30 Common & Not So Common Foot Pathologies, Conditions & Observations

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Pedorthics is the design, manufacture, modification and/or fit of footwear, including shoes, orthoses and foot devices, to prevent or alleviate foot problems caused by disease, congenital defect, overuse or injury.

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30 Common Foot Pathologies
- Question
- Answer
- Etiology (Cause)
- Epidemiology (Incidence)
- Symptoms
- Effects on gait

Your patient is a 40 year old male. He complains of pain in the left heel when walking or running. You observe that the tendon is painful to touch and the skin over the tendon is swollen and warm. You suspect:

A. Peritendonitis
B. Plantar Fasciitis
C. Heel Spurs
D. Sever’s Disease

Achilles Tendonitis
AKA
- Peritendonitis
- Insertional Achilles Tendonitis
- Non-insertional Achilles Tendonitis

- Achilles tendon can become inflamed, most commonly as a result of overuse or arthritis, although inflammation can also be associated with trauma and infection

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Achilles Tendonitis
- More common in patients over age 35
Achilles Tendonitis: Symptoms

- Pain in the affected heel when walking or running
- The tendon is usually painful to touch and the skin over the tendon may be swollen and warm

Achilles Tendonitis: Symptoms

- Achilles tendonitis may predispose the patient to achilles rupture
- Patients who experience this usually describe the injury as a sharp pain, like someone hit them in the back of the heel with a stick

Achilles Tendonitis: Effects On Gait

- Decreased propulsion in toe-off on affected side
- Pain on heel strike

Hallux Valgus is most often associated with what pathology?

A. Callouses
B. Bunions
C. Diabetes
D. Arthritis

Bunions / Hallux Valgus

- The condition may become painful as extra bone and a fluid-filled bursa grow where the base of the Hallux meets the foot and the overlying skin

Bunions / Hallux Valgus

- Associated with Hallux Valgus. Estimated as the third most common foot problem in the United States

Bunions: Symptoms

- Reddened skin over the base of the great toe. Pain over the joint where the great toe joins the foot (MTP joint), aggravated by pressure from shoes
Bunions: Effects on Gait

- Overpronation due to 1st ray instability
- Degraded toe-off

Your patient is a 6 year old female. Upon examination you notice excess calcaneal eversion during the contact phase of gait followed by slap-foot gait from heel-strike to foot-flat. You suspect:

A. Cerebral Palsy
B. Charcot-Marie-Tooth
C. Calcaneovalgus
D. None of the above.

Calcaneovalgus

AKA
- Congenital Flat Foot,
- Talipes
- Calcaneovalgus
- Congenital Calcaneovalgus

- A congenital deformity of the foot characterized by extreme dorsiflexion
- It may be a uni- or bilateral finding

The prognosis for talipes calcaneovalgus is usually very good

Calcaneovalgus: Symptoms

- The foot is pointing upwards and outwards

Calcaneovalgus: Effects on Gait

- Excess calcaneal eversion during the contact phase of gait
- Slap-foot gait from heel-strike to foot-flat

Your patient is an 80 year old non-diabetic male. He states that he has Charcot-Marie-Tooth disease. You observe that he has a foot deformity typical to CMT. How would you best describe it?

A. Pes Planus
B. Severe Pronation
C. Severe Supination
D. Ankle rigidity
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Charcot-Marie-Tooth Disease
- CMT patients slowly lose normal use of their feet/legs and hands/arms as nerves to the extremities degenerate  
- The muscles in the extremities become weakened because of the loss of stimulation by the affected nerves

Charcot-Marie-Tooth Disease
- Additionally, there is a loss of sensory nerve function  
- Unlike muscular dystrophy in which the defect is in the muscles, CMT is a disorder in which the defect is in the nerves that control the muscles

CMT: Symptoms
- A high arched foot is one of the first signs of this disorder  
- As the disease progresses, structural foot deformities take place  
- The patient develops a pes cavus foot with hammer toes  
- Foot drop and ankle sprains are frequent manifestations

CMT: Symptoms
- The progressive muscle wasting leads to problems with walking, running, and balance  
- To avoid tripping, patients with foot drop raise their knees unusually high resulting in high steppage gait  
- In some patients, muscle weakness may also occur in the upper legs

CMT: Effects on Gait
- High Steppage gait  
- Loss of balance

Upon patient examination, you observe areas of white moist skin between the fourth and fifth toes. This is most likely:

A. Clavus mollis  
B. Heloma molle  
C. Soft Corn  
D. All of the above.

Clavus mollis
AKA
- Soft Corns  
- Heloma molle  
- Interdigital Corns
**Clavus mollis**
- Caused by pressure from a bony prominence on the next toe, they are often brought on by shoes that squeeze the toes together.

**Clavus mollis: Symptoms**
- Soft corns are areas of white moist skin between the toes.
- They most commonly occur between the fourth and fifth toes.

**Clavus mollis: Symptoms**
- They can be very painful and if not treated can form small ulcerations or sinus tracts that can become infected.

**Clavus mollis: Effects on Gait**
- Pain can substantially affect gait.

**A hard corns are also known as ____**.
- A. Dorsal Callouses
- B. Interdigital Corns
- C. Heloma durum
- D. All of the above.

**Clavus durus**
- AKA
  - Hard Corn
  - Heloma durum

**Clavus durus**
- Corns are thickened layers of skin caused by repeated pressure or friction.
- They are well circumscribed and have a central conical keratin core.

**Clavus durus: Symptoms**
- Typical sites include the dorsolateral aspect of fifth toe and the dorsum of interphalangeal joints of lateral toes.
Clavus durus: Symptoms
• They tend to develop over a bony prominence
• Thick
• Hardened
• May be flaky and dry

Clavus durus: Effects on Gait
• An abnormal gait pattern is a common cause of corns

Your patient is a 12 year old female with cerebral palsy. The patient "toe walks". You observe a bouncy gait with early heel lift. Upon examination, you find that the foot is unable to fully dorsiflex against the ground. This condition is called:
A. Equinus
B. Sciatica
C. Pes Cavus
D. Kohler’s Disease

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B. Sciatica
C. Pes Cavus
D. Kohler’s Disease

Equinus: Symptoms
• Less than 10° of available dorsiflexion at the ankle joint, when the Subtalar joint is in its neutral position and the midtarsal joint is fully locked.

Equinus: Effects on Gait
• Typically this is seen in patients that tend to walk more on their toes, or have a bouncy gait
• If the foot is unable to fully dorsiflex against the ground there may be early heel off giving this bouncy gait pattern

Your patient is a 22 year old diabetic female. She complains of pinpoint pain and swelling localized to the 2nd metatarsal head. She states that pain increases with weight bearing and typically becomes worse with the duration of time spent on the feet. Upon examination, you observe limited ability to flex the 2nd toe. You suspect:
A. Diabetic Neuropathy
B. Freiberg’s Infraction
C. Morton’s Neuroma
D. Charcot-Marie-Tooth Disease
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Freiberg's Infraction

AKA
- avascular necrosis
- AVN

Freiberg's Infraction:
- A condition specific to the lesser metatarsal heads, most commonly the second metatarsal
- This condition results in a focal loss of blood supply to the metatarsal head

Freiberg's Infraction: Symptoms

- Freiberg's Infraction is most commonly seen in women and has an onset during the second decade of life
- Pain and swelling localized to the metatarsal head are the most specific symptoms

Freiberg's Infraction: Symptoms

- Pain may be increased with weight bearing and typically becomes worse with the duration of time spent on the feet
- Patients may have only pinpoint tenderness or may have difficulty walking
- Limited ability to bend the toe

Freiberg's Infraction: Effects on Gait

- Pain may be increased with weight bearing or may have difficulty walking
- Need to reduce pressure off the 2nd Met head

_____ is a condition of pain and discomfort on the posterior aspect of the heel at the area of the insertion of the Achilles tendon.

A. Haglund’s Deformity
B. Haglund’s Syndrome
C. Pump Bump
D. All of the above.

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Haglund’s Syndrome

AKA
- Haglund’s Heel
- Haglund’s Syndrome
- Pump Bump
Haglund's Syndrome
• The friction may cause an inflamed bursa known as an Achilles Bursitis
• The typical patient with Haglund’s Deformity that is symptomatic is usually a female who wears high-heeled shoes

Haglund's Syndrome: Symptoms
• A noticeably enlarged bone prominence on the back of the heel, commonly seen at the area where the Achilles tendon attaches

Haglund's Syndrome: Symptoms
• The bump may be painful especially when tight shoes are worn against the area.
• It may be red and swollen,
• It may form a bursa which can become inflamed

Haglund's Syndrome: Effects on Gait
• Pain on heel strike and toe off

Kohler's Disease
• Kohler's disease is a condition, where the navicular bone in the foot undergoes avascular necrosis.
• For some unknown reason, typically in a child, the navicular bone in the foot loses its blood supply for a while

Kohler's Disease
• The affected foot usually has typical findings of a dense flattened navicular bone, compared to the normal foot
• Can be unilateral or bilateral

Kohler's Disease: Symptoms
• Usually male approximately 5 yrs old
• Pain at the apex of the medial longitudinal arch

Kohler's Disease
• Kohler’s disease is a condition, where the navicular bone in the foot undergoes avascular necrosis.

A. Haglund’s Syndrome
B. Tarsal Coalition
C. Freiberg’s Infraction
D. Kohler’s disease

A. Haglund’s Syndrome
B. Tarsal Coalition
C. Freiberg’s Infraction
D. Kohler’s disease

Kohler's Disease: Symptoms
• Usually male approximately 5 yrs old
• Pain at the apex of the medial longitudinal arch
Kohler's Disease: Symptoms

- Talonavicular joint is tender
- Some swelling may be evident

Kohler's Disease: Effects on Gait

- Pain on weightbearing and antalgic gait

Metatarsalgia is a general term used to denote a painful foot condition in the metatarsal region of the foot. Metatarsalgia is often ____.

A. located under the 1st Metatarsal Head
B. located under the 2nd, 3rd and 4th Metatarsal Heads
C. diagnosed in patients with rheumatoid arthritis
D. All of the above.

Metatarsalgia: Symptoms

- Diagnosis is common for patients with rheumatoid arthritis
- Discomfort in the planter aspect of the metatarsal area caused by a variety of disorders

Metatarsalgia: Effects on Gait

- Person tries to avoid pain associated with the ambulation
- Often quick, short and soft foot steps

Your patient is an 18 year old female. She complains of a burning sensation on the dorsal aspect of her foot between the third and fourth digits. Upon examination you find that she wears tight fitting footwear and works as a cashier. You suspect:

A. Plantar Fasciitis
B. Morton's Neuroma
C. Metatarsalgia
D. Sesamoiditis
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Morton's Neuroma

AKA: Interdigital Neuroma

• When two bones repeatedly rub together, it will usually cause the outer coating of a nerve in your foot to swell which is called a neuroma or a Morton’s neuroma.

• It is most commonly affected between the metatarsal heads of the third and fourth toe.

The exact etiology of Morton’s Neuroma is still somewhat unclear, however, there are a number of precipitation factors that can cause a localized irritation to the nerve and thus may contribute to the development of a neuroma. These precipitating factors are:

FOOTGEAR: Any shoe that is high-heeled or is constricting may place the individual at higher risk for developing a neuroma. Morton’s Neuroma are commonly found in women who have worn high heeled shoes for many years or men who’s occupation require excessive stress of the forefoot such as kneeling or climbing ladders or are required to wear constricting shoe gear.

BIOMECHANICAL ABNORMALITIES: An unstable (pronated) foot can predispose the foot to the development of a neuroma. The excessive pulling on the common digital nerve against the deep transverse intermetatarsal ligament results in irritation and eventually the development of the neuroma.

TRAUMA: Repetitive trauma that results from certain activities such as basketball, tennis, aerobics, running, etc., may precipitate the development of a neuroma. Trauma resulting from an injury such as fractures, sprains, dislocations, and crushing injuries may cause a neuroma.

Almost 90% of all Neuroma’s are found in females between the ages of 18 - 85 year old. Single Neuroma’s are most common, however, instances of multiple neuromas in the same foot have been reported.

The pain from the neuroma may start gradually but may become a severe and persistent pain. Burning, cramping, or aching sensation but may cause tingling or numbness. Usually occurs after walking or standing on your feet for a long period of time.
Morton's Neuroma: Symptoms

- Commonly found in people who wear tight-fitting shoes
- Pain is usually relieved by removing the shoe and massaging the affected area

Morton's Neuroma: Effects on Gait

- Person tries to avoid pain associated with the ambulation
- Often quick, short and soft foot steps

___ is a common forefoot disorder where the second digit is longer than the Hallux.

A. Oblique Forefoot
B. Marie's Disease
C. Digitorum Longus
D. Morton's Toe

Morton's Toe

- Morton's toe is a common forefoot disorder where the second toe is longer than the Hallux

Morton's Toe: Symptoms

- Pain similar to the discomfort associated with metatarsalgia
- Callus formation under the second metatarsal head

Morton's Toe: Effects on Gait

- Protective gait to avoid pressure and pain
Plantar Warts

- AKA Verruca Wart
- Plantar warts are hyperkeratotic lesions on the plantar surface
- They tend to develop over areas of pressure such as the heel and ball of the foot

Plantar Warts

- Plantar warts are endophytic (i.e., they grow into the deeper layers of skin because of pressure)
- Although they are generally self-limited, plantar warts should be treated to lessen symptomatology, decrease duration, and reduce transmission.

Plantar Warts

- Plantar warts are caused by direct exposure of HPV to the epidermis.
- This occurs through breaks in the stratum corneum of the epidermis. Such exposure frequently is associated with using public showers

Plantar Warts

- Plantar warts are widespread; 7-10% of the population have warts
- Commonly found in patients who have warts elsewhere or who have a history of previous warts

Plantar Warts

- Plantar warts affect females slightly more often than males
- Plantar warts may occur at any age, although they are more common in children and teenagers

Plantar Warts

- Plantar warts may cause pain, particularly when walking.
- They may spread to other sites but not to histologically dissimilar areas (i.e., plantar warts do not spread to genitalia).
- Most resolve spontaneously.
- Firm, hyperkeratotic lesions

Plantar Warts: Symptoms

- Smooth surface with a gray-yellow color
- Usually occur over areas of pressure or bony prominence such as the heel and ball of the foot
- Usually flat because of pressure
- Several warts may fuse to form mosaic warts

Plantar Warts: Symptoms

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A. are contagious.
B. can spread to genitalia
C. never resolve without treatment
D. All of the above.

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B. can spread to genitalia
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D. All of the above.
Plantar Warts: Effects on Gait

- Person tries to avoid pain associated with the ambulation.
- Often quick, short and soft foot steps.
- Resembles stepping on a stone in the shoe.

"Too many toes" sign may be an indication of _____.
A. adult acquired flatfoot
B. severe pronation
C. posterior tibialis dysfunction
D. All of the above.

Posterior Tibial Dysfunction

- AKA Acquired Flatfoot / Too Many Toes
- A damaged posterior tibial can be caused by trauma, a degenerative tear (simple deterioration over time), muscle dysfunction or tenosynovitis (inflammation of the tendon).

Posterior Tibial Dysfunction: Symptoms

- Mainly affects women over 40 years of age.
- Pain and swelling at the inner ankle when weight is put on the foot.
- Too Many Toes Sign

- There will also be tenderness of the tendon itself.
- Patients will usually have trouble walking on their tiptoes.

Posterior Tibial Dysfunction: Effects on Gait

- The mid tarsal joint becomes locked and the subtalar joint pronates.
- There will also be increase abduction of the forefoot in stance phase.

Your patient is an eleven year old male. He complains of heel pain on exercise, especially running and jumping. He states that the pain is often worse before and after activity and increased on deceleration or when landing from a jump. You observe that the patient is tip-toeing and limping.

After a complete exam and assessment you suspect ____.
A. Reiter's Syndrome
B. Kohler's Disease
C. Sever's Disease
D. Haglund's Deformity
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B. Kohler’s Disease  
C. Sever’s Disease  
D. Haglund's Deformity

Sever’s Disease

• AKA Calcaneal Apophysitis

Sever’s disease is a traction apophysitis of the Achilles tendon insertion at the calcaneus.

• It is the most common cause of heel pain in the growing athlete and the second most common osteochondroses of both sexes.

Sever’s Disease: Symptoms

• The condition occurs in both sexes usually between the age of 8 and 12 years and resolves upon cessation of growth.

• Patients suffering from Sever’s disease complain of heel pain on exercise, especially running and jumping.

Sever’s Disease: Effects on Gait

• Patient may be tip toeing or limping

Your patient is a 15 year old male complaining of chronic hind foot pain and peroneal spasm. Upon examination you observe rigid flat feet, and a rigid talocalcaneal joint. The patient walks with quick, short and soft foot steps. You suspect:

A. Calcaneal Apophysitis  
B. Metatarsalgia  
C. Tarsal Coalition  
D. None of the above.

Tarsal Coalition

• AKA Tarsal Union, Tarsal fusion

• Calcaneous Talar fusion

• Calcaneous Navicular fusion

• Cartilaginous coalition begins to ossify with resultant loss of inversion and eversion.

Tarsal Coalition

• Ossification generally occurs between 8–12 years of age for calcaneonavicular coalition

• 12–16 years of age for talocalcaneal coalition.

• The condition may be uni- or bilateral, is often familial
Your patient is a 47 year old female. The patient complains of numbness over the bottom of the foot, as well as pain, burning, and tingling over the base of the foot and heel. You suspect:

A. Exostosis
B. Plantar Fasciitis
C. Charcot-Marie-Tooth
D. Tarsal Tunnel Syndrome

Tarsal Tunnel

• AKA Posterior tibial nerve entrapment
• The tarsal tunnel is a structure in the foot formed between bones of the foot and overlying fibrous tissue.

Tarsal Tunnel Syndrome results when the posterior tibial nerve is compressed within the tarsal tunnel.

Tarsal Tunnel: Symptoms

• Affects patients 14 - 80 with an average onset of 47
• Slight female preponderance
• Flat feet, cyst or trauma
• Pain, burning, and tingling on the sole of the foot
• This pain can usually be relieved by rest, elevation, or massage
• Usually worsens as the day progresses

Tarsal Tunnel: Effects on Gait

• Person tries to avoid pain associated with the ambulation.
• Often quick, short and soft foot steps

Your patient complains of numbness over the bottom of the foot, as well as pain, burning, and tingling over the base of the foot and heel. The patient has a history of trauma to the medial malleolus. You suspect:

A. Exostosis
B. Plantar Fasciitis
C. Charcot-Marie-Tooth
D. Tarsal Tunnel Syndrome

Tarsal Coalition: Symptoms

• Pain upon standing or with prolonged activity

Tarsal Coalition: Effects on Gait

• Person tries to avoid pain associated with the ambulation.
• Often quick, short and soft foot steps
Tarsal Tunnel: Effects on Gait
• Person tries to avoid pain associated with the ambulation
• Often quick, short and soft foot steps

Turf toe is ____.
A. a torsion injury to the 5th digit
B. rupture of the hallux longus extensor
C. hyperextension of the 1st MTPJ
D. fracture of the hallux

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Turf Toe
• Turf toe is an injury to the joint capsule and ligaments that connect the foot to the Hallux.
• Hyperextension of the 1st metatarsal phalangeal joint.
• Traumatic hyperextension of 1st MTPJ.

Turf Toe: Symptoms
• Pain and tenderness in the ball of the foot and the big toe
• Swelling and bruising of the ball of the foot and the big toe

Turf Toe: Symptoms
• Inability to bear weight on the ball of the injured foot
• Inability to push off on the big toe
• Reduced range of motion in the big toe

Turf Toe: Effects on Gait
• Varies from an inability to bear weight to an antalgic gait followed by beer drinking and swearing

Plantar Fasciitis is may be caused by:
A. Heel spur
B. Obesity
C. Overuse
D. All of the above

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A. Heel spur
B. Obesity
C. Overuse
D. All of the above
Plantar Fasciitis
• Plantar Fasciitis, an irritation and swelling with presence of extra immune cells of the fascia on the plantar surface of the foot.

Plantar Fasciitis
• Some risk factors for development of this problem include a cavus arch, a planus arch, obesity, sudden weight gain, running and a tight Achilles tendon.

Plantar Fasciitis
• Plantar fasciitis is commonly thought of as being caused by a heel spur, but research has found that this is not the case. On X-ray, heel spurs are seen commonly both in people with and without plantar fasciitis.

Plantar Fasciitis: Symptoms
• Characteristic: dull tooth-ache or burning pain
• Stiffness may also be present
• Pain Location: Posterior and medial aspect of heel
• Medial tubercle of calcaneus
• Medial longitudinal arch
• Both heels often affected
• Pain worse with first few steps in morning
• Pain may be worse at days end in severe cases
• Pain worse with first steps of run
• Pain worse with prolonged standing (weight bearing)

Plantar Fasciitis: Effects on Gait
• Person tries to avoid pain associated with the ambulation.
• Often quick, short and soft foot steps.
• Painful first step in the morning

Plantar Fasciitis: Symptoms
• Person tries to avoid pain associated with the ambulation.
• Often quick, short and soft foot steps.
• Painful first step in the morning

Heel Spurs
• Heel Spurs or heel spur syndrome are most often the result of stress on the muscles and fascia of the foot.
• This stress may form a spur on the bottom of the heel.
• While many spurs are painless others may produce chronic pain.

Heel Spurs: Symptoms
• Bony heel growth
• Foot pain
• Heel pain
• Heel pain when walking
• Heel pain under weight bearing

Heel Spurs
• Heel Spurs are most often the result of:
  A. Stress on the muscles and fascia
  B. Increased intake of calcium
  C. Diabetes
  D. All of the above
Heel Spurs: Effects on Gait

- Pain throughout the stance phase of the gait cycle
- Painful first step in the morning

Your patient is a 19 year old male. His diagnosis is "Acute Ankle Sprain". Upon examination you notice moderate pain and swelling, mild to moderate ecchymosis, tenderness over involved structures, some loss of motion and function and mild to moderate instability. How would you classify this sprain?

A. Class I
B. Class II
C. Class III
D. Class IV

Acute Ankle Sprain

- Acute trauma or injury usually results in an acute ankle sprain, a lateral twisting of the ankle that can cause ankle pain and cause damage to the stabilizing ligaments of the lateral ankle.

Acute Ankle Sprain

- Ankle sprains remain one of the most frequent injuries in sports, comprising 45% of all sports injuries. The recurrence rate after an Ankle Sprain has been estimated to be as high as 80%.

Acute Ankle Sprain: Symptoms

**Class I:** Partial tear of a ligament
- Mild tenderness and swelling
- Slight or no functional loss
- No mechanical instability

**Class II:** Incomplete tear of a ligament, with moderate functional impairment
- Moderate pain and swelling
- Mild to moderate ecchymosis
- Tenderness over involved structures
- Some loss of motion and function
- Mild to moderate instability

**Class III:** Complete tear and loss of integrity of a ligament
- Severe swelling
- Severe ecchymosis
- Loss of function and motion
- Mechanical instability

Acute Ankle Sprain: Effects on Gait

- Varies from ability to bear weight and ambulate with minimal pain to total loss of ambulation
Your patient is a 63 year old female 6 months post ankle arthrodesis surgery. During gait you notice:

A. Increased sagittal ROM
B. Difficult toe clearance in the swing phase
C. Increased stride length
D. All of the above

Ankle Arthrodesis

• Arthrodesis procedures are the removal of cartilage and any diseased bone from a joint to produce a fusion of at least two bones to create one bone.
• This removal of cartilage exposes the underlying bone on both sides of the joint.
• These joint surfaces are then compressed together with some form of fixation to create the fusion.

Ankle Arthrodesis: Symptoms

• Post Arthrodesis Surgery
• Decreased Sagittal ROM
• Decreased Plantarflexion at toe off
• Decreased stride length
• Hyperextension of the knee after foot-flat is achieved as the body moves forward without compensatory ankle dorsiflexion resulting in excess strain on the knee

Ankle Arthrodesis: Effects on Gait

• Early heel-off, with prolonged weight bearing in the forefoot and associated pain of the metatarsals
• Difficult toe clearance in the swing phase, resulting in toe drag, compensatory increased hip and knee flexion, or circunduction of the lower limb

Ankle Arthrodesis: Shoes

• Elevations for leg length discrepancy

Ankle Arthrodesis: Shoes

• claw
• hammer
• mallet
• turf

__ toe is a contracture of MTP joint, dorsiflexed PIP, and plantarflexed MTP.
A claw toe is a contracture of MTP joint, dorsiflexed PIP, and plantarflexed MTP.

Claw, Hammer & Mallet Toe

- Claw toe can be congenital or acquired.
- Claw toes may result from a problem with the peripheral nerves in the leg or from a spinal cord problem.
- Many cases have an unknown cause.
- Claw toes in and of themselves are not usually dangerous, but sometimes they are the first symptoms of a more serious disease of the nervous system.
- Claw toe is a dorsiflexed PIP, flexed MTP, and flexed DIP.

Hammer toe

- Hammer toe is a deformity of the toe in which the end of the toe is bent downward.
- Hammer toe usually affects the second toe, although it can also affect the other toes.
- The toe assumes a claw-like position.
- The condition may occur as a result of pressure from a bunion.
- A high arch may also develop.
- Hammer toe is a contracture of MTP joint, dorsiflexed PIP, and plantarflexed MTP.

Mallet toe

- Mallet toe occurs when the joint at the end of the toe cannot straighten up.
- The tip of the toe is often turned down against the shoe causing pressure and discomfort.
- Development of mallet toe is often caused by bone and muscle imbalances.
- People who are constantly on their feet or participate in athletic activities are more likely to develop mallet toe.
- Mallet toe is a variation of hammer toe in which DIP is plantarflexed.

Claw, Hammer & Mallet Toe: Symptoms

Besides pain and an obvious deformity to the toe, symptoms may include:

- Changes in gait and balance
- Redness and swelling on and around the affected toe
- Corns or calluses where the toe bends and rubs
- An infection may develop
- Ulcers sometimes develop in patients with diabetes, who have decreased sensitivity in the foot

Claw, Hammer & Mallet Toe: Effects on Gait

Motion of the foot inside the shoe during gait can also cause intermittent, repetitive crowding of toes with painful gait.

Early symptoms of a diabetic foot ulcer include:

A. drainage
B. pain
C. blistering
D. infection

Early symptoms of a diabetic foot ulcer include:

A. drainage
B. pain
C. blistering
D. infection
Diabetic Ulcers
• Microvascular disease is a significant problem for diabetics and can lead to ulcerations.
• It is well known that diabetes is called a small vessel disease.

Diabetic Ulcers
• Diabetics are prone to foot ulcerations due to both neurologic and vascular complications.
• It is critical that diabetics maintain close control on their glucose level, maintain a good body weight and avoid smoking in an attempt to reduce the onset of small vessel disease.

Diabetic Ulcers: Symptoms
• Early symptoms of a diabetic foot ulcer include redness of the skin, blistering, and other signs of irritation.
• In later stages, the person may have an open wound that drains fluid onto socks or bedding.
• The open wound can then become infected and develop swelling, redness, and drainage of pus.
• The person may have a fever, and blood sugar levels may be higher than usual.

Diabetic Ulcers: Effects on Gait
• Shorter stride with wider stance

Diabetic Ulcers: Shoes
• Long medial counters to control the heel and medial arch and decrease shear
• Blucher openings to allow easy entry into the shoe
• Shock-absorbing soles to reduce impact shock
• Low heels to decrease pressure on the metatarsal heads and the toes and decrease shear.

An appropriate rocker sole may be prescribed to help reduce overall pressure and impact shock, limit motion of the joints, and improve the transfer of weight.
• Extended steel shank may be added to enhance the effects of the rocker sole.

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Your patient is a 48 year old male. The patient's foot “spins” in the toe off phase of gait. Upon examination you notice smooth skin under the 1st met head and callusing under the 2nd through 5th. You suspect:
A. Calcaneal Eversion
B. Hallux Rigidus
C. Morton's Toe
D. Achilles Tendonitis

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Hallux Limitus/Rigidus
• Hallux Limitus is diminished motion in the first metatarsophalangeal (MTP) joint
• Hallux rigidus is a continuation of the Hallux Limitus deformity.
• Both are often due to traumatic arthritis of first metatarsophalangeal joint. Motion ceases to occur in the joint, the first ray becomes fixed or rigid.
Hallux Limitus/Rigidus

- Hallux Limitus can also result from trauma or bunion surgery in which the first metatarsal is elevated during an osteotomy.
- Occurs secondary to repeated dorsiflexion stress.
- Results in restricted range of motion of great toe.

Hallux Limitus/Rigidus: Symptoms

- Gradually increasing great toe pain and stiffness
- Precipitated by minor injury
- Provocative Ambulation / Dorsiflexion
- Smooth skin condition under the 1st met heads. This is an indication of hallux Rigidus / Limitus

Hallux Limitus/Rigidus: Effects on Gait

- Spinning of the foot in the toe off phase of gait.

The best way to detect limb length discrepancy is:

A. X-Ray
B. CT Scan
C. Measuring Tape
D. Physical Exam

Limb Length Discrepancy

- A limb length discrepancy may be due to a normal variation
- Differences of 3 1/2 to 4 percent of the total length of the lower extremity (4 cm or 1 2/3 inches in an average adult), including the thigh, lower leg and foot, may cause noticeable abnormalities while walking and require more effort to walk.
- Common with total hip arthroplasty 27-50% of cases.
- 32% of general population has minimal LLD.

Limb Length Discrepancy: Symptoms

- Neck pain
- Change in structure of the lumbar vertebrae
- Sciatica
- Arthritis of hip or knee
- Patellar tendonitis
- Shin splints

Limb Length Discrepancy: Effects on Gait

- A patient with a significant shortening of one leg will walk with an apparent lateral lurch to the affected side - somewhat like a Trendelenburg gait.
- However, if you watch his head, it bobs down during stance phase on the short leg, whereas in a Trendelenburg or coxalgic gait the head merely sways laterally

Your patient is a 26 year old female. She complains of pain focused under the great toe on the ball of the foot. Upon examination you find no swelling. There is difficulty flexing the Hallux. You suspect:

A. Turf Toe
B. Morton’s Toe
C. Kohler’s Disease
D. Sesamoiditis
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**Sesamoiditis**

- With a first-ray deformity such as hallux valgus, the sesamoids are no longer in their correct anatomic position because of the change in the musculotendinous balance around the joint.  
- The tendons surrounding the sesamoids can become irritated or inflamed. This is called sesamoiditis and is a form of tendinitis.  
- Sesamoid injuries include simple inflammation, Avascular necrosis, and fracture.

**Sesamoiditis: Symptoms**

- Common among ballet dancers, runners and baseball catchers  
- Pain is focused under the great toe on the ball of the foot. With sesamoiditis, pain may develop gradually; with a fracture, pain will be immediate  
- Swelling and bruising may or may not be present.  
- Difficulty and pain in bending and straightening the great toe

**Sesamoiditis: Effects on Gait**

- Person tries to avoid pain associated with the ambulation.  
- Often quick, short and soft foot steps.  

**Torsional Deformities**

Your patient is a 58 year old male with diabetes. He has had an amputation across the 1st ray. What is this type of amputation called?

A. Chopart  
B. Ray Disarticulation  
C. Ray Amputation  
D. Lisfranc

**Amputations**

- Amputations can fall into two different categories depending upon the location of amputation.  
- A disarticulation is an amputation at a joint, leaving the proximal bone(s) intact.  
- A "trans" amputation is an amputation done by cutting through the bone.

**Amputations**

**TOE DISARTICULATIONS**

- Interphalangeal disarticulation of the great toe  
- Interphalangeal disarticulation of the lesser toes  
- MTP joint disarticulation of the great toe  
- Disarticulation at lesser toe MTP joints

**Amputations**

**RAY AMPUTATIONS**

- First ray amputation  
- Lesser toe ray amputation
Amputations: Effect on Gait

- Toe Amputation - Little effect unless Hallux is involved, then decreased toe-off and stability
- Ray Amputation - Little effect unless 1st ray is involved, then greatly decreased toe-off stability in stance phase
- Transmetatarsal Amputation - Poor gait with little propulsion
- Lisfranc Amputation - Poor barefoot gait.
- Chopart Amputation - Allows direct end bearing, but no roll over function. Because heel pad is stable and because preservation of full leg length, no prosthesis is needed for walking, but gait is apropulsive.

The Torsional deformity most commonly seen in females that causes a pigeon-toed appearance is:

A. Internal Tibial Torsion
B. Femoral Anteversion
C. Metatarsus Adductus
D. Forefoot Adductus

Torsional Deformities

- There are three major pathologies involved with Torsional Deformities:
  - Internal Tibial Torsion
  - Femoral anteversion
  - Metatarsus Adductus

Torsional Deformities: Internal Tibial Torsion

- Internal Tibial Torsion (ITT) is a condition in early childhood in which the tibia (leg bone) is twisted inwards axially, causing the child to intoe as he walks.
- ITT is universal in infants and toddlers, and when the child takes his first steps, inverting is the norm.
- With walking, the ITT resolves, and disappears by 18 to 24 months of age. ITT is a normal phase of skeletal development in the first 2 years of life.

Torsional Deformities: Internal Tibial Torsion

- The tibia derotates itself over time, and the intoeing improves. During this phase, walking causes the ITT to correct itself.
- In a small proportion of children, however, the ITT does not resolve completely, or improves partially only. Even in these cases, the ITT can still improve spontaneously beyond age 2.
Torsional Deformities:
Internal Tibial Torsion
• Internal Tibial Torsion is a very common condition
• Considered normal unless it does not resolve beyond 18 to 24 months of age

Torsional Deformities:
Femoral anteversion
• The normal femoral head and neck are rotated anteriorly with respect to the femoral condyles.
• Femoral anteversion decreases from an average of 40° at birth to 15° at skeletal maturity (25° change). The normal tibia is externally rotated 5° at birth and 15° at skeletal maturity.
• Total for femur and tibia = 35° of external rotation.
• Femoral anteversion causes the child’s knees and feet to turn inward, or have what is also known as a pigeon-toed appearance.

Torsional Deformities:
Femoral anteversion
• It is twice as likely to be seen in girls and most typically occurs among toddlers.
• Femoral anteversion can be the result of stiff hip muscles due to the position of the baby in the uterus. It also has a tendency to run in families.
• Typically, a child’s walking style looks like that of his/her parents.

Torsional Deformities:
Metatarsus Adductus
• Forefoot is adducted at the tarsal-metatarsal joint.
• Usually seen shortly after birth and usually resolves within the first year of life.
• It may be associated with hip dysplasia (10-15%). 85% resolve spontaneously.
• Feet that can be actively corrected to neutral do not need any treatment.

Torsional Deformities:
Metatarsus Adductus
• Usually seen shortly after birth
• Usually resolves within the first year of life

Torsional Deformities:
Effects on Gait
• Child trips frequently
• Arms out for balance

Torsional Deformities:
Orthosis
• Functional Orthosis
• Dennis Browne Bar
• Fillauer Clamp
• Counter Rotational System

Torsional Deformities:
Shoes
• High top shoe
• Spinner wedge
• Reverse Thomas Heel
• Rocker Sole
• Lateral Wedging
• Lateral Counter reinforcements
Thank You!

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