Lower Limb PAIN

‘the skinny’

Is it radiculopathy, vulnerability, or Parsonage-Turner?
E.M.G. Diagnosis (886 Abnormal E.M.G.s)

- Lumbar Root
- Cervical Root
- Thoracic Root
- Peripheral Neuropathies
- Anterior Horn Disease
- Myopathic Disease

% of Occurrence

0 20 40 60 80 100
extremitas (eks-trem’I-tas)  
[L. fr. extremus, last, outermost] [NA].  
Extremity; one of the ends of an elongated or pointed structure. 
Incorrectly used to mean Limb.  
See membrum.
Check back for symmetry

- Stand quietly
  - Both feel weight bearing
  - One foot weight bearing
  - Forward flexed
Exam prior to EDX

- Straight Limb Raising
  - Recumbent
  - Recumbent with dorsiflexion after lowering to no sx
  - Sitting
  - Sitting with neck flexion after SLR lowered
L-5 PX

- Walk on heels (only gross test)
- Check strength of Ext H L
  - NB. Must do with ankle plantar flexed and push on proximal phalanx
- Measure atrophy of leg (greatest circumference)
- MSR – lateral HS
NOT DISTAL PHALANX
PROXIMAL PHALANX
S-1 Radiculopathy

- Walking on toes is only a gross test
  - Must do heel raises unilaterally and compare (10)
  - MSR - Ankle jerk
  - Numbness lateral foot and sole
EDX of Lumbar radiculopathy

- Prone position is best
- Land marks
  - Mark L-4 spinous process at level of ilium crest
  - Mark L-5 – next caudal spinous process
  - Mark S-1 – next caudal spinous process
  - Draw diagonal line from post. sup. iliac spine to midline
Maximize relaxation

- Pillow under abdomen
- Pillow under ankles
- If still cannot get relaxation – use other hand to poke fingers in abdomen
Muscles to explore

- Paraspinals
- Same root but 2 different nerves
- One proximal muscle
- One distal muscle
- One muscle ABOVE suspected root
- One muscle below suspected root
Example – L-5 Radiculopathy

- Explore
  - Ant tib
  - Flex dig long
  - Soleus (distal to suspected root)
  - Vastus medialis (proximal to suspected root)
  - Tensor fascia lata (a proximal muscle)
  - Paraspinals
Chronology of L/S radiculopathy

- When radicular pain begins:
  - Recruitment will be reduced (if significant weakness)
  - H reflex latency will be prolonged
  - Early “polyphasic MUP’s” will appear
Needle EMG Abnormalities - chronology

- 1st week – recruitment frequency will be increased
- By 7-8 days – positive waves in paraspinals (Caution – a train will result if in end plate area!)
- 3rd week – abnormal irritability in paraspinals and proximal limb muscles
- 4th week all findings
Recruitment frequency

- In normal muscles the 2d MU will appear when the 1\textsuperscript{st} MU is firing 10-12 Hz
- L-5 radiculopathy – ext dig long 16-18 Hz
- Compare with contralateral muscle

- Easiest – a \textit{single} joint muscle
“Early polyphasic”

- LAMBERT IN 1968 (EEG.CL NEUROPHYSIOL 25:404):
  - A polyphasic MUP can be:
    - A SYCHRONOUS BUT NOT SIMULTANEOUS ACTIVATION OF 2 OR MORE MUP’S
“Early polyphasic”

- 2 axons conduct at different rates thus impulses arrive slightly separated
- Looks like a polyphasic MUP
  - Normal amplitude
  - Increased duration
  - Several MUP’s stucked together
Ephaptic transmission between single nerve fibers in the spinal nerve roots of dystrophic mice.

J. Physiol. 1980. 305:151
‘H’ REFLEX LATENCY IN LUMBAR RADICULOPATHY

- Will be prolonged in S-1 radiculopathy from the onset of radiculopathic pain
- Difference in latency, side-to-side, =or< 1 millisec or even .5 millisec is a red flag.
  - Original study (1974) mean .8 8 =/- S.D. .4 ms
  - More recent series difference side-to-side .3 ms
H-REFLEX OF PAUL HOFFMANN, M.D., 1918

IA AFFERENT SENSORY
From Muscle Spindle

DORSAL ROOT
GANGLION

SPINAL NERVE

Motor Fibers
To Muscle Fibers

From Courtille
Formula to calculate H latency

- \(0.46 \times \text{distance from stimulation to medial malleolus}\)
- + 0.1 \text{ age in years}
- + constant – 9.14

- Difference side to side > 1.0 ms (conservative)
- My opinion is > 0.5 ms is “red flag”
Use of H reflex latency

- Early in course of L/S radiculopathy
- When abnormal irritability is only in paraspinals
- Underlying peripheral neuropathy (diabetic)
- If muscle exploration is confusing
- Post laminectomy with recurrent symptoms
Use of H reflex latency when positive waves are only in paraspinals

- 90 – 95% of all first appearing radiculopathies are L-5 or S-1
- Ratio of frequency – L-5:S-1 = 2:1
- H latency is prolonged – S-1; if normal – L-5
Prognosis

- After 7-10 days an axon undergoing wallerian degeneration will become **inexcitable**

- **Stimulation** of nerve to weak muscle will identify the dead axons (NB. Amplitude, compare with contralateral)
  - L-4 – *ant* tibial or vastus lateralis
  - L-5 – extensor dig long
  - S-1 – medial head gastroc
CLINICAL WEAKNESS
BUT...
NORMAL AMPLITUDE "M"
Muscles to explore

- One proximal muscle (L-5 eg. tensor fascia lata)
- One distal muscle (S-1 eg. Abd hall)
- Muscle from 2 different nerves (L-5 eg. Peron. long; flex dig long) BUT same root
- Paraspinal level above and below
- Contralateral muscle of most abnormality
EMG of PARASPINALS
S/P surgery

- Not significant if abnormalities are all along scar

- Can be significant if localized and:
  - > 3 cm lateral to scar
  - > 3 cm deep
  - Correlate with sx
Dynamic myelogram

- Note the protrusion when lumbar spine is extended
- This demonstrates the *absurdity* of McKenzie exercises
- William flexion exercise program is best
Back surgery rates are higher in the Rocky Mountain states and the Northwest than in the Northeast or the Upper Midwest.
EDX L/S Summary

- Early – Recruitment frequency; H
- >10 days – positive waves in paraspinal; CMAP amplitude = prognosis
- >18 days all
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Above person can (ee is physically able) to fly

Refill __________ Time(s) ____________________________

DEA # ____________________

The Ohio State University
Form MS-22--Rev. 5/84
(496562)

M.D. ____________________

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What is it?

- Syndrome of pain and weakness occurring in a limb with the pain preceding the weakness by several days

- More common in upper limb
  - Lower limb – proximal muscles > distal
Parsonage-Turner syndrome

- Original 136 cases
  - 12 occurred after operation
  - 10 after trauma
  - Most after infections
- NB. Often occurred after serum injection
Isolated nerves in N-A

- Phrenic N
- Long thoracic N of Bell
- Anterior Intersosseus N
- Axillary N
- Suprascapular N
- Sensory N – lateral antebrachial cutaneous

**LL – Femoral; sciatic medial > lateral div.**
Parsonage-Turner syndrome (consensus)

- Brachial plexopathy
- Within 1 week or co-incident with surgery; or viral infection
  - Severe pain in shoulder
  - When pain abates, weakness and atrophy are apparent
  - Prognosis is generally good
summary

- Parsonage-Turner syndrome presents:
  - Acute shoulder / upper limb pain following an operation, viral infection, serum injection
  - Weakness occurs in 1-3 weeks and acute pain reduces
  - Most symptoms gone by 12-18 months
references