

Hand Injuries

Hand Injuries (Fractures, Tendon injuries, Nailbed & fingertip injuries)

What is a fracture?

The hand is made up of many bones that form its supporting framework. This frame acts as a point of attachment for the muscles that make the wrist and fingers move. A fracture occurs when enough force is applied to a bone to break it. When this happens, there is pain, swelling, and decreased use of the injured part. Many people think that a fracture is different from a break, but they are the same. Fractures may be simple with the bone pieces aligned and stable. Other fractures are unstable and the bone fragments tend to displace or shift. Some fractures occur in the shaft (main body) of the bone, others break the joint surface. Comminuted fractures (bone is shattered into many pieces) usually occur from a high energy force and are often unstable. An open (compound) fracture occurs when a bone fragment breaks through the skin. There is some risk of infection with compound fractures.

How does a fracture affect the hand?

Fractures often take place in the hand. A fracture may cause pain, stiffness, and loss of movement. Some fractures will cause an obvious deformity, such as a crooked finger, but many fractures do not. Because of the close relationship of bones to ligaments and tendons, the hand may be stiff and weak after the fracture heals. Fractures that involve joint surfaces may lead to early arthritis in those involved joints.

How hand fractures are treated?

Medical evaluation and x-rays are usually needed so that your doctor can tell if there is a fracture and to help determine the treatment. Depending upon the type of fracture, your hand surgeon may recommend one of several treatment methods.

A splint or cast may be used to treat a fracture that is not displaced, or to protect a fracture that has been set. Some displaced fractures may need to be set and then held in place with wires or pins without making an incision. This is called closed reduction and internal fixation.

Other fractures may need surgery to set the bone (open reduction). Once the bone fragments are set, they are held together with pins, plates, or screws. Fractures that disrupt the joint surface (articular fractures) usually need to be set more precisely to restore the joint surface as smooth as possible. On occasion, bone may be missing or be so severely crushed that it cannot be repaired. In such cases, a bone graft may be necessary. In this procedure, bone is taken from another part of the body to help provide more stability.

Fractures that have been set may be held in place by an “external fixator,” a set of metal bars outside the body attached to pins which are placed in the bone above and below the fracture site, in effect keeping it in traction until the bone heals.

Once the fracture has enough stability, motion exercises may be started to try to avoid stiffness. Your hand surgeon may determine when the fracture is sufficiently stable.

What types of results can I expect from surgery for hand fractures?

Perfect alignment of the bone on x-ray is not always necessary to get good function. A bony lump may appear at the fracture site as the bone heals and is known as a “fracture callus.” This functions as a “spot weld.” This is a normal healing process and the lump usually gets smaller over time. Problems with fracture healing include stiffness, shift in position, infection, slow healing, or complete failure to heal. Smoking has been shown to slow fracture healing. Fractures in children occasionally affect future growth of that bone. You can lessen the chances of complication by carefully following your hand surgeon’s advice during the healing process and before returning to work or sports activities. A hand therapy program with splints and exercises may be recommended by your physician to speed and improve the recovery process.

Flexor Tendon Injuries

Flexor tendons in the hand and forearm

The muscles that bend or flex the fingers are called flexor muscles. These flexor muscles move the fingers through cord-like extensions called tendons, which connect the muscles to bone. The flexor muscles start from the elbow and forearm regions, turn into tendons just past the middle of the forearm, and attach into the bones of the fingers. In the finger, the tendons pass through fibrous rings called pulleys, which guide the tendons and keep them close to the bones, enabling the tendons to move the joints much more effectively.

Deep cuts on the palm side of the wrist, hand, or fingers can injure the flexor tendons and nearby nerves and blood vessels. The injury may appear simple on the outside, but is actually much more complex on the inside. When a tendon is cut, it acts like a rubber band, and its cut ends pull away from each other. A tendon that has not been cut completely through may still allow the fingers to bend, but can cause pain or catching and may eventually tear all the way through. When tendons are cut completely through, the finger joints cannot bend on their own.

How are flexor tendon injuries treated?

Tendon healing

Tendons are made of living cells. If the cut ends of the tendon can be brought back together, healing begins through the cells inside as well as the tissue outside of the tendon. Because the cut ends of a tendon usually separate after an injury, it is not likely that a cut tendon will heal without surgery.

Your doctor will advise you on how soon surgery is needed after a flexor tendon is cut. There are many ways to repair a cut tendon, and certain types of cuts need a specific type of repair. In the finger, it is important to preserve certain pulleys, and there is very little space between the tendon and pulley in which to perform a repair. Nearby nerves and blood vessels may need to be repaired as well. After surgery, and depending on the type of cut, the injured area can either be protected from movement or started on a very specific limited-movement program for several weeks. Your doctor may prescribe hand therapy for you after surgery. If unprotected finger motion begins too soon, the tendon repair is likely to pull apart. After four-to-six weeks, the fingers are allowed to move slowly and without resistance. Healing takes place during the first three months after the repair.

In most cases, full and normal movement of the injured area does not return after surgery. If it is hard to bend the finger using its own muscle power, it could mean that the repaired tendon has pulled apart or is bogged down in scar tissue. Scarring of the tendon repair is a normal part of the healing process. But in some cases, the scarring can make bending and straightening of the finger very difficult. Depending on the injury, your doctor may prescribe therapy to loosen up the scar tissue and prevent it from interfering with the finger's movement. If therapy fails to improve motion, surgery to release scar tissue around the tendon may be required.

Hand therapy after surgery

If a program of controlled, limited motion is selected as therapy for the first several weeks after surgery, it is important to work closely with a hand therapist and your surgeon to understand the therapy and follow set guidelines. The tendon repair might pull apart if your hand is used too soon or if therapy guidelines are not followed. In addition to regaining motion of the finger after a tendon injury, therapy will be helpful in softening scars and building grip strength.

Nail Bed Injuries

What is involved with nail bed injuries?

Injuries to the nail are often associated with damage to other structures that are in the same location. These include fractures of the bone (distal phalanx), and/or cuts of the nailbed, fingertip skin (pulp), tendons that straighten or bend the fingertip, and nerve endings.

What causes nail bed injuries?

Many result from crush injuries after getting the fingertip caught in a door. Any type of pinching, crushing, or sharp cut to the fingertip may result in injury to the nail bed.

Presentation of nail bed injuries

Simple crushes of the fingertip may result in a very painful collection of blood (hematoma) under the nail. More severe injuries can result in cracking of the nail into pieces, or tearing off of pieces of the nail and/or fingertip, and possible injuries to the adjacent structures.

Diagnosis of nail bed injuries

An accurate history of the cause of the injury should be obtained. X-rays are recommended to look for associated fractures that may require treatment. The full extent of the injury may not be evident until adequate anesthesia (usually local) is given and the nail is examined with magnification. Other medical conditions that may affect healing should be discussed with your physician.

Treatment of nail bed injuries

Restoring the normal anatomy of the nail and surrounding structures is the goal of treatment. Simple hematomas are drained by making a small hole in the nail in order to relieve the pressure and provide pain relief. Straightforward cuts are repaired to put the parts back where they belong. Repairing the nail bed to which the fragments of bone are attached usually restores alignment of many fractures of the fingertip. Larger fragments of bone may need to be pinned or require splinting to heal the fracture. Missing areas of nail bed can be grafted from the same finger or from other digits. Tendon injury may require splinting or pinning. Local flaps of skin may be used to replace missing skin, or the open area of skin may be allowed to just heal on its own, or covered with a skin graft.

Prognosis

The final appearance and function of the nail and surrounding structures depends on the ability to restore the normal anatomy. If the injury is sharp and can be repaired, a normal nail is likely. If there is more severe crushing of the nail bed, then there is a greater likelihood of nail bed scarring and subsequent deformity of the nail. If the germinal matrix (crescent-shaped zone at the base of the nail bed from which the nail grows) is injured, there will likely be a deformity of the nail as it grows. The function of the fingertip also depends on the extent of injury to structures other than the nail. It normally takes 3-6 months for the nail to grow from the cuticle to the tip of the finger.

Surgical Reconstruction

Loss of part or all of the nail bed can be reconstructed with grafts from other digits. Grafts may be taken from the nail bed of a toe to prevent further injury or deformity of the fingers. The most common graft is a split-thickness graft to reconstruct missing nail bed.