FOOT DROP

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I HAVE NO DISCLOSURES

WHAT IS FOOT DROP?

- Weakness or inability to dorsiflex the ankle
- Common condition with significant functional impact
- Affects mobility, fall risk, and quality of life
- Many potential causes

MOTOR PATHWAY TO DORSIFLEXORS

Cerebral cortex → corticospinal tract → anterior horn cells

L4-L5 nerve roots → lumbosacral plexus

Sciatic nerve → common peroneal nerve

Deep peroneal nerve → tibialis anterior, extensor hallucis longus, extensor digitorum longus

COMMON ETIOLOGIES

- L5 radiculopathy
- Common peroneal neuropathy

OTHER IMPORTANT ETIOLOGIES

- Central nervous system lesions (stroke, MS, spinal cord injury)
- Lumbosacral plexopathy
- Sciatic neuropathy
- Polyneuropathy (diabetes, toxic, hereditary)
- Anterior horn cell disease
- Myopathy

MECHANISMS OF PERONEAL NEUROPATHY

Compression/Entrapment: Prolonged positioning, habitual leg crossing, casts/braces

Traction/Stretch: Knee dislocation, ankle inversion injuries

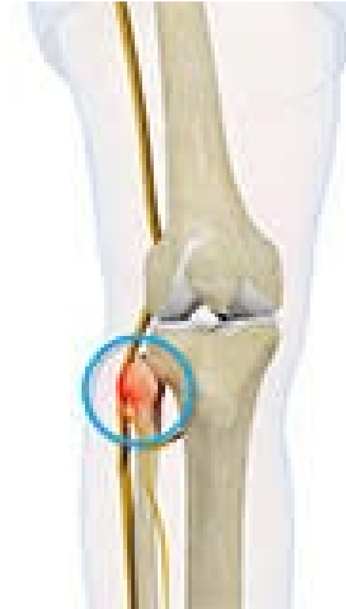
Transection/Laceration: Trauma, surgical injury

Intraneural ganglion cyst: Rare but important to identify

ANATOMICAL CONSIDERATIONS

Vulnerable at fibular head

Superficial location makes it susceptible to compression



CLINICAL EVALUATION - HISTORY

Onset: Acute vs. gradual

Mechanism: Trauma, surgery, positional, spontaneous

Associated symptoms: Pain (radicular vs. local), sensory changes, weakness in other muscle groups

Medical history: Diabetes, prior back problems, recent procedures

Functional impact: Gait changes, falls, use of assistive devices

RED FLAGS

- Bilateral symptoms
- Bowel/bladder dysfunction
- Progressive weakness
- Upper motor neuron signs

PHYSICAL EXAMINATION

- Ankle dorsiflexion strength (tibialis anterior)
- Great toe extension (extensor hallucis longus)
- Ankle eversion (peroneus longus/brevis)
- **Hip abduction strength** - Critical differentiating test
  - Weak hip abduction → L5 radiculopathy
  - Normal hip abduction → Peroneal neuropathy

PHYSICAL EXAM – ADDITIONAL FINDINGS

- **Sensory Examination:**
  - L5 dermatome (lateral leg, dorsum of foot)
  - Superficial peroneal distribution (dorsum of foot)
  - Deep peroneal distribution (first web space)
- **Reflexes:**
  - Ankle reflex (S1) - should be normal in isolated foot drop
  - Knee reflex (L4) - assess for multilevel involvement

GAIT ASSESSMENT

- Steppage gait pattern
- Circumduction
- Foot slap during heel strike
- Trendelenburg (if hip abductor weakness)

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ORTHOTIC INTERVENTION

Ankle-Foot Orthoses (AFO):

- **First-line treatment** for most patients
- Prevents foot drop during swing phase
- Reduces fall risk and improves gait efficiency

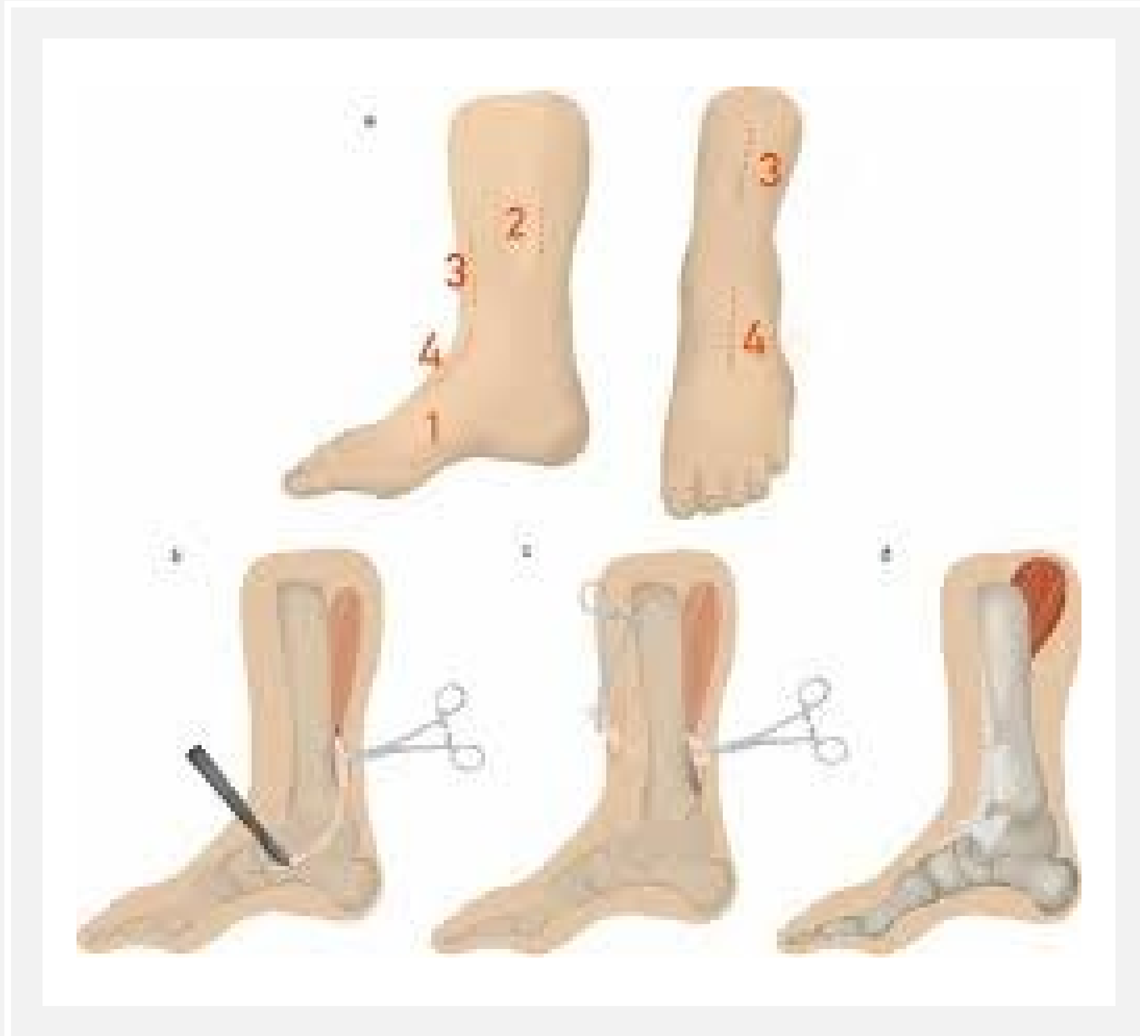
PHYSICAL THERAPY

Therapeutic Exercise Program:

- Strengthening of dorsiflexors and compensatory muscles
- Range of motion to prevent contractures
- Gait training with assistive devices
- Balance and proprioception training

SURGICAL INTERVENTION

Peroneal nerve decompression at the fibular head



SURGICAL INTERVENTION

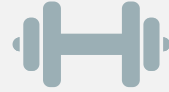
Indications for Tendon Transfer

- Chronic foot drop (>2 years without recovery)
- Failed nerve decompression
- Functional disability despite conservative management

Common Procedures:

- Posterior tibial tendon transfer (most common)

PREREQUISITES



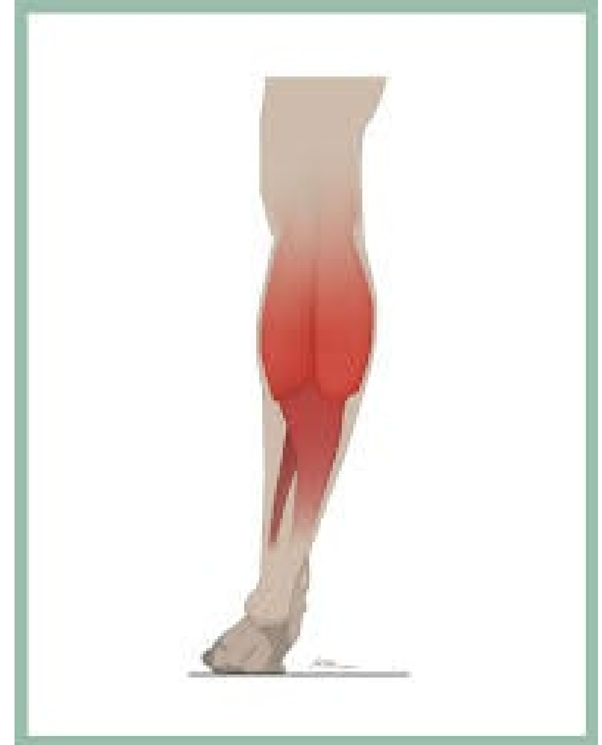
Adequate donor muscle strength

Correctible deformity

Adequate soft tissue coverage

SPASTIC FOOT DROP

Address contractures, spasticity, then weakness



TREATMENT OPTIONS

Botulinum toxin injections for spasticity

Serial casting for contractures

AFO for support

Tendon lengthening procedures

DIABETIC NEUROPATHY

Length-dependent process

Often bilateral and symmetrical

Associated with sensory loss

MANAGEMENT CONSIDERATIONS

Glycemic control optimization

Careful skin monitoring with AFO use

Fall prevention strategies

Multidisciplinary approach (endocrinology, podiatry)

CASES

THE LEG CROSSER

38-year-old male software engineer, presents with 3-week history of progressive right foot slapping while walking

Works 10–12 hours/day at desk, habitually crosses right leg over left

Recently lost 15lbs on a new diet

Noticed tingling on top of right foot 4 weeks ago, then weakness

No back pain, no trauma, no prior surgeries

EXAMINATION

Ankle dorsiflexion: 3/5

Great toe extension: 3/5

Ankle eversion: 4/5

Ankle plantarflexion: 5/5

Ankle inversion: 5/5

Hip abduction: 5/5

Tinel's sign positive at fibular head

Sensory loss over dorsum of foot

ELECTRODIAGNOSTICS

Peroneal motor NCS: Conduction block across fibular head (50% amplitude drop)

Superficial peroneal SNAP: Reduced amplitude

Tibial motor NCS: Normal

EMG: Fibrillations in tibialis anterior; normal medial head of gastrocnemius, short head of biceps femoris and lumbar paraspinals

DISCUSSION

Classic compressive peroneal neuropathy at fibular head

Weight loss is a well-known risk factor

Conduction block indicates neurapraxia — favorable prognosis

Management: Behavior modification (stop crossing legs), AFO, PT

Expected recovery: 3–6 months with conservative management

If no improvement by 3 months → consider MR neurography if available/MRI knee and surgical decompression

THE DIAGNOSTIC DILEMMA

62-year-old male with diabetes presents with 6-week history of left foot drop and low back pain radiating to the lateral leg

Type 2 diabetes for 15 years, A1c 8.2%

Chronic low back pain, worsened 6 weeks ago after lifting heavy box

Left leg pain radiating from buttock to lateral calf

Numbness in left foot

No bowel/bladder dysfunction

EXAMINATION

Ankle dorsiflexion: 2/5

Great toe extension: 1/5

Ankle eversion: 4/5

Ankle inversion: 4/5

Hip abduction: 4/5

Positive straight leg raise

Decreased sensation L5 dermatome AND dorsum of foot

Ankle reflex intact, knee reflex intact

Mild stocking-glove sensory loss bilaterally (baseline neuropathy)

DIAGNOSTICS

MRI L spine: Large L4-L5 paracentral disc herniation with severe L5 nerve root compression

Electrodiagnostics:

- Peroneal motor NCS: Reduced amplitude bilaterally (worse on left), no conduction block at fibular head
- Superficial peroneal SNAP: Absent bilaterally
- Tibial motor NCS: Mildly reduced amplitude bilaterally
- EMG: Fibrillations in left tibialis anterior, tibialis posterior, and gluteus medius; active denervation in left L5 paraspinals
- Right side: Chronic neurogenic changes in distal muscles

- **Dual pathology:** L5 radiculopathy superimposed on diabetic polyneuropathy
- Hip abductor weakness and paraspinal denervation confirm radicular component
- Bilateral SNAP abnormalities suggest underlying polyneuropathy
- Diabetes is an independent risk factor for foot drop with disc herniation
- This patient has multiple poor prognostic factors: diabetes, severe weakness, and nerve compression on MRI
- Surgical consultation warranted — early decompression associated with better motor recovery

LEARNING POINTS

In diabetic patients, consider dual pathology

Double crush phenomenon — a proximal lesion (radiculopathy) makes the nerve more vulnerable to distal compression, and vice versa

Electrodiagnostics are essential to sort out the contributions of each lesion

THE STROKE PATIENT

68-year-old male, 3 weeks post-right MCA stroke, referred to inpatient rehabilitation with left foot drop

Acute right MCA ischemic stroke with left hemiparesis

Received IV tPA within window

Left upper extremity: 2/5 throughout

Left lower extremity: Proximal 3/5, ankle dorsiflexion 1/5

Significant left ankle plantarflexor spasticity (Modified Ashworth 2)

Unable to ambulate independently

EXAMINATION

Left ankle dorsiflexion: 1/5 with increased tone

Passive ankle dorsiflexion limited to neutral due to gastrocnemius/soleus tightness

Hyperreflexia left lower extremity

Left ankle clonus

DISCUSSION

Upper motor neuron foot drop

Spasticity is the primary barrier, not just weakness

Management hierarchy: Address contracture → Manage spasticity → Address weakness

Treatment plan:

- Rigid AFO initially for safe gait training
- Aggressive stretching and serial casting if contracture develops
- Botulinum toxin to gastrocnemius/soleus if spasticity limits function
- Transition to articulated AFO as spasticity improves

ESSENTIAL POINTS

Accurate localization is critical - check hip abduction strength and electrodiagnostics

Most common causes: L5 radiculopathy and peroneal neuropathy

AFO is first-line for most patients, get patients into PT

Tendon transfer for chronic cases (>2 years)

Interdisciplinary approach optimizes patient care

Goals: Improved mobility, fall prevention, quality of life

THANK YOU