



Quick Reference Guide for Localizing a Neurologic Lesion

I. Neurologic vs. Orthopedic

- a. **Gait** – is the patient lame or ataxic? Is the patient paralyzed or weak?
- b. **Muscle mass** - is muscle atrophy present? Is it severe?
- c. **Posture** – does the dog have a wide-based stance, a head tilt, involuntary rigidity or opisthotonus?
- d. **Postural reactions** can help differentiate between orthopedic and neurologic, and are useful for detecting subtle deficits and asymmetry.
 - i. **proprioceptive positioning**
 - ii. **placing response**
 - iii. **hopping**
 - iv. **hemiwalking and wheelbarrowing**



II. Cranial vs. Spinal

- a. **Mental status** - is the animal demented, obtunded or stuporous?
- b. **Behavior** - both in the exam room and historically. Is the animal vocalizing or walking in circles? Behavior change observed at home?
- c. Does the animal have a recent history of **seizures**?
- d. **Spinal hyperesthesia** is identified by deep palpation of the entire spine. Eliciting a pain response from the animal can also help to localize the lesion.
- e. **Cranial nerve exam** can help localize cranial lesions
 - i. **I Olfactory** – cover the eyes and place food beneath the nose (not routinely checked)
 - ii. **II Optic** – Menace response, visual tracking, PLR
 - iii. **III Oculomotor** – PLR, strabismus, doll's eye movements
 - iv. **IV Trochlear** – strabismus, doll's eye movement
 - v. **V Trigeminal(sensory)** – corneal and palpebral reflexes, upper lip pinch
 - vi. **VI Abducent(motor)** – strabismus, doll's eye movement, corneal reflex
 - vii. **VII Facial(motor)** – palpebral reflex, upper lip pinch
 - viii. **VIII Vestibulocochlear** – response to noise, head tilt, nystagmus
 - ix. **IX Glossopharyngeal** – gag reflex, dysphagia, voice change
 - x. **X Vagus** – see IX
 - xi. **XI Accessory** – trapezius muscle atrophy (difficult to detect)
 - xii. **XII Hypoglossal** – tongue atrophy, asymmetry or deviation
- f. **Spinal reflexes** differentiate between an upper motor neuron (UMN) and a lower motor neuron (LMN) lesion.
 - i. UMN lesions occur cranial to the reflex arc and typically result in exaggerated reflexes.
 - ii. LMN lesions occur in any part of the reflex arc and typically result in weak to absent reflexes.
 - iii. Types of reflexes
 1. **patellar**
 2. **gastrocnemius/cranial tibial**
 3. **biceps**
 4. **triceps**
 5. **withdrawal**

- 6. perineal (anal)
- 7. cutaneous trunci (panniculus)
- g. **Pain perception** is utilized to assess the severity of a spinal injury, as well as help with determining prognosis for a return of function. It is crucial to differentiate a reflex response from conscious pain perception
 - i. **Superficial pain** – fast pain originating from the skin.
 - ii. **Deep pain** – slow pain originating from skin or deeper structures. Loss of deep pain sensation creates urgency and carries a guarded prognosis

III. Cervical vs. Thoracolumbar vs. Lumbosacral Spine

- a. C1 – C5
 - i. Gait – tetraparesis/plegia, hemiparesis/plegia
 - ii. Cranial nerves – Horner’s syndrome
 - iii. Spinal reflexes – hyperreflexia all limbs
- b. C6 – T2
 - i. Gait – tetraparesis/plegia, hemiparesis/plegia
 - ii. Cranial nerves – Horner’s syndrome
 - iii. Spinal reflexes – hyporeflexia thoracic limbs, hyperreflexia pelvic limbs
- c. T3 – L3
 - i. Gait – paraparesis/plegia
 - ii. Spinal reflexes – hyperreflexia pelvic limbs, normal thoracic limbs
- d. L4 - caudal
 - i. Gait – paraparesis/plegia
 - ii. Spinal reflexes – hyporeflexia pelvic limbs (pseudohyperreflexic patella with sciatic injury), decreased perineal reflex/anal tone (L7-S3)

IV. Peripheral nerve disease

- a. Posture – generalized weakness, unable to support head and neck
- b. Muscle mass – rapid and severe muscle atrophy
- c. Cranial nerves – may be affected
- d. Postural reactions – decreased to absent
- e. Spinal reflexes – often reduced or absent
- f. Pain perception – normal

V. Diagnostic tests to confirm localization and cause of the lesion

- a. **CSF tap** – inflammatory or infectious disease in particular
- b. **Magnetic resonance imaging** – ideal for subtle and/or diffuse lesions of the brain or spinal cord. Also images surrounding soft tissues well
- c. **Computed tomography** – mass lesions involving the brain or spinal cord (with a myelogram). Can be used to diagnose intervertebral disk disease.
- d. **Myelogram** – useful for survey of the spine, and to detect space-occupying lesions within the spinal canal.
- e. **Survey radiography** – should be performed in anesthetized patient. Ideal for identifying bony lesions.



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