

PERONEAL NERVE DYSFUNCTION IN SPINE CARE

DEMIAN YAKEL, DO

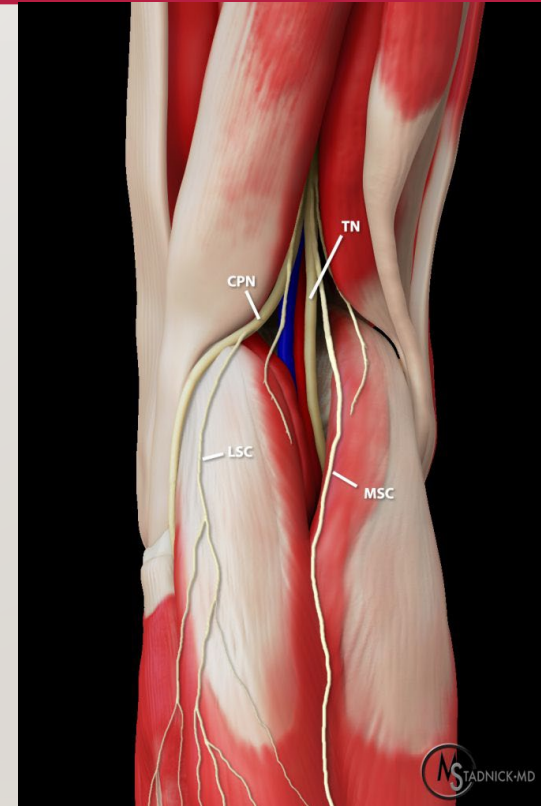
ORTHOPEDIC SPINE SURGEON

MISSION SPINE

ASHEVILLE, NC

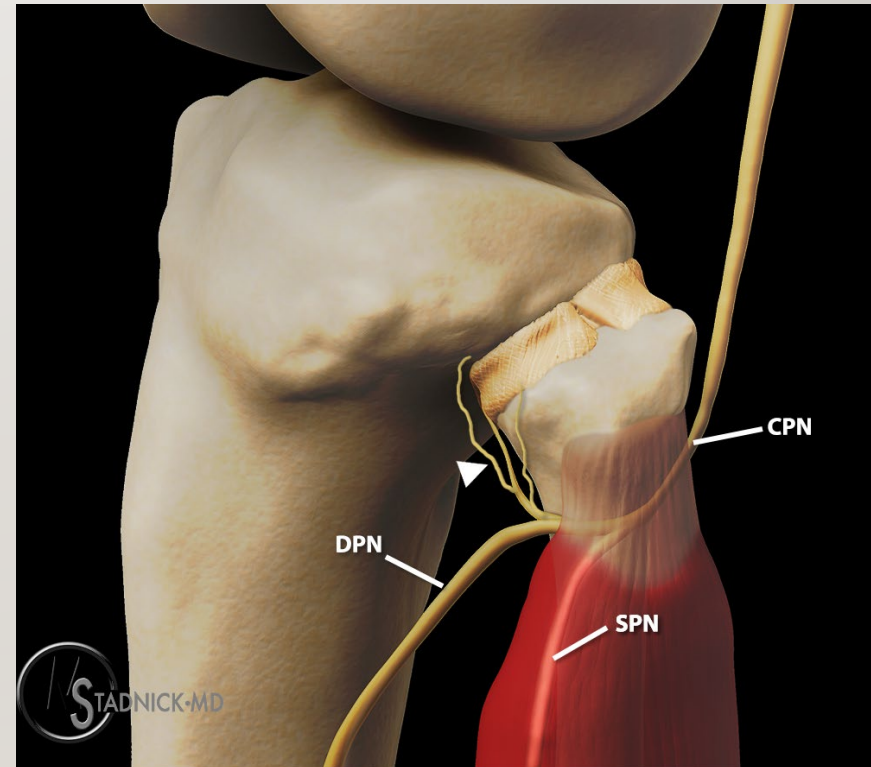
ANATOMY: PERONEAL NERVE

- One of 2 major branches off the Sciatic Nerve (Tibial nerve)
- Receives fibers from the posterior divisions of L4-S1 Nerve roots
- After branching off the sciatic N. it continues down the thigh, running posteroinferior to the biceps femoris muscle, and crosses laterally to the head of the lateral gastrocnemius muscle through the posterior intermuscular septum, becomes subcutaneous as it curves around the head of the fibula deep the peroneus longus muscle.
- Gives off the lateral cutaneous nerve of the calf the divides into the superficial and deep and articular branches.
- DPN lies on the bony surface of the fibula predisposing it to compression



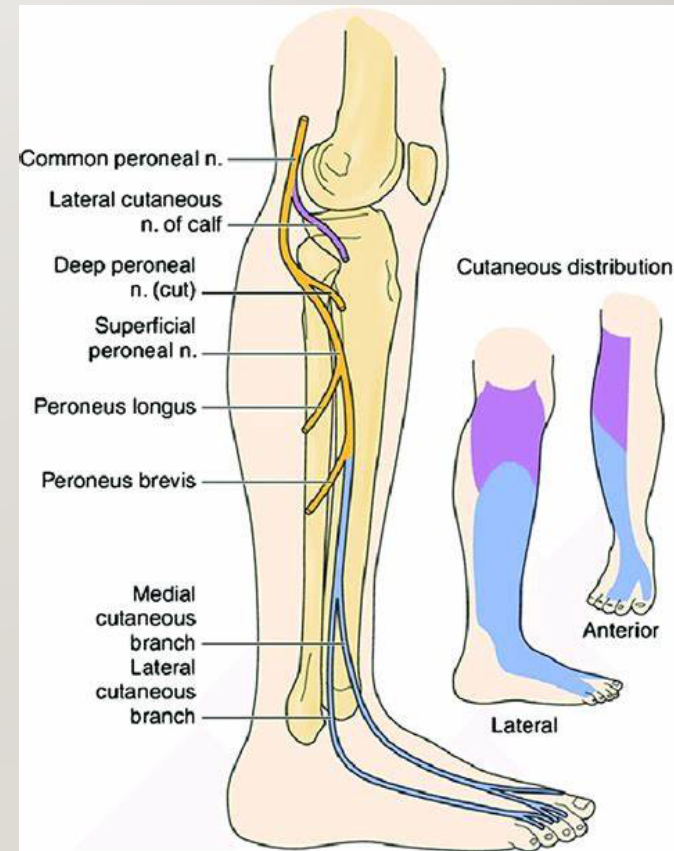
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ANATOMY: COMMON PERONEAL NERVE

- No motor component
- Sensory innervation to the lateral leg via the lateral sural nerve (light blue)

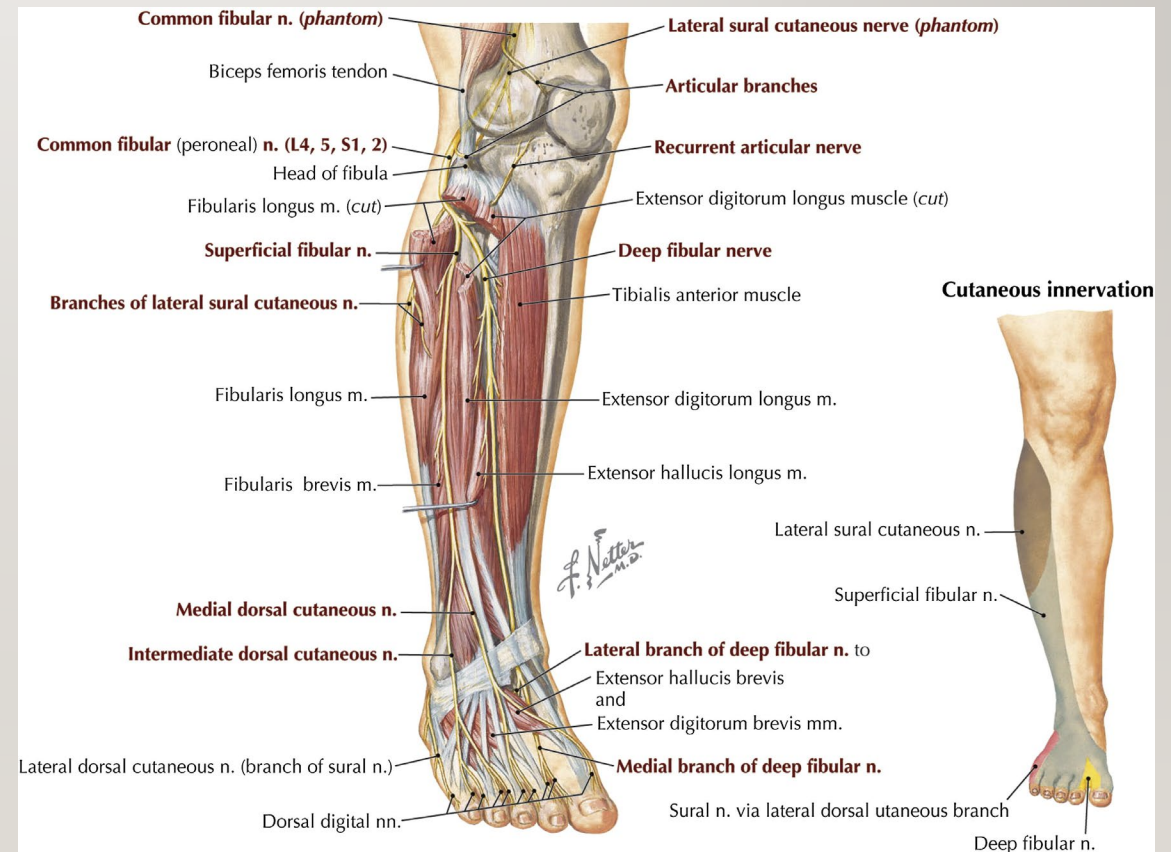


ANATOMY: COMMON PERONEAL NERVE

- Superficial: Innervates the lateral compartment of the leg (Peroneus Longus and brevis) and sensory to lateral leg.
 - Lies on the cortex of the fibula shaft in the mid leg then pierces the fascia anterior to the bone 10-12cm proximal to tip of the fibula. Terminates as the intermediate and medial dorsal cutaneous nerves.
- Deep: Anterior compartment of the leg and dorsum of the foot.
 - Travels 3-4mc along the fibula cortex then courses distally.
 - Then travels with the anterior tibial artery anterior and medial to intermuscular septum between anterior and lateral compartments.
 - Supplies foot and toe dorsiflexors

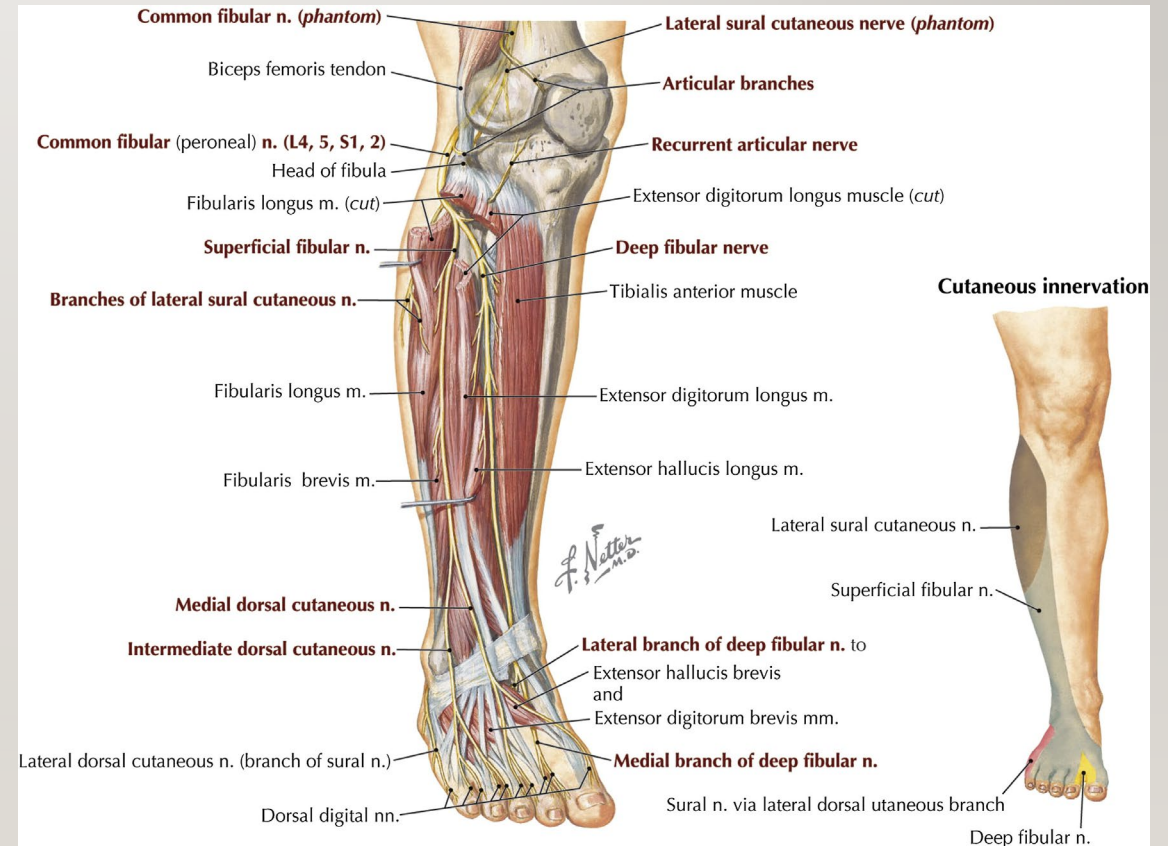
SUPERFICIAL BRANCH OF PERONEAL NERVE

- Motor
 - Lateral compartment
 - Peroneus Longus
 - Peroneus Brevis
- Sensory
 - Anterolateral leg
 - Distal 1/3 of leg and majority of the dorsum of the foot



DEEP BRANCH OF PERONEAL NERVE

- Anterior Compartment
 - Motor
 - Tibialis anterior
 - Extensor Hallucis Longus
 - Extensor digitorum longus
 - Peroneus tertius
 - Sensory
 - First Dorsal webspace



ETIOLOGY

- Most common LE Mononeuropathy
- 3rd overall after median and Ulnar
- Traumatic
 - Knee dislocations (40%) *7
 - Impact/penetrating trauma, laceration
 - Proximal fibula fracture
 - Compartment syndrome
- Atraumatic
 - Fibrous band at the origin of the peroneus longus

ETIOLOGY

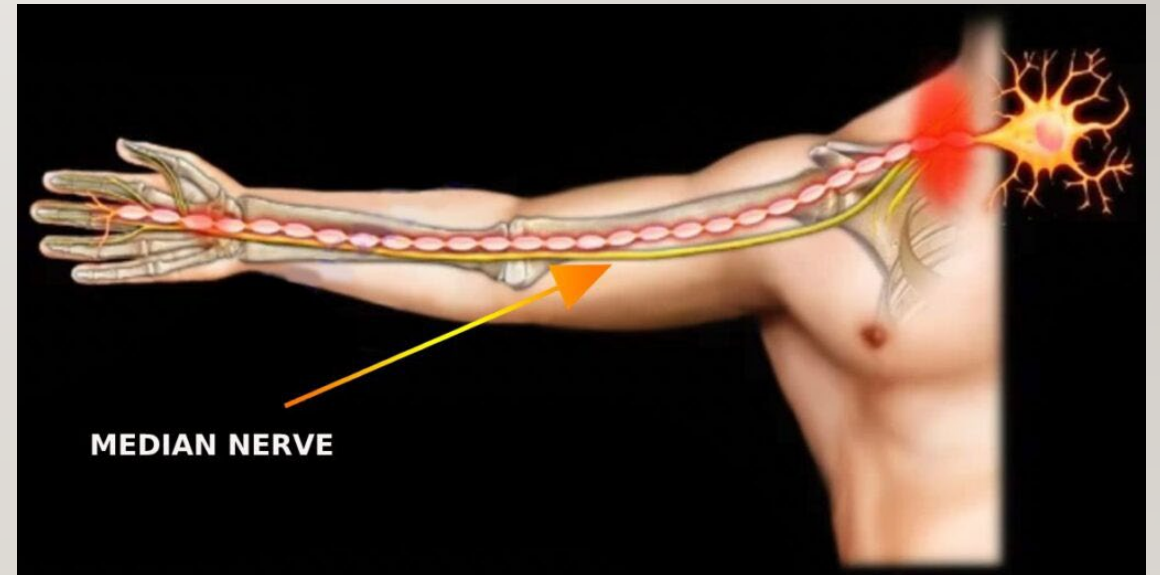
- Iatrogenic
 - Valgus correction TKA
 - THA (sciatic notch tension)
 - Post/lateral portion of sciatic – most vulnerable than tibial component
- External Compression Source
 - Splint/Cast
 - Compression wrap/Socks
 - Habitual leg crossing
 - Prolonged bed rest
 - Anesthesia/surgical positioning

ETIOLOGY

- Systemic Illness
 - Diabetes
 - Thyroid disease
 - Vascular disease
 - Alcoholism
 - Inflammatory conditions
 - Motor neuron disease
 - Upper – Brain
 - Lower – Spinal cord
 - Anorexia nervosa/Weight loss
 - Loss of subcutaneous fat at fibular head

DOUBLE CRUSH

- Focus of presentation
 - Two lesions with little or no independent clinical ramifications when combined, lead to magnification of symptoms
 - Constraints of axoplasmic flow in nerve fibers
 - Between 10-70% of symptomatic patients
 - 34-74 years of age
 - Female Prevalence
 - Literature heavy on UE, Scant on LE



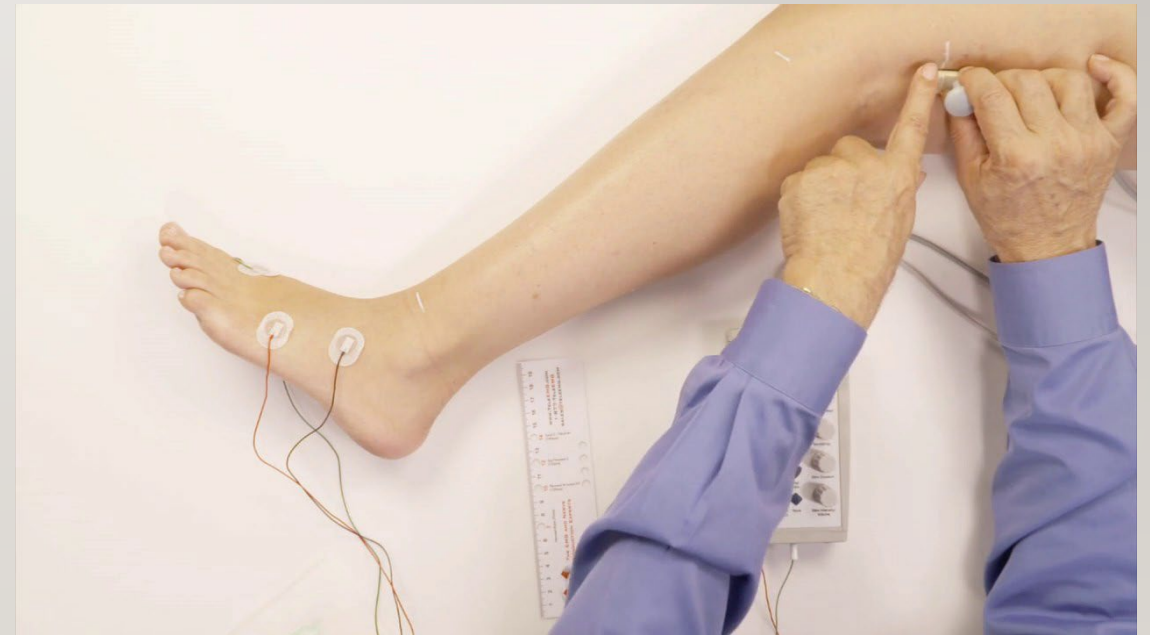
CLINICAL EXAMINATION

- Knee, Foot and ankle alignment
- Sensory, vascular, reflex and skin examination
- Foot slapping gate
- Steppage gate – Hip and knee flexion
- Vaulting – Contralateral plantarflexion with swing phase
- Circumduction gate
- Tinel's Sign at the proximal fibula



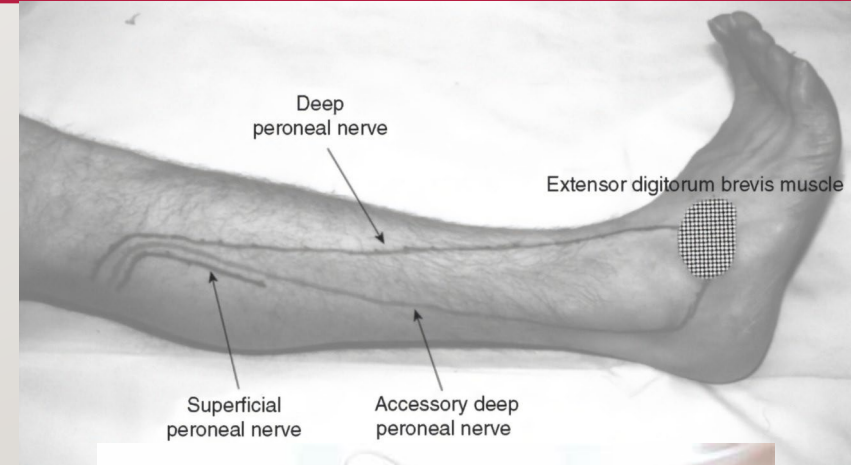
DIAGNOSTIC TESTING

- Electrodiagnostic
 - Nerve Conduction Studies - NCS
 - Measuring amplitude, velocity and latency responses to electrical stimulation to motor, sensory or mixed peripheral nerve fibers.
 - Sensory nerve abnormalities are shown by slowed conduction and/or decreased amplitude in myelination issues or axon loss. Motor axonal damage or demyelination cause similar abnormal patterns.
 - However muscle atrophy/muscle fiber damage and neuromuscular junction pathology can cause NCS abnormalities which can not be differentiated with NCS alone.



DIAGNOSTIC TESTING

- Electrodiagnostic
 - Electromyography - EMG
 - Needle electrodes inserted into muscle evaluates bioelectrical activity
 - Sensory stimulation (needle insertion)
 - Spontaneous activity (sharp wave and fibrillations)
 - Nerve activation (motor unit action potentials)
 - Can describe or pinpoint diagnosis of peripheral nerve pathology, neuromuscular junction or muscle pathology



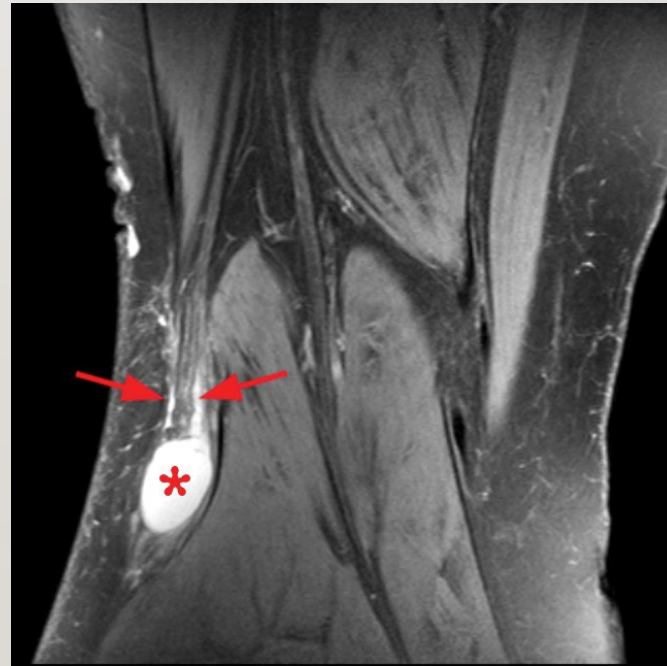
ADVANCED IMAGING

- X-Ray, CT
 - Bony growth
 - Osteochondroma
 - Melorheostosis,
 - Hyperostosis disorder,
 - Fabella, Posterolateral sesamoid
 - Fracture



ADVANCED IMAGING

- MRI
 - Tumor, schwannoma, ganglion cyst
 - Facial herniation of peroneal muscles
 - Stress fracture



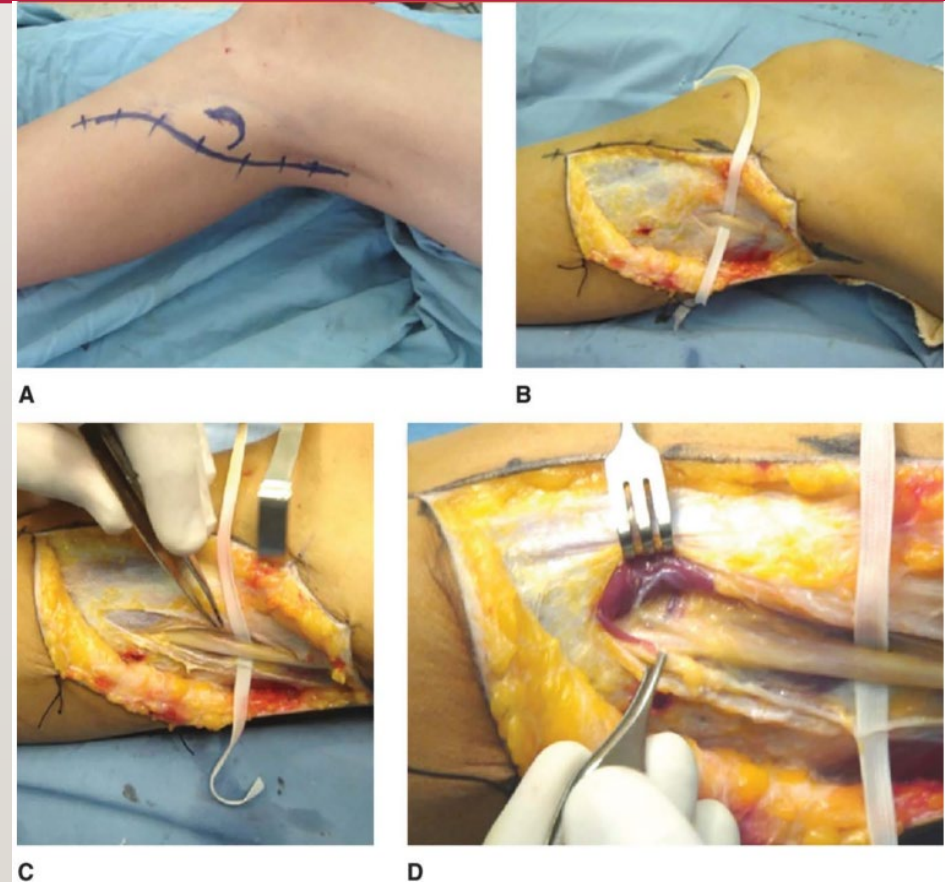
TREATMENTS

- Non-surgical
- Address Medical Disorders
- Physical therapy
 - Strengthening
 - Stretching
 - Mobilization
 - Neuro-mobilization
 - AFO

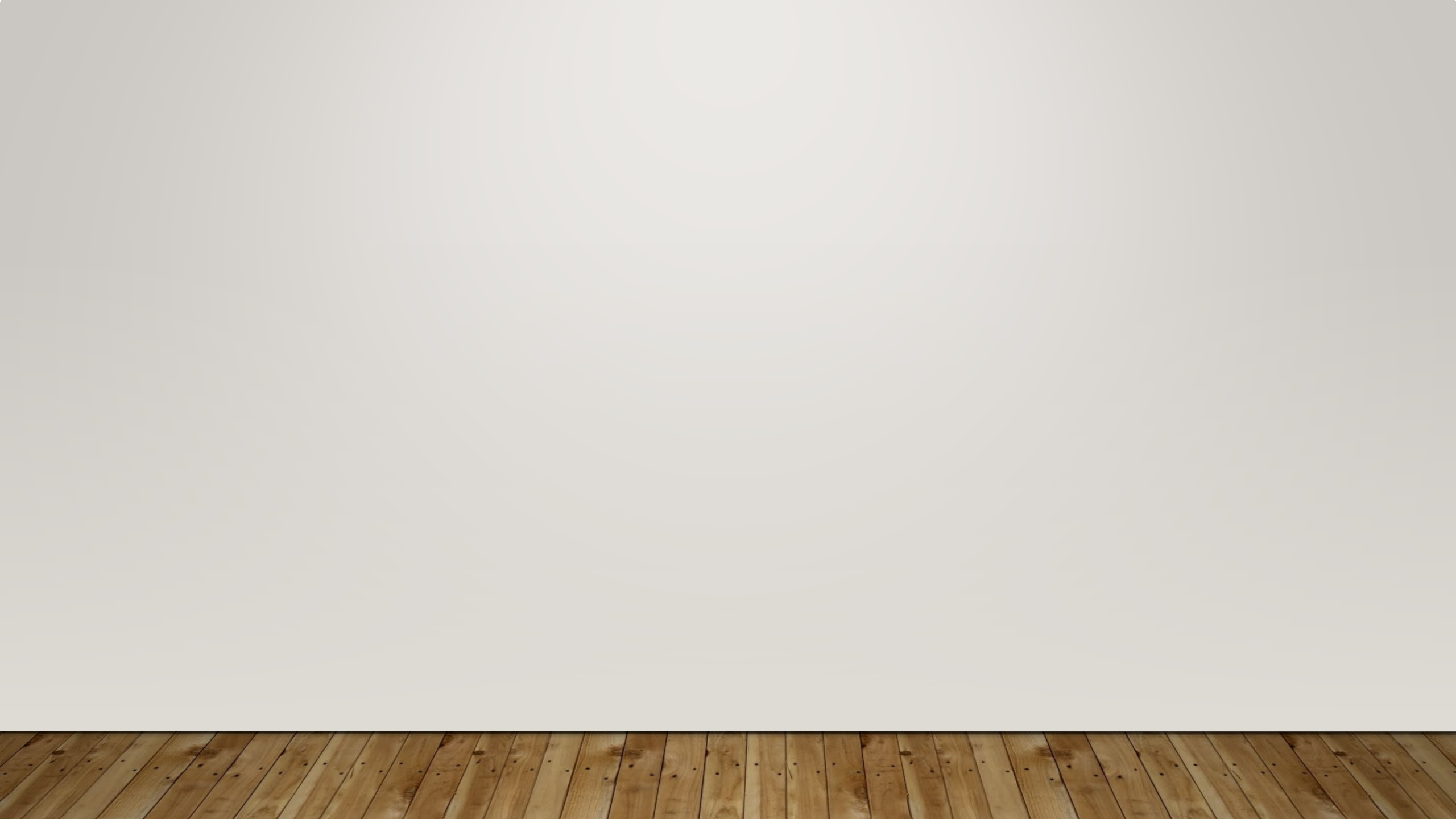


TREATMENTS

- Surgical
 - Mainstay of treatment options
 - Shown to rapidly and significantly improve symptoms



Intraoperative photographs demonstrating the authors' preferred technique for surgical management of peroneal nerve palsy. **A**, The fibular head and incision are marked on the skin. **B**, The common fibular nerve is identified proximally and tagged with a vessel loop. **C**, Incision of the fibular tunnel at the site of compression. **D**, The nerve is released, as distally as possible, down to the bifurcation into superficial and deep peroneal nerve branches. (Reproduced with permission from Maalla R, Youssef M, Ben Lassoued N, Sebai MA, Essadam H: Peroneal nerve entrapment at the fibular head: Outcomes of neurolysis. *Orthop Traumatol Surg Res* 2013;99[6]:719-722.)



MY EXPERIENCE

- 45 surgical cases
- Age ranging from 17 – 77 y/o
- 17 Isolated Peroneal Compression Pathology
 - 2 bilateral
 - 1 ganglion cyst from proximal tib-fib joint
- 25 Post-lumbar surgery found to have PN entrapment
 - 3 bilateral
- 41/42 full recovery of sensory, pain and motor
- 1 case improved pain and sensory, no motor recovery