

Thinking like a Neurologist

'Where's the lesion'?

The first thing that a neurologist focuses on is localizing the lesion. You will hear this over and over. Lesion localization is not unique to neurology, but the neurological approach to localization within the nervous system is. We take note of all symptoms and signs. Then, for each, we consider what system(s) or pathway(s) is(are) implicated. For each, we decide on the rostralmost and caudalmost a lesion could be within the neuroaxis, and the side of the lesion. Adding up this analysis for each symptom and sign, we then ask "Where in the nervous system can each of these localizations overlap?" The answer is the location of the current problem.

This process is so important in neurology because it enables us to narrow the differential diagnosis of a problem tremendously, leading to more expedient, effective, and efficient management of patients with neurological diseases.

On a very practical level, for the practitioner outside the field of neurology, this means not ordering that unnecessary (and very expensive) CT or MRI for the patient in myasthenic crisis, or sitting by as a patient has an acute stroke.

One approach to neurological localization and diagnosis is to approach each patient with the following six questions in mind:

1. Is there disease in the nervous system?

2. At what level(s)?

- cerebral hemispheric cortex
- cerebral hemispheric subcortical tissue
- diencephalon
- midbrain
- pons
- medulla
- cerebellum
- spinal cord
- nerve root
- plexus
- peripheral nerve
- neuromuscular junction
- muscle

3. What longitudinal system(s) is (are) involved?

- consciousness
- language
- vision
- motor function
- coordination
- pain, temperature
- proprioception, vibration

4. Is the process . . .

- focal?
- multifocal?
- diffuse?

5. What is the lateralization?

- right?
- left?
- bilateral?

6. What is the course?

- acute?
- subacute?
- chronic?

THEN

- static vs. progressive?
- relapsing/remitting or monophasic?
- onset sudden or insidious?

Based on the anatomic-temporal profile you have constructed, you should be able to construct an hypothesis about likely etiology (or etiologies). There are always exceptions, but generally...

- **DEGENERATIVE** processes are progressive and tend to be chronic and diffuse.
- **NEOPLASTIC** processes are progressive, may be subacute or chronic, and tend to be focal or multifocal but may be diffuse (e.g. carcinomatous meningitis).
- **VASCULAR** diseases are acute and usually focal -- but may be diffuse (e.g. subarachnoid hemorrhage). Ischemic stroke is characteristically static or "stuttering", while hemorrhagic stroke is characterized by smooth progression.

- **INFLAMMATORY** diseases are usually subacute or chronic and tend to be progressive. They may be focal (e.g. abscess), diffuse (e.g. meningitis, encephalitis), or multifocal (e.g. autoimmune disease).
- **TOXIC - METABOLIC** processes are diffuse and may have any time course.
- **TRAUMATIC** processes are always acute, may be static and improving or progressive, and may be diffuse, focal, or multifocal.
- **CONGENITAL - DEVELOPMENTAL** diseases are chronic and typically diffuse, and may be static or progressive.

Presentations

Your presentations should reflect this process of localization. Here is one suggested format:

- **Identification**
 - e.g., *"This is the second UVA admission for this 32 year old right-handed woman."*)
- **Chief complaint**
 - include duration
- **History of present illness**
 - aggravating/alleviating factors
 - severity
 - quality
 - location
 - associated symptoms
 - setting
 - time course
- **Medications and allergies**
- **Past medical history**
- **Family history**
- **Social history**
 - write-ups should be comprehensive, your oral presentation should contain only the pertinent points
- **Review of systems**
 - while your write-up should be comprehensive, your oral presentation should contain only the pertinent points folded into the HPI)
- **Physical examination**
 - this is the heart of most neurologic workups; for the oral presentation, systems which are normal and not relevant to the patient's problems may be summarized as 'normal.' Remember that WNL means "we never looked." Your write-up should be comprehensive).
 - Suggested sequence:

- General exam
 - this gives the flavor of the problem
 - e.g., Mr. X is a well-developed, poorly nourished man appearing older than his stated age, lying in bed without speaking or moving his right side.")
- Vital signs
- HEENT
 - save cranial nerves for neuro exam below
- neck
 - mobility, pain, lymphadenopathy, thromegaly, vasculature
- cardiovascular
 - rhythm, rate, gallops, murmurs, rubs
 - peripeheral pulses
- lungs
 - lung auscultation
 - accessory muscles of respiration
- abdominal exam
 - auscultation
 - masses
 - tenderness
- musculoskeletal
 - signs of trauma or rheumatologic disease
 - range of motion
- genitalia and rectal exam
 - do not defer these without an important reason
 - e.g. evidence of spinal cord disease may be overlooked if they are not examined
- extremities
- skin
- Neurologic exam (mention each of the following categories, even if normal)
 - mental status
 - cranial nerves
 - motor
 - reflexes
 - sensory
 - coordination
 - station and gait
- **Formulation**
 - Summary of your answers to the 6 questions above
 - Differential Diagnosis and plans
- **Data**
 - Laboratory data
 - Radiologic studies
 - Neurophysiologic studies
- **Differential diagnosis**

- based on all available data
- **Plans**
 - further diagnostic studies
 - Management plans.

When you present patients, the faculty request that you **do not read from the chart**. All of the information you need may be summarized on a 3x5 card.