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DIABETIC FEET

- What Does It Mean?
- What Must I Do?
- How Does Diabetes Affect My Feet?

What Does It Mean?

- 1. Make smart choices and changes
  - Proper Nutrition
    - Fruits and vegetables vs sugars and salty foods
    - Avoid soft drinks
    - Minimize carbohydrates
    - Consult with your primary care doctor
  - Exercises
    - Daily 20 minute exercises is better than exercising 1-2 hours in 1 day
    - Low impact exercises with proper shoe gear
      - Swimming, elliptical, stationary bicycle, walking
  - Sleep

Anyone With Diabetes Can Develop Nerve Damage, But These Factors Increase Your Risk:

- Blood sugar levels that are hard to manage
- Having diabetes for a long time, especially if your blood sugar is often higher than your target levels
- Being overweight
- Being older than 40 years
- Having high blood pressure
- Having high cholesterol
- Nerve damage, along with poor blood flow—another diabetes complication—puts you at risk for developing a foot ulcer (a sore or wound) that could get infected and not heal well. If an infection doesn't get better with treatment, your toe, foot, or part of your leg may need to be amputated (removed by surgery) to prevent the infection from spreading and to save your life.

Neuropathy

- Some people with nerve damage have numbness, tingling, or pain, but others have no symptoms. Nerve damage can also lower your ability to feel pain, heat, or cold.
  - Living without pain sounds pretty good, but it comes at a high cost. Pain is the body's way of telling you something is wrong so you can take care of yourself. If you don't feel pain in your feet, you may not notice a cut, blister, sore, or other problem. Small problems can become serious if they aren't treated early.

Preventing Further Nerve Damage

- What's the most important thing you can do to prevent nerve damage or stop it from getting worse? Keep your blood sugar in your target range as much as possible. Do not smoke. Smoking reduces blood flow to the feet.
  - Follow a healthy eating plan, including eating more fruits and vegetables and less sugar and salt.
  - Get physically active —10 to 20 minutes a day is better than an hour once a week.
  - Take medicines as prescribed by your doctor.

What Must I Do?

- See your doctor on a regular basis
- Examine your feet daily even if they feel fine
  - Small cuts that do no heal quickly can lead to infections and more serious problems
- Control you blood sugar well
- Wear good supportive, comfortable shoes that fit well.
- Stop smoking
  - Diabetes affects the blood flow. With smoking blood flow is further compromised
    - Lack of blood flow reduces chances of small wound from healing
- Collateral circulation building exercises (walking)

Recommendation for Walking to Improve Collateral Circulation

- Step 1: Warm up. Stretch your calf and thigh muscles in each leg for 20 to 30 seconds.
- Step 2: Start walking. Brisk walk for about 20 minutes
- Step 3: Stop and rest for 1-2 minutes.

Recommendation for Walking Continued

- Step 4: Cool down. Finish by walking slowly for 5 minutes. Then, stretch your calf and thigh muscles again for about 20-30 seconds each side

- Step 5: Stick with it. Aim to eventually do 50 minutes of walking, at least 3 to 5 times a week

Collateral Circulation Building Exercises

- Lay down on the floor
- Raise your feet 6 inches above the floor and hold for 20-30 seconds
- ~12" level
- ~18" level
- ~30" level
  - Repeat 10-12 repetitions 3-4 times a day at each level

Tips for Healthy Feet

- Check your feet every day for cuts, redness, swelling, sores, blisters, corns, calluses, or any other change to the skin or nails. Use a mirror if you can't see the bottom of your feet, or ask a family member to help.

- Wash your feet every day in warm (not hot) water. Don't soak your feet. Dry your feet completely and apply lotion to the top and bottom—but not between your toes, which could lead to infection.

- Never go barefoot. Always wear shoes and socks or slippers, even inside, to avoid injury. Check that there aren't any pebbles or other objects inside your shoes and that the lining is smooth.

- Wear shoes that fit well. For the best fit, try on new shoes at the end of the day when your feet tend to be largest. Break in your new shoes slowly—wear them for an hour or two a day at first until they're completely comfortable. Always wear socks with your shoes.

Additional Tips for Healthy Feet

- Trim your toenails straight across and gently smooth any sharp edges with a nail file. Have your foot doctor (podiatrist) trim your toenails if you can't see or reach your feet.
- Don't remove corns or calluses yourself, and especially don't use over-the-counter products to remove them—they could burn your skin.
- Get your feet checked at every health care visit. Also, visit your foot doctor every year (more often if you have nerve damage) for a complete exam, which will include checking for feeling and blood flow in your feet.
- Keep the blood flowing. Put your feet up when you're sitting, and wiggle your toes for a few minutes several times throughout the day.
- Choose feet-friendly activities like walking, riding a bike, or swimming. Check with your doctor about which activities are best for you and any you should avoid.

How Does Diabetes Affect My Feet?

- If you experience any of these symptoms, don't wait for your next appointment. See your regular doctor or foot doctor right away:
  - When to See Your Doctor

- Pain in your legs or cramping in your buttocks, thighs, or calves during physical activity.
- Tingling, burning, or pain in your feet.
- Loss of sense of touch or ability to feel heat or cold very well.
- A change in the shape of your feet over time.

How Does Diabetes Affect My Feet Continued

- Loss of hair on your toes, feet, and lower legs.
- Dry, cracked skin on your feet.
- A change in the color and temperature of your feet.
- Thickened, yellow toenails.
- Fungus infections such as athlete's foot between your toes.
- A blister, sore, ulcer, infected corn, or ingrown toenail.

Take Home Message

- Most people with diabetes can prevent serious foot complications. Regular care at home and going to all doctor's appointments are your best bet for preventing foot problems (and stopping small problems from becoming serious ones).

How Many Bones Do I Have In My Foot

Plantar Fasciitis and Heel Spurs

Heel Pain

Foot Anatomy: Plantar Fascia and Heel Spur

- A heel spur is a result of an abnormal pulling process created by the plantar fascia that stimulates calcium deposit causing a bone spur to develop over time on the underside of the heel bone.

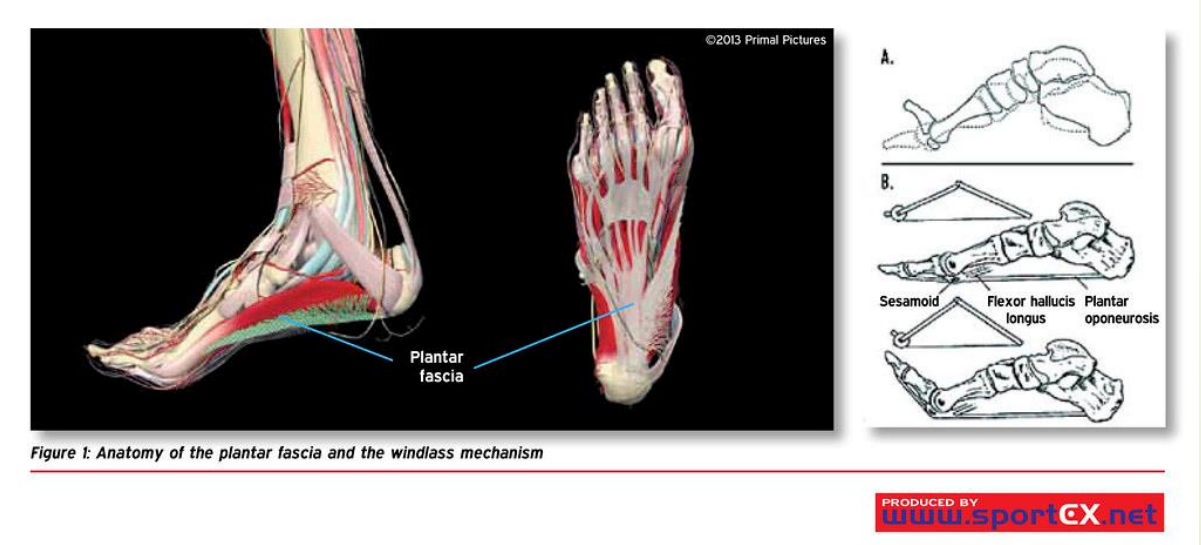

Figure 1: Anatomy of the plantar fascia and the windlass mechanism

Definition of Heel Spurs

- Calcium deposits build up on the underside of the heel bone, a process that usually occurs over a period of many months.
- Chronic strain on foot muscles and ligaments and repeated tearing of the membrane that covers the heel bone.
- 10% of population may experience heel pain in their life time

Heel Spur (X-ray)

- On an X-ray, a heel spur extends parallel to the pull of the plantar fascia.
  - Size of the spur varies on how long this process has been going on
    - Sooner this process is addressed better the outcome (Save time and money)

Heel Spur (Not the Culprit)

- In most instances it is not the heel spur that directly causes pain.
- Culprit:
  - Inflammation of the fibrous band of connective tissue (plantar fascia) that runs along the bottom of the foot that spans from the heel bone to the ball of the foot.
  - Microscopic tear along the plantar fascia.
  - Abnormal pulling process exerted on existing micro-tears in the plantar fascia triggers pain.

Symptoms of Heel Pain

- Heel spurs often cause no symptoms. But heel spurs can be associated with intermittent or chronic pain -- especially while walking, jogging, or running -- if inflammation develops at the point of the spur formation. In general, the cause of the pain is not the heel spur in and of itself but the soft-tissue injury associated with it.
- Many people describe plantar fasciitis pain:
  - Sharp knife or pin sticking into the bottom of their feet when they first stand up in the morning or getting up after sitting in one spot for long periods of time
  - Dull achy pain
  - Non-radiating
  - Worse at the end of the day

Risk Factors for Developing Heel Pain:

- Gait abnormalities (over pronation), which place excessive stress on the heel bone, ligaments, and nerves near the heel area. Tight lower extremity muscles
  - Hip, knee, or ankle issues causing uneven weight bearing to take place between left and right extremities (resolving this issue may alleviate heel pain)
- Running or jogging, especially on hard surfaces without proper cushioning and support.
- Poorly fitted or badly worn shoes, especially those lacking appropriate arch support (i.e. Weekend warriors going on long hikes).
- Excess weight and obesity. Body mass Index >27 kg/m^2

  1 pound of weight gain translates to 4 pounds of additional force going through our joints. Therefore 5 pound weight gain means additional 20 pounds of force every step.

Other Risk Factors Associated With Plantar Fasciitis Include:

- Age, which decreases plantar fascia flexibility and elasticity. Naturally thinning of the heel's protective fat pad
- Spending most of the day on one's feet
  - Cushioned mats may help
- Frequent short bursts of physical activity
  - Important to stretch before and after physical exercise
- Flat feet or high arches
  - Proper insoles or custom orthotics

Treatments for Heel Pain and Associated Conditions Include:

- Stretching exercises (use of towel and Thera-band)
- Pre-fabricated orthotics (lasts 6-9 months)
- Custom orthotics (5+ years)
- Anti-inflammatory medications (NSAIDs) Recommend for short duration
- Functional orthotic devices may help the causes of heel and arch pain by correcting biomechanical imbalances
- Cortisone injections. No more than 3-4 injection per foot/year
  - Corticosteroid may help relieve inflammation in the plantar heel area
  - 80% improvement in conjunction with orthotics. No more than 3-4 injections per foot/year
- If conservative treatments fail, surgery may be warranted (will address this option later)

Sample Shoe Insoles

Non-Surgical Treatments for Heel Pain

- The heel pain associated with heel spurs/plantar fasciitis may not respond well simply to resting. When you first take a step after a night's sleep, the pain may feel worse as the plantar fascia suddenly elongates, which stretches and pulls on the heel area. The sudden surge of pain after a night of rest is due to the increase in fluid which consists of healing components that congregate in attempt to promote healing. However, since 7-8 hours of sleep is not enough time for the complete healing to take effect the fluid accumulating contributes to the pain. The pain often decreases the more you walk because of the fluid being disbursed. But you may feel repeated recurrence of pain after either prolonged rest or extensive walking due to this vicious cycle. This is why stretching and strengthening exercises coupled with good shoes and inserts are very important.

Non-Surgical Treatments for Heel Pain

- If you have heel pain that persists for more than one month, consult a health care provider. They may recommend conservative treatments such as:
  - Stretching exercises 5/10/15 degrees stretching
    - Runner's stretch (Gastro-Soleus Muscles)
    - Hamstring stretch
  - Shoe recommendations: HOKAS, New Balance, Brooks, ECCOS
    - Shop for shoes at the end of the day
  - Taping or strapping to rest stressed muscles and tendons (YouTube "Low Dye" strapping)
  - Shoe inserts or orthotic devices (OTC devices such as Power Steps or Super Feet). Inserts have to be replaced approximately every 6-9 months

Sample Shoes

Non-Surgical Treatments for Heel Pain

- Physical therapy in many cases will help provide great outcomes
- Night splints and CAM (Controlled Ankle Motion) Boots
- Heel pain may respond to treatment with over-the-counter medications such as acetaminophen (Tylenol), ibuprofen (Advil), or naproxen (Aleve).
- RICE therapy. Rest, Ice, Compression, and Elevation
- Biofreeze
- Voltaren gel (Diclofenac)
- High heels
  - Decrease pulling tension on plantar fascia

Non-Surgical Treatments for Heel Spurs Continued

- Cold Laser Therapy (physical therapist may offer this option) Usually not covered by insurance
- Shock Wave Therapy
- Tenex procedure
  - Minimally invasive alternative to surgical intervention for plantar fasciitis and chronic heel pain. Ultrasound frequency delivered through a hollow needle to break up the scar tissue plantar fasciitis causes.

Is Surgery Necessary for Heel Spurs?

- More than 70-85 percent of patients improve with nonsurgical treatments. If conservative treatment fails to treat symptoms of heel spurs after a period of 9 to 12 months, surgery may be necessary to relieve pain and restore mobility.

Surgical Techniques Include:

- Pre-surgical tests or exams are required to identify optimal candidates
  - MRI
  - It is important to observe post-surgical recommendations concerning rest, ice, compression, elevation of the foot, and when to place weight on the operated foot.
- Release of plantar fascia
  - Endoscopic plantar fasciotomy
  - Conventional surgical release
- Removal of a spur
  - Not always necessary

Post-operative Care

- Surgical shoes vs CAM boot
- Knee scooter vs crutches vs cane
- Weight bearing as tolerated

Post-operative Complications

- Possible complications of heel surgery include:
  - Nerve pain
  - Recurrent heel pain
  - Permanent numbness of the area
  - Infection
  - Scarring
  - In addition, with plantar fascia release, there is risk of instability, foot cramps, stress fracture, and tendinitis. These are very rare.

Prevention of Heel Pain

- You can prevent heel spurs by wearing proper fitting shoes, rigid shanks, and supportive heel counters; choosing appropriate shoes for each physical activity; warming up and doing stretching exercises before and after each activity; and pacing yourself during the activities
- Avoid wearing shoes with excessive wear on the heels and soles. If you are overweight, losing weight may also help prevent heel pain
- Avoid walking barefooted especially on hard surfaces

Prevention of Heel Pain Continued

- Instead of having to limp out of bed every morning, your foot being the primary point of your body weight can start to feel better if proper precautions are taken. It's recommended to include lots of healthy fats into your diet.
- Omega 3 fats can be very effective in fighting inflammation in the body, fish and nuts are great sources of this.
- For instance, foods that contain Vitamin C, Vitamin A, lots of Calcium, Magnesium, and many more have been proven to reduce inflammation in the body which is usually created by trauma or in this case an illness.

Prevention of Heel Pain Continued

- Chronic magnesium deficiencies combined with Vitamin D deficiencies may contribute to issues leading to plantar fasciitis
  - If you're noticing pain in your foot/heel, it could due to lack of vitamin D in your diet. Vitamin D is a naturally occurring vitamin in foods like tuna, salmon, milk, eggs and fortified cereals, however, most people do not receive the amount required to maintain healthy bones. Ask you primary care doctor.

Prevention of Heel Pain

- Alpha-Lipoic Acid: Animal products like red meat and organ meats are great sources of alpha-lipoic acid, but plant foods like broccoli, tomatoes, spinach, and Brussels sprouts also contain it
- Turmeric Curcumin: It's a potent anti-inflammatory and antioxidant. It may also help improve symptoms of arthritis.
- Resveratrol: Helps with inflammation
- Magnesium daily. Bananas, spinach, cashews, almonds, seeds, avocados and more
- In addition to consuming nutrient rich foods, vitamin supplements can play an important role in reducing plantar fasciitis pain. Please discuss with you primary care doctor.

Enjoy Life: Exercise Daily

- Most likely the benefits of daily walks and exercises will out weigh the possibility of heel pain getting worse.
- Wear good comfortable shoes and inserts
- Daily stretching exercises.
- RICE therapy
- Swimming, cycling, elliptical (low impact exercises-consult your doctor)

Avoiding Possible Injuries

- Know how many steps you have in your staircase
  - Count down as you descend
  - Turn on your light switch, especially when going downstairs for midnight snack
  - Always wear properly fitting shoes (do not walk barefoot outside)
  - Enjoy the rest of your day with your family and friends and God bless you

Don’t Wait

- Visit your foot/ankle specialist if you have any concerns regarding your feet

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- Thank you very much.