Pilon Fracture Surgery

What is a pilon fracture?
The tibia (shin bone) and the fibula are the bones of the lower leg. Pilon fractures are injuries that occur at the lower end of the tibia and involve the weight bearing surface of the ankle joint. The fibula may also be broken. These injuries were first described more than 100 years ago and remain one of the most challenging problems for orthopaedic surgeons to treat. Common causes are falls and car accidents.

What are the goals of pilon fracture surgery?
The goals are to restore alignment and stability and allow healing of the tibia and fibula at the ankle joint. Once the fractures are healing or healed, the orthopedic foot and ankle surgeon’s goals are to restore movement and strength at the patient’s ankle joint.

What signs indicate surgery may be needed?
Some pilon fractures do not need surgical treatment. These are typically lower-energy injuries to the tibia and fibula at the ankle joint. The bones are still broken but the injuries are less severe. These lower-energy pilon fractures can be treated with a leg cast.

Most pilon fractures have multiple breaks. There is often large separation between fractured fragments and instability in the tibia and fibula at the ankle joint. These fractured bones must be set properly with surgery.

General Details of Procedure
Surgical treatment of pilon fractures is usually done in two steps. This is because the skin and soft tissue can be traumatized with these injuries. Orthopaedic surgeons do not routinely perform incisions through areas of damaged skin because doing so may result in wound healing problems. Surgeons often must wait until a patient’s soft tissue improves before incisions can be made. A notable exception would be an open fracture where the bone has penetrated through the skin.

In many cases the first stage in treating pilon fractures is by surgically applying an external fixator to the patient’s leg. This fixator is a frame applied outside of the leg that holds the leg and ankle in proper position. This allows both the patient and surgeon to regularly inspect the soft-tissue of the leg and ankle without frequent splint changes. The fibula fracture may be treated at the same time the external fixator is placed. This part of the procedure is known as open reduction and internal fixation of the fibula (ORIF).

It may take several weeks after the first surgery before the patient’s soft tissues improve and the leg is ready for the second stage of surgical treatment. This planned delay can be frustrating for the patient, but it may be necessary to minimize the risk of a wound healing problem. The wait does not affect overall results. In some cases the external fixator is used as the final treatment and is kept in place for many weeks to months.

The second stage of surgical treatment is to fix the tibia fracture with an ORIF. The fibula may also receive an ORIF if it was not fixed in the first stage. The external fixator is typically removed after both the tibia and fibula have been fixed.

Specific Technique
When an external fixator is applied surgically to the patient’s leg, steel pins are placed in the tibia far above the fracture. They are typically placed in the heel (calcaneus) and foot (metatarsals) bones far below the fracture. The pins are placed through small incisions that minimize damage to the soft tissues. The pins attach to metal bars outside the skin. The external fixator helps to hold the leg and ankle in proper position while the patient’s soft tissues improve.

The fibula may be fixed at the same time if the skin is not damaged. ORIF of the broken fibula involves an open incision over the bone. The broken fragments are put back together and held in place with a metal plate and screws. Special care is taken to restore the length of the fibula. The incision is then sewn together in layers. Deep tissue over the bone is closed with sutures and the skin is closed with sutures or staples.

This next step is an ORIF of the tibia bone. This step may be delayed several days or even weeks after the initial surgery. The incisions are typically at the front or the inner side of the ankle. Other incisions may be used depending on the injury. The broken fragments are put back together and are held in place with metal plates and screws. Special care is taken to restore the shape and stability of the ankle joint. The fibula may be fixed with an ORIF if it was not previously treated. The incisions are then sewn together. The external fixator is typically removed and the leg is placed in a splint. This involves slabs of plaster that are applied to the rear and sides of the leg, ankle and foot. Special care is taken to cushion the leg with appropriate padding.

What happens after surgery?
It often takes three to six months for the breaks in the tibia and fibula bones to heal. Until the bones fully heal...
heal, the patient's leg and ankle cannot be stressed or worked too hard. Advancing activity too soon before the tibia and fibula bones are healed can jeopardize the repair and ultimately bone healing.

The surgeon must also schedule regular visits to monitor healing of the fracture and advance the patient's activity accordingly. Many surgeons have a specific schedule for patients to see them in the office for post-surgical follow-up until the pilon fracture is fully healed.

The patient's first post-surgical visit is usually about two weeks after surgery. The splint is removed and the patient's leg is examined. The sutures/staples are removed if the incisions are healing well. If there is more severe leg swelling, the surgeon may wait longer before removing the sutures/staples. X-rays of the leg and ankle are performed to confirm that the tibia and fibula fractures are still in place. The leg in then placed in either a cast or a removable boot.

Patients usually received monthly follow-up with their surgeon. At each of these regular visits, the surgeon checks on the patient's leg's soft tissue, bones and ankle joint. The soft tissue is checked for swelling and wound problems, while the bones are checked on X-rays for the progression of healing. The ankle joint is checked for movement, strength and stability.

Patients are restricted from fully weight bearing on their operated leg until there is full healing of the tibia and fibula bones. Patients are not allowed to bear weight on their leg in their post-surgical splint. Patients are not allowed to bear any weight on their operated leg until there is evidence of bone healing. This period of non-weight bearing is with the leg in either a cast or boot. It usually takes six to 12 weeks to see initial bone healing on X-rays.

So long as the patient's tibia and fibula are healing with each subsequent visit, weight bearing activity can be gradually increased in the protective boot. Patients ultimately can remove the boot and gradually resume activities in normal shoes.

The time to achieve full bone healing of the pilon fracture typically occurs three to six months after surgery, but it often takes patients 12 months or more to fully recover from the injury. These are serious ankle injuries. Most patients do not return to the same function that they had before getting hurt. It is common for patients to have residual aches, swelling, stiffness and weakness even after the tibia and fibula bones are healed. Some patients may need physical therapy to help in their recovery.

Potential Complications

Early potential complications are problems that can occur within the first few weeks after surgery. Many of these are wound-related, whether these are healing problems or infection. Some of these are superficial problems or infections that can improve with wound care and oral antibiotics. Deeper wound problems or infections can occur and are more severe. These problems often need further surgery or stronger antibiotics to eliminate the infection.

Other potential complications can occur within several months after surgery. Many of these involve difficulties with bone healing at the fractured areas. Some of these are delayed unions in which the bones ultimately heal but take longer than six months to do so. Many delayed unions can improve by immobilizing the leg and limiting full activities for the longer amount of time it needs to heal. Some surgeons may recommend that the patient to use a bone stimulator. This is a removable device that is worn on the patient's leg where and uses either ultrasound or electrical impulses to help stimulate bone healing.

Another potential problem is a nonunion. This is when the bones do not fully heal. Some nonunions develop when the blood supply to the bones has been damaged from the injury. Other nonunions occur if there is too much movement between fractured pieces of bone. Some of these can be treated in the same way as delayed unions. Other nonunions may need surgery. The surgery to treat the nonunion depends on an individual's situation. It may involve procedures like adding healthy bone from other parts of the body or chemicals to help stimulate bone healing.

Long-term complications can occur many years after the patient's pilon fracture is healed. The most common of these is ankle arthritis. Restoring tibia and fibula bone and ankle joint alignment does diminish the chances of patients developing ankle arthritis. However, the cartilage at the tibia that helps to cushion the ankle joint can be irreversibly damaged during the initial injury. Arthritis can result in pain, swelling, stiffness and weakness at the leg and ankle.

Frequently Asked Questions

If my ankle is at risk for developing arthritis from the pilon fracture itself, why should I have surgery?

It is true that your ankle is at risk for developing arthritis after sustaining a pilon fracture, but the chances of developing ankle arthritis are generally less with surgery compared to nonsurgical treatment. Surgery typically offers the advantage of putting the broken pieces of the tibia and fibula back together. The chances of developing arthritis are reduced if the shape of the joint is restored than if the joint heals in an abnormal shape without surgery.

Do the implants that have fixed my pilon fracture ever need to be removed?

There are very few reasons to remove any internal plates or screws from the tibia and fibula bones. One reason would be if they are painful after the fracture is healed. This involves surgery on your leg to get them out. Another reason for implant removal would be if they became infected. This can happen while your fracture is healing or after it has already healed. The treatment for infection can be very complex and depends on your specific situation.

Is there anything I can do to improve bone healing?

What helps your tibia and fibula bones heal best after your pilon fracture is to follow your surgeon's post-surgical instructions. Advancing activity too soon after surgery can jeopardize the implants fixing the bones and ultimately bone healing. The surgeon must restrict the patient in certain ways after ORIF of a pilon fracture for the bones to heal properly.

There are things that you can do to improve the chances of the ankle joint and bones healing properly. A diet that is too low in protein can result in decreased bone and wound healing. Increasing your calcium and vitamin D intake may help with bone healing. Taking the recommended daily allowance of both (1,000 to 1,200 mg of calcium and 600 to 800 IU of vitamin D) may help your body to heal. Up to 2,000 mg of calcium per day...
may help broken bones to heal.

Drinking alcoholic beverages should be limited to no more than two drinks a day. Cigarette and cigar smoking should be stopped completely as they can be harmful to bone and wound healing.

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Treatments of the Ankle

Achilles Tendinosis Surgery
Achilles Tendon Rupture Surgery
Ankle Arthrodesis
Ankle Arthroscopy
Ankle Cheilectomy
Ankle Fracture Surgery
Bulk Allograft Transplantation for Osteochondral Lesions of the Talus
Insertional Achilles Tendinosis Surgery
Lateral Ankle Ligament Reconstruction
Lateral Ankle Stabilization
Mosaicplasty for Osteochondral Lesions of the Talus
Percutaneous Achilles Tendon Lengthening
Peroneus Longus to Achilles Tendon Transfer
Pilon Fracture Surgery
Posterior Ankle Endoscopy or Arthroscopy
Subtalar Arthroscopy
Subtalar Fusion
Surgery for the Syndesmosis
Talar Body Fracture Surgery
Talar Neck Fracture Surgery
Tendon Transfers
Tendoscopy
Total Ankle Arthroplasty