Diabetic Neuropathies

Nerve disorders caused by diabetes

Causes

- **Metabolic factors**, such as high blood glucose, long duration of diabetes, abnormal blood fat levels, and possibly low levels of insulin
- **Neurovascular factors** such as endothelial dysfunction leading to damage to the blood vessels that carry oxygen and nutrients to nerves
- **Autoimmune factors** that cause inflammation in nerves
- **Mechanical injury** to nerves, such as carpal tunnel and tarsal tunnel syndrome
- **Inherited traits** that increase susceptibility to nerve disease
- **Lifestyle factors**, such as smoking or alcohol use

About 60 to 70 percent of people with diabetes have some form of neuropathy.

- People with diabetes can develop nerve problems at any time.
- Risk of neuropathy rises with age and longer duration of diabetes.
- The highest rates of neuropathy are among people who have had diabetes for at least 25 years.
- Diabetic neuropathies also appear to be more common in people who have problems controlling their blood sugar.

Symptoms

- numbness, tingling, or pain in the toes, feet, legs, hands, arms, and fingers
- wasting of the muscles of the feet or hands
- indigestion, nausea, or vomiting
- diarrhea or constipation
- dizziness or faintness due to a drop in blood pressure after standing or sitting up
- problems with urination
- erectile dysfunction in men or vaginal dryness in women
- weakness

Types

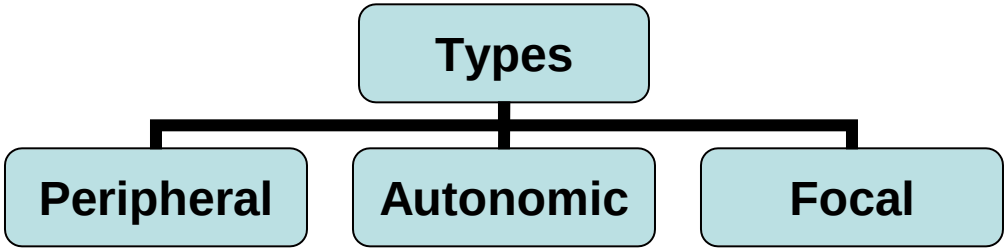
- **Peripheral neuropathy**

- **Autonomic neuropathy** causes changes in digestion, bowel and bladder function, sexual response, and perspiration. It can also affect the nerves that serve the heart and control blood pressure, as well as nerves in the lungs and eyes. Autonomic neuropathy can also cause hypoglycemia unawareness, a condition in which people no longer experience the warning symptoms of low blood glucose levels.

- **Proximal neuropathy** causes pain in the thighs, hips, or buttocks and leads to weakness in the legs.

- **Focal neuropathy** results in the sudden weakness of one nerve or a group of nerves, causing muscle weakness or pain. Any nerve in the body can be affected.

Neuropathies affecting feet



Peripheral Neuropathy

- The most common type of diabetic neuropathy
- Sensory
- Motor

Sensory

- Onset normally gradual
- May be sudden such as with a focal neuropathy
- Numbness
- Tingling
- Burning
- Pain to toes, feet and legs

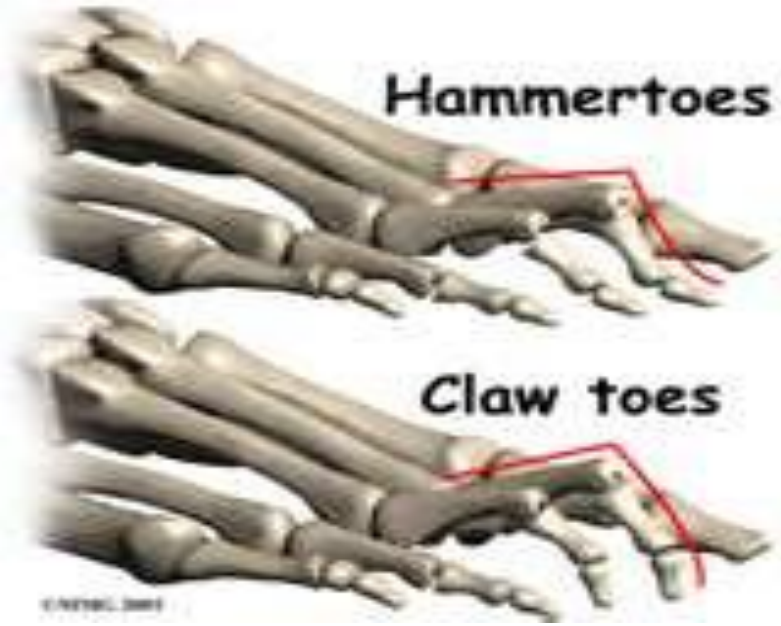
Sensory/Numbness

- Loss of warning system
- Loss of proprioception
- More susceptible to falling or tripping
- Loss of balance

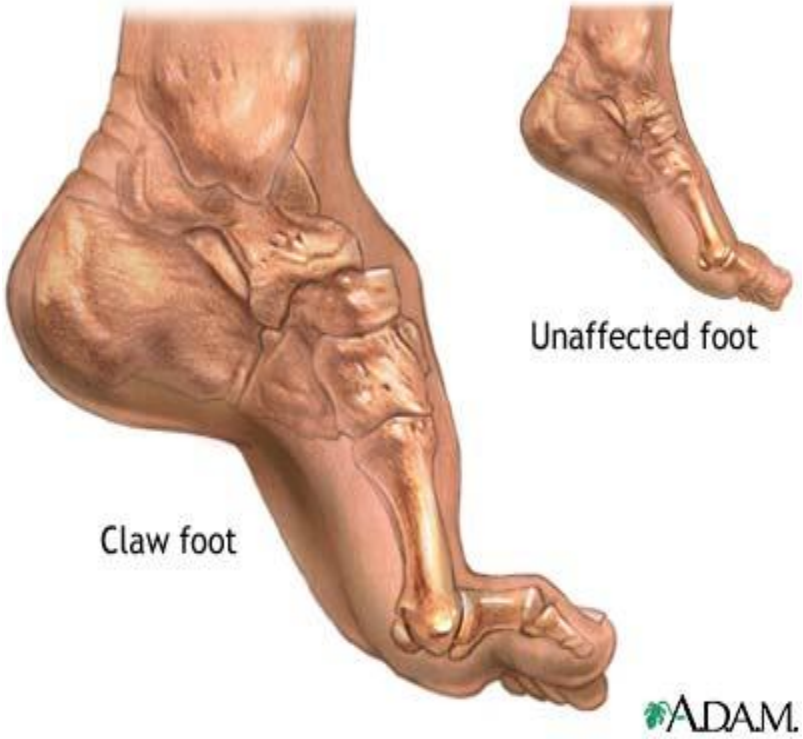
Motorneuropathy

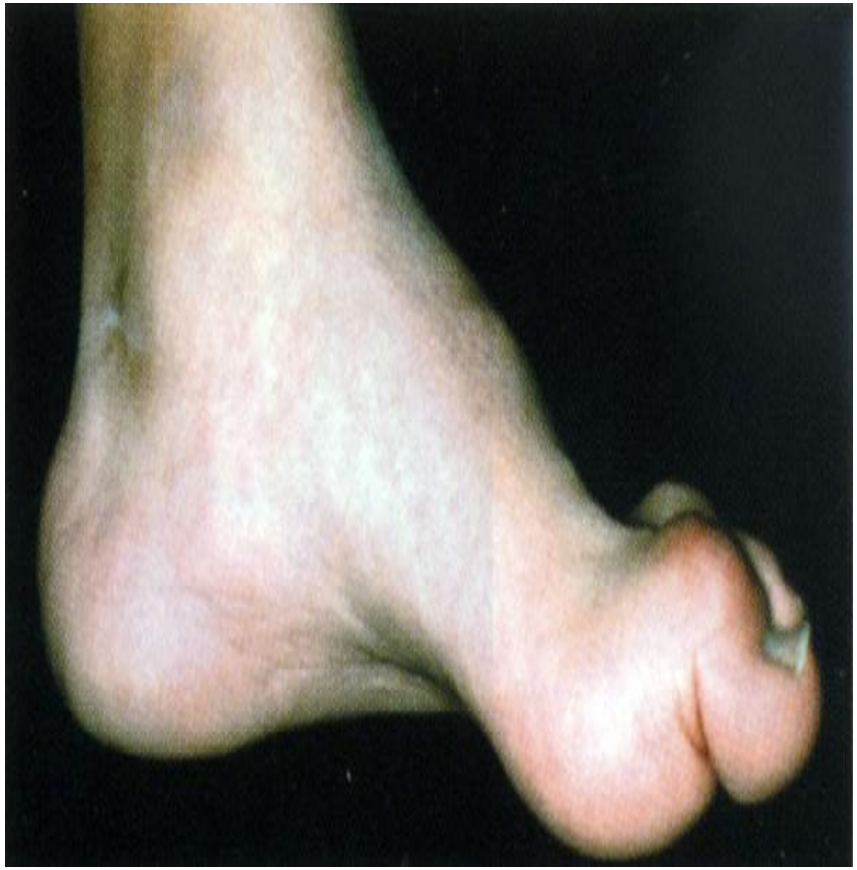
- Wasting of muscle
- Weakness of muscle
- Imbalance of muscle
- Foot deformities

Foot Deformities



Cavus





Pes Cavus / High Arch Feet


Corn
Callus
A.D.A.M.

Bunion Deformity

PHOTO COURTESY OF EVELYN TAYLOR

Hammertoe Deformity

Callous / Corn

Autonomic neuropathy affects

- Nerves that control sweating that can lead to severe dryness

- Nerves that control the blood vessels that can lead to severe swelling

Heel Fissuring with Hyperkeratosis

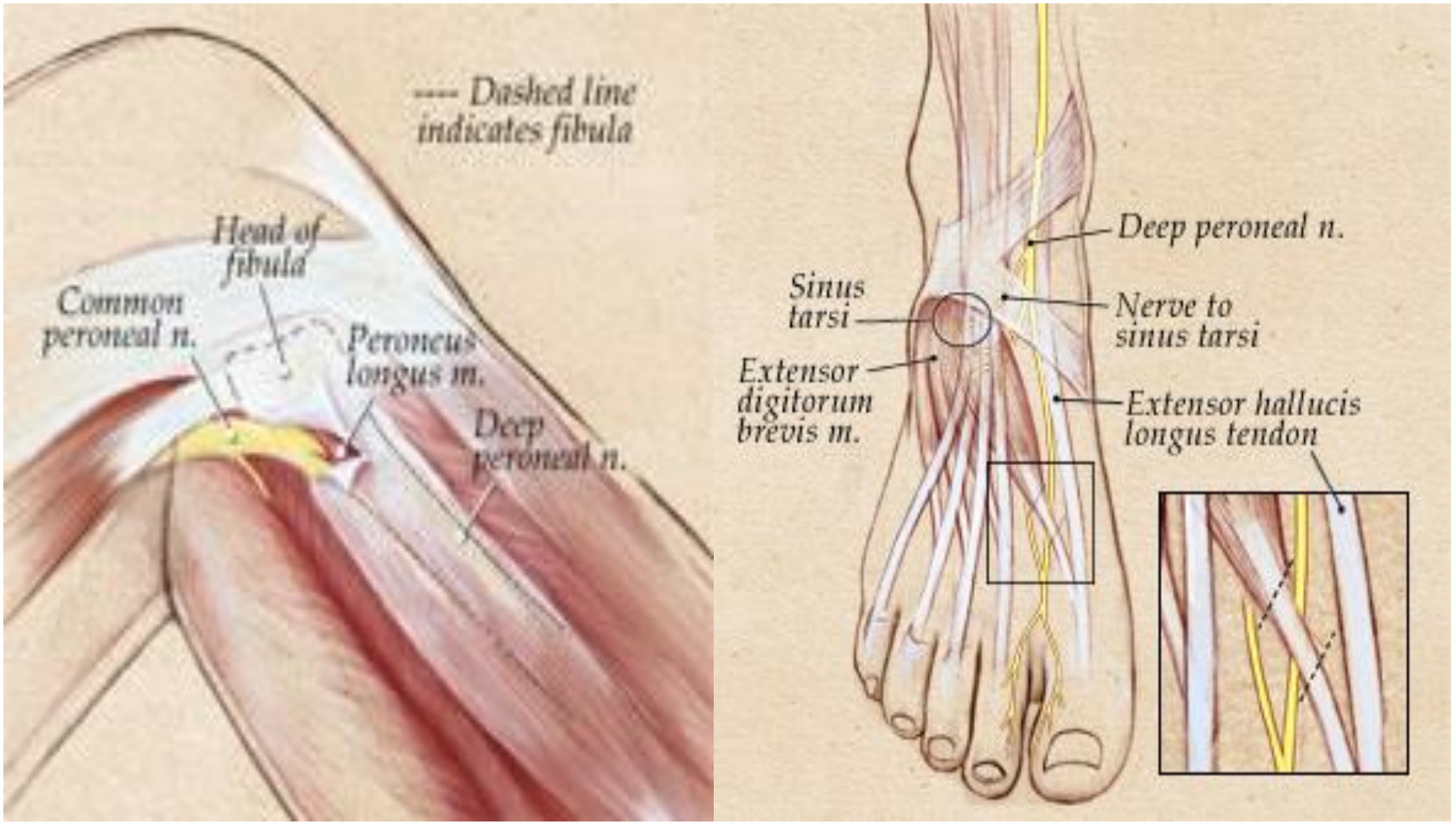
Focal neuropathy

- Appears suddenly
- Affects specific nerves
- Nerve compressions/entrapment syndromes

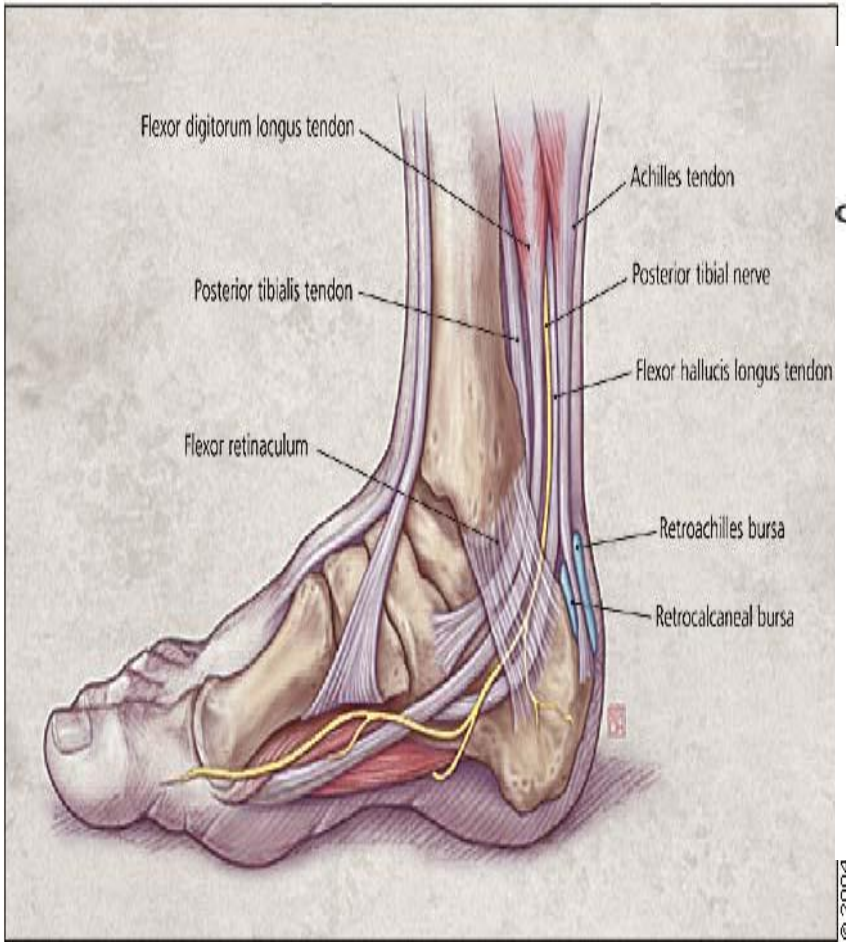
Nerve Compressions/Entrapment Syndromes

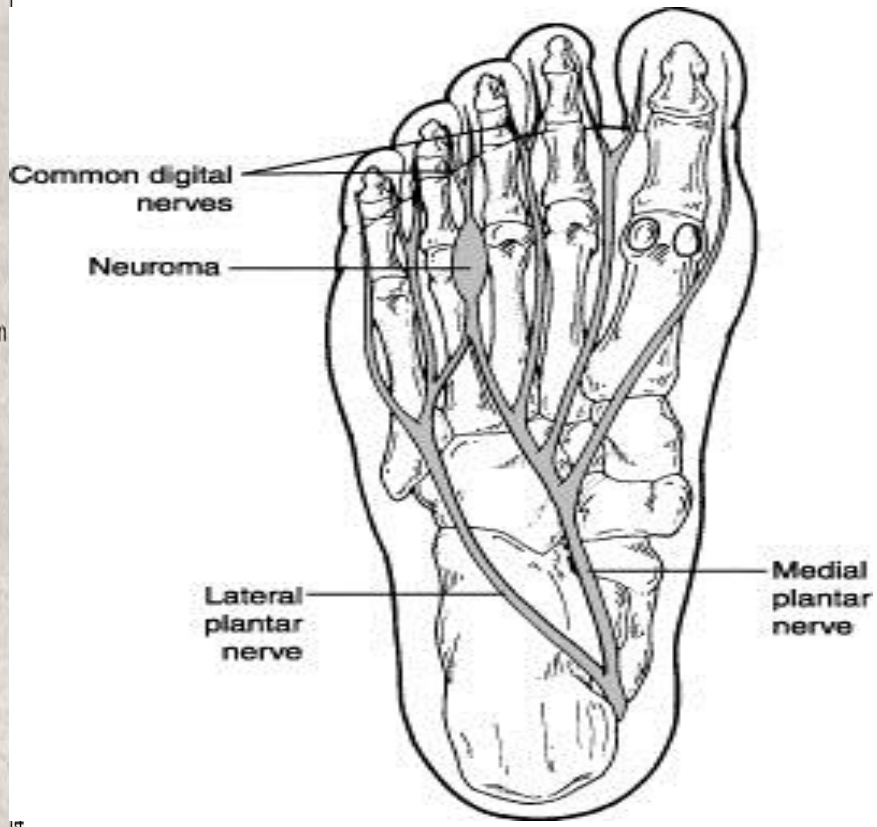
- Tarsal Tunnel Compression
- Deep Peroneal Compression
- Common Peroneal Compression
- Neuroma
- Mononeuritis

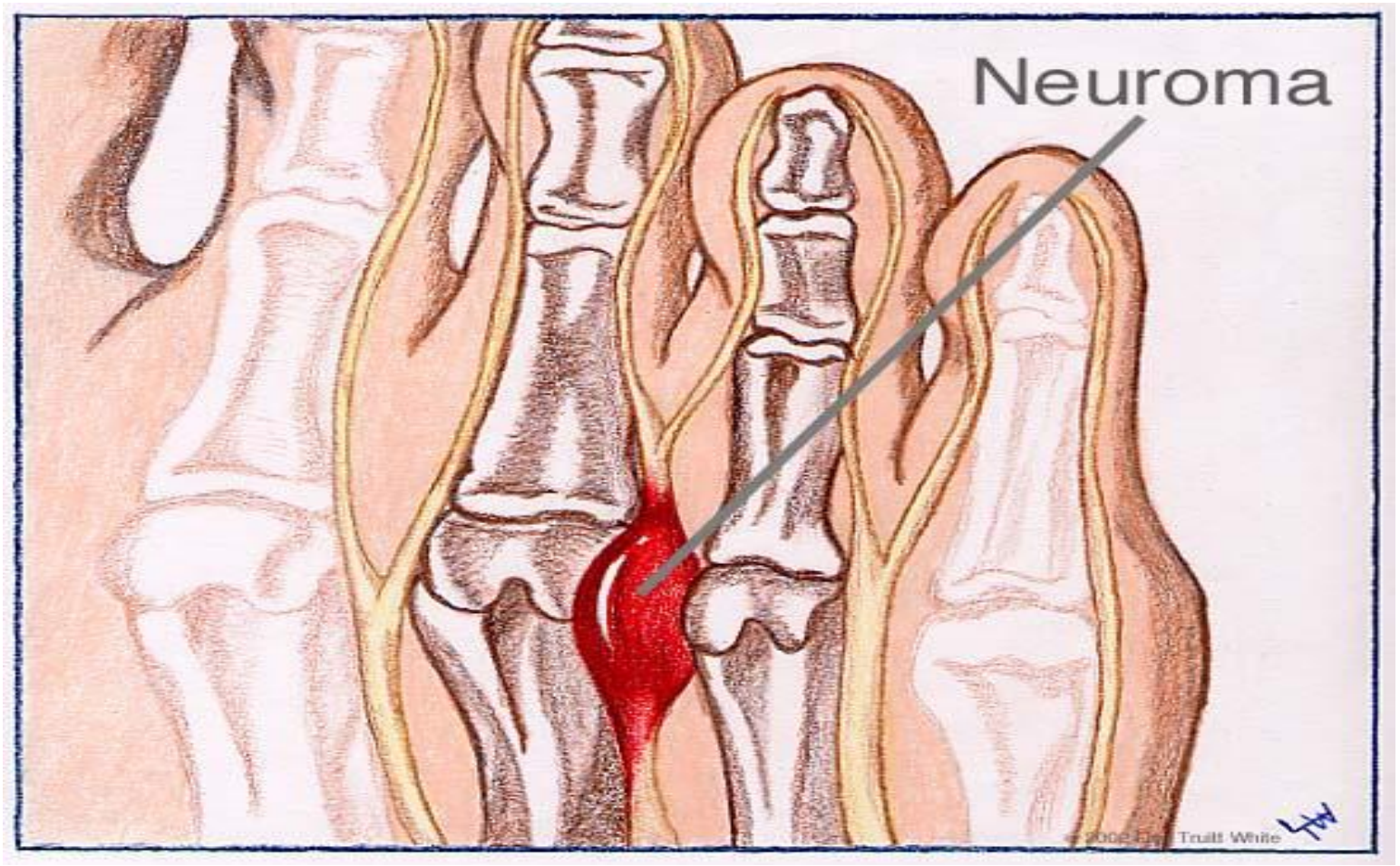
Common peroneal/Deep peroneal



Tarsal Tunnel/Neuroma






Neuroma

Complications

Ulcerations

Amputation of hallux

Amputation of forefoot

Amputations

Charcot Foot

- Progressive degeneration of a weight-bearing joint, a process marked by bony destruction, bone resorption, and eventual deformity. Onset is usually insidious.
- Decreased peripheral sensation
- Decreased proprioception
- Increased swelling

Charcot foot

Charcot

Charcot

- .

Neurological Testing

- Semmes-Weinstein 5.07 (10gm) monofilament
- Vibratory perception threshold >25 V
- EMG/NCV
- Tinel's sign
- (**PSSD**) **Neurosensory testing** is a non-invasive technique for assessing nerve damage by measuring the pressure threshold felt in the skin.

(PSSD) Neurosensory testing

Treatments

- **Analgesic**

- **Remittive(reversible)-restore function to the nerve**

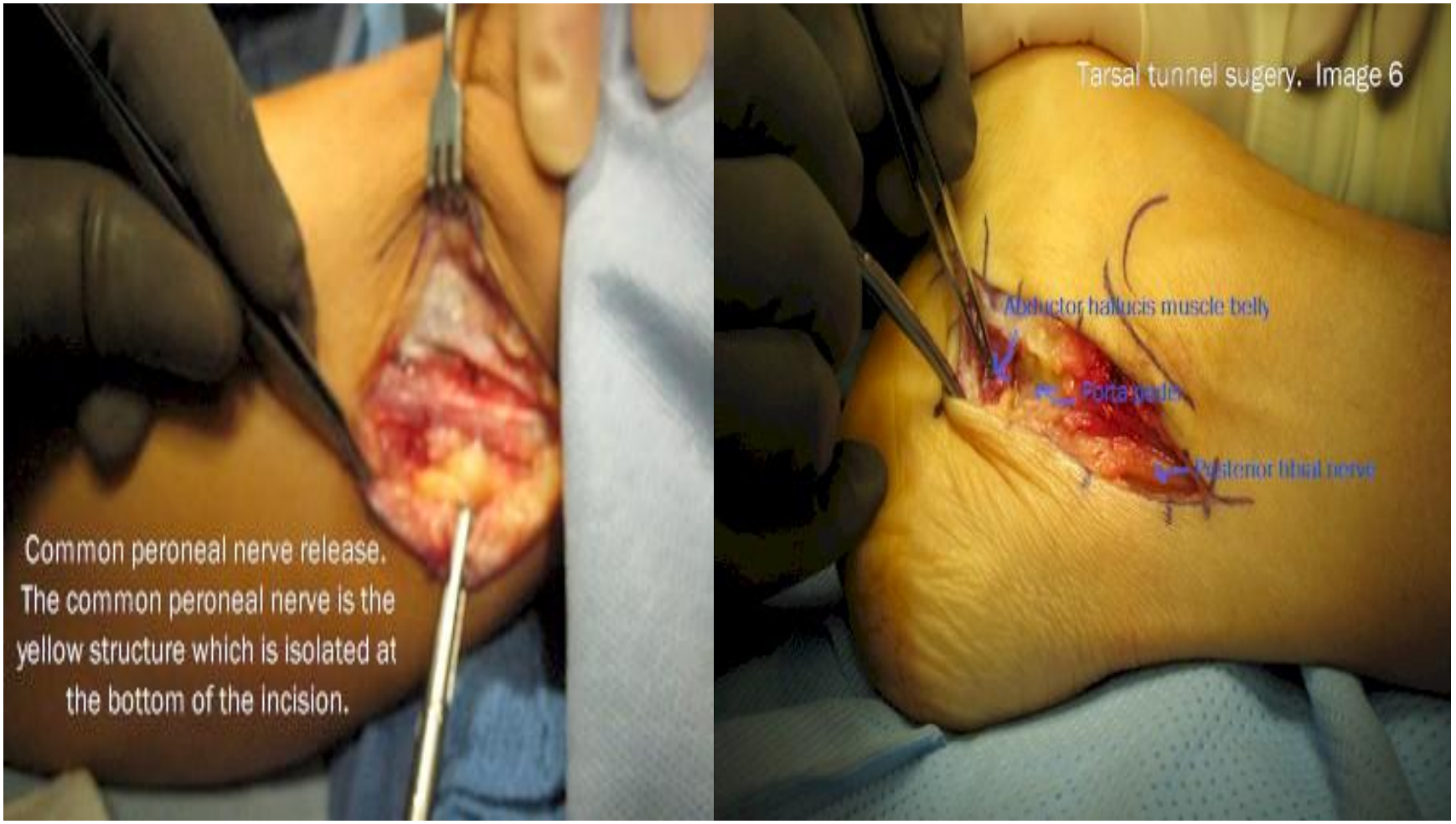
Analgesic

- **Anticonvulsants**-Gabapentin(Neurotin),Pregabalin(Lyrica), Topical Gabapentin
- **Antidepressants**-Amitryptilline,Duloxetine(SSRI)(Cymbalta)
- Alpha-2 adrenergic agonist- clonidine
- **Opioid Analgesics-** Tramadol, Topical Ketamine
- **Topical**-Lidocaine-transdermal,Zostrix
- **Ten's unit-** electrical stimulation**/**pain blocker

Remittive

- Control of blood sugars
- Alpha Lipoic Acid-antioxidant,coverts glucose to energy
- L-Methylfolate,Me-Cbl,P-5-P(Metanyx)- increases nitric oxide leading which dilates blood vessels
- L-Arginine HCL 12.5% Topical cream-increased nitric oxide
- Infrared Therapy-anodyne
- MicroVas® (NeuroVasix) is also a non-invasive, FDA-approved device, which utilizes a magnetic waveform to increase blood flow and oxygenation in the area.
- Nerve Decompression

Nerve Decompression



Endoscopic decompression of intermetatarsal nerve

The Foot Institute

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