

# THE FOOT BOOK

**COMMON FOOT PROBLEMS AND  
WHAT YOU CAN DO ABOUT THEM**



**By Dr. Donald Pelto**

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## INTRODUCTION



**T**hank you for your interest in the “The Foot Book - Common Foot Problems and What You Can Do about Them.” This book will help provide further education to you about common foot problems and what can be done to treat those problems prior to your doctor's visit.

**By no means do we believe that this book takes the place of visiting the office;** however, it can be used as a good **reference source for information** about treatments that can begin at home and what treatments are used in the office setting.

## HEEL PAIN



### WHAT IS PLANTAR FASCIITIS?

Heel pain is most often caused by a problem called plantar fasciitis. This can also be termed heel spur syndrome, where a spur is present on x-ray evaluation. Heel pain can also be due to other causes such as a stress fracture, tendonitis, arthritis, nerve irritation or even a bone cyst. Since there are many probable causes, it is essential to have the heel pain properly diagnosed.

### SYMPTOMS OF PLANTAR FASCIITIS

The symptoms of plantar fasciitis are:

- Pain on the bottom of the heel
- Pain first thing in the morning when getting out of bed
- Pain that increases over a period of time

People with plantar fasciitis often describe the pain as severe upon rising in the morning and then improving as they become more active during the day. After they sit down and relax, their pain is lessened until they begin moving again. After walking for a few minutes, the pain decreases because they are stretching the plantar fascia. For other people the pain is worse when they are on their feet for long periods of time.

## CAUSES OF PLANTAR FASCIITIS

The most common cause of plantar fasciitis is too much motion in your foot causing excess pulling on the plantar fascia. The plantar fascia is a ligament-like structure that courses from the heel to the ball of your foot. When your foot has too much motion there is excess pull on the plantar fascia causing it to become inflamed. Feet that are overly flat (pronated) or have too much of an arch are more likely to develop plantar fasciitis.

Also, an overly tight Achilles tendon (equinus) in the back of your leg will cause excess tightness on the structures on the bottom of the foot. If you imagine two ropes pulling on the heel bone, the bottom one is the plantar fascia and the top one is the Achilles tendon. If the Achilles is pulling up, the plantar fascia will naturally become tighter making it more prone to injury.

Wearing non-supportive footwear on hard, flat surfaces puts an abnormal amount of strain on the plantar fascia and can also lead to plantar fasciitis. This is especially true for those that wear flip-flops over extended periods of time and also for those who have a job that requires long hours on their feet. Obesity can also contribute to plantar fasciitis.

## DIAGNOSIS

To properly evaluate heel pain, a complete medical history and examination of your foot and lower extremity mechanics is necessary. This will require an evaluation of your walking (gait) and possible video or photography of your feet. By doing this we are able to rule out all other possible causes of plantar fasciitis.

Also, diagnostic imaging such as **x-ray, ultrasound, bone scan, and magnetic resonance imaging (MRI)** may be used to distinguish among different types of heel pain. Sometimes x-rays can reveal heel spurs with people with plantar fasciitis; however, these are rarely a source of pain.

## HOME TREATMENT

There are numerous treatment options for plantar fasciitis. The first-line strategies can begin before you come to the doctor's office:

- Stretching exercises: exercises that stretch out the calf muscles and the plantar fascia can help ease the pain and assist with recovery.
- Avoid going barefoot or wearing flip-flops: when you walk without shoes you put undue strain and stress on the plantar fascia.
- Ice: putting an ice pack on your heel for 10 minutes a few times a day helps reduce the inflammation. An easy method of icing is using a frozen bottle of water to massage the bottom of your foot.
- Shoes: wearing supportive shoes that have good arch support and a slightly raised heel can help reduce the stress on the plantar fascia. When buying shoes they should be comfortable the moment you buy them. Make sure you shop for shoes at the end of your day when your feet are the largest.
- Medications: oral anti-inflammatory drugs (NSAIDs), such as ibuprofen, may help reduce pain and inflammation.
- Lose weight: reducing extra pounds will help decrease the strain on the plantar fascia.
- Arch supports: over-the-counter arch supports are non-specific to your foot type. Similar to over-the-counter eye glasses, they may help some people and are a **good place to start treating heel pain**. Keep in mind that unless you have new supportive shoes, arch supports will not help.

## OFFICE TREATMENT

When you have not been successful at resolving your heel pain with home treatments, there are additional methods of treatment that are specific to your doctor. Keep in mind that typically patients wait many months with foot pain before seeing a **specialist who can usually resolve the problem more quickly and inexpensively than with self-treatment**:

- Padding: an Aircast AirHeel pad can be placed under the heel to help minimize the pain but correction of the mechanical abnormality is still necessary.
- Strapping: consists of placing padding and tape on the bottom of the foot to help support the foot and reduce the strain on the plantar fascia.

- Medications: prescription-strength oral anti-inflammatory drugs (NSAIDs) may help reduce pain and inflammation.
- Non-custom orthotics: non-custom orthotic devices are a step down from custom orthotics in that they correct your foot based on its type. They can be useful while waiting for your custom orthotics to be fabricated, when used with a night splint, and even in a second pair of shoes.
- Orthotic devices: custom orthotic devices are specially molded to your foot and help correct the underlying structural abnormalities causing the plantar fasciitis.
- Injection therapy: many times a corticosteroid injection can help reduce the inflammation and pain around the plantar fascia.
- Removable walking cast: in more severe cases wearing a walking cast boot for a few weeks can allow your foot to rest and heal.
- Night splint: wearing a night splint allows you to passively stretch your plantar fascia and calf muscles while sleeping. This can help reduce morning pain experienced by some patients. This is effective treatment when used with non-custom orthotics to prevent foot flattening (pronation) while in the night splint.
- Trigger Point: deep tissue massage using Trigger Point Tools is a dynamic treatment option when compared to static stretching exercises. The basis is on reducing soft tissue adhesions to the muscles in the back of the leg that can lead to heel pain. This treatment can be done in the convenience of your home with quick results.
- Physical therapy: when stretching alone is not enough, either home physical therapy tools or a physical therapy evaluation may be beneficial.

## ADVANCED AND SURGICAL TREATMENTS

Although **most patients with plantar fasciitis respond well to non-surgical treatments**, a small percentage of patients may require more advanced treatments or surgery. If after many months of conservative treatment you continue to have pain, these are other options that can be considered:

- Shockwave therapy: this is a non-invasive surgical procedure that uses high intensity sound waves to break up adhesions on the plantar fascia and to help activate your body's healing response. The benefit to this procedure is that there is less of a need for time off work following the procedure.

- Amniotic Tissue Allograft: this is a regenerative medicine treatment that uses human amniotic membrane that contains natural growth factors that can help control inflammation, reduce scar tissue and improve healing.
- Platelet rich plasma: the plasma portion of our natural blood has many healing components. This procedure uses the patient's own blood in a concentrated form and injects it into the area of injury on the plantar fascia. Following the procedure, the patient is immobilized in a removable walking cast and needs minimal time off work.
- Endoscopic plantar fasciotomy: this is a procedure that uses a small incision to identify and then surgically cuts a portion of the plantar fascia to help relieve the pain.
- Open plantar fasciotomy: this procedure is similar to the one above except that a larger incision is made.

## PREVENTING PLANTAR FASCIITIS

No matter what type of treatment is used to treat plantar fasciitis, the **underlying causes that led to this condition may remain**. Therefore, you will need to continue with preventative measures such as weight loss, supportive shoes and custom orthotic devices for long-term treatment for plantar fasciitis.

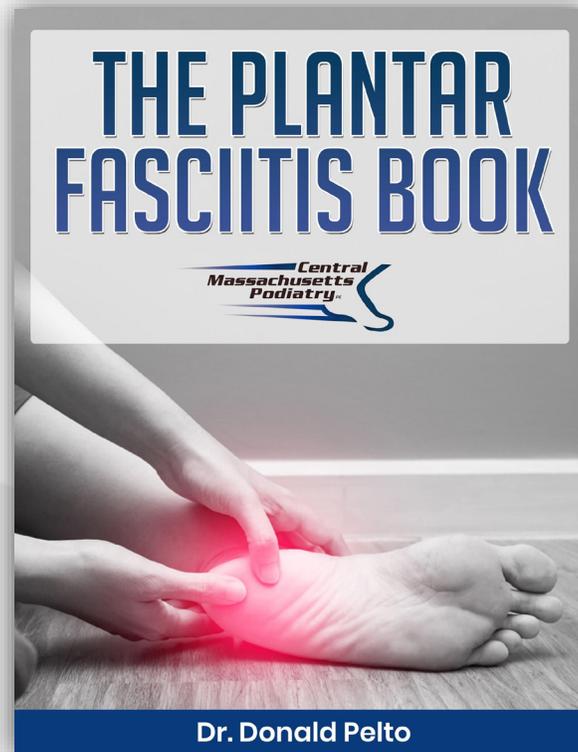
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## ONLINE PRODUCT RECOMMENDATIONS

Click image to view a list of online recommendations based on diagnosis



## FREQUENTLY ASKED QUESTIONS

**Q: Do I need orthotics to get rid of plantar fasciitis?**

A: Each patient is different and even though the pain may subside, the mechanical instability and excess movement of the foot that caused the problem still need to be addressed. Using supportive shoes and orthotics are very effective at controlling foot motion.

**Q: Will I need surgery for plantar fasciitis?**

A: Most of our patients DO NOT advance to surgery due to plantar fasciitis. However, if you have been treated for six months to a year, then some surgical options may be considered.

**Q: When should I seek treatment for plantar fasciitis?**

A: Since there are so many home treatment options to try, that is a good place to start. However, keep in mind that seeing a doctor can help you get better faster than on your own. If you have it for over a month and it is not improving with the home treatments, it is best to make an appointment.

## INGROWN TOENAIL



### WHAT IS AN INGROWN TOENAIL?

When a toenail is ingrown, the nail is curved downward and grows in the adjacent skin. This usually happens to one or both sides of the nail.

### SYMPTOMS OF AN INGROWN TOENAIL

The side of the nail that is ingrown usually becomes irritated, painful, red, swollen and warm. Sometimes if the nail causes a break in the skin, bacteria can enter and cause an infection in the area. When the toe is infected there is usually drainage and a foul odor from the toe which will not resolve with self-treatment. However, even if your toe is not painful, red, swollen or warm, **a nail that curves downward into the skin should be treated.**

## CAUSES OF AN INGROWN TOENAIL

An ingrown toenail has a number of causes. Many people have a **hereditary tendency** toward ingrown nails which has affected their parents or siblings. An ingrown toenail can also be a result of trauma to the nail by **stubbing your toe**, having an **object fall** on your toe, or involvement in activities like running or kicking that make your toe press into your shoes.

The **most common cause** of ingrown toenails is **improper trimming**. If you cut your nails too short or pick at your nails, that can cause the skin to fold over the nail. Another cause of ingrown toenails is wearing shoes that are too tight or short.

Some other conditions that are often linked to ingrown toenails include fungal infections in the nail. Thickened nails can more easily grow in to the sides of the skin. If you have lost a nail due to trauma you are also at a greater risk of developing an ingrown toenail.

## DIAGNOSIS

Normally if a toenail is ingrown you can see drainage and signs of infection. However, if it has not become infected and is simply pressing on the skin, it will usually elicit pain. In some instances of recurrent ingrown toenail infections and abnormal toe shape, an x-ray is used to rule out any bone infection or bone spurs on the toe.

## HOME TREATMENT

The best **treatment of an ingrown toenail is to prevent it from happening:**

- Trimming: make sure you trim your nails straight across and do not dig into the borders of the nails. If they are painful, see your doctor.
- Shoes: avoid poorly fitting shoes that are either too short or too small. Also, avoid activities that will push your toe to the front of your shoes.
- Skin massage: to help train your skin to form around your nail, massage the skin next to your nail in a downward motion for about 10 seconds daily after your shower. This will help your skin to grow away from the nail and will help the nail to grow out without growing into the corner of the skin.
- If infected: DO NOT try to treat your own ingrown toenail if you suspect you have an infection. This can lead to a complication of the condition or even a bone infection.

- High risk patient: if you have a medical condition that makes you a **high risk patient of foot problems, you should NEVER treat your own ingrown toenail.** These **high risk conditions** include **diabetes, nerve damage of the foot (neuropathy), or poor circulation (peripheral vascular disease).**

## OFFICE TREATMENT

If you have one of the high risk conditions or are unable to resolve your ingrown toenail, here are some of the treatment options for treating your ingrown toenail:

- Oral antibiotics: if an infection is present an oral antibiotic may be prescribed.
- Trimming: if the ingrown toenail is not very deep into the surrounding skin, then trimming can be performed with or without a local anesthetic using a specialized nail nipper.
- Onyfix: this is a new treatment that is an external bracing device that can help retrain your toenail to grow in the proper direction.

## SURGICAL TREATMENT

In our practice we go by the premise **“three strikes and you’re out.”** If you have had more than three experiences we perform an **office based surgical procedure** where a small portion of either side of the nail is removed and an acid is placed under the cuticle to prevent the nail from growing back. Following nail surgery a light bandage is applied, and we recommend that our patients place a specialized antibiotic on the toe daily until it heals. Most people experience very little pain after surgery and may resume normal activity the next day.

In a **small percentage of patients there is recurrence** of the ingrown toenail after the surgical procedure. We can either perform the procedure again or opt for a **surgical removal of the nail growth plate.** This procedure can also be beneficial on younger children with extra skin growth around the nail and for older patients whose healing capacity we are concerned about.

## PREVENTING INGROWN TOENAILS

Keep in mind these important points to avoid having ingrown toenails:

- Trimming: make sure you **trim your nails straight across** and **do not dig into the borders** of the nails. If they are painful, see your doctor.
- Shoes: **avoid poorly fitting shoes** that are either too short or too small. Also, avoid activities that will push your toe to the front of your shoes.
- Skin massage: to help train your skin to form around your nail, massage the skin next to your nail in a downward motion for about 10 seconds daily after your shower. This will help your skin to grow away from the nail and will help the nail to grow out without growing into the corner of the skin.

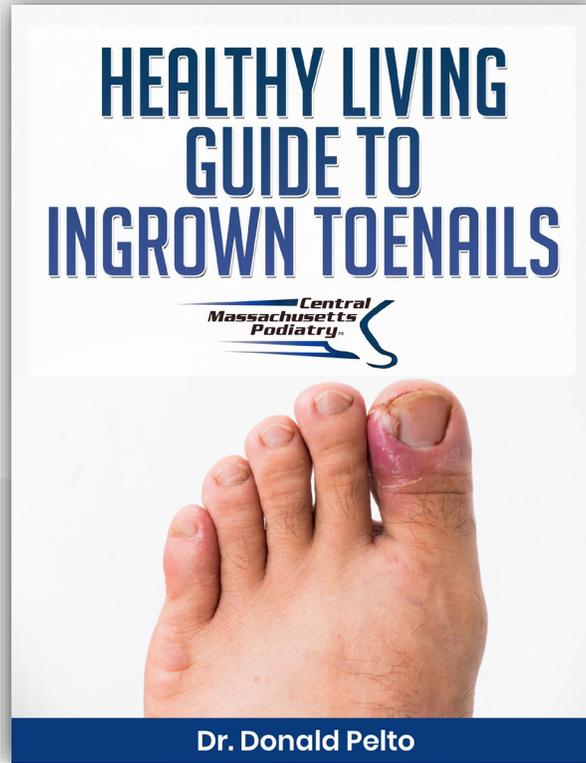
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## FREQUENTLY ASKED QUESTIONS

**Q: When should I see a doctor about my ingrown toenail?**

A: Immediately if you are a high risk patient (diabetes, poor circulation, nerve damage) or if it is red, swollen, or infected. Within a week if it is bothering you after you failed the home treatments.

**Q: Can cutting a notch (a “V”) in the nail reduce the tendency for the nail to curve downward?**

A: Cutting a “V” does not affect the growth of the toenail. New nail growth will continue to curve downward.

**Q: Is repeated trimming of the nail borders a good way to treat ingrown toenails?**

A: Repeated nail trimming fails to correct future nail growth and can make the condition worse.

**Q: Will placing cotton under the nail relieve the pain?**

A: Cotton placed under the nail can be harmful because it can harbor bacteria and encourage infection.

**Q: Can I buy an effective ingrown toenail treatment at the drugstore?**

A: Over-the-counter topical medications may mask the pain and they fail to address the underlying problem. It is better to see a doctor for your painful ingrown toenail.



## BUNION



Even though bunions are a common foot deformity, there are many misconceptions about them. Many people live for years suffering from pain unnecessarily before seeking treatment. Please remember that your feet and your bunion may not be painful. If they are painful, you should see a doctor.

### WHAT IS A BUNION?

Bunions are often described as a bump on the side of the big toe joint. On the outside, that is what they look like. However, when examining the bony architecture of the foot, we can see that there are changes to the alignment of the foot bones that cause the bunion deformity. When you have a bunion, the big toe leans toward the second toe rather than pointing straight ahead. This throws the bones out of alignment causing the bump that is seen with the bunion deformity.

Bunions are a progressive disorder in which the big toe leans over and causes a gradual change of the bones of the foot. Over the years this causes a bump that increases as the deformity increases. Usually the symptoms occur in later stages of bunion formation even though some people never have symptoms.

## SYMPTOMS OF A BUNION

Symptoms occur most often when wearing shoes that crowd the toes, such as high heels or shoes with a tight toe box. This explains why women are more likely to have bunion symptoms than men. Also, spending long periods of time on your feet can aggravate the symptoms of bunions.

Some of the symptoms that can occur at the site of the bunion may include:

- Pain or soreness
- Inflammation and redness
- A burning or shooting pain sensation
- Numbness
- Callus formation
- Sores between the toes
- Restricted motion of the big toe joint
- Ingrown toenail

Bunions usually start out as mild deformities that are flexible and can be straightened with your own hand. **It is best to treat them at this early stage** because as they advance to the more rigid stage over time they will not respond to non-surgical treatments. When corns and calluses begin to form, even though they may be trimmed they will always return because of the excess pressure caused by the bunion deformity. Over time these calluses and corns may develop sores (ulcers) that can be limb threatening to patients with nerve injury (neuropathy), poor circulation and diabetes.

## WHAT CAUSES A BUNION

Bunions are most often **caused by an inherited faulty mechanical structure of the foot**. The bunion is not inherited but the foot type that is prone to developing the bunion deformity is. That is why it is important to evaluate your foot type to determine if the bunion is prone to progress quickly or not.

Many people think that wearing tight shoes causes bunions; however, they will not actually cause bunions in the first place but can make the deformity worse more quickly. That means you may experience symptoms sooner.

## DIAGNOSIS OF BUNIONS

Bunions are apparent with a visual inspection of the feet. You can usually see the prominence on the side of the big toe joint as well as the drifting of the big toe in the direction of the second toe. However, for a complete examination an **x-ray** is necessary to determine the degree of the deformity and to evaluate for the arthritic changes that may have occurred.

Since bunions are a progressive deformity they usually get worse over time, but some types get worse more rapidly than others. A bunion deformity **can also affect the second toe**, causing it to lift up over the big toe. Proper diagnosis is necessary to evaluate the severity of the deformity and especially to evaluate the joint for **non-reversible arthritic damage** that bunions can cause. **Treating bunions earlier can preclude more joint destructive procedures in the future.**

## HOME TREATMENT

Usually, evaluating your own bunion and noticing if it is getting larger over time are ways to determine progression. Also, if you have pain in the joint, redness, sores or sharp shooting pain, your bunion is more severe.

Initial treatment is directed toward easing the pain of the bunions but these actions will not reverse or cure the bunion deformity:

- Pumice with lotion: a good place to start treating the corns and calluses is with a pumice stone to reduce some of the hard skin following a shower. Placing lotion on the callus can help to soften it up as well. **DO NOT** use a shaving blade on calluses as they can cause infection and sores on the feet. If you need to trim the calluses, see a professional.
- Change shoes: wearing sensible shoes that are wide enough without a high heel can initially help to reduce the pain over the bunion deformity.
- Padding: pads placed over the bunion can help minimize the pain, but younger patients are usually reluctant to using padding long-term.
- Activity modification: avoid activities such as prolonged standing and shoes that cause the bunion pain.
- Medications: oral anti-inflammatory drugs (NSAIDs), such as ibuprofen, may help reduce pain and inflammation.
- Icing: applying an ice pack a few times a day can help decrease the inflammation and pain.

- Arch supports: over-the-counter arch supports are non-specific to your foot type. They are a good place to start when treating bunions. Keep in mind that unless you have new supportive shoes, arch supports will not help.

## OFFICE TREATMENT

There are many treatments that can be tried conservatively for bunion pain. In general, if the bunion is diagnosed and treated early on then conservative treatments are more effective:

- Padding: pads placed over the bunion can help minimize the pain but younger patients are usually reluctant to padding long term.
- Strapping: consists of placing a bunion brace to help align the toe in the corrected position. This can be used to retrain the tendons and soft tissue structures. However, these are normally more effective post-operatively to help keep the proper foot correction after surgery.
- Medications: prescription-strength oral anti-inflammatory drugs (NSAIDs) may help reduce pain and inflammation.
- Topical cryotherapy: topical pain relievers can help through the day to take the edge off foot pain. They can be beneficial when icing is not an option while working or away from your home.
- Non-custom orthotics: non-custom orthotic devices are a step down from custom orthotics in that they correct your foot based on its type. They can be useful while waiting for your custom orthotics to be fabricated.
- Orthotic devices: custom orthotic devices are specially molded to your foot and help correct the underlying structural abnormalities causing the bunion deformity. As we mentioned above, bunions themselves are not inherited, but the faulty mechanical foot type, which can be helped by orthotics, is.
- Injection therapy: many times a corticosteroid injection can help reduce the inflammation and pain around the bunion deformity.
- Physical therapy: sometimes physical therapy can help retrain a toe that has the flexible type of bunion deformity.
- Correct toes: there are devices made of silicone that go between the toes to help strengthen and the muscles in the foot to help prevent progression of bunions and along with proper "anatomic" shoes can help your bunion pain.

## SURGICAL TREATMENT

Normally **surgery is indicated when bunion pain interferes with daily activities.** Advances in foot surgery have led to making bunion surgery a very successful and gratifying experience for patients.

Various surgical procedures are performed to treat bunions. These procedures are designed to remove the painful “bump” on the bone, correct the changes in bone architecture of the foot and correct the soft tissue changes that have occurred. The overall goal of bunion surgery is to eliminate the pain.

When evaluating the need for bunion surgery we **will evaluate your specific foot type, x-rays, age, activity level and other foot problems.**

Surgical options include:

- Bump Removal Bunionectomy: this is a procedure that is used in mild bunion deformity with a painful bump. The bump is removed and the soft tissue is corrected to help realign the toe. The benefits to this procedure are that the bone is not surgically fractured so the recovery time is shortened. However, this procedure is only possible for mild bunion deformity.
- Distal Metatarsal Bunionectomy: this is a procedure that combines the above procedure along with surgically fracturing the metatarsal bone and shifting it over to correct for a moderate bunion deformity. Since this procedure fractures the bone and uses screws or wires to hold the bone in place, a longer recovery time is needed.
- Shaft or Base Metatarsal Bunionectomy: in general, the closer you make the surgical fracture toward the ankle joint, the more correction is achieved. Therefore, this surgery can correct more severe bunion deformities than the previous two. However, a longer period of non-weight bearing is necessary until the bones are healed.
- Lapidus Bunionectomy: this is a fusion of the metatarsal cuneiform joint in a corrected position. This is used in feet that are very flexible (hypermobile) and require a similar period of non-weight bearing as the procedure above.
- Hammertoe surgery: often, patients that have bunion surgery also have hammertoe deformities that need to be corrected at the same time depending on the severity.
- Central metatarsal osteotomy: many times when a patient shows signs of a long metatarsal on x-ray, a shortening surgery is necessary to relieve the pain underneath the metatarsal head.

**Surgery should never be considered lightly** since there are always possibilities of complications no matter how perfectly the procedure was done. There can be risks of infection, non-healing bone and even recurrence. However, if conservative care does not provide relief of symptoms then surgical correction should be discussed with your doctor.

## PREVENTATIVE CARE

With or without bunion surgery, it is important to help stabilize the faulty mechanical structure of the foot to prevent the bunion from getting worse or from recurring after surgery. This is best done with supportive shoes and custom-made orthotic devices. Progression cannot be stopped but attempts can be made to slow down the progression and to alleviate the pain.

## VIDEO EXPLANATION

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## FREQUENTLY ASKED QUESTIONS

**Q: Will my bunions return after surgery?**

A: If the proper surgical procedure is utilized the risk of recurrence is greatly reduced. Also, by using custom-made orthotic devices that can correct the mechanics of your foot, the deforming forces are minimized to keep the correction from returning.

**Q: How long will I be off work?**

A: Depending on the type of procedure, anywhere from 4 to 12 weeks. That assumes there is no postoperative infection or non-healing bone.

**Q: What is the earliest age you can fix bunions?**

A: Typically we like to wait until full skeletal maturity, which is around 15 for girls and 18 for boys. At this time the growth plates are fully closed.

**Q: My parents have bunions; how can I be prevented from getting them?**

A: Just because your parents have bunions does not mean you will get them. However, you are more likely to have the foot type that can cause bunions. Good shoes that are wide enough, together with custom orthotics, are a good place to begin.



## HAMMERTOES



Hammertoes can typically be seen with other types of foot deformities like bunions and calluses. They are sometimes corrected separately or in conjunction with other foot problems.

### WHAT IS A HAMMERTOES?

A hammertoe is a contracture or bending of one or both joints of the toes of the foot. This deformity is usually progressive in nature and tends to get worse over time.

## SYMPTOMS OF HAMMERTOES

The following are common symptoms of hammertoes:

- Pain when wearing shoes at the area where the toe bends
- Corns (excess skin buildup) on the top, side, end, or even between the toes. Corns are caused by friction against the shoe and they can be either hard or soft depending on the location.
- Calluses (excess skin buildup) on the bottom of the toe or on the ball of the foot.

Corns and calluses can be painful and **make finding shoes difficult**. However, even hammertoes without corns or calluses can be painful because of dislocation of the joint.

Hammertoes usually **start out as mild** deformities that are flexible and can be straightened with your own hand. It is **best to treat them at this early stage** because as they advance to the more rigid stage over time they will not respond to non-surgical treatments. When corns and calluses begin to form, even though they may be trimmed they will always return because of the excess pressure caused by the hammertoes. **Over time these calluses and corns may develop sores (ulcers) that can be limb threatening to patients with nerve injury (neuropathy), poor circulation and diabetes.**

Because of the **progressive nature** of the hammertoes they should be **evaluated and treated early**. Remember that hammertoes will never just go away without treatment.

## CAUSES OF HAMMERTOES

The most common cause of hammertoes is a muscle tendon imbalance in the foot that leads to a bending of the toes. This is due to the mechanical structure of the foot type. As with bunions, there are certain foot types that predispose the foot to hammertoes.

Hammertoes are often **irritated by shoes** that don't fit properly. For example, shoes that are too small or short tend to cramp the toes into a tight toe box. If one toe is longer than the others it will naturally have to bend to fit in the shoe, actually causing the contracture that is a hammertoe.

Sometimes hammertoes can be caused by an injury or broken toe.

## DIAGNOSIS OF HAMMERTOES

Hammertoes are apparent with a visual inspection of the feet. You can usually see the curvature and bending of the toe along with the corn or callus formation on the toe. However, for a complete examination an **x-ray** is necessary to determine the degree of the deformity and to evaluate for the arthritic changes that may have occurred.

Since hammertoes are progressive deformities, they **usually get worse over time**, but some types get worse more rapidly than others. A **bunion deformity can also cause a hammertoe** of the second toe, causing it to lift up over the big toe. Proper diagnosis is necessary to evaluate the severity of the deformity and especially to evaluate the joint for non-reversible arthritic damage. **Treating hammertoes earlier can preclude more joint destructive procedures in the future.**

## HOME TREATMENT

Evaluating your own hammertoes and noticing if they are getting worse over time are good ways to determine progression. Also, if you have pain, redness, corns, calluses, sores or sharp shooting pain, your hammertoes are more severe.

Initial treatment is directed toward easing the pain of the hammertoes but **these actions will not reverse or cure the hammertoe deformity:**

- Pumice with lotion: a good place to start treating the corns and calluses is with a pumice stone to reduce some of the hard skin following a shower. Placing lotion on the callus can help to soften it up as well. **DO NOT** use a shaving blade on calluses as it can cause infection and sores on the feet. If you need to trim the calluses, see a professional.
- Change shoes: wearing sensible shoes that are wide and deep enough can initially help to reduce the pain over the hammertoe deformity.
- Padding: pads placed over the hammertoe can help minimize the pain, but younger patients are usually reluctant to use padding long term. **DO NOT buy pads that have acids to help reduce the corns; these can cause sores.**
- Activity modification: avoid activities such as prolonged standing and shoes that cause the pain.
- Medications: oral anti-inflammatory drugs (NSAIDs), such as ibuprofen, may help reduce pain and inflammation.
- Icing: applying an ice pack a few times a day can help decrease the inflammation and pain.

## OFFICE TREATMENT

There are many treatments that can be tried conservatively to relieve hammertoe pain. In general, if the **hammertoe is diagnosed and treated early, then conservative treatments are more effective:**

- Trimming and padding: this is the mainstay of treatment of corns and calluses caused by hammertoes. A podiatrist can trim down the callus or corn and place a pad to help relieve the pressure from shoes.
- Strapping: consists of placing a brace to help align the toes in the corrected position. This can be used to **retrain the tendons and soft tissue structures**. However, these are normally more effective with mild hammertoes and post-operatively to help keep the proper foot correction after surgery.
- Medications: prescription-strength oral anti-inflammatory drugs (NSAIDs) may help reduce pain and inflammation.
- Topical cryotherapy: topical pain relievers can help through the day to take the edge off foot pain. They can be beneficial when icing is not an option while working or away from your home.
- Non-custom orthotics: non-custom orthotic devices are a step down from custom orthotics in that they correct your foot based on its type. They can be useful while waiting for your custom orthotics to be fabricated.
- Orthotic devices: custom orthotic devices are specially molded to your foot and help correct the underlying structural abnormalities causing the hammertoe deformity. As we mentioned above, hammertoes themselves are not inherited, but the faulty mechanical foot type, which orthotics can help correct, is.
- Injection therapy: many times a corticosteroid injection can help reduce the inflammation and pain around the hammer toes deformity.
- Physical therapy: sometimes physical therapy can help retrain a toe that has the flexible type of hammertoe deformity.
- Correct toes: there are devices made of silicone that go between the toes to help strengthen and the muscles in the foot to help prevent progression of hammertoes and along with proper “anatomic” shoes can help your bunion pain.

## SURGICAL TREATMENT

Normally surgery is **indicated when hammertoe pain interferes with daily activities**. Advances in foot surgery have led to making hammertoe surgery a very successful and gratifying experience for patients. However, even though toes are some of the smallest parts of the foot to operate on, they are the most complicated because of the need to balance the muscles and tendons around the joint.

Various surgical procedures are performed to treat hammertoes. These procedures are designed to remove the painful bone underneath the callus, correct the changes in bone architecture of the foot and correct the soft tissue changes that have occurred. **The overall goal of hammertoe surgery is to eliminate the pain and callus formation.**

When evaluating the need for hammertoe surgery, we will evaluate your specific foot type, x-rays, age, activity level and further foot problems.

Surgical options include:

- Arthroplasty: this is the **most common surgical procedure** performed to correct hammertoes. In this procedure we remove a small section of the bone from the affected joint. This is used for more flexible hammertoe deformities. This type of procedure requires 4 to 6 weeks for the foot to heal.
- Arthrodesis: this is a more complicated procedure that is done like the procedure above, except that the joint is then fused in a **straightened position so that it will not move (fusion)**. This is used in more rigid hammertoe deformities, and a pin or small fixation device is usually used to hold the toe in position while the bones are healing. This type of procedure requires 6 to 8 weeks for the bone to heal.
- Exostectomy: this is a procedure done for “kissing calluses” or calluses between two toes. Usually the larger toe has an arthroplasty while a simple bone filing (exostectomy) is performed on the neighboring toe.
- Tendon surgery: in conjunction with the two procedures above, typically a tendon rebalancing, transfer or shortening is necessary.
- Bunion surgery: often, patients that have hammertoe repair also have bunion deformities that need to be corrected at the same time depending on the severity.
- Central metatarsal osteotomy: many times, when a patient shows signs of a long metatarsal on x-ray, a shortening surgery is necessary to relieve the pain underneath the metatarsal head.

**Surgery should never be considered lightly** since there are always possibilities of complications no matter how perfectly the procedure was done. There can be risks of infection, non-healing bone and even recurrence. Typically the length of time needed to recover from hammertoe surgery is 4 to 8 weeks depending on the type of procedure, but can be lengthened depending on the post-operative outcome.

## PREVENTING HAMMERTOES

With or without hammertoe surgery it is important to help **stabilize the faulty mechanical structure of the foot** to prevent the hammertoes from getting worse or recurring after surgery. This is best done with **supportive shoes, padding and custom-made orthotic devices**. Progression cannot be stopped but attempts can be made to slow down the progression and to alleviate the pain.

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## FREQUENTLY ASKED QUESTIONS

**Q: Only my hammertoe hurts and my bunion does not; what should I do?**

A: Normally the bunion is causing the hammertoe deformity by pushing it up in the air. Padding is the best treatment until you decide to fix it. Then, serious consideration should be given to fixing both the bunion deformity and hammertoe, so that the hammertoe does not return.

**Q: I have a corn between my toes; can that be fixed?**

A: Soft corns or corns between the toes are one of the most painful foot problems. They usually occur between the fourth and fifth toes. A simple arthroplasty along with exostectomy can be enough to take care of the problem.

**Q: My toe is bent but it can still be straightened; should I get this evaluated?**

A: A flexible hammertoe is one of the easiest to treat and many times only has a tightened tendon that can be stretched or lengthened in the office. The earlier it is treated, the less likely it will transform to a rigid deformity over time.



## MORTON'S NEUROMA



### WHAT IS A NEUROMA?

A neuroma is a **thickening of nerve tissue** that may develop in various parts of the body. The most common nerve that is affected in the foot is at the base of the third and fourth toes. This is normally referred to as a **Morton's neuroma** or intermetatarsal neuroma because of its location in the ball of the foot between the metatarsal bones.

### SYMPTOMS OF A NEUROMA

Normally a neuroma is **painful when wearing narrow-toed shoes and feels better when shoes are removed and the area is rubbed**. This is because the compressive forces are removed when the shoe is removed. Also typically there is a shooting, burning pain that goes to the toes. Symptoms include:

- Tingling, burning or numbness
- Pain
- Feeling like something is inside the ball of the foot or that a sock is bunched up

As the symptoms progress, the pain may not subside when shoes are removed and the symptoms may persist for several days or weeks. **Symptoms become more intense as the neuroma enlarges and the changes to the nerve become more permanent.**

## CAUSES OF A NEUROMA

The thickening and irritation of the nerve fiber is caused by **anything that causes compression of the nerve**. Commonly, people who wear shoes that have a tapered toe box or high-heeled shoes that force toes into the toe box have more symptoms.

Certain foot types and deformities, such as bunions, hammertoes, flat feet, flexible feet or people with tight calf muscles, are at greater risk for neuromas. Also, activities such as running or tennis, that place repetitive pressure on the ball of the foot, can predispose to neuromas. Injuries of the foot can also lead to a neuromas at times.

## DIAGNOSIS

Typically diagnosis of a neuroma can be determined from a comprehensive history and physical exam. **Compression of the front** of the foot as well as pressure on the affected area can recreate painful shooting symptoms. Also, evaluation of a **tight calf** can cause increased pressure on the front of the foot making neuroma symptoms worse.

Evaluation using an **x-ray** can display the proximity of the metatarsal bones and can help to determine that a neuroma is not a fracture. However, an x-ray is inherently limiting since it only views the bone structures. An **ultrasound examination** can provide measurements as to the size of the neuroma as well as evaluate for inflammatory changes around the area. In rare circumstances a **magnetic resonance imaging** (MRI) is necessary to evaluate a recurrent neuroma or to rule out other diagnoses.

It is best to have symptoms of a neuroma evaluated early before the changes to the nerve are irreversible. **Early diagnosis can diminish the need for more surgical intervention.**

## HOME TREATMENT

Initial treatment is directed toward easing the pain of the neuroma, but these actions will not reverse or cure the nerve injury:

- Change shoes: wearing sensible shoes that are wide can initially help to reduce the symptoms of the neuroma.
- Padding: pads placed under the metatarsal heads can help them to separate and minimize the compression forces on the neuroma.
- Activity modification: avoid activities such as running, tennis, and prolonged standing, and shoes that cause the pain and nerve irritation.
- Medications: oral anti-inflammatory drugs (NSAIDs), such as ibuprofen, may help reduce pain and inflammation.
- Icing: applying an ice pack a few times a day can help decrease the inflammation and pain.

## OFFICE TREATMENT

There are many treatments that can be done for mild to moderate pain from a neuroma. In general, if the neuroma is **diagnosed and treated early, then conservative treatments are more effective:**

- Trimming and padding: this is the mainstay of treatment of calluses on the ball of the foot that may cause neuroma pain. A podiatrist can trim down the callus or corn and place a pad to help relieve the pressure from shoes.
- Medications: prescription-strength oral anti-inflammatory drugs (NSAIDs) may help reduce pain and inflammation.
- Injection therapy: many times a corticosteroid injection can help reduce the inflammation and pain around the plantar fascia.
- Sclerosing injections: injecting dehydrated alcohol into the nerve over a number of visits can help shrink and injure the nerve to stop the pain.
- Non-custom orthotics: non-custom orthotic devices are a step down from custom orthotics in that they correct your foot based on its type. They can be useful while waiting for your custom orthotics to be fabricated.

- Orthotic devices: custom orthotic devices are specially molded to your foot and help correct underlying structural abnormalities. Metatarsal pads can be incorporated into the orthotic device to help relieve the pressure on the neuroma.
- Removable walking cast: in more severe cases wearing a walking cast boot for a few weeks can allow your foot to rest and heal.
- Physical therapy: sometimes physical therapy can help reduce the pressure on the ball of the foot by stretching the calf muscles.

## SURGICAL TREATMENT

Normally **surgery is indicated when neuroma pain interferes with daily activities** and you have not had adequate relief from other treatments. There are two types of surgical procedures that can either release or remove the neuroma. The overall goal of surgery is to eliminate the pain and callus formation.

When evaluating the need for surgery we will evaluate your specific foot type, x-rays, age, activity level and further foot problems. The length of recovery varies from 4 to 8 weeks depending on the procedure.

Surgical options include:

- Nerve release: this procedure is used when the nerve is compressed by a ligament between the adjacent metatarsal bones. This ligament is easily accessed between the toes and surgically cut with a small incision. In this procedure the nerve is not removed and only decompressed. This type of procedure requires 4 to 6 weeks for the foot to heal.
- Nerve removal: this procedure is performed with an incision either on the top or bottom of the foot and the ligament mentioned above is surgically transected and the **enlarged nerve is removed**. This type of procedure requires 6 to 8 weeks for the bone to heal.

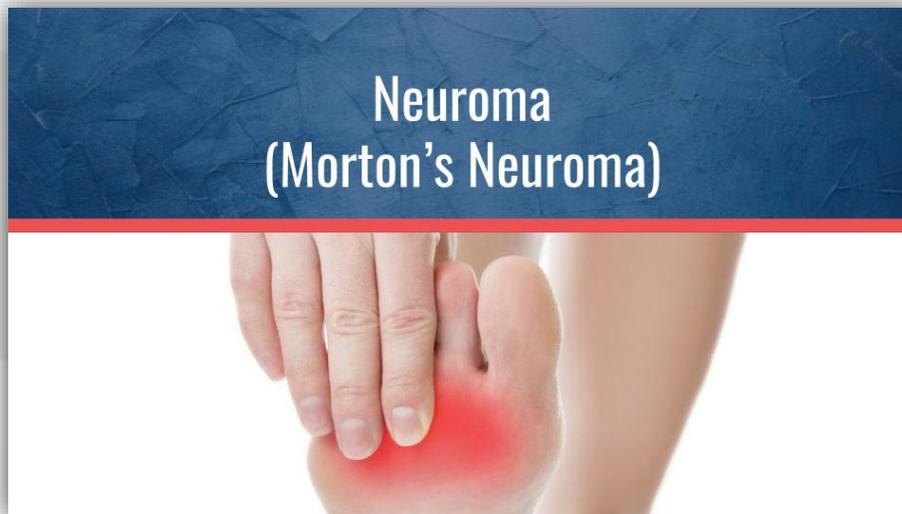
Surgery should never be considered lightly since there are always possibilities of complications no matter how perfectly the procedure was done. There can be risks of infection, non-healing and even recurrence of what is termed a **"stump" neuroma**, which is a remaining piece of nerve that is painful. Typically the length of time needed to recover from neuroma surgery is 4 to 8 weeks depending on the type of procedure, but can be lengthened depending on the post-operative outcome.

## PREVENTATIVE CARE

With or without neuroma surgery, it is **important to help stabilize the foot to prevent the excess movement and nerve impingement** and to diminish excess pressure on the bottom of the foot. This can be done with supportive shoes, padding and custom-made orthotic devices. Progression cannot be stopped but attempts can be made to slow down the progression and to alleviate the pain.

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## FREQUENTLY ASKED QUESTIONS

**Q: I have shooting pain to my third and fourth toes; do I have a neuroma?**

A: Those are classic signs of a neuroma, but you need to determine if the pain is improved when you remove your shoes. If it does improve then a neuroma is probable and should be evaluated in the office.

**Q: I have pain on the bottom of my third metatarsal; what else could it be?**

A: You could have metatarsalgia (pain in the metatarsal) or predislocation syndrome (dislocation pain over the toe joint) or even a stress fracture of the bone. You should see a podiatrist to determine the problem.



## PLANTAR WARTS



### WHAT IS A PLANTAR WART?

**A wart is a small skin growth that is caused by a virus.** Warts can occur on any place on your foot, and a plantar wart is one which occurs on the bottom of your foot. Warts more commonly affect children and adolescents.

There are two types of warts:

- Single wart: this is an isolated wart that may increase in size and even multiply on the foot by forming nearby warts.
- Mosaic wart: this is a cluster of several small warts that grow together. These are normally more difficult to treat than single warts.

## SYMPTOMS OF PLANTAR WARTS

The symptoms of plantar warts may include:

- Thickened skin: often this **resembles a callus** on the bottom of the foot because it is in an area of increased pressure.
- Pain: warts can hurt while walking and standing. They are also painful with side to side pressure.
- Tiny black dots: often appear on the surface of the wart and they are an indication of dried blood of the tiny blood vessels around the wart.

Warts normally grow deeper in the skin over time and are **more painful over time**. Therefore, it is **beneficial to treat them early before they are very painful**.

## CAUSES OF PLANTAR WARTS

Warts are **caused by a viral infection** in the skin that appears on the bottom of the foot. At times these infections can be **contracted at public places like pools, showers and restrooms**. They are commonly found in individuals that have **excess perspiration** on the foot.

What is necessary to fight any viral infection is your body's immune response. Simply put, your body's immune system has not recognized the virus or it is not large enough to destroy the virus. Therefore, **treatment** is aimed at **helping your body recognize the virus and build its own immune response** to destroy the virus.

## DIAGNOSIS OF PLANTAR WARTS

Most of the time, we can diagnose a wart by taking a thorough history and doing a physical exam. However, on occasion when a wart has been present for a prolonged time, is found in a different location, or is not being cured at the normal rate, a **biopsy may be indicated**. A biopsy is performed by taking a small piece of the wart and having it examined to make sure it is not anything else on the foot.

Also, be aware that individuals with warts **commonly have sweaty feet (hyperhidrosis) and athlete's foot that should be treated as well**.

## HOME TREATMENT

Even though most warts go away on their own over time, most patients desire faster relief. The **goal** of treatment is to **completely remove the wart**. There are many different types of remedies that people try, but many of these are unproven and may be dangerous. Be especially **careful if you have high risk diseases like diabetes, poor circulation or nerve disorders (neuropathy)**:

- Acid treatment: there are many over-the-counter treatments that can be a first-line treatment for warts. However, if there is no response within a few applications, you should seek out a professional.
- Drying agent: if your feet sweat excessively, a drying agent like an underarm antiperspirant can be used just as effectively on the foot to decrease sweating.
- Pumice stone: together with the acid treatment and if the wart is not painful, pumicing after showering can help remove excess hard skin.
- Stockings: special stockings with copper or wick-away fibers can help decrease perspiration on the bottom of the foot.

## OFFICE TREATMENT

After you have exhausted home treatments or if they were unsuccessful, there are other treatment options for plantar warts:

- Topical drying solutions: prescription-strength drying solutions can help dry out the wart and initiate the body's defense mechanism.
- Topical antiviral cream: helps your body activate its own immune response.
- Wart destruction: wart destruction can be done in the office using a number of modalities including **acid, laser, debridement or freezing**.
- Oral medications: have been found to be effective in treating the wart virus.

## SURGICAL TREATMENT

When office treatments are unsuccessful or the wart is too large you can consider surgical excision. Surgical wart removal is performed by surgically removing the wart with or without closure of the wounds of the foot. This is a very effective method of treating plantar warts but also has a possibility of wart recurrence after surgery.

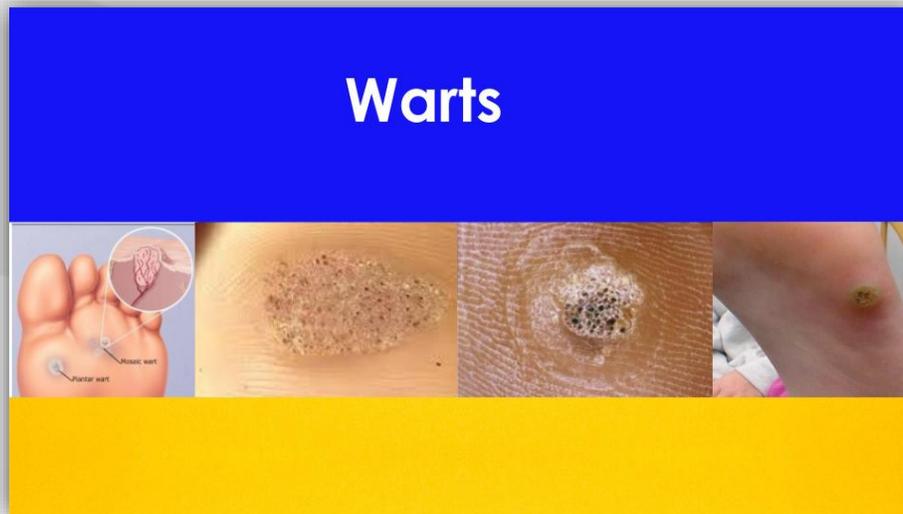
## PREVENTATIVE CARE

After a wart has been resolved it is always a great concern to not acquire them again. Here are some ways to prevent recurrence:

- Sandals: wear shower sandals when at public locations including pools and restrooms.
- Diminish perspiration: a topical drying agent can reduce moisture, used together with socks that remove moisture.

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## FREQUENTLY ASKED QUESTIONS?

### **Q: Can duct tape work?**

A: There are many folk remedies to treat warts and this is one of them. The way it works is that the removal of the duct tape helps your body's immune system to recognize the wart.

### **Q: Are plantar warts contagious?**

A: Plantar warts can be transferred from one person to another, usually in areas where you are barefoot, like the shower. Care should be taken to clean the tub and floor and wear sandals.

### **Q: When should I consider surgical removal?**

A: After many months of unsuccessful conservative treatment or if the wart is too large and will unlikely clear up on its own.



## ADULT FLATFOOT



Adult flatfoot is specific to adults and is caused by an overstretching and/or inflammation of the posterior tibial tendon of the foot. Another name for this disorder is posterior tibial tendon dysfunction (PTTD).

### WHAT IS PTTD?

Posterior tibial tendon dysfunction (PTTD) is an **inflammation and/or overstretching of the tendon that is used to support the arch of the foot**. In PTTD, the tendon's ability to work properly is impaired, which causes a flat foot.

The posterior tibial tendon is a fibrous cord that begins on the side of the leg, courses behind the inside of the ankle, and inserts into the inside of the foot to help hold up the arch. This is one of the most important tendons used when walking.

PTTD is also called **"adult-acquired flatfoot"** because **it is one of the most common reasons for adults developing a flat foot later in life**. This problem can affect both feet but it usually affects one more than the other. PTTD is a progressive disorder so it will become worse if not treated early on.

## SYMPTOMS OF PTTD

Symptoms can be pain, swelling, flattening of the arch and an inward rolling of the ankle. As the dysfunction progresses, the symptoms become worse:

- Initially, there is only pain on the inside of the foot along the course of the tendon. The area may be red, warm and swollen.
- Then over time, the arch begins to flatten, the ankle begins to roll inward, and the toes begin to point outward.
- At end-stage PTTD the pain moves to the outside of the ankle along with pain in the foot and ankle joints due to arthritis over the joints.

## CAUSES OF PTTD

Overuse of the posterior tibial tendon is a frequent cause of PTTD. Obesity can also contribute to overuse, as will activities that involve the tendon such as running, walking, hiking or climbing stairs.

## DIAGNOSIS OF PTTD

Initially, a detailed history and physical exam are able to determine problems with the posterior tibial tendon. There may be a decrease in muscle strength of the posterior tibial tendon compared to the other side of the foot. Grading the advancement of the deformity can be done via **x-rays** to determine the amount of joint involvement. **Magnetic resonance imaging** (MRI) and **ultrasound** can be used to detect flattening, tears and inflammation in the posterior tibial tendon.

## HOME TREATMENT

Since PTTD is **progressive** it is best to visit a doctor if you are concerned about your feet. If treated early enough, your symptoms may be resolved without surgery and the progression can be stopped. However, untreated or delayed treatment of PTTD can lead to a very flat, painful and arthritic foot and can interfere with activities like walking and running.

Some of the initial treatments of PTTD include the following:

- Shoe modifications: wearing shoes that provide a good support along the course of the posterior tibial tendon and help support the arch can be beneficial.
- Activity modification: avoid activities such as running, tennis and prolonged standing.
- Medications: oral anti-inflammatory drugs (NSAIDs), such as ibuprofen, may help reduce pain and inflammation.
- Icing: applying an ice pack a few times a day can help decrease the inflammation and pain.
- Arch supports: over-the-counter arch supports are non-specific to your foot type. They are a good place to start treating mild PTTD. Keep in mind that unless you have new supportive shoes, arch supports will not help.

## OFFICE TREATMENT

There are many treatments that can be done for mild to moderate posterior tibial tendonitis in the office:

- Strapping: consists of placing padding along the arch with tape on the bottom of the foot to help support the foot and reduce the strain on the posterior tibial tendon.
- Medications: prescription-strength oral anti-inflammatory drugs (NSAIDs) may help reduce pain and inflammation.
- Topical cryotherapy: topical pain relievers can help through the day to take the edge off foot pain. They can be beneficial when icing is not an option while working or away from your home.
- Non-custom orthotics: non-custom orthotic devices are a step down from custom orthotics in that they correct your foot based on its type. They can be useful while waiting for your custom orthotics to be fabricated.
- Orthotic devices: custom orthotic devices are specially molded to your foot and help correct the underlying structural abnormalities for mild posterior tibial tendonitis.
- Removable walking cast: in more severe cases wearing a walking cast boot for a few weeks can allow your foot to rest and heal.

- Ankle Foot Orthoses (AFO): an AFO is used for moderate to severe PTTD to help support the foot while extending to the level of the ankle for more support.
- Bracing: other methods of bracing can be utilized to help decrease the motion over the foot, supporting the posterior tibial tendon and reducing painful motions.
- Physical therapy: sometimes physical therapy can strengthen the posterior tibial tendon to help it function properly.

## SURGICAL TREATMENT

Normally surgery is indicated when **PTTD pain interferes with daily activities** and you have not had adequate relief from other treatments. For certain people surgery may be the only option if the disorder has progressed to later stages. Correction of the deformity can involve repairing the tendon or realigning the foot, or both.

Surgical options include:

- Tendon repair: this is normally done in more mild cases of PTTD or with more elderly individuals. The tendon is repaired where it is torn or strengthened with a neighboring tendon to help it work better.
- Bone realignment: this procedure can be done in flexible feet using a conical implant device. However, in more rigid arthritic feet, the bones of the foot can be surgically realigned using a bone graft and surgically fracturing the heel bone to put it in proper alignment.
- Fusion: at times when more conservative procedures have not been successful or arthritis is too advanced, removing the joint (fusion) may be the best option because joints that do not move are not painful.

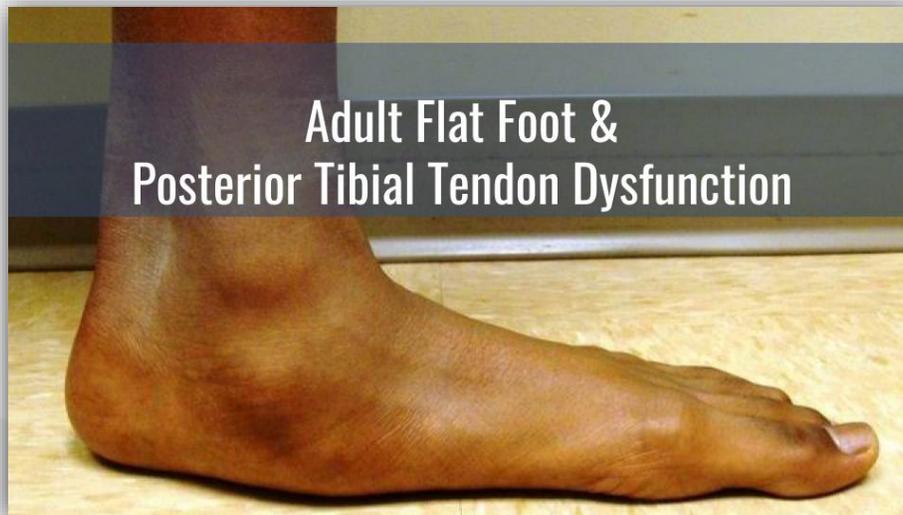
Each procedure has a different recovery period including cast immobilization, physical therapy and muscle retraining.

## PREVENTATIVE CARE

As mentioned above the most important aspect to preventing PTTD is early diagnosis and treatment. In order to prevent the need for surgery a **custom made orthotic or AFO** are very beneficial. Also, to protect the surgical correction **orthotics** are very beneficial in minimizing excess movement and strain on the tendons and joints in the area.

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## FREQUENTLY ASKED QUESTIONS

**Q: I have flatfoot and my children do as well; should they see someone even though it doesn't hurt?**

A: Yes, usually adult flatfoot progresses over time and by treating children young, you are able to slow or stop the development of more severe symptoms.

**Q: I see my arch flattening out but it is not painful all the time. What should I do?**

A: It is beneficial to have an examination of your feet to determine the stage of your tendon injury and joint alignment. Many times if caught early on, using custom orthotics can help preclude the need for surgery in the future.

## PEDIATRIC FLATFOOT

### WHAT IS PEDIATRIC FLATFOOT?

Flatfoot is seen in both children and adults. In the version seen in children, there is commonly a **complete absence or collapse of the arch in the foot**. Most children **do not have pain** with their flat feet and it is mostly the parents that bring them to the doctor.

### SYMPTOMS OF PEDIATRIC FLATFOOT

When symptoms are present they can have one or more of the following:

- Pain, tenderness and cramping of the foot, leg and knee.
- Outward tilting of the heel
- Awkwardness or frequent falls walking
- Difficulty wearing shoes
- Increased fatigue or voluntary withdrawal when participating in physical activities like sports

Flatfoot can be observed in one or both feet. Also, it can be present at birth or develop years later, depending on the type.

### CAUSES OF PEDIATRIC FLATFOOT

Basically there are two types of flatfoot: asymptomatic and symptomatic. As mentioned earlier, most children are asymptomatic.

The **symptomatic** flatfoot disorder can either be "flexible" or "rigid". Flexible means that the foot is flat when standing but the arch returns when the foot is off the floor. Rigid means the foot is flat both standing and not standing.

Some of the causes of rigid flatfoot include the following:

- Tarsal coalition: this is a bony or fibrous connection between two or more bones in the foot that does not allow those bones to move as much as they should. This condition is congenital (occurs at birth).

Tarsal coalitions may or may not be painful, but when they are painful they usually begin in preadolescence or adolescence. That is the age when those bones become fully mature and children participate in more strenuous activities.

- Congenital vertical talus: this problem is apparent in the newborn because there is a rigid “rocker bottom” appearance that occurs with vertical talus. Symptoms begin at walking age since it is difficult for the child to put weight in the foot or wear shoes.

Some of the causes of flexible flatfoot include the following:

- Equinus: this is a **tight heel cord** that is frequently seen in children with flatfeet that puts excess pressure on the foot causing it to flatten out.
- Hypermobility: this is extra motion seen among the foot joints causing the heels to tilt outward and the toes to point outward. If other family members have flat feet with symptoms such as posterior tibial tendon dysfunction this is best treated to prevent further problems in adulthood.

## DIAGNOSIS OF PEDIATRIC FLATFOOT

Examination of the child's foot while sitting, standing and walking is very important to determine if the foot is rigid or flexible. Also, examination of the knee and hip may be indicated to determine if there are any rotational components further up the leg that could involve the feet.

**X-rays** are initially used, together with measurement of a few angles to determine the severity of the deformity. Sometimes **CT, MRI** and **blood tests** may be necessary to determine the diagnosis and severity of the disorder as well.

## HOME TREATMENT

Initially it is important to determine if the child's flatfoot causes pain. Usually a **child will not complain of pain but rather will choose not to play or will stop before the game is finished**. These signs can indicate fatigue and pain to the observant parent.

If there are no symptoms, then no treatment is required. Instead, the condition should be observed and **re-evaluated periodically**. Sensible supportive shoes and custom made orthotics may be considered to help slow down the progression of the disorder.

If symptomatic pediatric flatfoot is observed, here are some of the home treatments:

- Shoe modifications: wearing shoes that provide a good support to help support the arch. DO NOT wear flip flop sandals that have no arch support.
- Activity modification: avoid or decrease activities that cause pain or discomfort. Also, avoid prolonged walking or standing.
- Medications: oral anti-inflammatory drugs (NSAIDs), such as Ibuprofen may help reduce pain and inflammation.
- Arch supports: over-the-counter arch supports are non-specific to your foot type. They are a good place to start treating mild PTTD. Keep in mind that unless you have new supportive shoes arch supports will not help.

## OFFICE TREATMENT

There are many treatments that can be done for mild to moderate pediatric flatfoot in the office:

- Strapping: consists of placing padding along the arch with tape on the bottom of the foot to help support the foot and reduce the strain on the posterior tibial tendon.
- Medications: prescription-strength oral anti-inflammatory drugs (NSAIDs) may help reduce pain and inflammation.
- Topical cryotherapy: topical pain relievers can help through the day to take the edge off foot pain. They can be beneficial when icing is not an option while working or away from your home.
- Non-custom orthotics: non-custom orthotic devices are a step down from custom orthotics in that they correct your foot based on its type. They can be useful while waiting for your custom orthotics to be fabricated.
- Orthotic devices: custom orthotic devices are specially molded to your foot and help correct the underlying structural abnormalities for mild posterior tibial tendonitis.
- Removable walking cast: in more severe cases wearing a walking cast boot for a few weeks can allow your foot to rest and heal.
- Ankle Foot Orthoses (AFO): an AFO is used for severe flatfoot to help support the foot while extending to the level of the ankle for more support. This is used more for the adult version of flatfoot.

- Physical therapy: sometimes physical therapy can help stretch the Achilles tendon if it is a deforming force contributing to pediatric flatfoot.

## SURGICAL TREATMENT

Normally surgery is **indicated when pain interferes with daily activities** and you have not had adequate relief from other treatments. Also, for painful flatfoot due to coalitions in the joints, surgery can help relieve pain and improve foot function. However, in cases where non-painful pediatric flatfeet are observed in the family, surgical correction may be indicated to help reduce symptoms in the future.

Surgical options include:

- Achilles tendon lengthening: this is usually performed in conjunction with another procedure to diminish the deforming force on the surgically corrected flat foot.
- Bone realignment: this procedure can be done in flexible feet using a **conical implant device**. However, in more rigid arthritic feet, the bones of the foot can be surgically realigned using a bone graft and surgically fracturing the heel bone.
- Fusion: at times when more conservative procedures have not been successful or arthritis is too advanced, a fusion of the joints in the foot may be the best option because joints that do not move are not painful.

Each procedure has a different recovery period including cast immobilization, physical therapy and muscle retraining.

## PREVENTATIVE CARE

As mentioned above the **most important aspect of pediatric flatfoot is early diagnosis and treatment**. In order to prevent the need for surgery, **custom-made orthotics** are very beneficial. Also, even after surgery orthotics are very beneficial in minimizing excess movement and strain on the tendons and joints in the area.

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## FREQUENTLY ASKED QUESTIONS

**Q: I have flatfoot and my children do as well; should they see someone even though it doesn't hurt?**

A: Yes, usually adult flatfoot progresses over time and by treating children while young you are able to slow or stop the development of more severe symptoms.

**Q: My doctor says flatfoot is normal in children and they will grow out of it.**

A: Many times children will develop an arch over time, but if parents have flat feet, it is likely the children will, too. Early treatment may preclude the need for surgical intervention in the future.

**Q: How often will I need to buy orthotics for my child with flatfoot?**

A: Orthotics are good for about 1.5 to 2 shoe sizes but there are special insurance programs that make pediatric orthotics much more affordable for parents. Sometimes insurance covers the entire cost of the orthotics.

## ATHLETE'S FOOT



### WHAT IS ATHLETE'S FOOT?

Athlete's foot is a skin infection caused by **fungus**. A fungal infection may occur on any part of the body and when occurring on the foot is tinea pedis. **Most people either have or have had athlete's foot at some time in their lives** and many people have it and are used to living with it.

### SYMPTOMS OF ATHLETE'S FOOT

Typically feet that are infected with fungus are itchy, dry and have scaling skin. This commonly affects the bottom of the foot or in between the toes. In more severe cases athlete's foot can cause cracks, blisters and inflammation of the skin. If bacteria get into the opening an infection can occur as well. Also, keep in mind that the fungus from the foot can spread to other body parts including the **toenails**.

## CAUSES OF ATHLETE'S FOOT

Fungus usually likes to grow in areas that are dark, warm and moist. That makes the shoe a perfect environment for growth and the reason that fungus commonly attacks feet. Feet that perspire (hyperhidrosis) more than usual and individuals who infrequently change socks or rotate their shoes are more prone to athlete's foot. Also, as with warts, athlete's foot can be spread in public restrooms and showers.

## DIAGNOSIS

Usually athlete's foot can be diagnosed by a complete medical history and physical exam and treatment can begin. However, a sample of affected skin (**biopsy**) is frequently necessary to rule out any other infections that can mimic fungal infections and which should not be treated with topical antifungal medication. When treating athlete's foot you **should treat any nail fungus, foot perspiration, and bad odor as well.**

## HOME TREATMENT

For many people, there is no perfect shoe. Though I am not an advocate for cutting holes in shoes, there are instances where releasing a seam can be help relieve pressure on a certain area of the foot. The best modifications for the shoes at home can be done with the sock liners. If there is discomfort, or a painful callus on the tip of a toe or under the foot, then the area of the sock liner in that exact spot can be removed to relieve some pressure. If the heel seems to be slipping in the back too easily, especially those with narrow heels, a heel cradle (adhesive felt) can be applied to the heel counter of the shoe, just below the padding that runs around the top, back edge. If someone has a high spot on the top of the arch, either the laces can be modified (see below), or the tongue of the shoe can have a piece removed or it can be padded underneath with space created for the prominent area of the foot.

## OFFICE TREATMENT

After you have exhausted home treatments, there are other treatment options for athlete's foot:

- Topical drying solutions: prescription-strength drying solutions can help dry out the affected area if you have increased perspiration that can cause foot odor and athlete's foot.

- Topical antifungal cream: prescription-strength cream helps cure athlete's foot faster and can be combined with anti-inflammatory drugs to assist with the itchy feeling on the feet.
- Antifungal nail lacquer: when used with antifungal cream, can help treat and prevent spread to nails.
- Oral medications: may be used in conjunction with topical treatment for quicker resolution to the fungal infection or to treat toenail fungus.
- Stockings: special stockings with copper or wick-away fibers can help decrease perspiration on the bottom of the foot.
- Odor treatment: for people who have odor problems with shoes, there are prescription-strength odor solutions to kill fungus and odor on contact. These can be applied to shoes without the need to purchase new shoes.

## ADVANCED TREATMENT

When there is a need for definitive diagnosis of fungus, a **biopsy can be considered**. A biopsy is performed by injecting a small amount of numbing medicine under the skin and removing a few pieces of tissue to send to a dermatopathologist to verify a fungal infection is causing the problem. A Band-Aid can be placed on the area for a few days until the wound is healed.

## PREVENTATIVE CARE

After athlete's foot has been resolved, it is always a great concern to not acquire it again or pass it on to others. Here are some ways to prevent that:

- Sandals: wear shower sandals when at public locations including pools and restrooms.
- Diminish perspiration: a topical drying agent can reduce moisture, used with socks that remove moisture.
- Topical antifungal: using a weekly application of skin or nail antifungal can help prevent recurrence.

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## FREQUENTLY ASKED QUESTIONS

**Q: I have athlete's foot and have tried a topical medication, but it is not getting better; when should I see a doctor?**

A: If the fungal infection is not getting better with the topical medicine and you are applying it as prescribed, either it may not be a fungal infection or you may need a stronger medication by mouth in combination. After two weeks with no improved symptoms, you should see a professional.

**Q: I have itching between my toes and peeling skin; is that athlete's foot?**

A: Infection between the toes is one of the most common and most difficult to treat because it frequently recurs. It probably is athlete's foot and if it frequently returns, you should seek medical advice.

## ARTHRITIS



### WHAT IS ARTHRITIS?

Arthritis is injury to any joint, caused by wearing down or injury of the cartilage over the bone. Cartilage normally provides shock absorption and smooth motion between the joints and when it is injured, this can cause joint pain and/or inflammation.

### SYMPTOMS OF ARTHRITIS

Arthritis is typically painful with movement or motion over the joint. Arthritis usually feels better when the joint movement is stopped or restricted with bracing.

Some of the common places for arthritis in the foot include:

- Big toe joint: the big toe joint may be painful with movement and with walking.
- Metatarsal phalangeal joint: this is the big toe where it attaches to the rest of the foot. This joint commonly gets arthritis over time with usage. This can occur more rapidly if there is a bunion deformity; diminished movement over the joint, called "hallux limitus"; or no movement over the joint, called "hallux rigidus."

- **Rearfoot arthritis:** there are a number of joints in the back of the foot that can get isolated or combined arthritis and pain with movement. This can be caused by other tendon problems such as with the **posterior tibial or peroneal tendons**. Also, this can be caused by an injury or overuse from working or sports.

## CAUSES OF ARTHRITIS

Arthritis is usually caused by the following:

- **Overuse:** using the joint too much causing wear and tear on the cartilage and joint surface.
- **Injury:** injury to the joint surface can cause parts of the cartilage to become damaged and expose bone to bone contact.
- **Rheumatoid arthritis:** this can cause destruction of the joints leading to painful arthritis in many joints on the body, including the foot.
- **Abnormal motion:** sometimes there are other foot or leg problems that make the foot function other than in the normal way. Any motion that is not normal will put more stress on the joints, making them more apt to become injured and arthritic.

## DIAGNOSIS

Usually arthritis can be determined by a complete history and physical exam. Initially an **x-ray** is essential to determine the joint involvement and an **ultrasound** to determine tendon involvement. If needed, a **CT scan or MRI** can assist to determine the precise extent of injury and what surgical options are available.

Normally, a painful joint in the front of the foot is easier to diagnose than one in the back of the foot, because of its close proximity. Therefore, a **diagnostic injection** of local anesthetic into the affected joint can diagnose joint arthritis and determine the feeling of what the patient would experience with removal of that joint surgically (fusion).

## HOME TREATMENT

Here are some of the conservative treatments that can be utilized:

- Activity modification: avoid or decrease activities that cause pain or discomfort. Also, avoid prolonged walking or standing. If the big toe or joint attaching to the foot is involved, avoid activities such as squatting or kneeling that can aggravate the joint.
- Medications: oral anti-inflammatory drugs (NSAIDs), such as ibuprofen, may help reduce pain and inflammation.
- Arch supports: over-the-counter arch supports are non-specific to your foot type. They are a **good place to start treating mild arthritis**. Keep in mind that unless you have new supportive shoes, arch supports will not help.
- Ice: putting an ice pack on the affected joint for 10 minutes a few times a day helps reduce the inflammation. An easy method of icing is using a bag of vegetables on the affected joint.

## OFFICE TREATMENT

There are many treatments that can be done in the office for mild to moderate arthritis:

- Strapping: consists of placing padding along the arch along with tape on the bottom of the foot to help support the foot and reduce strain on the joints. If the big toe is affected the pad can be extended to the big toe to decrease movement.
- Medications: prescription-strength oral anti-inflammatory drugs (NSAIDs) may help reduce pain and inflammation.
- Topical cryotherapy: topical pain relievers can help through the day to take the edge off foot pain. They can be beneficial when icing is not an option while working or away from your home.
- Steroid injection: many times used in conjunction with diagnostic anesthetic injection to help diminish inflammation over the joint surface and provide pain relief.
- Non-custom orthotics: non-custom orthotic devices are a step down from custom orthotics in that they correct your foot based on its type. They can be useful while waiting for your custom orthotics to be fabricated.

- Orthotic devices: custom orthotic devices are specially molded to your foot and help correct the underlying structural abnormalities and motion causing pain in the arthritic joint.
- Surgical shoe: this can help to decrease bending in the joints of the foot if they are affected.
- Removable walking cast: in more severe cases wearing a walking cast boot for a few weeks can allow your foot to rest and heal and works better than a surgical shoe.
- Ankle Foot Orthoses (AFO): an AFO is used for joint arthritis to decrease joint movement while walking.
- Bracing: other methods of bracing can be utilized to help decrease the motion over the joints.
- Physical therapy: sometimes physical therapy can help increase joint mobility.

## SURGICAL TREATMENT

Normally surgery is indicated **if pain interferes with daily activities** and you have not had adequate relief from other treatments. Also, for painful arthritis, surgery can help relieve pain and improve foot function.

Surgical options include:

- Achilles tendon lengthening: this is usually performed in conjunction with another procedure to diminish the deforming force on the surgically corrected area.
- Exostectomy: is removal of bony prominence that hinders movement over a joint. Typically seen in large toe joint and in rearfoot joints.
- Fusion: is used at times when more conservative procedures have not been successful or arthritis is too advanced. A fusion of the joints in the foot may be the best option because joints that do not move are not painful.
- Implant: when indicated an implant over a joint surface can help preserve the joint movement while addressing the painful arthritis.
- Joint removal: for advanced arthritis or patients who are older, removal of the joint may provide best results, especially for patients with rheumatoid arthritis.
- Tendon repair: many times, this is performed with fusion to correct improper functioning of tendon causing incorrect foot mechanics that lead to arthritis.

Each procedure has a different recovery period including cast immobilization, physical therapy and muscle retraining.

## PREVENTATIVE CARE

The most important aspect of arthritis is early diagnosis and treatment. In order to prevent the need for surgery, a **custom orthotic device, AFO or brace** is very beneficial. Also, even after surgery an additional custom orthotic device, AFO or brace is very beneficial in minimizing excess movement and strain on the tendons and joints in the area.

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## FREQUENTLY ASKED QUESTIONS

### **Q: How long does a joint fusion take to heal?**

A: Usually a bone takes 6-8 weeks to heal; a fusion over two bones requires at least that amount of time without putting weight on the foot for proper healing.

### **Q: I have arthritis but do not want surgery; should I see a doctor?**

A: Surgery is the last option and there are many non-surgical treatment options that are available such as orthotics, AFOs and braces that can successfully reduce or eliminate your foot pain due to arthritis.

## BROKEN FOOT BONE



There are 52 bones in both of your feet combined and any one of these bones can become broken. However, there are certain bones that are more prone to injury than others. Also, there are some bone breaks that are not evident right away on x-ray and only show up over time.

### WHAT IS A BROKEN BONE?

A broken bone is either a partial or complete break in a bone. These breaks can **occur at the following locations:**

- Straight across the bone
- At the level of a joint and involving the joint
- At an area of weakness along the bone architecture
- Break in many pieces (comminution)
- Crack at the outer cortex (stress fracture)

- No break in the outer bone cortex, just the inside of the bone causing a bruised bone (contusion)
- Injury of ligaments that hold the bones in place (Lisfranc's injury)
- Injury of sesamoid bones on the bottom of the great toe

## SYMPTOMS OF A BROKEN BONE

There are many symptoms including:

- Pain when walking or movement of the bone and joints around the break
- Swelling and redness of the skin over the bone
- Bruising of the skin around the bone extending even beyond the area of the break
- Shooting pain at area of the break
- Opening in the skin if break is severe enough
- Inability to play in physical activities
- Inability to walk or bear weight on the foot

Many times you can tell when you have a broken bone because of the pain. Usually the symptoms decrease over time as the body heals the break.

## CAUSES OF A BROKEN BONE

There are many causes for a broken bone. Usually it is caused by some type of **injury or trauma** to the foot. They can be from a **misstep** or from someone or something landing on the foot. Also, when **overusing the foot** or trying to become too active too quickly, the bone does not have time to strengthen to accommodate for the activity and a break can occur.

Many times a **twisting motion** of the foot can cause a break, as well as **missing a step or walking off a curb** when not ready. Your foot is not prepared to absorb the shock and an injury can occur. Many times a sprain can be confused with a fracture or break. If you are confused as to whether you have a sprain or a break, proper medical evaluation is necessary.

## DIAGNOSIS OF A BROKEN BONE

A broken bone can many times be diagnosed by a good history and physical examination to evaluate where the pain is located. Usually **x-ray, CT scan and MRI** are beneficial to determine the type, extent and angulations of the break to determine if it is stable or unstable. If there is a stress fracture many times **ultrasound** can diagnose it before an x-ray. Each type of fracture is treated differently depending on the location.

Here are some **tests** that can be used to **diagnose a fracture**:

- Pressure from touching and pushing on the affected bone will cause pain when the bone is broken.
- Vibration from a **tuning fork** can help determine a stress fracture and will cause pain to the affected area of bone.
- X-ray can help determine the presence of a break and extent of bone involvement.
- MRI can help distinguish between a bone fracture and a soft tissue injury.
- CT scan can help distinguish the extent of bone involvement.
- Bone scan can show bone injury compared to other parts of the body.

A broken bone needs to be determined and distinguished from a soft tissue injury, coalition, bone cyst or other abnormality.

Here are some of the more **common areas that can develop bone breaks**:

- Sesamoid is painful under the great toe, usually caused by injury or overuse. It needs to be determined if there is a fracture or only inflammation of the sesamoid.
- Metatarsal fractures are very common on the most outside metatarsal that attaches to the **5<sup>th</sup> toe**. This is frequently broken because there is an area of weakness about halfway up the foot from the little toe. Another area of injury is underneath the ball of the foot where **stress fractures** can occur to one or multiple metatarsals. When a heavy object falls on the foot these bones frequently can become injured or shattered.
- Toes are frequently broken when running into an object; when one toe sticks out more than the others; or when hitting the bed at night. They usually become black and blue and painful.

- Heel fractures usually occur when falling from a height and landing directly on the heel bone. This needs to be distinguished between plantar fasciitis (heel pain) and a bone cyst.

## HOME TREATMENT

**Toe breaks** can usually be treated at home by taping the smaller toe to the larger toe. If symptoms do not improve in a week, you should seek medical attention. It is usually helpful to wear shoes that do not bend or put pressure on the toes. If you seek medical attention, a hard-soled **surgical shoe** can provide relief until the bones are healed. If the toe looks misaligned it may be necessary for medical evaluation to reposition the toe and hold it in place.

**Remember** if pain does not improve, it is essential to seek a medical evaluation to make sure there are not more serious problems.

Here are some of the conservative treatments that can be utilized:

- Activity modification: avoid or decrease activities that cause pain or discomfort. Also, avoid prolonged walking or standing.
- Medications: oral anti-inflammatory drugs (NSAIDs), such as ibuprofen, may help reduce pain and inflammation.
- Arch supports: over-the-counter arch supports are non-specific to your foot type. They are a good place to start treating mild foot discomfort and can stabilize your foot to reduce excessive movement when your bone is healing. Keep in mind that unless you have new supportive shoes, arch supports will not help.
- Ice: putting an ice pack on the affected area of pain for 10 minutes a few times a day helps reduce the inflammation. An easy method of icing is using a bag of vegetables on the affected area of pain.

## OFFICE TREATMENT

There are many treatments that can be done for broken bones in the office:

- Strapping: consists of placing padding along the arch with tape on the bottom of the foot to help support the foot and reduce strain on the joints. Padding is especially helpful for sesamoid pain. Strapping can also be beneficial for toe breaks by strapping one to the other.

- Medications: prescription-strength oral anti-inflammatory drugs (NSAIDs) may help reduce pain and inflammation.
- Topical cryotherapy: topical pain relievers can help through the day to take the edge off foot pain. They can be beneficial when icing is not an option while working or away from your home.
- Non-custom orthotics: non-custom orthotic devices are a step down from custom orthotics in that they correct your foot based on its type. They can be useful while waiting for your custom orthotics to be fabricated.
- Orthotic devices: custom orthotic devices are specially molded to your foot and help correct the underlying structural abnormalities that caused the foot fracture to begin with. Use of orthotics by military personnel in basic training decreased the number of stress fractures by adjusting the motion of the foot.
- Surgical shoe: this can help to decrease bending in the joints of the foot if they are affected.
- Removable walking cast: in more severe cases wearing a walking cast boot for a few weeks can allow your foot to rest and heal and works better than a surgical shoe.
- Steroid injection: many times is used to help diminish inflammation over the joint surface and provide pain relief. This is not used in a fracture but rather in an area of inflammation because it can slow down bone healing.
- Shockwave treatment: sometimes to help heal the bone faster shockwave therapy can be helpful for patients to reduce the recovery time and back to activity time.

## SURGICAL TREATMENT

Normally surgery is indicated if pain continues and the fracture is unstable, misaligned or not healing in the expected time frame. Also, surgery is preferred in athletes because healing time is reduced and return to activity is quicker. Types of surgery include:

- Closed fixation: this is using **pins** and **screws** with minimal incisions for breaks that are well aligned. Recovery time is the same as open fixation but there is less of a wound and fewer wound healing complications.
- Open fixation: this is done with a larger incision where the bones need to be realigned and held in place and a pin, screw, staple or plate can be used to hold the bones in the corrected position. At times pins with an **external fixation rail** may be necessary to hold a very unstable fracture in place.

- **Fusion:** is used at times when more conservative procedures have not been successful or arthritis is too advanced. A fusion of the joints in the foot may be the best option because joints that do not move are not painful.
- **Tendon repair:** many times performed when tendon injury occurs with a bone break.

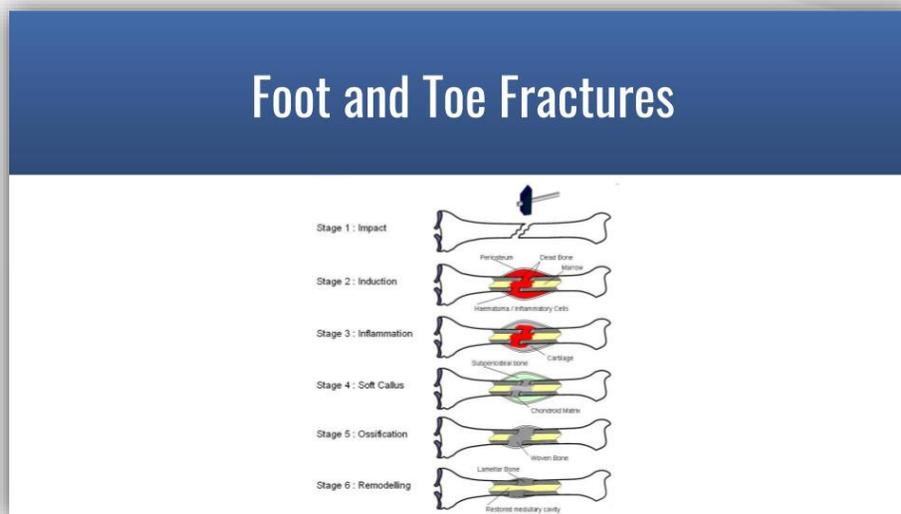
These are some of the surgical options and each procedure has a different recovery period including cast immobilization, physical therapy and muscle retraining. All surgical procedures have a probability of complications such as infection, re-fracture, non-healing and delayed healing.

## PREVENTATIVE CARE

The most **important aspect of a bone fracture is to prevent recurrence** of the fracture. Therefore, a proper period of non-weight bearing is essential to let the bone strengthen and repair. Early walking or returning too quickly to activity can cause delayed healing or breaking the bone again. Also, after surgery or healing of the fracture, **custom orthotics** are very beneficial in minimizing excess movement and strain on the tendons, joints, and bones in the foot.

## VIDEO EXPLANATION

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## FREQUENTLY ASKED QUESTIONS

**Q: I hit my bedpost at night and my little toe is black and blue and painful; what should I do?**

A: This is a common break that heals by itself unless the toe is aligned wrong compared to the other foot. Wear a stiff-soled shoe or sandal that does not put pressure on the foot. If pain does not decrease in a week, seek professional help.

**Q: I started running and now I have pain in the ball of my foot; what should I do?**

A: Usually those who begin physical activities after not doing much activity are at greater risk for stress fractures. These fractures will display on x-rays only after a few weeks. However, if you have pain after a few days, seek medical attention for x-rays and use a stiff-soled shoe. Stop activities that cause pain.

**Q: I stepped off a curb and my foot rolled inward; the outside of my foot is painful and I cannot put weight on the outside of my foot. What should I do?**

A: This is a common complaint for a fractured metatarsal. Stay off the foot to not make it worse and see a doctor quickly.

**Q: I have pain under my big toe joint that is not improving. What should I do?**

A: Pain under the big toe joint can either be an inflammation or break of the sesamoid bone. Try not to walk on foot and see a doctor to have an x-ray. Most of the time, an x-ray can distinguish between the two.

## FOOT WOUND (ULCER)



Foot wounds are one of the most frequently avoided or non-treated problems on the foot. Also, they are one of the problems that if treated can help save your foot or leg from amputation.

### WHAT IS A FOOT WOUND

A foot wound or ulceration is an open wound found on some part of your foot. It is commonly found in people with diabetes, poor circulation and nerve damage (neuropathy). It is also one of the leading causes of amputations in the world.

## SYMPTOMS OF A FOOT WOUND

Sometimes there are no symptoms at all, especially if you lack feeling (neuropathy). However, if pain is present that is a good indication that the wound is severe. There can also be redness, swelling, warmth, foul odor and drainage from the wound. Bone, tendon and muscle may be present in the wound as well.

For some people, though, all that is present is a **hard callus** on the bottom of the foot. The callus is caused by increased pressure on the bottom of your foot and it covers a wound. That is why every time you visit a podiatrist that callus is removed. The callus is dead skin covering up the real problem underneath.

## CAUSES OF A FOOT WOUND

A foot wound can be caused by many issues together or each individually. Here are the top four reasons wounds don't heal:

- Walking: in order to heal a wound it is **essential to keep off the foot**. The more pressure the longer the healing process will take. The longer the wound is open the more prone it is to becoming infected.
- Poor circulation: if you have inadequate circulation an ulceration will take longer to heal or will not heal at all. A foot without an ulceration has minimal problems from poor circulation; however, when an ulceration develops, **blood is necessary to heal the wound**.
- Infection: if there is a deeper infection in the wound then it will not heal. Many times a **biopsy or culture** is necessary to determine the appropriate antibiotic to help the wound heal faster.
- High blood sugar: when blood sugar is higher than normal the body has a delayed healing response and it is more difficult to close wounds. **Strict control and frequent monitoring of blood sugar is necessary for healing a wound**.

Other causes of ulcerations are:

- Equinus: a tight Achilles tendon can cause increased pressure on the front of the foot, causing an ulceration.
- Shoes: shoes that are too **tight or short** are a frequent cause for foot ulceration. Many times people do not know that the shoes are too tight because of the diminished feeling in the feet.

- Swelling: swelling of the legs and ankles with **improper compression** can cause the skin to break down and create an ulceration.
- Nails: a nail that is either too thick with a fungal infection or one that is ingrown can puncture the skin and cause an infection or ulceration.
- Hammertoes or Bunions: when a hammertoe or bunion is present, the joint contracture on the top or side rubbing on the shoe can make a wound. Also pressure between two toes can make a wound between the toes.
- Diminished joint mobility: due to decreased joint movement the foot is not able to adapt to the floor as easily. A callus may then form from increased pressure and friction on that part of the foot. This callus can then change into an ulceration over time.
- Callus: a **callus is a precursor to an ulceration** for people with diabetes or nerve damage (neuropathy).

## DIAGNOSIS OF FOOT WOUND

Wounds on the foot are usually noticed in the form of either a callus or a wound. They can be noticed by family members, caretakers, or individuals taking care of themselves. For those who receive frequent foot care, their podiatrist is quick to recognize warning signs of ulcer-prone feet.

Some diagnostic tests that are used to verify and evaluate an ulcer are as follows:

- Imaging: **x-ray, MRI, CT and bone scan** can all be used to evaluate the extent of an ulceration and whether or not there is bone involvement.
- Blood tests: blood tests can determine if there is an infection in the blood or increased types of blood cells (**white blood cells**) that are common in infections.
- Circulation tests: are necessary to determine healing potential of wounds.
- Nerve test: nerve testing is helpful to determine if "protective sensation" is lost; that is, the minimum amount of feeling necessary to know if you step on something.
- Probe to bone test: this is a test used with a probe to determine if the wound goes to the bone underneath. It can be indicative of a deeper bone infection and change the course for treatment and antibiotics.
- Culture and biopsy: these tests are of tissue or bone of the ulceration site to determine the infecting organism and presence of infection of bone.

When a wound is found with a collapsed foot that looks like a reverse arch, it is commonly a problem called **Charcot Foot**. In the initial stages, complete non-weight bearing is essential to delay progression of the deformity. These are some of the most difficult wounds to treat because the patient is often walking directly on the bone itself.

## HOME TREATMENT

Good wound care begins at home with prevention. Here are some **preventative measures** for individuals with diabetes, circulatory problems and nerve problems:

- Do not use tobacco: **tobacco of any type delays healing** and diminishes blood circulation.
- Do not soak feet: soaking feet may feel good but it can make skin soft and prone to cuts and infection. If you do bathe, make sure that you check the water with your hand first because nerve damage can prevent recognition of hot and cold. Another good method is to use a thermometer and keep the temperature between 80-93° F.
- Wash your feet daily: good foot hygiene will help clean your feet and will help you recognize any wounds early.
- Dry skin: if you have dry skin, gently apply moisturizing cream or lotion to keep your skin soft and free from scales and dryness. **Do not put cream between toes** as it can cause breaks in the skin that can cause an infection.
- Separate toes: if they overlap or are close together, with lamb's wool or **special pads**. This will help prevent skin wounds under the bony prominences.
- Use diabetic shoes: when walking around at home and outside. **Diabetic shoes** that protect your feet and toes are better than house slippers or flip-flops. Make sure the shoes are the proper size and are not too tight around the ankle. A good suggestion is to have two pairs of shoes, one for outside the house and another for inside the house if you are concerned with dirtying the floor.
- Wear loose shoes: make sure your shoes fit properly and conform to your feet. In the winter wear fleece lined shoes or warm woolen socks.
- Diabetic socks: should be worn that are loose and seamless. Socks also should be changed on a daily basis.
- Sweaty feet: should be treated with moisture-removing socks and foot powder on a daily basis.

- Inspect shoes: before you put them on for any pebbles or other item in the shoes that you might not see before placing them on your feet.
- Examine your feet: daily on the top, bottom, and between the toes for possible areas of irritation and injury.
- No heat: to prevent risk of burns, do not use heating pads or hot water bottles. Use loose, warm bed socks instead.
- Corns and calluses: should be treated by your podiatrist. **DO NOT** use corn and callus removers or medicated corn pads as they can cause wounds in the skin.
- If problems are recognized: go to the Emergency Room or your podiatrist as soon as you notice any **redness, swelling, blistering, abrasions, pain, ingrown nails, corns or calluses that look infected.**
- Do not miss appointments: with your podiatrist or family physicians.
- Blood sugar: should be checked regularly along with regular checkups by your family physicians to evaluate your blood sugar.
- Check out *any* problems: because it is better to be cautious and reassured than to have a possible severe limb-threatening foot infection.

## OFFICE TREATMENT

There are many ways of managing foot wounds in the office, depending on the severity of the wound. It is always better to get treatment as soon as a wound is noticed. Delaying care only makes the wound worse and increases the risk of surgery and/or amputation. Treatments include:

- Tissue debridement: consists of using a medical instrument to remove hard skin and dead tissue from the wound. Ideally wounds should be the red color of beef to heal better.
- X-rays: are initially done in the office to determine if the wound has affected the underlying bone.
- Vascular tests: these can be obtained either in the office or hospital to determine blood flow to the feet and legs. Adequate blood flow is essential for healing.
- Oral antibiotics: are useful if there is redness of the skin or other signs of infection.

- Culture and biopsies: can be obtained in the office to determine if a wound is infected and to help guide the choice in antibiotics.
- Skin cream: helps keep non-ulcerated skin in good health with proper hydration. Typically individuals with diabetes have poor skin quality and dryness.
- Topical antibiotics: can be useful for mild wounds that may or may not need oral antibiotics as well.
- Wound dressings: there are a number of wound dressings that are specific for different types of wounds depending on if the wounds are wet, dry, draining or infected. These wound dressings help to decrease the healing time and the risk of infection.
- Wound VAC: is changed at home or in the office and uses vacuum pressure to remove wound draining that can delay healing.
- Off-loading: removing pressure from the wound can be accomplished in many ways including wheelchair, padding, surgical shoe, removable cast boot and casting. Removing weight from the wound is essential to quick healing.
- Opening the wound: is necessary to make sure there are no hidden areas of infection, pockets under the skin, or calluses that can harbor infection. All these areas need to be opened up to allow for quicker wound healing.
- Remove calluses: many times patients come in with large calluses which are dead skin on top of a wound. That skin needs to be removed to evaluate the wound underneath. If the skin remains it forms a pocket in which infection can harbor and make the wound worse.
- Stretching: of a tight Achilles tendon in the foot is helpful to decrease the pressure on the bottom of the foot. Stretching and physical therapy may help increase movement over joints that become stiff and do not allow the foot to adapt to the ground surface causing calluses and wounds on the bottom of the foot.
- Diabetic shoes: as necessary, for everyone who has had a foot wound or a callus that is at high risk of forming a wound. These shoes help disperse the weight over the bottom of the foot and diminish focal pressure from one area.
- Ankle Foot Orthoses: AFOs are utilized to help redistribute weight on the bottom of the foot.
- Custom orthotics: are many times beneficial to help disperse weight in individuals that do not have an active ulceration but have a mechanical instability and excess movement of the foot.

- Diabetic socks: should be worn that are loose and seamless. Socks also should be changed on a daily basis.

## HOSPITAL TREATMENT

Many times it is necessary to bring a patient to the hospital for aggressive treatment of wound infections. Here are some of the options specific to hospital care:

- Infectious disease: physicians can provide valuable input in recommending antibiotics through the vein based on culture and biopsy results.
- Vascular surgeons: can evaluate vascular exams obtained either in the office or in the hospital to determine circulation to the affected area of the foot and probability of healing. Also, circulation is necessary for antibiotics to reach the infection; if there is no blood flow, there is limited availability of antibiotics.
- Blood sugar: is strictly evaluated in the hospital. Many times people who take only oral blood sugar medication are transitioned to injectable medication to keep the level of blood sugar under control to help healing.
- Additional imaging: such as x-rays, MRI, CT scan and bone scans are all beneficial to determine the extent of soft tissue and bone involvement. Each is used for different purposes with foot wounds.
- Biopsy and cultures: can be obtained in the hospital as well as in the clinic. These can help guide antibiotic treatment.
- Surgical debridement: is necessary if the wound is infected and not responding to antibiotics quickly enough. Also, wounds that probe to bone typically have infected bone that needs to be removed along with damaged skin and tissue around the area. After removal of all infected bone and tissue and opening up of any pockets that can harbor infection, the wound is evaluated daily in the hospital.
- Achilles tendon: lengthening can help reduce the pressure on the front of the foot caused by a tight tendon.
- Exostectomy: can be helpful in removing bony prominences on the bottom of the foot that are prone to making foot wounds. It is useless to heal a wound only to have it open up again because of an underlying prominent piece of bone.
- Fusion: many times removal of joint spaces can help prevent recurrence of wounds on the bottom of the foot.

- Joint removal: can be beneficial if the underlying wound is located at a joint. The infected bone surrounding the wound is removed along with the joint. The only concern is that the wound may transfer to the adjacent bones if not properly supported with orthotics and diabetic shoes.
- Physical therapy: can help determine the best way to keep the weight off the wound while keeping the patient safe.
- Social workers: can determine if patients are safe and able to return home following their hospital stay or if they would benefit from services at a rehabilitation center for a period of time to receive more comprehensive medical care.

A foot wound that is brought into the hospital is a **medical emergency**. Surgery many times is necessary to open up the infected areas to allow the infection to drain. It is better to treat a foot infection and foot wound early while in the clinic rather than having to go to the hospital where there is a greater risk of surgery or even amputation.

The risk for recurrent foot wounds is increased after the first one is present. Also, the risk for amputation of a toe or even leg is greatly increased with the presence of a foot wound. Therefore, proper and timely recognition and treatment is necessary to preserve people's limbs.

## PREVENTATIVE CARE

As mentioned above in the Home Treatment sections, there are many methods to prevent recurrence of wounds. However, the most important aspect is early recognition and treatment. Seeing your family physician and podiatrist on a regular basis can be a good start toward recognizing foot ulceration risk factors. Remember, once one wound is healed, there is a greater likelihood of developing another one; therefore you should wear **diabetic socks and shoes** and **inspect your feet daily**. A little preventative care can prevent a foot amputation.

Also, if you have never had an ulcer, prevention is necessary. To keep your feet healthy it is best to keep **control of blood sugar, make frequent podiatry visits, use skin moisturizer, treat any fungal nail infections or athlete's foot, and wear diabetic shoes and socks**.

## VIDEO EXPLANATION

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## FREQUENTLY ASKED QUESTIONS

**Q: I have a large callus under my big toe; should I get it checked out if I have diabetes?**

A: Any callus should be evaluated if you have diabetes to make sure that your foot mechanics area is able to disperse the weight over the whole foot and not just one spot. Many times special shoes and orthotics will help diminish areas of increased pressure.

**Q: I have thick nails and calluses but am told treatment is not covered by my insurance even though I have diabetes.**

A: Medicare has developed treatment protocols for patients with diabetes for foot care. You either need to have a callus that can easily become an ulceration or be missing pulses or feeling in your feet. If these cannot be documented, you do not qualify for foot care. However, most doctors will accept private payment or if you do suspect a problem, you can always come in and it is a covered service.

**Q: I went to the doctor with a callus and left with a hole on the bottom of my foot; why?**

A: As mentioned above, the callus is hiding the true problem, just as a hat hides your hair. The problem is under the callus and it needs to be removed to find the severity of the wound. Even though between office visits it may look like the wound is healing, often it is only hard dead skin formation due to pressure on the foot. That needs to be removed or the space pocket can cause a worse infection.

**Q: My wound is not painful; why do I need to stay off it?**

A: A wound in a person with diabetes or neuropathy may not be painful because sensation is lacking in the foot. This can be verified in the office. If this is the case you do not have the "gift of feeling" and thus something that would be painful on your hand or arm is not painful. Because of that many people do not seek medical attention quickly or do not stay off their feet. That only makes the wound worse, more difficult to heal, and more prone to infection.

**Q: I just healed my wound; what should I do now?**

A: Healing a wound is the first of many steps to preventing further recurrence. First, frequent care by your podiatrist is essential to remove any calluses and examine for other symptoms of recurrence. Also, diabetic socks, shoes and inserts are necessary to relieve pressure from the bottom of the foot. Good foot hygiene is necessary as well.



## SHOE FITTING



### WHAT ARE THE DIFFERENT TYPES OF SHOES AVAILABLE?

The basic types available are sporting, casual and dress shoes. Of the sporting shoes, there are specific designs available for the following:

- Running
- Walking
- Combination (Cross trainers)
- Hiking
- Basketball
- Tennis
- Other sports specific.

Casual shoes are less sporty, but not quite dress. Dress shoes are purchased mainly for appearance, and often structure and function are overlooked. Of the sporting shoes, they are often characterized and used as follows:

- Neutral Shoe type: for people with a normal arch
- Cushioned Shoe type: for the high arched (Cavus) foot
- Structured or Posted Shoe type: good for the low arched foot (pronated or flat foot)

Shoes are also built on a Last. The last is the “footprint” of the shoe. Lasts come in Curved, Semi-curved or Straight design. Again, as a general rule, but less consistent as with structure, the last shapes are often matched with foot morphology: Curved for high arches, Semi-curved for regular feet and Straight for low arched feet.

## WHAT TYPE OF SHOE IS RIGHT FOR ME?

The shoe should be matched with a person's activity, as much as possible. The technology in today's shoes is geared towards the specific tasks or activities. The shoe should be comfortable while trying them on your feet and should be a good match for the shape and structure of the foot.

## HOW TO DETERMINE IF I'M IN THE WRONG SHOE?

Though it's true that shoes can be “broken in,” it's not recommended to rely on this process when purchasing a pair of shoes. Shoes should be comfortable out of the box. If you feel rubbing on the toes or feel as though the toes or the foot is being squeezed in any way, then the shoe is not a good match. Some rubbing on the back of the heel can be acceptable, but it should be avoided in the front of the foot. If someone has a large bunion, they may need to obtain shoes that do not have a large seam at the location of the bunion. If someone has hammertoes, that person may need a shoe with extra depth in the toe box.

## HOW TO PROPERLY FIT SHOES?

Clearly, this should start at a store that not only measures the foot, but knows how to measure the foot, and select the proper shoe for the individual. The most important thing to realize with shoe fitting is this: The fit of a shoe is all about perception, not necessarily reality.

From the time we are kids, we grow into our shoes and get used to the feeling of what a shoe should feel like on our feet. As we grow however, we grow into our shoes, and get used to the feeling of snugness. That feeling then becomes the new normal, and what we tend to seek when trying on shoes. Just because you have been a certain size for most of your life, doesn't mean you still are the same size. We get used things pretty easily, including shoes that are sometimes two sizes too small!

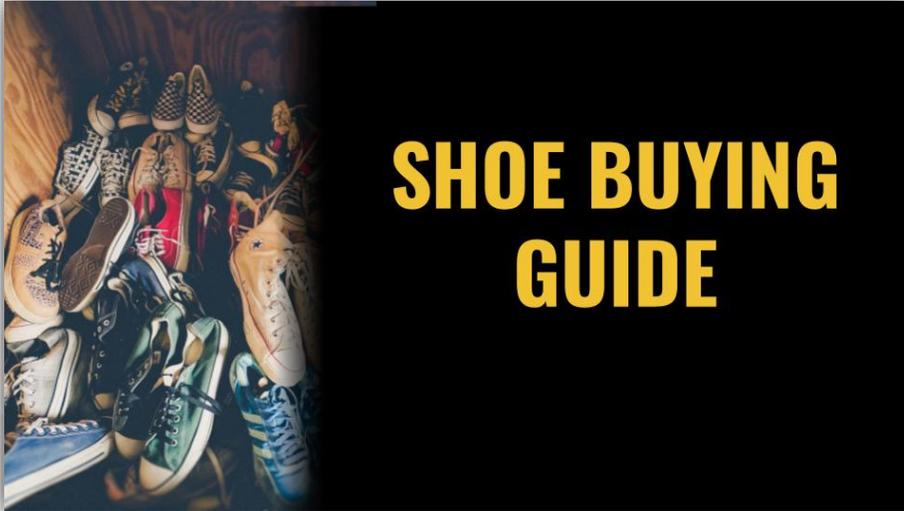
The feeling or sensation in our feet is sometimes the first to go, therefore you should NEVER just rely on how something feels. A good test is to remove the sock liner of the shoe and stand on it. Make sure that the foot fits within the confines of the liner. If it does fit, then you can rely on the fact that the shoe is properly sized. If the shoe you've been wearing happens to have been too small, then realize a properly fitting shoe will feel too big. It can take several weeks to change perceptions, and have it seem as though you are not walking out of the shoe. But proper fit is the most important part of shoe buying.

## LACING PATTERN CHANGES THAT CAN IMPROVE COMFORT

Laces are designed to help hold the shoe on the foot in a snug manner. Laces can be modified in a number of different ways to help relieve pressure off certain areas of the foot. When someone has a wide foot, bunion or arthritis of the big toe joint, skipping the 1<sup>st</sup> set up eyelets, and starting the lacing 1 to 2 loops from the bottom can be very helpful. If the foot is wide on the outside (Tailor's bunion), then the laces can begin in the 1<sup>st</sup> loop, then skip the next 2 loops on each side to allow that part of the shoe to spread as much as possible. Avoiding crisscrossing of the laces over a bony prominence on the top of the arch is extremely helpful as well. Ask your Podiatrist or shoe salesperson for advice if there are questions, though the web has many sites dedicated to alternate lacing patterns for shoes.

## VIDEO EXPLANATION

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## SHOE BUYERS GUIDE

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## FREQUENTLY ASKED QUESTIONS

### **Q: Does it matter where I buy my shoes?**

A: It could. If you have a history of foot problems or difficulty finding a proper shoe, then it is best to go to a specialty shoe store; one that will spend time with the customer, measure the foot and answer questions. Also, specialty stores as opposed to department stores and discount chains, have a more consistent inventory of newer shoes. Specialty stores won't have shoes that have been sitting on shelves for long periods of time (years sometimes) and ensure that the customer is getting a shoe that will meet up to the expectations of the manufacturer. Lastly, name brand companies such as New Balance, Asics will make lower quality shoes that can be made and sold for less money to discount stores, department stores and large chains.

### **Q: What time of day is best for shoe shopping?**

A: End of the day is typically best as the feet tend to be largest at the end of a normal day's activity.

### **Q: Should I consider minimalist shoes?**

A: Minimalist shoes are probably the fastest growing area of shoe design and change seen in many years. The idea is to try and mimic being barefoot as much as possible, assuming that barefoot is best. While this is true for many people, there are so many of us who have adapted to life with traditional footwear to a point where trying to live life "barefoot" style will be impossible without risking injury. If the comfort and desire is there, then the most important thing to do would be a slow adaptive process that allows the body to get used to the change.



## CONCLUSION

Thank you for showing interest in this publication. We hope that you found it informative and relevant to your foot condition. **This book is not meant to be a substitute for seeking medical advice nor is it to guide treatment.** However, we have found many patients like to be informed about treatment options for their particular condition and this book allows concise explanations of common treatment methods. As you know, medical advancements are changing daily and thus the information provided here is only an outline of some treatment options and is by no means comprehensive.

If you found this interesting or have any additional questions please contact us using the information below. Also, if you enjoyed this book, please pass it on to a friend who needs it just as much as you.

Dr. Donald Pelto is a board-certified podiatrist from Worcester, Massachusetts who enjoys educating his patients about foot problems. Dr. Pelto has other patient education information on his YouTube channel as well Thinkific courses. Dr. Pelto speaks Spanish and Portuguese.

## WANT TO LEARN MORE? HERE ARE SOME NEXT STEPS:

1. **Visit the office** - If you live in Massachusetts and want to see Dr. Pelto, call (508) 757-4003 or to book an appointment online visit <https://www.centralmasspodiatry.com>. His office address is 299 Lincoln Street, Suite 202 in Worcester, Massachusetts.
2. **Subscribe to Dr. Pelto's YouTube channel** at <https://www.youtube.com/user/DrPelt>
3. **Books from Dr. Pelto** - <https://drpelto.com/free-books-download>
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Sincerely,

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