

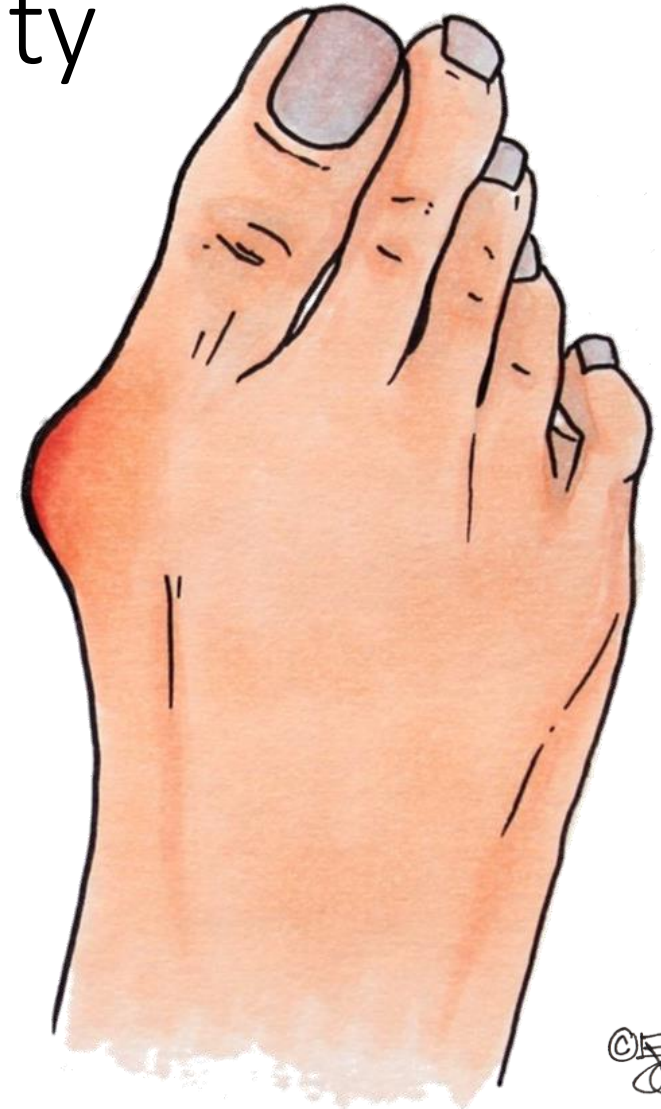
Maladies of the Toes

Maladies of the Toes

- While some toe deformities are congenital, most are acquired and develop after injury and/or prolonged use of inappropriate footwear. Sometimes they are associated with systemic diseases like rheumatoid arthritis.
- Some people/feet are predisposed, or more susceptible, to developing deformities like bunions or hammertoes.
- For most of the conditions addressed in this module, surgery is the only way to truly *correct* the problem. Most can be adequately managed using pedorthic modalities and techniques. In a great many cases, the need for surgical intervention can be delayed or obviated if the patient is amenable to changes in their footwear.

Hallux Valgus – Bunion Deformity

- Hallux valgus deformity is a relatively common condition.
- It occurs in approximately 23% of adults aged 18 to 65 years and up to 36% of adults older than 65 years.
- According to a National Foot Health Assessment, about 18 million American women and 4 million men report having bunions every year.
- Women are 10x more likely to develop a bunion deformity. (One study claims as high as 15x!)
 - Footwear choices
- People aged 60+ years twice as likely to develop bunion as younger people.



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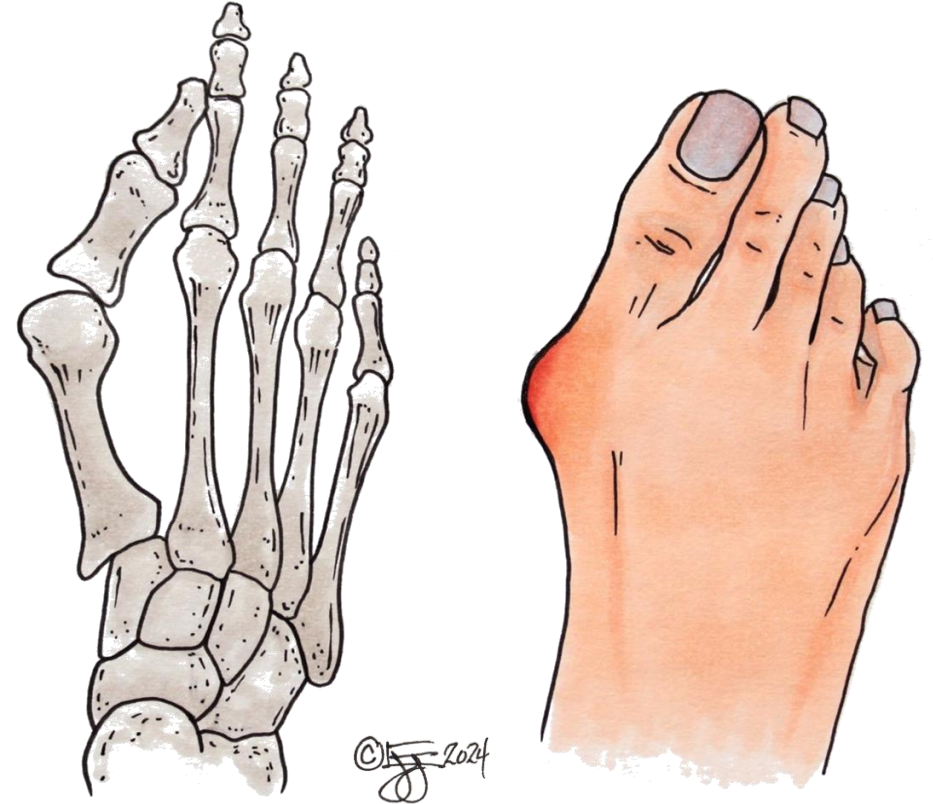
Hallux Valgus – Bunion Deformity

- Underlying skeletal deformity is called *hallux valgus*.
- Although the precise etiology is not well understood, the deformity develops as follows (remember, first metatarsal alignment is maintained by the tension created by the peroneus longus laterally and the abductor hallucis muscle medially):
 - Excess pressure on the 1st metatarsal head causes it deviates medially.
 - This force increases the hallux angle, which is also worsened by muscle stabilization while walking.
 - This creates a muscle imbalance between the intrinsic and extrinsic muscles of the toe that disallows the great toe from combatting the force of the shoe's toe box. The shoe is pushing the great toe back laterally at the same time the imbalanced muscles are pulling it that way.
 - As these forces push the first metatarsal medially and the hallux laterally, the medial collateral ligament and the medial capsule become strained and eventually rupture. Without stabilizing structures medially, the lateral structures (adductor hallucis muscle and collateral/lateral joint capsule ligaments) exacerbate the hallux valgus deformity.
 - Because of muscle imbalance and altered foot/gait mechanics, the deformity continues to worsen.
- Pain of medial eminence of 1st MTH from shoe pressure
- Pain in arthritic, misaligned and improperly functioning 1st MTP joint
- Pain at plantar 2nd MTH due to transfer of pressure that was previously, and should be, being borne by the 1st MTH



Hallux Valgus – Bunion Deformity

- The precise etiology is not fully understood but are many proposed theories.
- Most likely a result of a mix of contributing factors including:
 - Genetic predisposition
 - Short first metatarsal
 - Dorsiflexed first metatarsal
 - Forefoot varus (flexible or fixed)
 - Pes planovalgus (flexible or rigid)
 - Gastroc contracture
 - Abnormal foot mechanics
 - Joint hypermobility
 - Other conditions such as gout, psoriatic arthritis, rheumatoid arthritis and connective tissue disorders like Marfan syndrome and Ehlers-Danlos syndrome, as well as in Down syndrome.
 - Muscle imbalance in the foot due to conditions such as a stroke, cerebral palsy, or myelomeningocele can also cause a hallux valgus deformity.
- Hallux valgus deformity is common in people who wear tight shoes and high heels - which are most commonly cited as the offending agent.



Staging and Surgery

- Root et al. divided hallux valgus deformity into four stages:
 - Stage 1: Lateral displacement of the hallux at the MTP joint
 - Stage 2: Progression of the hallux abduction (hallux pressing against the second toe)
 - Stage 3: Increased intermetatarsal angle, possible associated second hammertoe deformity
 - Stage 4: Partial/Complete hallux dislocation at the MTP joint
- Most surgical procedures for hallux valgus correction involve the shortening of the first metatarsal. As such, correction of the bunion does not necessarily resolve whatever pre-op transfer 2nd MTH metatarsalgia existed.
- Relatively speaking, some procedures have a high rate of bunion recurrence. Recurrence rates after surgical correction differ based on procedure, ranging from 10 to 47%.

Hallux Valgus – Bunion Deformity

- Pedorthic Management
 - Footwear
 - Well-fitted, **appropriately shaped**, in-depth shoes to accommodate deformity
 - Consider Lycra® upper to accommodate bunion deformity
 - Foot Orthosis
 - Medial longitudinal arch support can help reduce pressure on bunion during toe off, especially with flexible flatfoot.
 - Cushion and offload painful 1st MTH (and 2nd/3rd if transfer metatarsalgia is a concern).
 - Shoe Modification
 - Rocker soles to unload forefoot
 - Stretch shoes to accommodate deformity
 - Other Device(s)
 - Bunion “pads” may provide cushion, but also take up valuable space in the shoe and can increase pressure/pain instead of relieving it.
 - Splints may provide relief pain caused by 1st MTPJ arthritis and/or alignment (see next slide...)



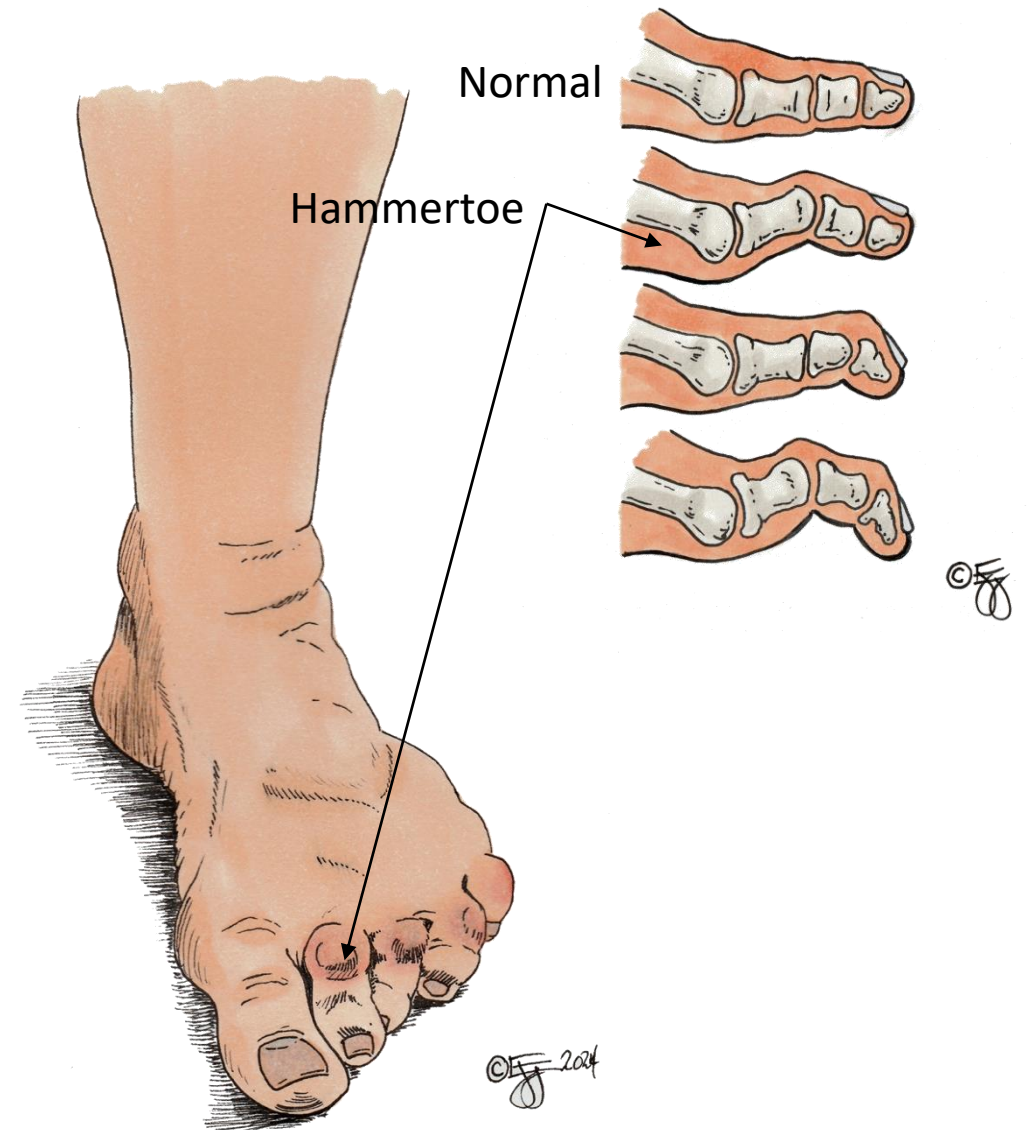
Hallux Valgus – Bunion Deformity

- What about HV splints and “corrective” devices?
 - They may provide some pain relief while being worn, but they do nothing to actually correct the deformity.
 - Only surgery will correct the deformity.



Hammertoes

- Contracture at proximal interphalangeal joint
- Most common cause is wearing shoes that are too tight and short. The toe is consistently forced into a flexed position; tendons shorten and tighten.
- Other causes include trauma and an imbalance of flexor and extensor muscles in the toes.
- Leads to arthritis and pain in the IP joints. Also, dorsal pain and redness due to shoe pressure, and toe tip pain due to effects on mechanics caused by the deformity.



Hammertoes

- Pedorthic Management

- Footwear

- Well-fitted, appropriately shaped in depth shoes to accommodate deformity
 - Consider Lycra® upper to reduce dorsal pressure on toes
 - Double-depth shoe to reduce dorsal pressure on toes

- Foot Orthosis

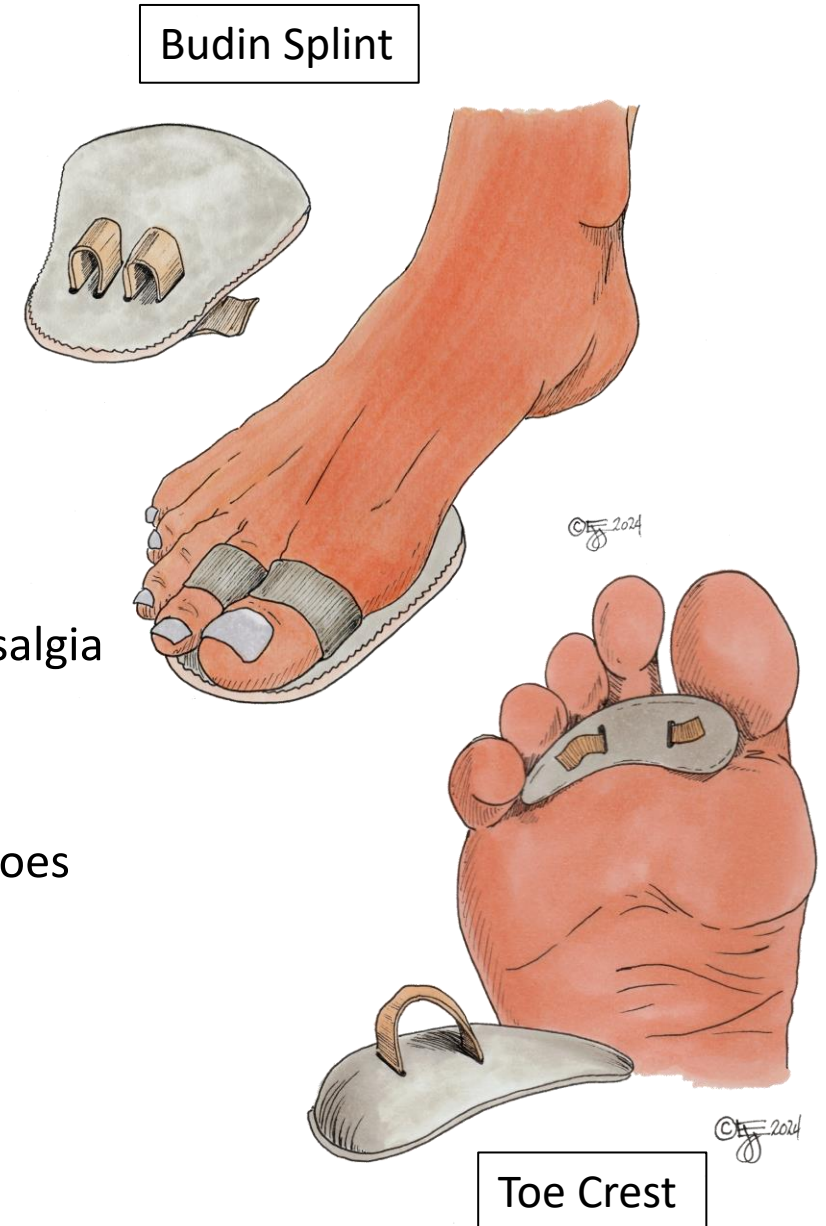
- Custom Vs. prefab to cushion and offload MTHs is metatarsalgia is present due to hammer toes

- Shoe Modification

- Stretch shoes to accommodate hammertoes
 - Rocker soles if there is MTH pain associated with hammertoes

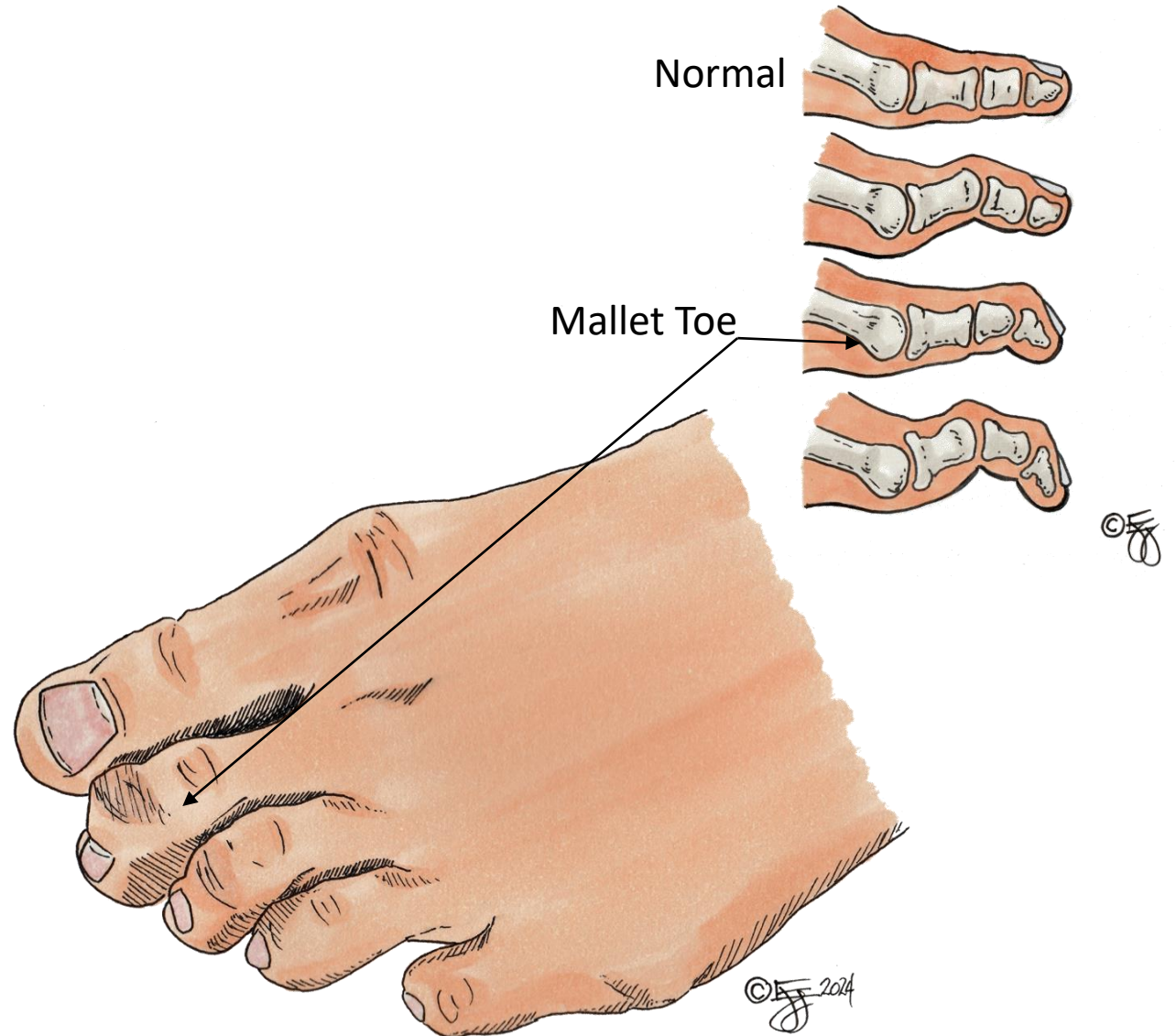
- Other Device(s)

- Toe Crest may be used to prevent pressure on toe tip
 - Budin splint may be used to straighten toe (provided it is passively correctable and not painful to do so)



Mallet Toes

- Contracture at distal interphalangeal joint (flexor digitorum longus)
- Most common in 2nd toe
- Causes:
 - Arthritis
 - Ill-fitting shoes
 - Injury
 - Muscle weakness
- Can be quite painful, cause shoe fitting issues and may be especially problematic for someone with diabetic neuropathy
- Can also contribute to toenail problems in affected toe



Mallet Toes

- Pedorthic Management

- Footwear

- Well-fitted, appropriately shaped in depth shoes to accommodate deformity

- Foot Orthosis

- Custom Vs. Prefab with low-friction interface (Shear-Ban®) under toe tip

- Shoe Modification

- Rigid rocker sole to decrease weightbearing and bending stresses on toe

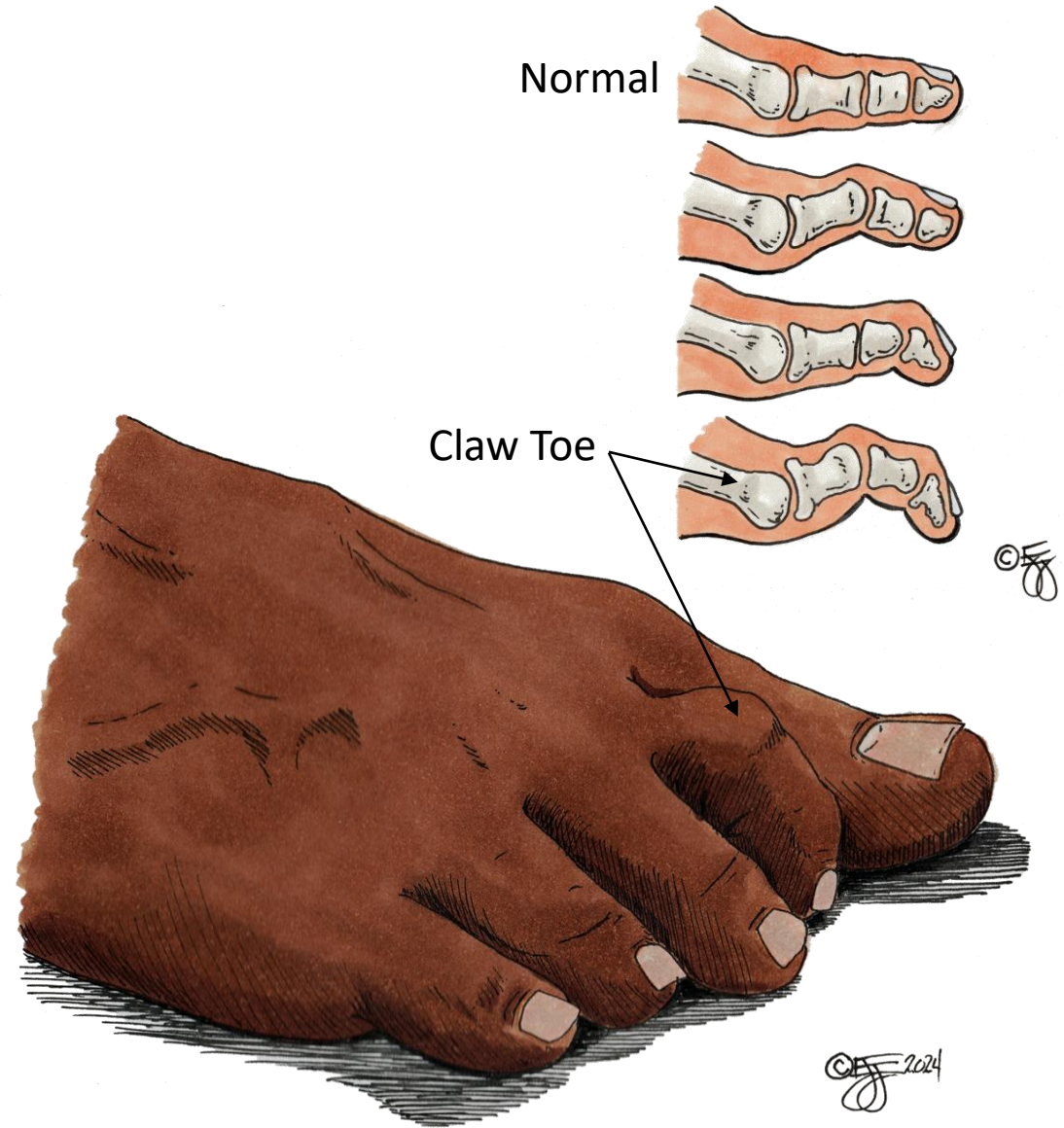
- Other Device(s)

- Silicone toe cap
 - Budin splint in shoe that won't accommodate foot orthosis



Claw Toes

- Contractures at both the proximal and distal interphalangeal joints is called a *claw toe*.
- Typically a progressive disorder; becomes less passively correctable as time goes on.
- Causes can include:
 - Congenital deformity
 - Charcot-Marie-Tooth disease
 - Cerebral palsy
 - Other brain and nervous system disorders
 - Rheumatoid arthritis
 - In many cases, the cause is unknown.
- Pain in the joints from arthritis, pain over PIP from shoe pressure, toe tip pressure pain due to deformity.



Claw Toes

- Pedorthic Management

- Footwear

- Well-fitted, appropriately shaped in depth shoes to accommodate deformity
 - Consider Lycra® upper
 - Consider double-depth

- Foot Orthosis

- Metatarsalgia 2° claw toe
 - Custom Vs. prefab device to offload painful MTH(s)

- Shoe Modification

- Stretch shoe over claw toe
 - Bubble patch over deformity
 - Deerskin

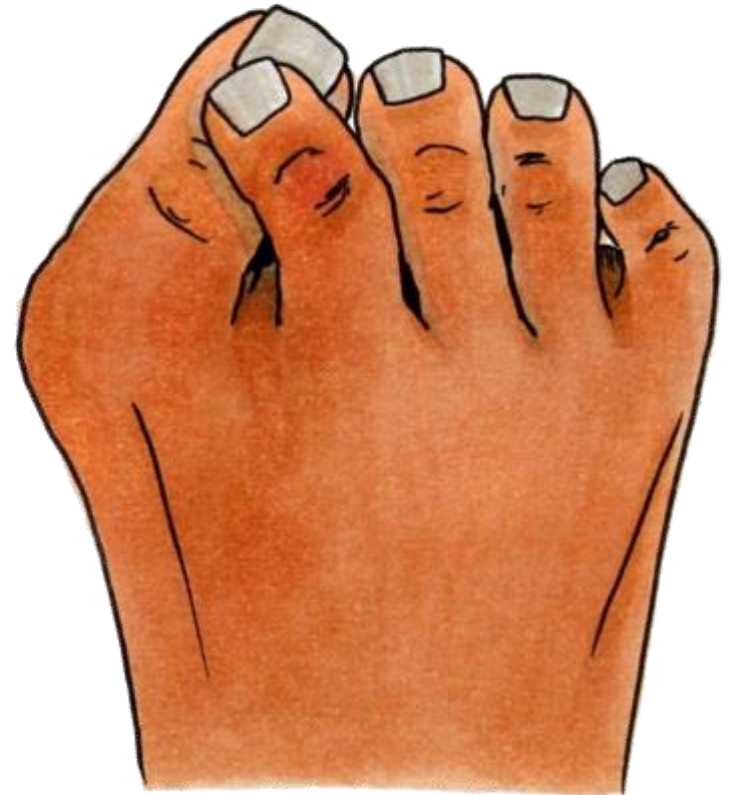
- Other Device(s)

- If deformity is passively correctable, a Budin splint maybe helpful
 - If there is toe tip pain/lesion, toe crest may be helpful



Crossover Toes

- As muscle imbalance/weakness worsens, if the patient has both a severe hallux valgus deformity and a 2nd hammer or claw toe a crossover toe situation can develop
- This is painful
 - Dorsally from shoe pressure
 - Plantarly as 2nd MTH is forced downward and fat pad has been displaced
 - Through the joint itself from misalignment and/or arthritis
- This is a challenging foot to fit properly



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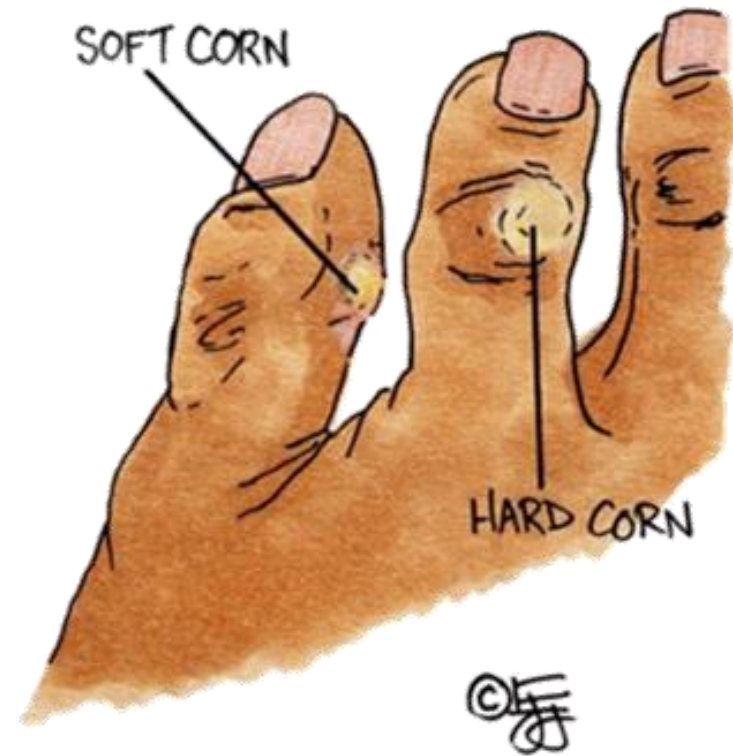
Crossover Toes

- Pedorthic Management
 - Footwear
 - Well-fitted, appropriately shaped, *double-depth* shoes to accommodate deformity
 - Consider Lycra® upper to accommodate deformity
 - Foot Orthosis
 - Custom foot orthosis to cushion and offload painful MTH associated with dorsal subluxation of MTPJ
 - Shoe Modification
 - Soft, deerskin bubble patch over affected toes
 - Other Device(s)
 - Silicone toe sleeve



Soft Interdigital Corns

- Soft corns (*heloma molle*) are usually found between toes. They're caused by the condyles of the phalanges in adjacent toes rubbing against each other. The body's reaction to this is to thicken the skin to protect itself.
- They don't harden fully as the moisture found between the toes keeps them soft. In fact, this location often leads to maceration of the corn, with sometimes the occurrence of a bacterial or fungal infection or ulceration.
- Clearly, the particular skeletal anatomy is the underlying factor, but shoes that are too narrow facilitate and advance the formation of the corn.
- Most commonly found between the 4th and 5th toes.
- They are also called interdigital corns or "kissing corns".



Soft Interdigital Corns

- Pedorthic Management
 - Footwear
 - Well-fitted, appropriately shaped in depth shoes to accommodate deformity
 - Shoe Modification
 - Stretch shoes to provide additional width and depth around toes
 - Other Device(s)
 - Toe spacers/separators
 - Silicone toe sleeves/caps
 - So-called “corn pads”



Tailor's Bunion (Bunionette)

- Painful bony prominence on the lateral aspect of the fifth metatarsal head that occurs in many individuals
- +/- Medial deviation of the 5th toe
- May be congenital and/or caused or exacerbated by compression from years of wearing ill-fitting footwear.
- Causes:
 - Extrinsic causes
 - Compression of forefoot
 - Abnormal loading on the lateral aspect of the foot
 - Intrinsic causes
 - Congenital deformities (e.g. splayfoot, brachymetatarsia)
 - Inflammatory arthropathies
 - Residual malalignments from surgery
- Seldom symptomatic
- 2-4x more common in women; frequently bilateral



Tailor's Bunion (Bunionette)

- Pedorthic Management

- Footwear

- Well-fitted, appropriately shaped in depth shoes to accommodate deformity

- Foot Orthosis

- Orthotics may be useful if a symptomatic tailor's bunion results from excessive subtalar joint pronation.

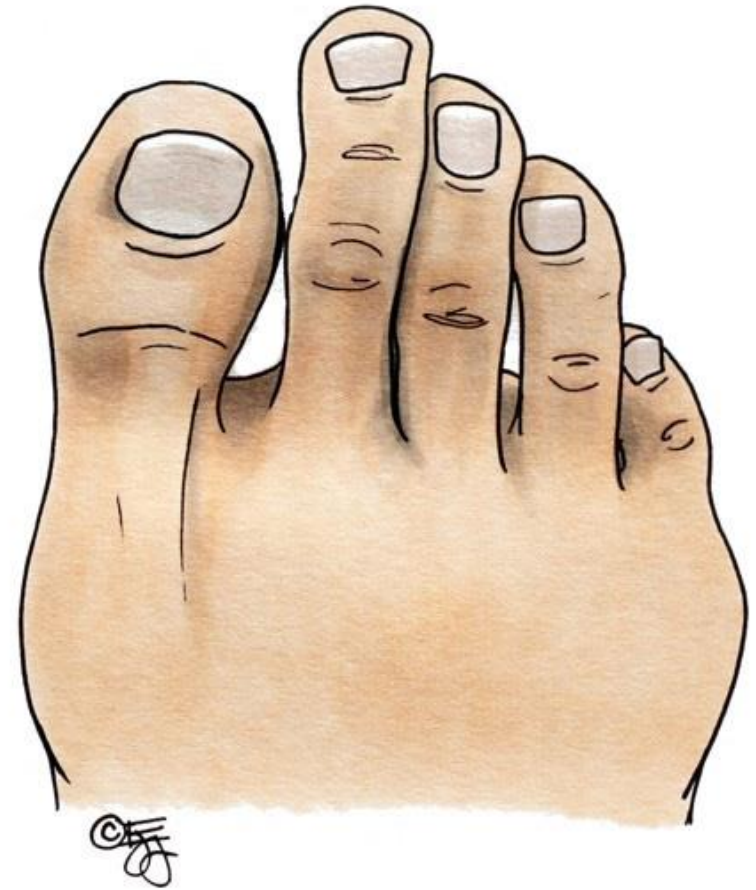
- Shoe Modification

- Stretch shoes as needed to accommodate bunionette
 - Shaft pad in shoe along lateral toe box proximal to 5th MTH to push MTH away from lateral border of shoe. Especially if there are overlapping pieces of the shoe and/or stitching.



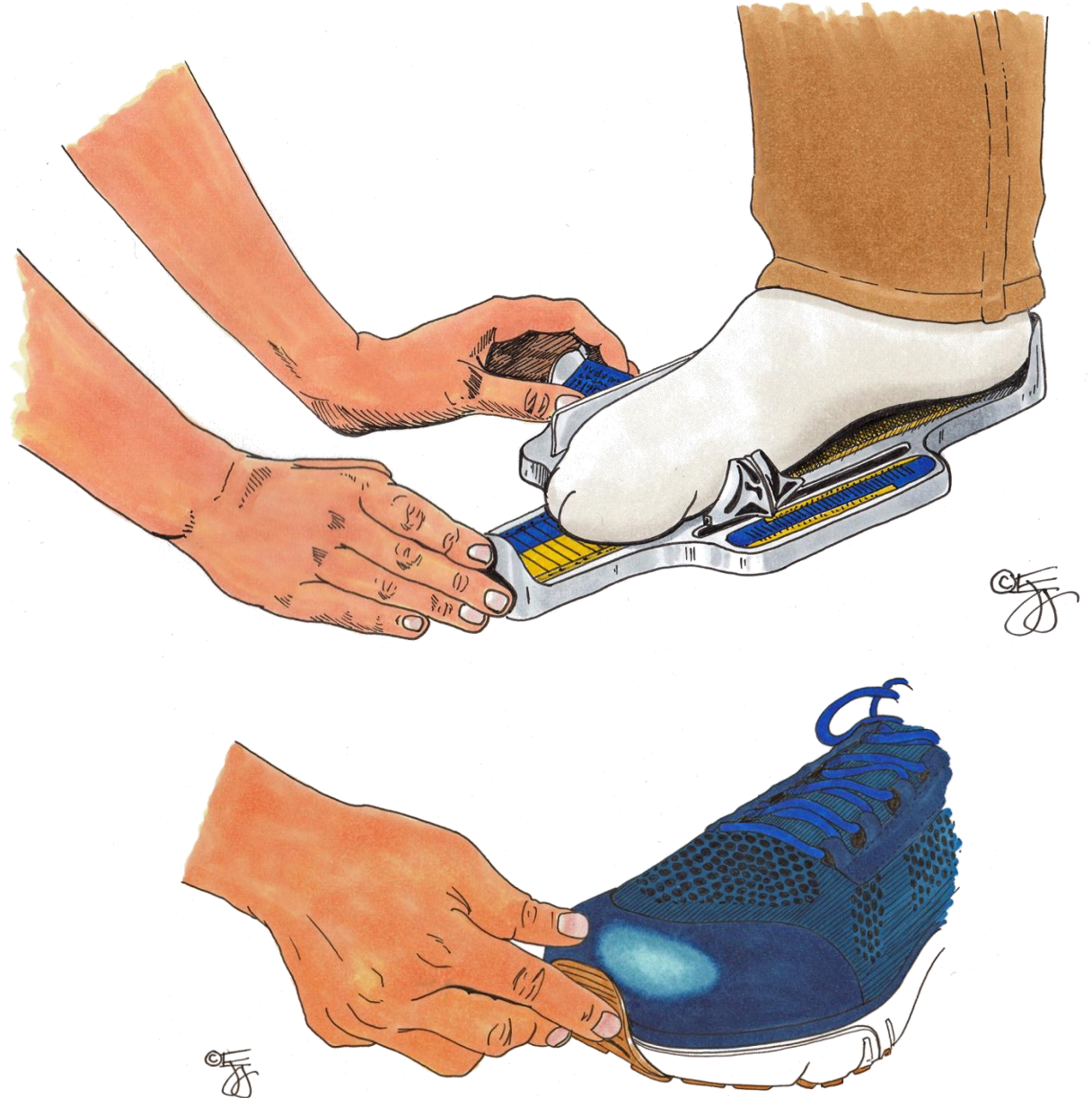
Morton's Toe

- Congenital foot type wherein the 1st metatarsal is shorter than it ideally should be.
- The same foot type may be seen after surgical procedure that shortens the 1st metatarsal (bunion correction, 1st MTP fusion, etc.)
- 2nd transfer metatarsalgia may be present
- Creates foot measuring/shoe fitting challenge



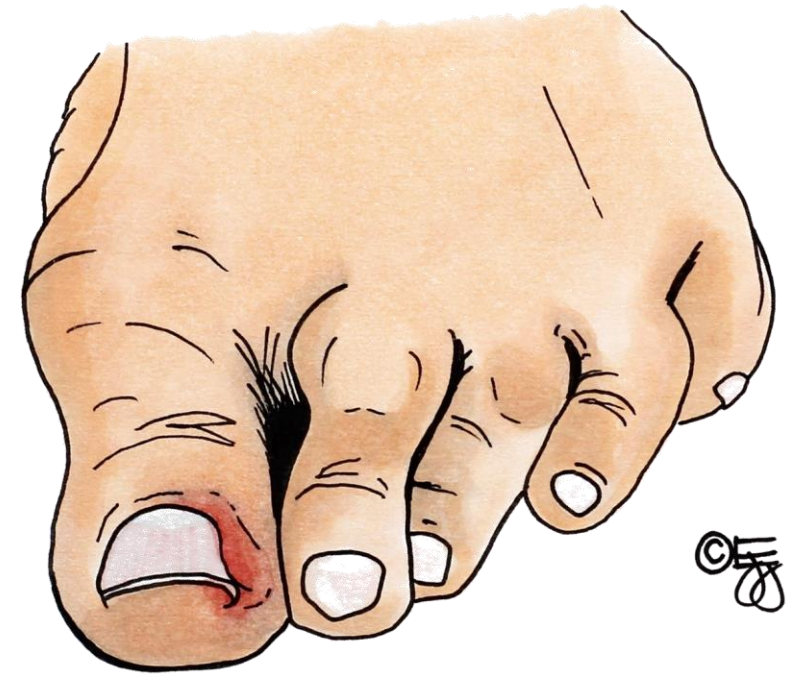
Morton's Toe

- Pedorthic Management
 - Footwear
 - Well-fitted, appropriately shaped in depth shoes to accommodate deformity
 - Be sure to measure to the end of the 2nd toe when measuring for shoes
 - Foot Orthosis
 - Custom Vs. Prefab with offloading/relief for 2nd MTH if it is symptomatic



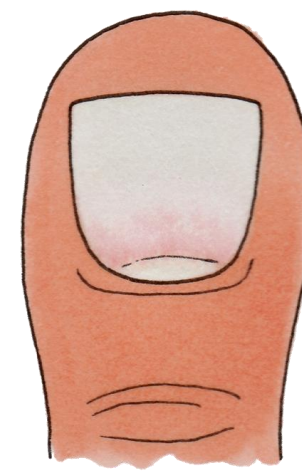
Ingrown Toenails

- An ingrown nail (*onychocryptosis*) occurs when the skin on one or both sides of a nail grows over the edges of the nail, or when the nail itself grows into the skin. Not uncommon, it accounts for 20% of foot-related visits to the primary care physician.
- It occurs when the periungual skin of the lateral nail fold is traumatized by its adjacent nail plate, resulting in an inflammatory foreign body reaction.
- Redness, pain and swelling at the corner of the nail may result and infection may soon follow.
- Unless the problem is congenital, the best way to prevent ingrown toenails is to protect the feet from trauma and to wear shoes and hosiery with adequate room for the toes.
- Nails should be cut straight across with a clean, sharp nail trimmer without tapering or rounding the corners.
- Keep the feet clean and dry at all times.

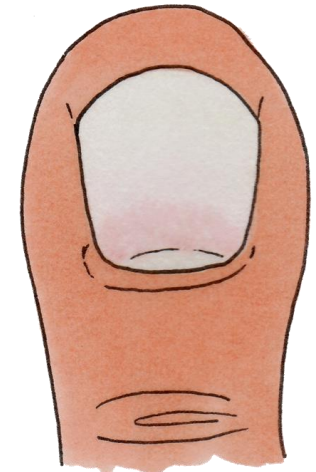


Ingrown Toenails

- Pedorthic Management
 - Footwear
 - Well-fitted, appropriately shaped in depth shoes to accommodate deformity
 - Shoe Modification
 - Stretch shoe to prevent pressure on affected toe(s)
- Partial or full surgical removal of offending nail may become necessary in chronic cases.
- Correct toenail trimming technique is critical to avoid recurrence.



Correct

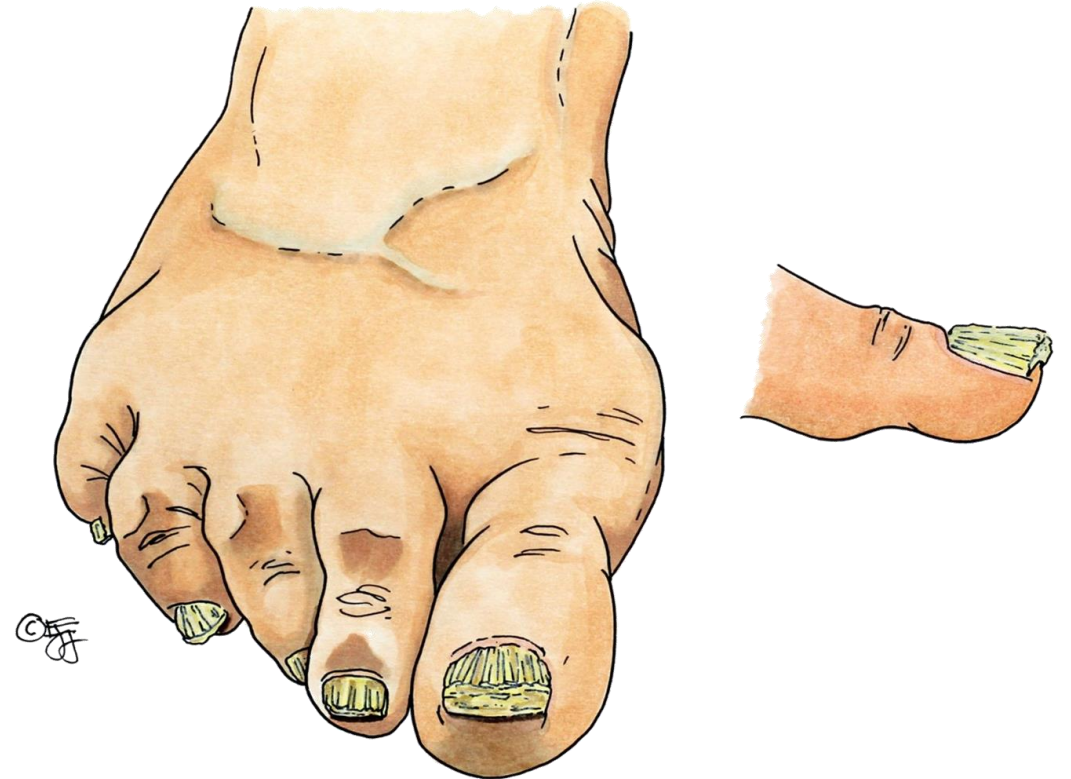


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Fungal Nails

- Fungal infection of the toenails (*onychomycosis*) is a common foot problem.
- Infection starts in the nail bed.
- The term onychomycosis encompasses the dermatophytes, yeasts, and saprophytic mold infections.
- Onychomycosis can infect both fingernails and toenails, but onychomycosis of the toenail is much more prevalent.
- Risk factors include:
 - Aging
 - Diabetes
 - Tinea pedis (athlete's foot)
 - Psoriasis
 - Immunodeficiency
 - Living with family members with onychomycosis.
- Hotel carpets, public showers, and pool decks can culture causative organisms.
- An asymptomatic, dry hyperkeratotic tinea pedis usually precedes onychomycosis.



Fungal Nails

- Pedorthic Management

- Footwear

- Well-fitted, appropriately shaped in depth shoes to accommodate fungal nails – no pressure on the front, top or sides of affected toenail
 - Consider Lycra® uppers

- Nails become thick, tough and brittle, progressing to a point where the patient is unable to trim them at home themselves. It is okay to remind Medicare patients that they do have coverage to see a podiatrist for nail care.

Runner's Toe

- Injury to the toe, toenail and nail bed due to the toe repeatedly slamming into the front of the shoe during running.
- Bleeding under the nail (*subungual hematoma*) causes the black appearance of the nail.
- Nail may eventually fall off.
- Common amongst frequent and long-distance runners, and trail runners. More likely to occur during downhill running.
- Shoes too short? Shoes too big? Not secured appropriately?



Runner's Toe

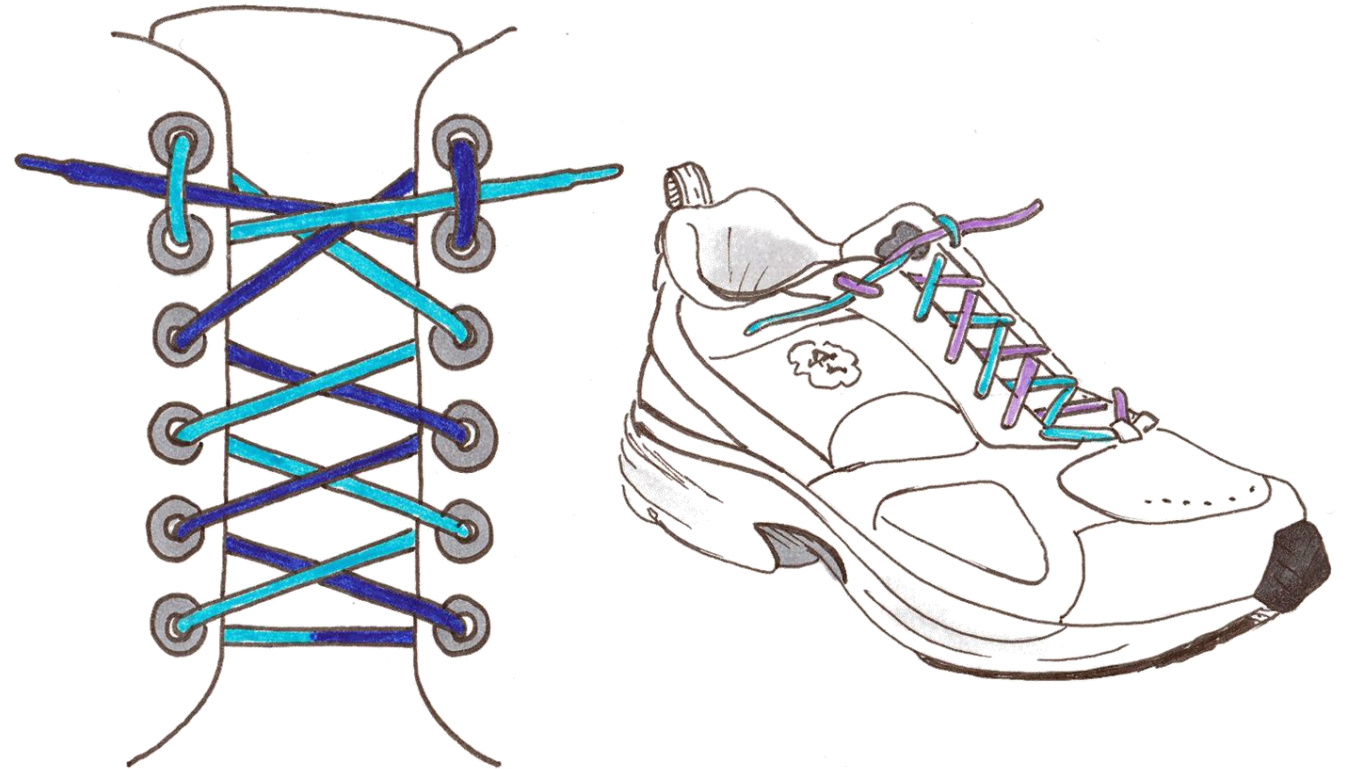
- Pedorthic Management

- Footwear

- Well-fitted, appropriately shaped in-depth shoes with $\frac{3}{8}$ "- $\frac{1}{2}$ " space between the end of the longest toe and the front of the toe box
 - Alternate lacing techniques
 - Tongue pad to hold foot back in shoe

- Foot Orthosis

- Total contact foot orthoses to maintain foot positioning in shoe.



Other Injuries

- Tendonitis – Tendon Rupture
- Phalangeal Fracture
- Pedorthic management primarily entails splinting the injured toe to aid healing.
 - Rigid rocker soled shoe
 - Extended steel shank
 - Carbon footplate
 - Post-op shoe

The End