

# ELECTRODIAGNOSIS & REHABILITATION

INAUGURAL ISSUE 1997→2012

## UPDATE

SURINDERJIT SINGH, M.D., M.S.\*† EMERITUS

MOHAMMAD A. SAEED, M.D., M.S.\*

YEARLY PUBLICATION

EDGAR S. STEINITZ, M.D.\* ‡ † --- EDITOR-IN-CHIEF

IRFAN ANSARI, M.D.\* § †

SRINI SUNDARUM, M.D., M.P.H.\* §

TABASSUM SAEED, M.D., M.S.\*†

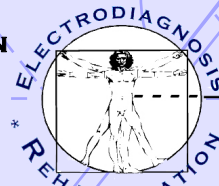
STEPHEN C. SETTLE, M.D.\*

HUI WANG, M.D.\*

WWW.ELECTRODX.COM &

WWW.ELECTRODIAGNOSIS.NET

\* FOUNDED 1981\*



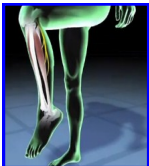
2201 S. 19th Street #104  
Tacoma, WA 98405  
(253) 272-9994  
Fax (253) 572-0468

JULY, 2012

VOLUME 13, ISSUE 1

BOARD CERTIFIED ABPM&R \*, ABEM †, ABPM ‡ ABIM §

### 'Differential Diagnosis of Foot Drop', Edgar S. Steinitz, M. D., Editor-In-Chief



The colloquial & medical term '**Foot Drop**' describes weakness of foot dorsiflexors, usually toe extensors & often everters resulting in steppage gait & destabilizing ankle control → risk for falls & injury. Different is '**Flail Foot**' which involves plantar flexors as well. The most likely etiology is common peroneal neuropathy at the fibular head (fig. 1), but the differential diagnosis is varied (fig. 2 & 3). While peripheral & lower motor neuron lesions are most common, upper motor neuron lesions must also be considered due to spinal cord or motor strip involvement. **Determine:** Where, Why, How severe & What to do?

**EDX (EMG/NCS) - Critical to determine the severity, acuity, location & to prognosticate.**

#### Differential Diagnosis - Foot Drop

| Lower Motor Neuron (LMN)                                                                                                           | Peroneal Neuropathy (Fibular Head) *                                                     |
|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>See Table 1, Page 2.</b><br><b>Foot Drop, Clinical &amp; Electrophysiologic Features: UMN vs. LMN Differential Presentation</b> | Sciatic Neuropathy                                                                       |
|                                                                                                                                    | LS Plexopathy                                                                            |
|                                                                                                                                    | L5 Radiculopathy                                                                         |
|                                                                                                                                    | Peripheral Neuropathy                                                                    |
|                                                                                                                                    | Poliomyelitis                                                                            |
| Upper Motor Neuron (UMN)                                                                                                           | Cauda Equina Lesions                                                                     |
|                                                                                                                                    | ALS/Motor Neuron Disease                                                                 |
|                                                                                                                                    | Spinal Cord Lesions                                                                      |
|                                                                                                                                    | Spinal Stenosis/Myelopathy                                                               |
|                                                                                                                                    | Cortical/Motor Strip Lesions                                                             |
| Nonorganic                                                                                                                         | Conversion Disorders, Psychogenic                                                        |
| Unilateral                                                                                                                         | Most Peripheral & Central Lesions                                                        |
| Bilateral                                                                                                                          | Hereditary Factors, GPN ‡, MND, CES                                                      |
| * Peroneal - Extrinsic                                                                                                             | Masses, Ganglion or Baker's Cyst, Callus, Tumor, Osteomas, Hemangiomas                   |
| - Intrinsic                                                                                                                        | Nerve sheath tumors, vascular predisposition, GPN (Diabetes, Pernicious Anemia, Leprosy) |
| ‡ Hereditary                                                                                                                       | Charcot-Marie-Tooth (CMT), Hereditary Neuropathy with Liability Pressure Palsy ( HNPP)   |

#### Tidbits:

- 0.3 - 0.4% after TKR, but 2-13% after proximal tibial osteotomy
- 2.8 X higher after epidural vs. general anesthesia for TKR
- When subsequent to THR, 70% have lumbar spinal stenosis

#### Muscle Grading:

- 0 = complete paralysis
- 1 = flicker contraction
- 2 = contraction with gravity eliminated
- 3 = contraction against gravity
- 4 = contraction against gravity + resistance
- 5 = contraction against powerful resistance (normal strength)

Foot drop ≠ Foot slap - the later an audible foot slap on heel strike, although often concurrent.

Fig 1. Peroneal Nerve

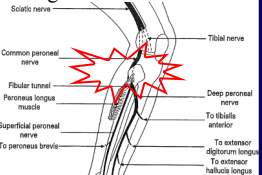


Fig 2. L5, Plexus & Sciatic

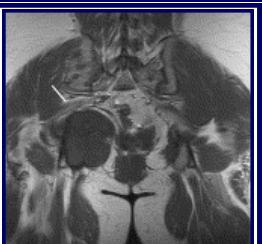
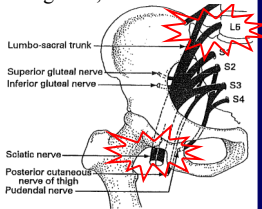


Fig 3. T1WI pelvis. Neurofibromatosis type I. Note large dumbbell-shaped mass within the right sciatic notch displacing sciatic nerve.



Fig 4. External 'New Aide'® Walking System.

**Evaluation - EDX (EMG/NCS):** Determines presence, severity, acuity & location LMN lesion & prognosticates

**X-Ray:** Post-trauma tibia/fibula & ankle to uncover bony injury; when concern for a Charcot joint

**US:** Helpful if bleeding is suspected S/P THR or TKR

**MRN/MRI:** If tumor concern, MRN to define specific neuronal pathology (can show fascicular organization)

**Labs:** FBS, HbA1C, ESR, CRP, SPE/IEP, BUN/Creatinine, B12 levels

**Treatment - Conservative/Medical vs. Surgical = f(etiology):** 1. Define cause & location 2. Severity 3. Prognosis

**If painful:** Meds - Tricyclics, Pregabalin, Gabapentin; Topicals - Diclofenac and/or Capsaicin; Minimize opioids if possible; Experimental Erythropoietin/EPO (neuroprotective - anti-apoptotic & anti-inflammatory (5000 IU/kg over 1 week); Sympathetic blocks. **Vitamin deficiency:** Replace (B1, B6, B12); **Labile Diabetes:** Control, A1C < 7.0. **AFO:** (Dorsi-flexion assist swing phase, medial/lateral stability stance, push-off simulation late stance. If trimmed posterior to malleolus, posterior **leaf-spring** type → allows plantarflexion heel strike (for flaccid foot drop or mild spasticity). Shoe clasp orthosis only for flaccid conditions (provides no ankle stability). **Nerve stimulation:** External (fig.4), or Internal '**neuro-prosthesis**' using radio-frequency (swing phase stimulated for DF & eversion → balanced control (good for mild stroke & TBI). May enhance gait quality & speed. **Surgery: Direct Trauma** - Usually requires surgical repair (decompression with nerve grafting) ± transfer of functional fascicles to deep peroneal innervated muscles (superficial peroneal or tibial as donor, < 1 year out).

**Focal Nerve Insult** (compression, distortion, invasion). Exploration, microdissection & release. **Lumbar Herniation/Stenosis** (~3-4% of cases) → consider discectomy &/or laminectomy (to prevent ischemia of arteriolar supply, the earlier the better). **Sciatic Neuropathy** i.e. S/P THR, if bleeding or hematoma; or shorten prosthetic stem if leg lengthened.

**Chronic Foot Drop:** Tendon transfers ± Achilles lengthening if contracture. When both neurologic & anatomic factors (e.g. Polio or Charcot joint), consider arthrodesis for stability, e.g. Lisfranc & triple or pan-talar arthrodesis.

