Learning Objectives

- Describe and Discuss Common entrapment neuropathies of the lower extremity
- Analyze the relevant anatomy of these neuropathies
- Review possible Osteopathic treatments for these neuropathies
Definitions

- Peripheral Neuropathy
- Compression Neuropathy
- Entrapment Neuropathy
- “Any of a group of neuropathies, ..., in which a peripheral nerve is injured by compression in its course through a fibrous or osseofibrous tunnel or at a point where it abruptly changes its course through deep fascia over a fibrous or muscular band.” *Dorlands, 27th*
Definitions

- Peripheral Neuropathy
  - Focal
  - General
    - Disease
    - Drugs
    - Genetic
    - Nutrition
    - Environmental
Definitions

- **Radiculopathy**
  - Specialized form of neuropathy which occurs at the root (radicule) of the nerve as it leaves the spinal cord.

- **Segmental Neuropathy**
  - AKA Segmental demyelinating neuropathy
  - Loss of myelin sheath, changes conduction pattern
Case #1

- 72 year old dentist, complains of dragging his right toe. Mild pain in his right knee.
- Hx: Started about three weeks ago. Is progressive.
- Weekend previous, was washing van, moving some furniture to close summer cottage, not much else.
Case #1

- You think (differential)
  - Diabetes?
  - Alcoholism (B12 def?)
  - Sitting position, legs crossed?
  - Recent wt loss

- No history, no recent changes
- One drink daily in evening x 30 years
- Rarely crosses legs, usually ankles if at all
- 155# x 25 years
Case #1

- Washing van?
  - He is about 5’8”, stretching to get top of windows and parts of roof. On tiptoes…”
Case #1

- On Tiptoes…
  - Biceps femoris contracts
  - Soleus contracts
  - Gastroc contracts
- Compress nerve
- Loss of dorsiflexion
Common Peroneal

- Divides into Deep & Superficial
- Deep innervates
  - Tibialis Anterior
  - Extensor digitorum longus/brevis
  - Extensor hallucis longus
Innervation of Anterior Compartment = Deep Peroneal
Common Peroneal Compression

- Third most common compression neuropathy

- Etiology
  - Leg hooked over rail (bedridden, comatose, post operative)
  - Strawberry Pickers palsy
    - Time spent in squatting position
  - Ankle Sprains (always check fibular head)
Common Peroneal Compression

- New Meditators or New to Yoga
  - “lotus position”
- Natural Childbirth
  - Time spent squatting
  - Holding knees (wrist can compress at fibular head)
- Idiopathic
Common Peroneal Compression

- Treatment?
- Posterior fibular head
- Muscle Energy on gastroc/soleus
- Muscle Energy on Biceps femoris
- How do you know when you are done?
  - Pain resolves
  - Dorsiflexion returns to normal
Case #2

- A 34 year old female stockbroker comes to your office with a complaint of foot pain. On weekends she plays volleyball with a few of her old teammates from college in an amateur league.
- The pain started the week after a teammate came down on her foot. She did not notice much pain until later in the week.
Case #2

- She denies any diabetic, alcohol, nutritional or other problem.
- Systemic signs of disease are absent.
- On examination
  - Patellar reflex intact
  - Achilles reflex intact but when you dorsiflex her foot, she winces.
Case #2

- You pursue the pain and she notes that the tap was not painful but when your hand grasped her foot, the pain was on the dorsum of the foot.
- You test your hypothesis by plantar-flexing her foot which exacerbates her pain.
- Sensory evaluation of the foot reveals numbness between the first and second toes and not much further.
Anterior Tarsal Tunnel Syndrome

- You further localize the compression and the nerve by dorsiflexing the foot and then asking her to dorsiflex her big toe. Attempting to do so exacerbates the pain.
- Her history is positive for pain at night, which has been waking her from sleep more frequently recently.
Anterior Tarsal Tunnel Syndrome

- Which nerve is it?
  - Medial branch of the deep peroneal?
  - Lateral branch of the deep peroneal?
- Which nerve innervates the extensor digitorum brevis?
- Where is the problem?
Anterior Tarsal Tunnel Syndrome

The Problem:
Compression of the nerve at the inferior flexor retinaculum
- injury
- talonavicular dysfunction
- prolonged plantar flexion
- compression from shoes
  shoe straps
  shoes tied too tight
Summary:
Anterior Tarsal Tunnel Syndrome
Treatment

- Remove compressive forces
- Myofascial release of inferior flexor retinaculum
- Release talonavicular joint – Traction tug
- Hiss whip for navicular, cuneiforms, 1\textsuperscript{st} – 2\textsuperscript{nd} metatarsal
Tarsal Tunnel Syndrome
(NOT anterior tarsal syndrome)

- Difficult Diagnosis
  - Pain on plantar surface of the foot
  - Not very specific
  - Does not affect large foot muscles
    - Difficult to test toe intrinsics…
    - Extrinsic compensate very well
  - May be described as burning, itching, tightness, numbness.
  - Gait seldom affected
Tarsal Tunnel Syndrome

Calcaneal branches of posterior tibial
-many variations
some branch above retinaculum
some branch through retinaculum
very few branch distal to retinaculum.
Tarsal Tunnel Syndrome

- Etiology
  - Trauma to medial malleolus – MVA
  - Congenital
  - Autoimmune
    - RA, Ankylosing spondylitis
  - Diabetes
  - Tumors
  - Lifestyle (long periods of standing…)}
Treatment

- Tibial ligaments/fascia
  - May be posterior to normal position
- Talo-calcaneus tx
- Stretch the ligaments
  - Roof of the ‘tunnel’
- Talonavicular
Saphenous Nerve Syndrome

- Athletes
  - Body builders
- Femoral Arteriography
- Vascular surgery
- Higher than average – thrombophlebitis
  - Inflammation causes nerve & vein to expand in canal, increases compression
Saphenous Nerve Syndrome

Saphenous N
Branch of Femoral
-separates just below inguinal ligament
-may be compressed at vaso-adductor membrane
Saphenous Nerve Syndrome

Saphenous Nerve Compression

- Sartorius

- Between Adductor longus & vastus medialis

Saphenous Nerve below knee

- infrapatellar branch

- medial leg and foot – descending branch
Saphenous Nerve Syndrome

- Clinical symptoms
- Medial leg pain when walking
- Medial knee pain
- May be painful on resisted adduction
- Tinel’s anywhere along path of nerve
Treatment

- Muscle energy
  - Sartorius
  - Adductor longus
  - Vastus medialis

- Fascial Treatments
  - Inguinal area
  - Vaso-adductor membrane
  - Medial knee fascia
Meralgia Paresthetica

- Compression of the lateral femoral cutaneous nerve, usually under the inguinal ligament
- Sensory only
- Symptoms include
  - Numbness on anterolateral thigh
  - Burning pain in same area
  - Hypesthesia to the point of not putting anything in the pockets over the area
  - Late sign: trophic skin changes
Meralgia Paresthetica

- Causes
  - Very intense athletics
  - Obesity
  - Tight girdle, tight clothing
  - Seat belt misplacement or post accident
  - Anatomic anomaly, ie through the sartorius
Meralgia Paresthetica

- Treatment
  - Relieve tension in Pelvic Diaphragm
  - Muscle energy to Psoas
  - Myofascial release to inguinal canal
  - Find and fix lumbar, innominate and sacral problems
  - Muscle energy or MFR to sartorius
Meralgia Paresthetica

- Usual area of entrapment is at inguinal canal
Possible distribution areas
**Sciatic Neuropathy**

Cause: Trauma at sciatic notch or gluteal region (hip dislocation, fracture, or replacement), prolonged bed rest, deep-seated pelvic mass, piriformis syndrome

Sxs: Lower leg pain and weakness

Signs: Sensory loss in peroneal, tibial, and sural territories, normal patellar reflex, foot drop less common

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**Femoral Neuropathy**

Cause: Mid thigh or pelvis trauma (hip, pelvis or femur fracture, mass, ischemic nerve infarction or, hip replacement, lithotomy position, diabetes mellitus)

Sxs: Leg pain, Quadriceps weakness and sensory loss over thigh and shin

Signs: sensory loss, decreased patellar reflex

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**Meralgia Paresthetica**

Cause: Compression of lateral femoral cutaneous nerve at inguinal ligament Obesity, tight fitting belts, idiopathic

Sxs: Paresthesias and pain radiating down the lateral thigh to knee, paresthesias and/or sensory loss

Signs: Minimal sensory loss

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**Common Peroneal Neuropathy**

Cause: Compression just below fibular head from prolonged lying, leg crossing, squatting, leg cast

Sxs: Foot drop, paresthesias and/or sensory loss

Signs: Foot drop/weakness on foot dorsiflexion and eversion; sensory loss on dorsum of foot

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**Tarsal Tunnel Syndrome – Tibial nerve entrapment**

Cause: Fracture or dislocation of talus, calcaneus, medial malleolus, rheumatoid arthritis, tumor, diabetes alone?

Sxs: Aching, burning, numbness, tingling on plantar foot, distal foot, toes, and occasionally heel, paresthesias and/or sensory loss

Signs: Positive Tinel's sign over nerve posterior to medial malleolus; sensory loss on plantar foot; atrophy of foot muscles if severe

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**Distal Peroneal Neuropathy**

Cause: Trauma to dorsum of foot or ankle/distal peroneal nerve, tight-fitting shoe rim or strap

Sxs: Dorsal foot paresthesias and/or sensory loss

Signs: Minimal sensory loss

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Taken from a lecture by Jim Bailey, MD

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