Practical aspects of the EDX examination and Some recording principles

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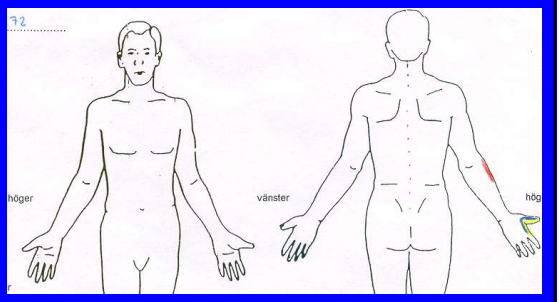
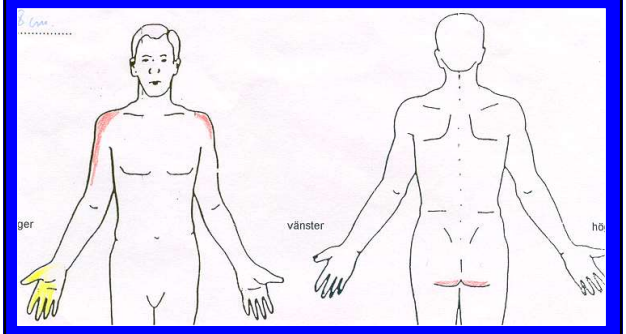
Practical approach

- Often we start with neurography
  - sometimes this is enough
  - supplement with inching, centimetering
  - autonomic tests
  - TMS
  - quantitative sensory testing
- Second step is EMG
- Successive steps depend on findings
  - RNS
  - SFEMG,Macro EMG

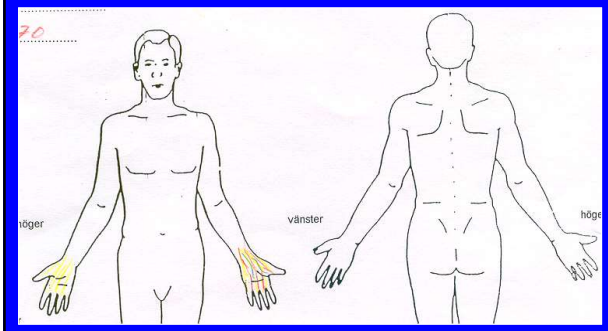
Examples of the use of symptom chart



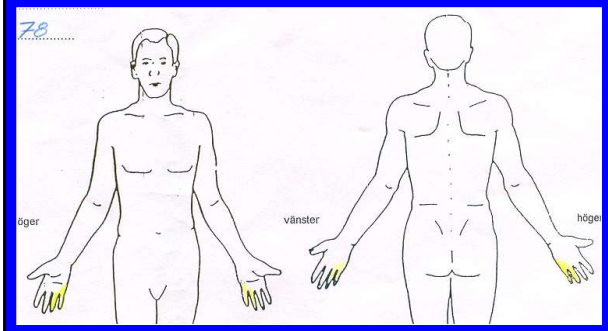
Conduction block, radial nerve



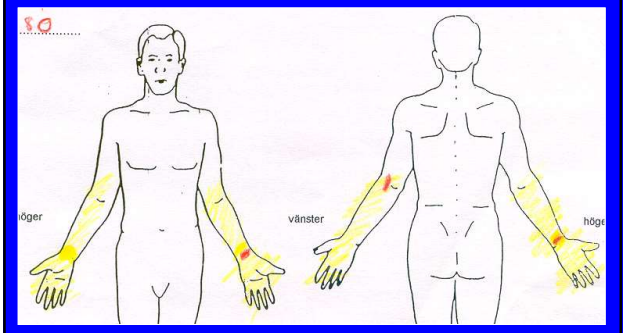
Severe unilateral carpal tunnel syndrome



Bilateral carpal tunnel syndrome,
left severe, right moderate



Ulnar conduction block at the elbow, right side
low sens ampl dig IV and V without motor involvement, left side



Bilateral moderate carpal tunnel syndrome

Neurography; general

Neurography often the first test to be performed
Focus on the clinical question

pathophysiology	demyelinating/axonal/CB
fiber type	sensory/motor/autonomic
fiber size	large/small
distribution	distal/proximal
severity	

Follow strict methodological standards (el.type, positions)
Use reference values adapted to your methods (or vice versa)
Require maximal signal quality (baseline,noise,anomalies)
Adjust stim strength (and duration)
Collaborate with Technicians for Neurography

Neurography; MCS

Ascertain "maximal quality" of the CMAP;
(stim strength, noise, el.)
Check evoked muscle twitch (tendon rupture, abn reflexes)
Add tests if you suspect anomalous innervation or LEM

Neurography; SCS

Prepare skin and electrodes
Do not start averaging sensory signals unless you see a response
Ask the patient about evoked sensation
signal but no sensation – prox CB, spinal cord
sensation but no response – technical or distal CB

EMG

Practical hints - the patient

- inform the patient about reason for EMG
- explain expected discomfort
- do not display the electrode
- term "pin" (or similar) better than needle
- keep bloody tissues away
- do not state number of remaining muscles
- inform about soreness for 1-2 days
- inform the patient about next step

Practical hints - the examiner

- medical consultation
- read referral before you see the patient
- check history, phys exam
- formulate strategy
- inform the patient about the progress
- have all supplies ready before exam
- use gloves

Practical hints - the investigation

- Hold the electrode like a pen
- Support your hand on the patient close to the intended muscle
- Avoid end-plate regions
- Make a small rel. brisk insertion after notifying the patient
- Start with the electrode 2-10 mm under the fascia, i.e. not just under the fascia, and not deep
- Move the needle to different positions, separated by 2 mm-5 mm
- Record during rest, slight, increasing and strong activity
- Remove the electrode slowly

Muscle at rest

- After electrode insertion, keep the electrode still for 10 seconds and listen carefully
- Then move the electrode, to 5 positions in 2 skin insertions, separated laterally by 2 cm
- Sometimes tapping of the muscle can provoke myotonic discharges

Slight contraction

- Ask for *slight* contraction. Move the electrode a little to reach "focus", sharp signals
- Move the needle to new position
  - 2 mm deeper
  - 2 mm deeper
  - out and then new direction--pyramid
- 2-3 skin insertions, total 30 MUPs
- Use the trigger and delay!

Increasing and strong contraction

- If you study pattern during increasing contraction, keep the electrode with one hand and give resistance to muscle shortening with the other
- Go to successively stronger contraction
- Remove the electrode during the strong contraction

- If you study just activity at moderate-strong contraction (IP), then insert the electrode when the muscle is active
- Make recordings from a few sites
- Remove the electrode during contraction

Results must harmonize

ampl decay and normal # F	- techn
prox ampl higher than dist	- anomal.inn, overstim
jitter/ blocking but no weakness	- techn
good strength - low CMAP	- bad stim or inexcitabilty
low strength – normal CMAP	- tendon rupture

NOTE

Be open for the unexpected

F wave studies

Same stim position as for MCS. No need to invert polarity
– anode is a weak stimulator compared to the cathode.
No stimulation or anodal block is seen with conventionally used stim strength

Suggested efficient protocol

1. distal stimulation
2. 20 stimuli with same estimator position
3. proximal stimulation for MCS