a stable configuration, early range of motion exercises will keep muscles from getting weak and joints from getting stiff. The job of the physical therapist or athletic trainer becomes paramount in returning the patient back to his or her pre-injury level once the fracture has healed.

*Robert J. McAlindon, MD*
*Auburn, Alabama*

# Distal Radius Fracture

A distal radius fracture occurs when the long bone that connects the elbow to the wrist, called the radius, breaks close to the wrist. The most common cause of a distal radius, or wrist, fracture is falling or landing on an outstretched hand (Fig. 1). Elderly individuals who have developed osteoporosis (a disease that weakens bone) are more susceptible to sustaining a distal radius fracture from a simple fall. A wrist fracture is one of the most common fractures in the elderly population; however, it can also occur in younger individuals, but it is usually caused by an athletic injury or motor vehicle accident.

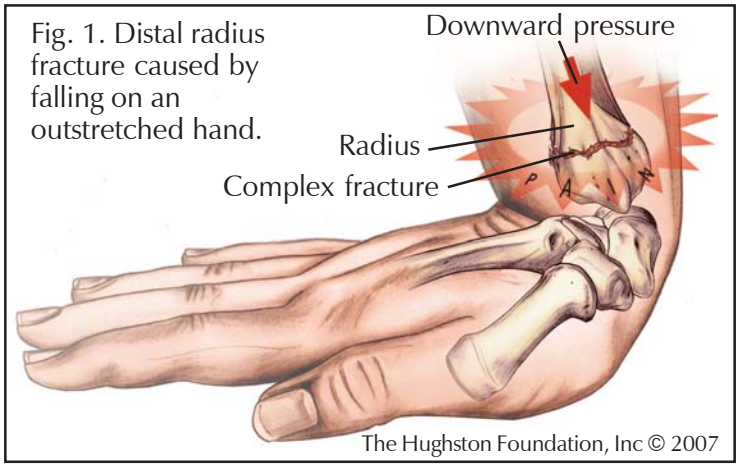


Fig. 1. Distal radius fracture caused by falling on an outstretched hand.

A broken wrist can cause pain, swelling, bruising, and can often cause the wrist to appear deformed. After the trauma of a fall or a sudden impact caused by an accident, if your forearm or wrist begins to swell and the pain makes it difficult to function normally, you should see your doctor.

Fractures have many different degrees of severity. A broken bone, or fracture, can be nondisplaced, which means the bone fractures, or cracks, but the pieces do not move apart from each other. In other words, they stay in their original position. A displaced fracture occurs when the bone breaks and the broken pieces move, or displace, away from each other (Fig. 2).

## Treatment

Initial treatment for any significant wrist injury should include immobilization, elevation, and ice to reduce swelling, discomfort, and further damage. You should seek medical attention as quickly as possible to be evaluated for the extent of your injuries and to obtain x-rays of the fracture. There are many ways to treat distal radius fractures depending on the severity (displacement) of the fracture. A simple, nondisplaced fracture can often be treated with immobilization (usually a cast) for 4 to 8 weeks.

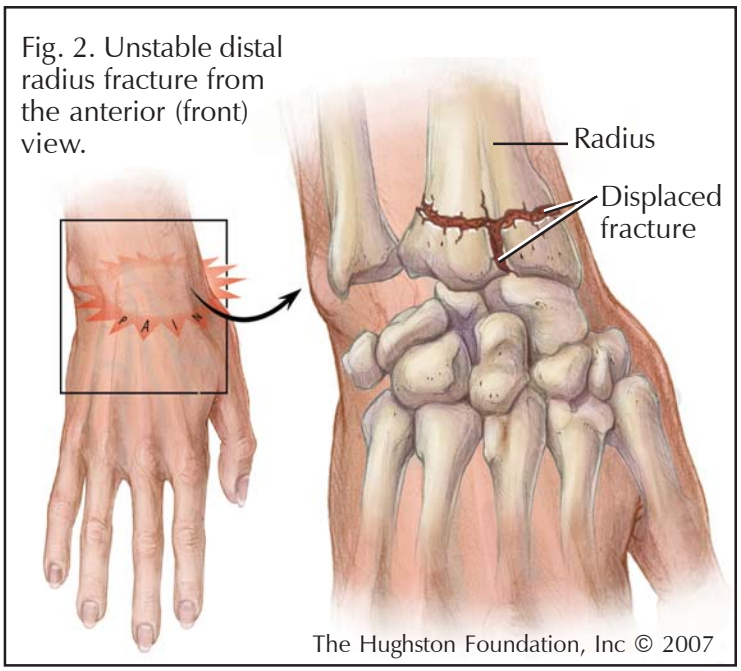
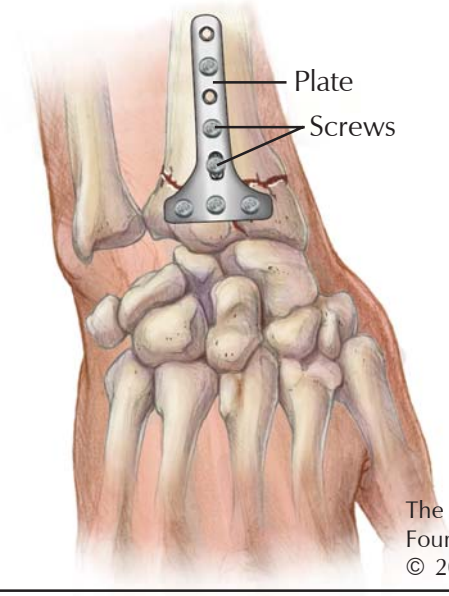


Fig. 2. Unstable distal radius fracture from the anterior (front) view.

Displaced fractures, however, often require more complicated treatments because the displaced, or separated, bone pieces need to be repositioned back to their correct alignment. This is known as either reduction or manipulation. Once the bone pieces have been placed back into the correct position, they need to be held, or stabilized, in alignment until the bone heals. After the bones have been reduced or realigned, they may be able to be held in place with a simple cast. With more severe or unstable fractures, however, a cast will not provide enough support to prevent the bones from shifting back out of place. These are known as unstable fractures and require mechanical devices, also known as hardware or implants, to hold the bone fragments in place while they heal. External fixators are metallic frames that are placed in the bone fragments to hold them in place, but can be seen outside of the skin.

Internal fixation is a popular method used to stabilize bone fragments. This method most often uses plates and screws to hold the bone fragments together (Fig. 3, pg. 4). These devices are usually completely contained within the arm, cannot be seen, and often do not have to be removed. Most unstable fractures that require internal fixation are corrected through outpatient (you spend less than 24 hours in the hospital) surgery. There are several significant advantages to stabilizing distal radius fractures using plates and screws. This method allows for very accurate repair and placement of the bone fragments back into their normal position. It also allows for very early range of motion without the need for a large cast. Consequently, therapy and rehabilitation can begin almost immediately. This limits the long-term stiffness and weakness that can occur. It also allows for more independent use of the hand

Fig. 3. Internal fixation




at home while it heals. Often, therapy is complete at the same time or before your last follow-up visit with your doctor. In the past, therapy would begin once the bone had healed or when it was stable enough for rehabilitation.

The results of a properly treated distal radius fracture can be excellent. The most important aspects, with respect to obtaining a good result, are early initial treatment to prevent swelling and to maintain finger range of motion. Additionally, the fracture fragments must be placed back in their correct position and allowed to heal. Early rehabilitation with a qualified hand therapist can also contribute to an excellent result.

*David C. Rehak, MD*
*Columbus, Georgia*

## Wrist Fracture Therapy

Physicians often prescribe therapy to begin 3 days to 2 weeks following injury and fracture stabilization. Early intervention through therapy can maximize recovery and minimize complications as it keeps your fingers, hand, forearm, elbow, and shoulder functioning while you heal. The amount of time spent in therapy varies depending on individual healing stages and the presence of complicating factors. Therapy should continue until the x-rays show sufficient bone healing and until the patient can use their upper extremity comfortably during daily activity. An individual's prior level of function determines the extent of the final strengthening phase of treatment.

The early stages of therapy include an initial evaluation by a licensed therapist. Development of a treatment plan is based on physician orders, procedure performed, and clinical findings at the time of the evaluation. The early phase of treatment involves dressing changes, wound care, and proper positioning with splints or braces. Your therapist can choose to custom fabricate an orthotic device or issue a brace off-the-shelf. The balance of maintaining proper protection of a healing fracture and keeping swelling to a minimum, while allowing range of motion is the goal at this stage.

While immobilized in a cast or brace, it is important to maintain range of motion in all unaffected joints and to keep the hand and wrist elevated above the heart. A well designed, rigid support should allow for full finger and thumb movement and not be so restrictive that it causes increased swelling in surrounding areas. Excessive swelling caused by a tight fitting cast or brace can compromise the blood flow in the forearm and hand and can potentially cause serious complications. Should this occur at any time, the patient should contact their physician immediately.

The elbow and shoulder can also become stiff as a result of decreased use of the injured wrist and hand. The use of a sling to maintain elevation of the forearm and hand is helpful for prolonged activity. This will decrease fatigue of the shoulder and elbow muscles. However, slings should only be used during periods of activity. Prolonged use of a sling can cause excessive stiffness in the shoulder and elbow.

X-ray testing helps therapists determine when to progress movement of the wrist, forearm, and hand and when to decrease immobilization. As with any fracture, healing time can vary based on a number of factors, such as underlying medical conditions, including diabetes, osteoporosis, or circulation problems. Complicating factors can increase the amount of time spent recovering. Smoking decreases circulation and can delay healing as

Fig. 1. Hand above the heart

damaged tissue requires adequate blood supply to heal properly.

The intermediate phase of treatment includes continued range of motion of uninvolved joints and initial movement of the fractured wrist. This phase also can include soft tissue, scar massage, and mobilization of uninvolved joints. All tissues should remain soft and pliable to allow joints to move freely. Range of motion and functional use of the affected upper extremity is progressed as the fracture heals, which is indicated by the physician, based on x-ray results. The final phase of treatment involves achieving full range of motion of all joints, combined with strengthening. The amount of time spent in each phase is dependant on tissue healing and the presence of any complicating factors.

In all phases of therapy, education is the key to success. When a patient understands his or her injury and takes an active part in the rehabilitation process, they will progress faster. It is important to remember that the final goal of therapy is to have functional use with minimal discomfort. Range of motion deficits and long-term stiffness, to some degree, is expected. However, patients will continue to make progress after therapy is no longer required. Realistically, it takes 6 months to 1 year for patients to reach their full potential.

While it is not required, there are therapists that specialize in the treatment of the upper extremity exclusively, known as Certified Hand Therapists (CHT). These individuals can be physical therapists or occupational therapists who have had a minimum of 5 years general experience. In addition, at least 2 of the 5 years experience must be in treatment of injuries of the upper extremity and they must have passed the national board certification exam. This entitles them to use the CHT credentials. If a certified hand therapist is in your area, your physician can order treatment by that individual specifically.

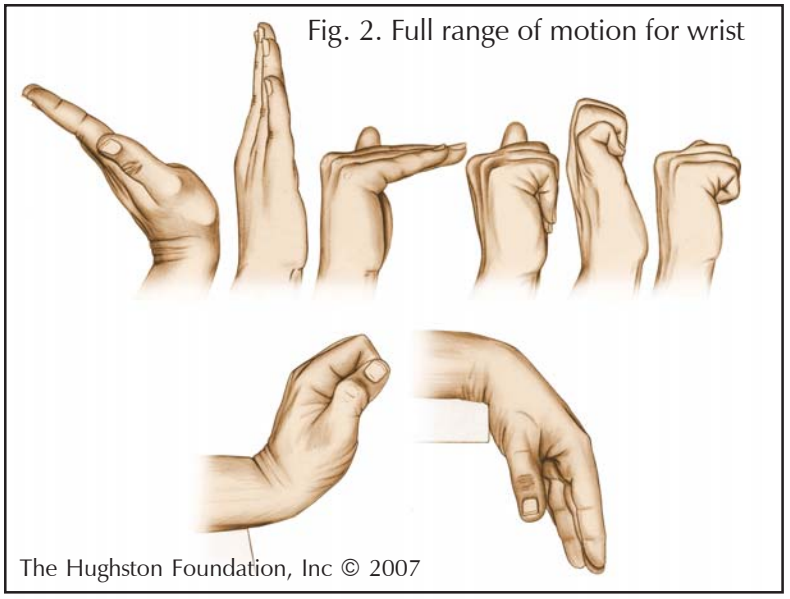



Fig. 2. Full range of motion for wrist

Recent studies indicate that patients who participate in therapy protocols following orthopaedic injuries of the hand and wrist regain motion, strength, and functional use in shorter periods of time than those who do not.

*Linda Moore, OTR/L,CHT*
*Columbus, Georgia*

**References:**

American Society of Hand Therapists. Clinical assessment recommendations. 2nd ed. Chicago: American Society of Hand Therapists; 1992.

American Society of Hand Therapists. Hand Therapy certification study module CD-ROM. American Society of Hand Therapists; 2002:312-321-6866.

Cannon NM (editor). Diagnosis and treatment manual for physicians and therapists. Indianapolis: The Hand Rehabilitation Center; 2001.

Hunter J M, Schneider LH, Mackin EJ, Callahan AD (editors). Rehabilitation of the hand and upper extremity. 5th ed. St. Louis: Mosby, Inc; 2002.

Jebson PJL, Kasdan ML (editors). Hand Secrets. Philadelphia: Hanley & Belfus; 2001.

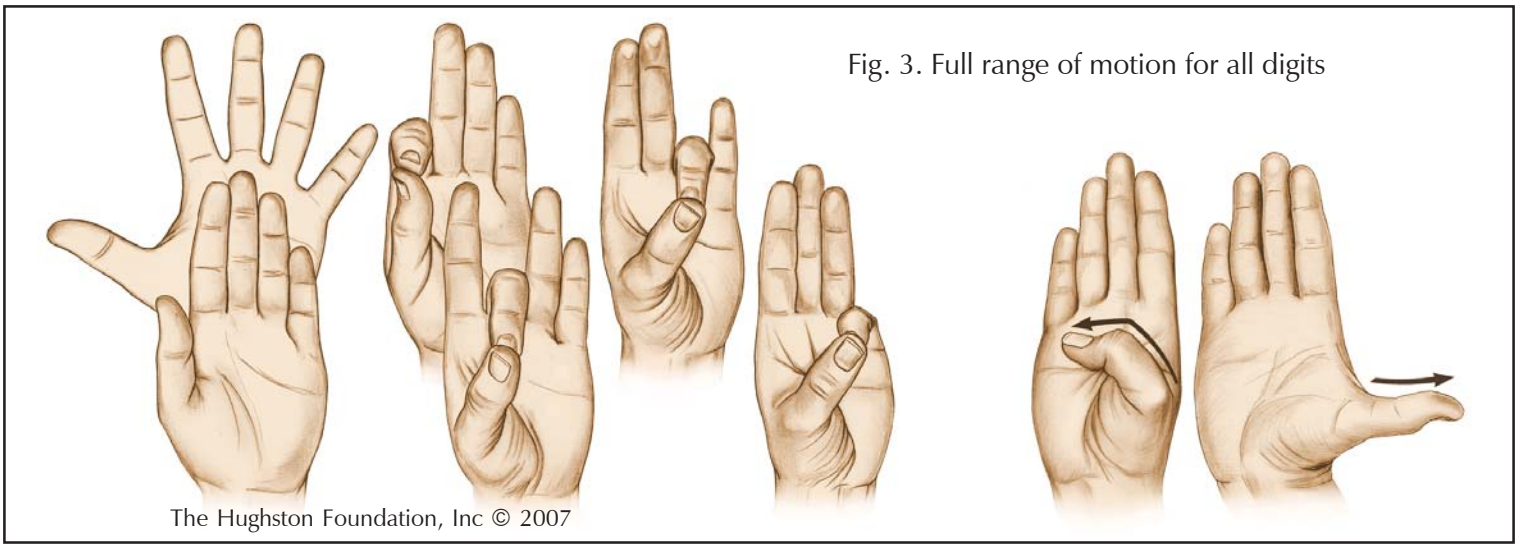


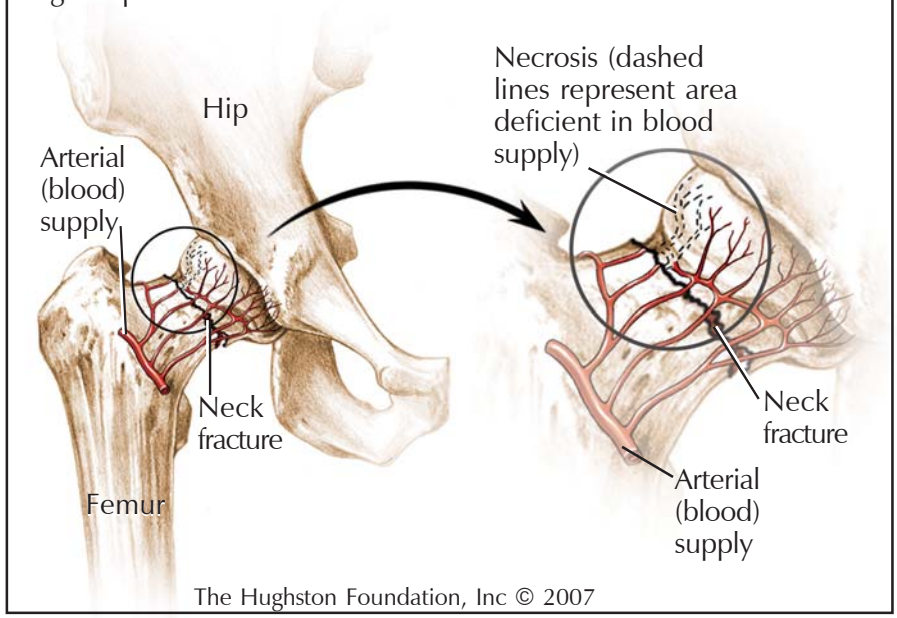

Fig. 3. Full range of motion for all digits

# Stress Fractures of the Hip in Young Athletes

Stress fractures occur most frequently in the lower leg and foot; however, about 5 to 10% occur in the hip. Although hip stress fractures represent a small percentage of all stress fractures, they are more prone to devastating complications if unrecognized or inadequately treated.

The femur is the large bone in the thigh. Its ball-shaped head fits into the socket of the pelvis, called the acetabulum, to form the hip joint. When a stress fracture occurs in the hip, it often involves the femoral neck (the short section of bone connecting the femoral head to the main shaft of the bone). During routine activities, tremendous forces are concentrated across the femoral neck, but while running, the force is more than tripled. A single, high-energy force, such as a motor vehicle accident or fall, can cause a fracture. However, a stress fracture is a hairline crack in the bone that occurs from repetitive low-energy forces over a long period of time. Fatigue fractures occur when a normal bone is subjected to overuse or repetitive stress beyond its ability to repair itself. These fractures commonly occur in athletes who run and jump on hard surfaces, such as basketball players and distance runners, or military recruits who march long distances.

Fig. Displaced femoral neck fracture with avascular necrosis




Making the diagnosis of a femoral neck fracture is very difficult and often delayed because most patients present with a vague, activity-related anterior groin pain that is relieved by rest. Patients will often have a limp and pain at extremes of motion during a physical exam. X-rays are helpful in ruling out other problems, but rarely show the stress fracture. A bone scan and magnetic resonance imaging (MRI) are both helpful in diagnosing stress fractures and can help identify any other injury or disease, in case the patient does not have a stress fracture.

Treatment depends on the location of the fracture and whether or not the bone is displaced. If the stress fracture becomes complete and the bone cracks all the way through, bone fragments can displace and no longer line up properly. A displaced femoral neck fracture in a young person is a very serious problem because it can disrupt the blood supply to the femoral head. This can lead to a devastating complication known as avascular necrosis (tissue death caused by deficient blood supply) (Fig.). Femoral neck stress fractures can be classified according to where they occur. Stress fractures that occur on the inferior, or undersurface, of the femoral neck are called compression fractures and are less likely to displace. The fractures located on the superior (top, upper) side of the femoral neck are called tension fractures and have a higher incidence of displacement and complications.

Nonsurgical treatment is often recommended for compression-type fractures because of the low risk of displacement. The patient uses crutches for 4 to 6 weeks, thus putting no weight on the leg. Surgery is often recommended for tension-type fractures or fractures involving more than 50% of the femoral neck width. Surgery includes making a small incision on the upper thigh and placing 3 screws in the femoral neck across the fracture. Often, after surgery, a patient can begin to bear as much weight as tolerated, and over the course of a few weeks can begin to walk without crutches. After 3 to 4 months, the patient can tolerate low-impact activities for long periods of time, and physical therapists can begin high-impact exercises.

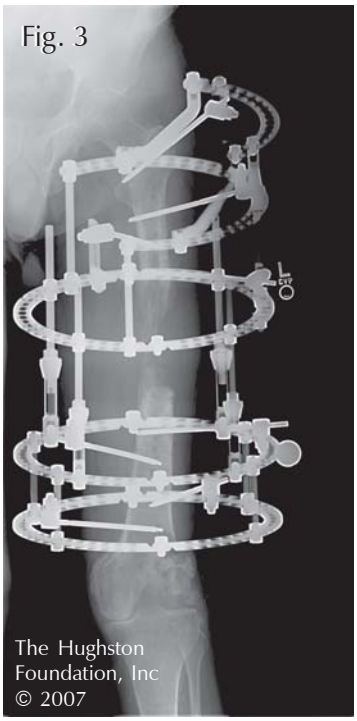
Stress fractures are best managed by prevention. Stress fractures are related to both the amount of training and how fast the person increases the frequency, intensity, or duration of their activity level. Bones are usually able to adapt to repetitive stress but extreme stress, repeated too often, can overwhelm the bone's ability to adapt. This is especially true when someone suddenly begins a new, strenuous, or repetitive activity. The type and condition of running shoes can also contribute to the problem. Athletes, coaches, and parents should be aware of the effects of overtraining and the importance of taking periodic rest days.

*Robert Smith, MD*
*Columbus, Georgia*

# Stabilizing and Protecting a Fracture



For generations, plaster casts were used for protecting noncomplicated fractures; however, over the past 20 years, fiberglass has taken the place of plaster. Fiberglass dries in minutes and creates a lighter, stronger cast giving patients more mobility. Improvements in hard casts barely scratch the surface in the advancements of fracture treatments. Today, physicians can use a variety of products and techniques to stabilize and protect a fracture, including adjustable splints, a removable cast (Fig.1), a custom made brace (Fig. 2), external fixators (Fig 3), use of screws, rods (Fig. 4), and plates (Fig 5), and other internal and external fixators (Fig. 6).



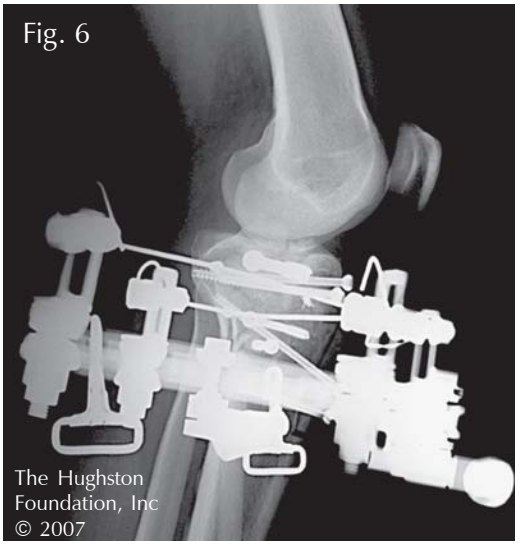

Treatment for complex fractures requiring surgery has changed with new developments in implant technology. Surgically repaired fractures are considerably more stable when using implants; however, outside protection can be needed while the fracture heals. Custom made and off-the-shelf braces have also kept up with advancements in technology. The braces are designed to protect like a hard cast, but also to be removable allowing for better hygiene. Removable and adjustable braces permit early participation in rehabilitation and, therefore, increase the rate of recovery. Removable braces are often used right after an injury when the swelling is still high. Once the swelling decreases, then a hard fiberglass cast can be used to provide the additional stability and protection the fracture needs.

External fixators, which use rods and rings outside the body, allows orthopaedists to treat bone deformities, open fractures (fractured bone breaks through the skin), and other complex fractures such as malunions (bones do not heal back together correctly). External fixation can correct angle and length problems by adjusting dials on the fixator, based on the physician's order. Fixators also permit better wound care, as well as greater overall hygiene. The use of new surgical techniques using internal and external fixators and removable braces for protection, provide huge benefits for the patients in reduced complications and faster recovery.



With the new treatments for fractures, physical and occupational therapists can begin working with patients much sooner. Patients can also perform weight bearing and range of motion exercises sooner. Although patients begin therapy sooner, they still must follow their physician's instructions so they do not cause a re-injury or slow the healing process.

Most fractures require 6 to 12 weeks for recovery, which is a relatively short period of time. Having a good attitude and following your physician's instructions should not only make the recovery *seem* much shorter, it will actually be shorter.




*Jay Graham, Certified Orthopaedic Technologist*
*Columbus, Georgia*

**Robert J. McAlindon, MD**, attended college and received his undergraduate degree in his native state of Michigan. His graduate studies include biology at the University of Detroit and physiology at Georgetown University. He attended medical school and completed an orthopaedic surgical residency at Georgetown University. Before becoming a member of our elite staff, Dr. McAlindon completed a sports medicine fellowship at The Hughston Clinic, P.C.

Dr. McAlindon is certified by the American Board of Orthopaedic Surgery and a member of the American Academy of Orthopaedic Surgeons. He specializes in general orthopaedics with an interest in sports medicine and continues doing research in sports medicine and trauma at The Hughston Foundation and The Hughston Clinic, P.C.

Dr. McAlindon is an affiliate professor in the Department of Health and Human Performance in the College of Education at Auburn University where he serves as the chief of orthopaedics for the Kenny Howard Athletic Training Fellowship. Through this appointment, he teaches and guides research efforts in health issues related to youth sports.




The *Hughston Health Alert* is a quarterly publication of The Hughston 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 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.




*ISSN# 1070-7778*



HUGHSTON

6262 Veterans Parkway
P.O. Box 9517
Columbus GA 31908-9517

Hours of Operation:
M-F 8:30-5:30

Appointments:
706-324-6661
1-800-331-2910

**www.hughston.com**

HUGHSTON Orthopedic Hospital

**1-866-HUGHSTON**
**www.hughstonhospital.com**

100 Frist Court
Columbus GA 31909



# Hughston Health Alert

*The Hughston Foundation, Inc.*
*6262 Veterans Parkway P.O. Box 9517*
*Columbus, Georgia 31908-9517*

WINNER 2005 APEX AWARDS FOR PUBLICATION EXCELLENCE
2002-2006

NONPROFIT ORG
US POSTAGE
PAID
COLUMBUS GA
PERMIT NO 99