Sensory Disorders

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**-algesia**, **-dynia** – disorders of pain perception – see [p. S20 >>](HTTP://WWW.NEUROSURGERYRESIDENT.NET/S.%20SYMPTOMS,%20SIGNS,%20SYNDROMES\S20-29.%20PAIN,%20HEADACHE,%20OPIOIDS,%20SENSORY%20DISORDERS\S20.%20Pain.pdf)

**psychogenic sensory disorders** – see [p. D1 >>](HTTP://WWW.NEUROSURGERYRESIDENT.NET/D.%20Diagnostics/D1-5.%20Neurologic%20Examination/D1.%20Neurologic%20Examination.pdf)

**Negative phenomena** - ***failure*** along sensory channels (conduction block, fiber loss, etc):

**Hypesthesia** - **diminution** of any sensory modality (most frequently in discussion of tactile stimulation).

N.B. at least half afferent fibers must be lost in order for sensory deficit to be demonstrated!

**Positive phenomena** – ectopic neural ***hyperactivity*** anywhere along sensory pathway (as such, it may be not localizable); physical examination may be normal!

**1. Hyperesthesia** - **exaggeration** of any sensory modality response.

* **hyperpilaphesie** - augmentation of tactile faculties in response to other sensory deprivation (e.g. touch in blind).

**2. Paresthesia** - spontaneous abnormal sensation (i.e. sensations of purely subjective nature).

* often described as *pins-and-needles sensation*.
* often coexist with pain syndromes.
* abnormality anywhere along sensory pathway (from peripheral nerves to sensory cortex).
* CNS disorders may cause particular kinds of paresthesias:
* *focal sensory seizures* with **cortical lesions**;
* *spontaneous pain* in **thalamic syndrome**;
* *bursts of paresthesias* down back or into arms on neck flexing *(****Lhermitte symptoms****)* in **disorders of cervical spinal cord** (e.g. multiple sclerosis).
* **level lesions of spinal cord** → "*band sensation*" / "*girdle sensation*" (altered sensation encircling abdomen) or *sensory level* (i.e. altered sensation below level of spinal cord lesion).
* most intense and annoying paresthesia in PNS disorders is due to multiple symmetric peripheral neuropathy (**polyneuropathy**).

1. if paresthesias **do not persist**, they are *not likely to imply neurologic lesion*.
2. **persistent** paresthesias *imply* ***abnormality of sensory pathways***!

* if paresthesias persist and fail to correspond abnormality to explain symptom, patient should be re-examined.

**3. Dysesthesia** - disagreeably abnormal sensations when area is touched (sometimes even pressure of bedclothes cannot be tolerated by patient).

**Sensory symptoms** may be either positive or negative, but **sensory signs** on examination are always negative phenomena!

Diagnosis

* abnormalities of **touch** sensation are ***readily recognized*** by patient.
* impairment of **vibration** is generally ***not noted*** by patients (because this sensory inflow is not part of daily conscious experience).
* **proprioceptive** loss is recognized by patient as ***lack of coordination*** in limbs\* or ***impairment in gait***; (early proprioceptive loss may be unmasked by asking if patient has difficulty walking or reaching for objects in dark).

\*limb may show pseudoathetosis if patient closes eyes

**Distribution & modality** of sensory loss are chief features for lesion localization:

|  |  |  |
| --- | --- | --- |
| **Lesion location** | **Sensory loss modality** | **Sensory loss distribution** |
| **Receptor dysfunction** (dermal pathology) | All sensations | Distribution of local cutaneous process |
| **Peripheral mononeuropathy** | Distribution of nerve (distal to proximal gradient loss) |
| **Peripheral polyneuropathy** | Distal “glove-and-stocking”, gradual shading from normal to diminished sensation |
| **Plexopathy** | Multiple nerves in single limb |
| **Sensory root** | Dermatomes (several roots must be affected to produce loss!) |
| **Conus medullaris or cauda equina** | Saddle distribution |
| **Spinal cord**  **(central as in syringomyelia)** | Pain & temperature | Dermatomes |
| **Spinal cord**  **(posterior column)** | Position, vibration, discriminative touch | Ipsilateral below lesion |
| **Spinal cord**  **(half transection)** | Position & vibration | Ipsilateral below lesion |
| Pain & temperature | Contralateral below lesion |
| Touch relatively preserved! | |
| **Spinal cord**  **(full transection)** | All sensations | Below lesion (“sensory level”) |
| **Brain stem (medial lemniscus)** | Position, vibration, discriminative touch | Contralateral incomplete\* hemibody (\*due to segmental arrangement of fibers) |
| **Brain stem (spinothalamic tract + nucl. spinalis CN5)** | Pain, temperature | Harlequin pattern: ipsilateral face, contralateral hemibody |
| **Thalamus** | All sensations ± hyperpathia, spontaneous pain | Contralateral entire hemibody |
| **Subcortical white matter** (as in multiple sclerosis) | All sensations | Contralateral multifocal partial peripheral nerve distribution |
| **Sensory cortex** | Permanent loss of discriminative touch & proprioception.  Mild transient loss of pain, temperature, vibration. | Contralateral entire hemibody (or different body parts); limbs > trunk & face; variability in distribution and severity from moment to moment; sensory phenomena (inability to recognize own limbs, alien hand syndrome). |

PNS lesions - ***intense*** sensory loss, with ***fixed***, ***clearly defined*** zones.

CNS lesions - deficit is more ***mild*** with ***vague boundaries***; there may be considerable ***variation*** in both distribution and intensity of sensory deficit.

Electrophysiologic testing

Lesions *distal* to dorsal root ganglion → **sensory nerve conduction studies**.

Lesions *proximal* to dorsal root ganglion → **somatosensory evoked potentials** (most frequent site of stimulation: in upper extremity - **median nerve**; in lower extremity - **tibial nerve**).

General Management

1. Rehabilitative ***sensory re-education***.
2. Increase ***patient's awareness*** of potential injuries:
3. do not to use insensate hand when cooking or smoking;
4. do not to place insensate extremity in hot water.

Bibliography

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