

Horner Syndrome: A Clinical Detective's Guide for the AMC Exam



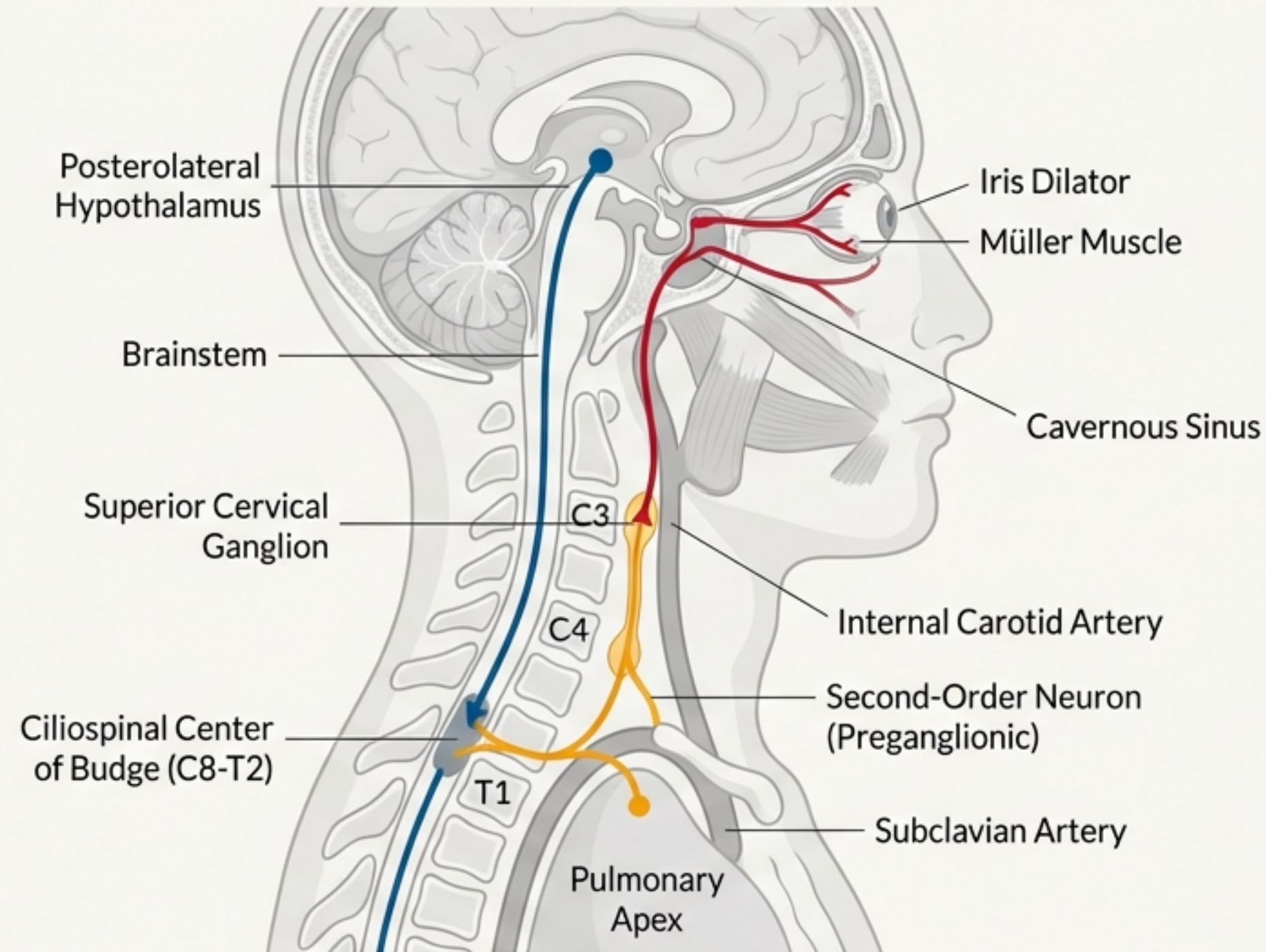
The Classic Triad: Unmasking the Oculosympathetic Clues

- **Partial Ptosis:** Drooping of the upper eyelid from denervation of the Müller muscle.
- **Miosis:** A constricted pupil, more noticeable in dim light.
- **Anhidrosis:** Decreased or absent sweating on one side of the face (hemifacial).

Additional Finding: Apparent Enophthalmos (a sunken-in appearance of the eye, which is an illusion caused by the ptosis).

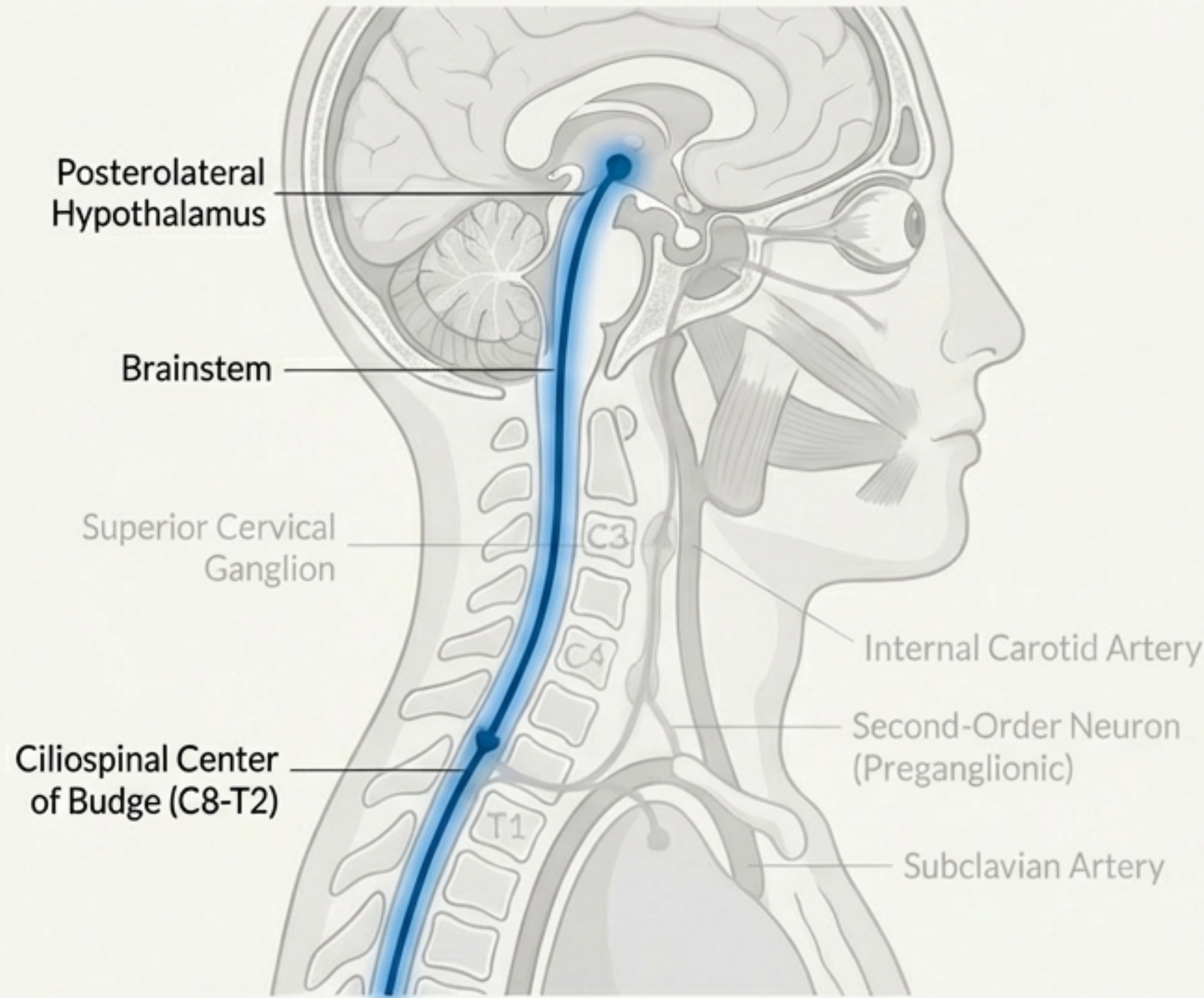
Master the pathway, localize the lesion, ace the exam.

The Anatomy of a Diagnosis: The 3-Neuron Sympathetic Pathway



This pathway is your roadmap. Every cause, symptom, and diagnostic test is about pinpointing the lesion's location on this map.

The Central Suspects: First-Order Neuron Lesions



Key Localizing Sign:

Anhidrosis of the ipsilateral side of the **BODY**.

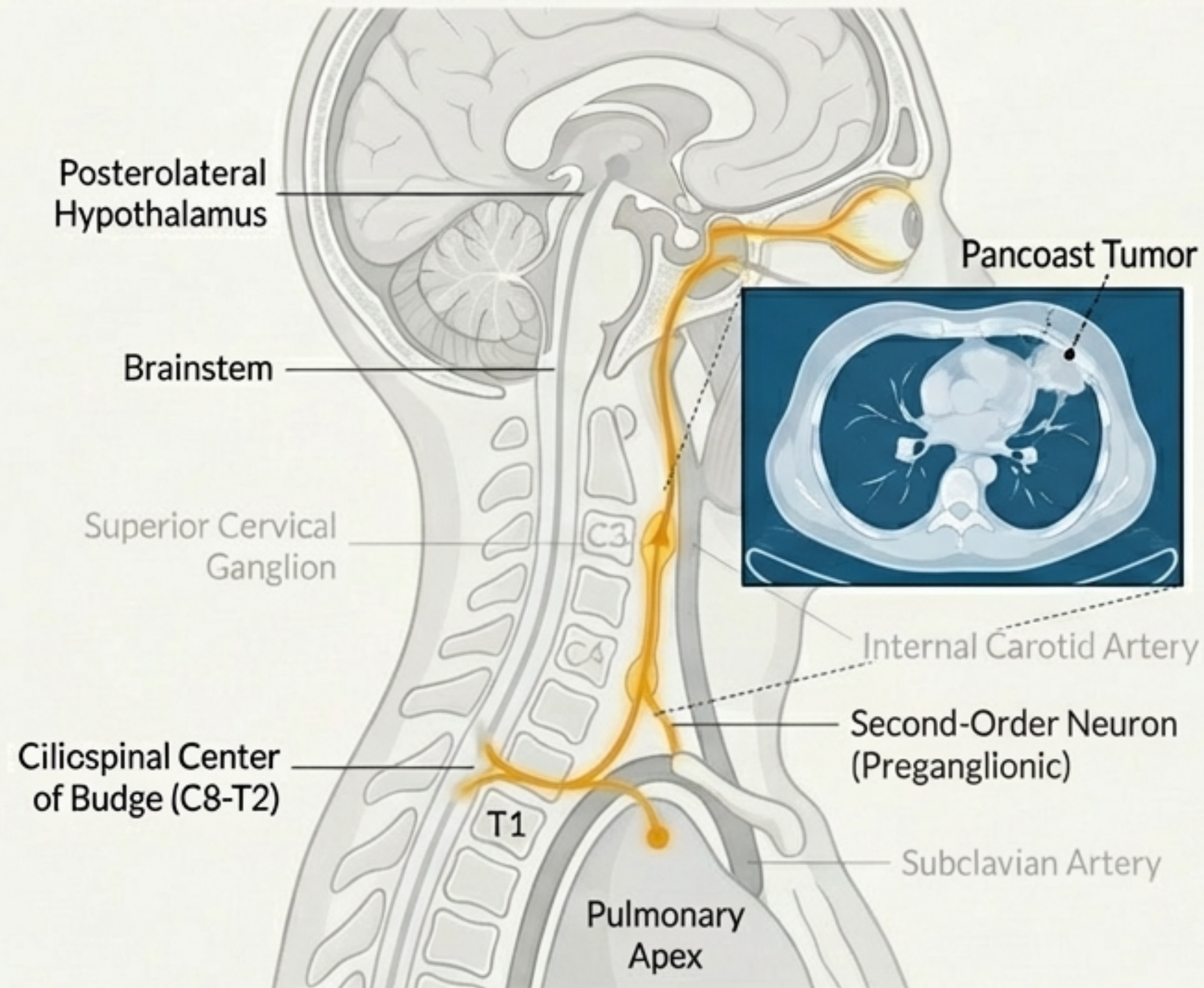
🎯 AMC High-Yield Causes

- **Brainstem Stroke (e.g., Wallenberg/Lateral Medullary Syndrome):** Associated with vertigo, ataxia, dysphagia.
- **Demyelinating Disease:** Notably Multiple Sclerosis.
- **Syringomyelia:** A fluid-filled cyst within the spinal cord.
- **Tumors:** Brainstem, pituitary, or basal skull tumors.
- **Neck Trauma:** High cervical cord lesions.



Detective's Note: "Look for the company it keeps." First-order lesions rarely travel alone and are often accompanied by other major neurological deficits.

The Thoracic Connection: Second-Order Neuron Lesions



Key Localizing Sign:

Anhidrosis of the ipsilateral **FACE**.

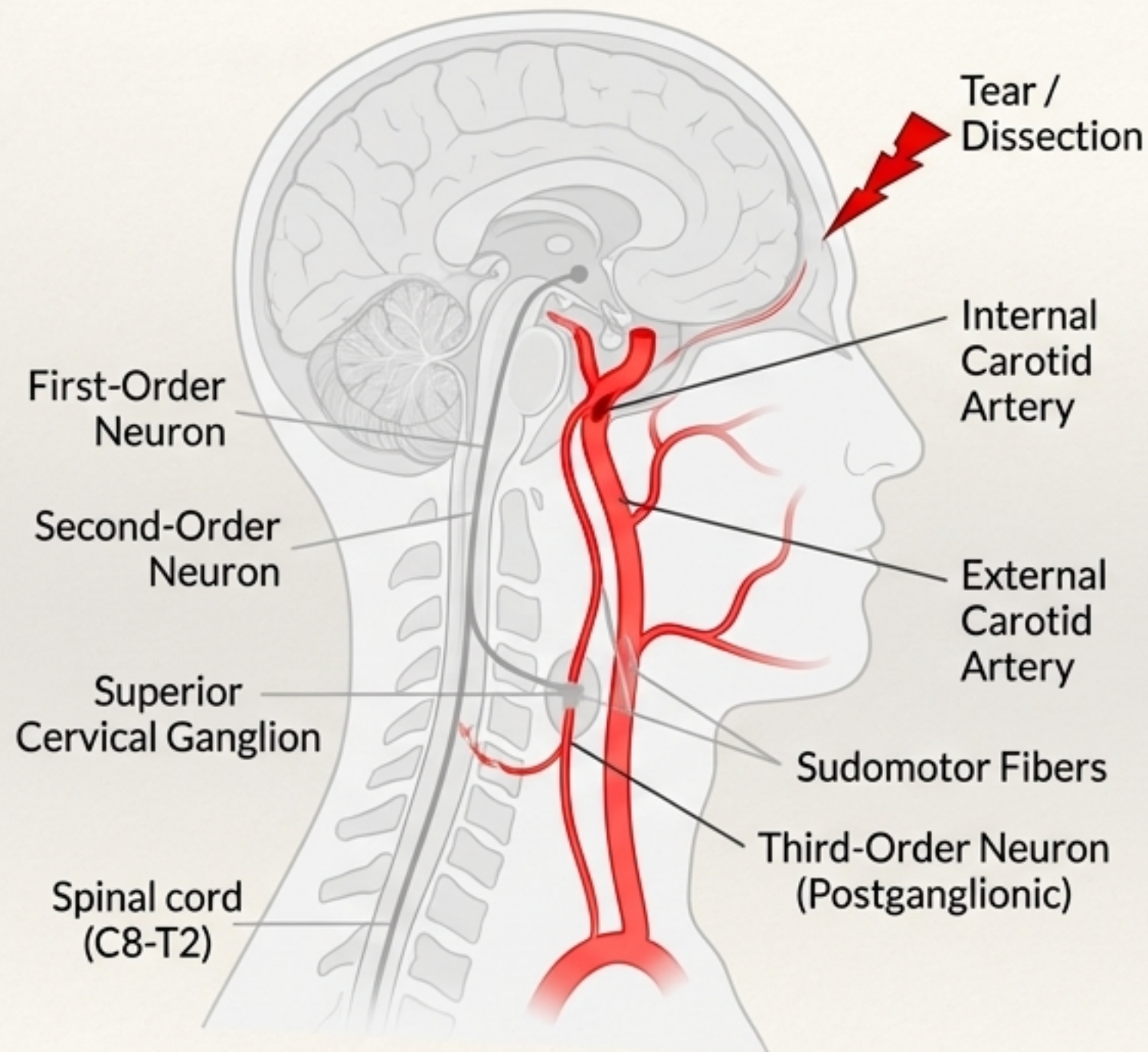
🎯 AMC High-Yield Causes

- **Pancoast Tumor (Apical Lung Cancer):** The classic association. Look for shoulder/arm pain, cough, hemoptysis.
- **Trauma / Iatrogenic Injury:** Surgical (thyroidectomy, neck dissection), central line placement, chest tubes, birth trauma to brachial plexus.
- **Vascular:** Aortic or subclavian artery aneurysm/dissection.
- **Masses:** Mediastinal tumors, lymphadenopathy (e.g., Hodgkin disease).



Detective's Note: Preganglionic Horner syndrome has a high association with malignancy. **A chest radiograph is a non-negotiable first step in the workup.**

Painful Clues: Third-Order Neuron Lesions



Key Localizing Sign:

Anhidrosis is **ABSENT** or limited to the medial forehead and side of the nose.

🎯 AMC High-Yield Causes


- **Internal Carotid Artery Dissection:** **A medical emergency.** Presents with sudden ipsilateral face or neck pain.
- **Headaches:** Cluster or migraine headaches can be associated.
- **Cavernous Sinus Pathology:** Look for associated cranial nerve palsies (III, IV, VI, V1/V2).
- **Raeder Paratrigeminal Syndrome:** Horner syndrome plus ipsilateral trigeminal pain/numbness.





Detective's Note:: The combination of painful Horner syndrome and neck/face pain must be considered a carotid dissection until proven otherwise.


The Pharmacology Lab: Confirming and Localizing the Lesion

SECTION 1: CONFIRM THE DIAGNOSIS

Test	Mechanism	Result	
Topical Apraclonidine 0.5% (Test of choice)	Weak $\alpha 1$ -agonist. Denervation supersensitivity of the iris dilator's $\alpha 1$ -receptors in Horner syndrome.	The affected (miotic) pupil DILATES , reversing the anisocoria. The normal pupil is unaffected.	
Caveat	May be falsely negative in acute Horner's (<5 days).		

SECTION 2: LOCALIZE THE LESION (Preganglionic vs. Postganglionic)

Test	Mechanism	Result (1st/2nd Order Lesion)	
Topical Hydroxyamphetamine 1%	Stimulates norepinephrine release from intact 3rd-order nerve endings.	3rd-order neuron is INTACT. Both pupils dilate.	
Result (3rd Order Lesion)	3rd-order neuron is DAMAGED.	The affected pupil FAILS to dilate , increasing the anisocoria.	

 **AMC High-Yield Takeaway:** Apraclonidine *confirms*. Hydroxyamphetamine *localizes*.

The Final Proof: Suspicion-Guided Imaging



Suspicion: Central / First-Order Lesion

(Signs: ataxia, vertigo, widespread neuro deficits)

Imaging: MRI / MRA of Head & Neck

Purpose: To identify stroke, MS, tumor, or syrinx.



Suspicion: Preganglionic / Second-Order Lesion

(Signs: shoulder pain, cough, smoking history)

Imaging: Chest X-Ray, followed by CT Chest

Purpose: To rule out Pancoast tumor or other mediastinal masses.



Suspicion: Postganglionic / Third-Order Lesion

(Signs: acute neck/facial pain, headache)

Imaging: URGENT MRI/MRA or CT Angiography (CTA) of Head & Neck

Purpose: To rule out life-threatening internal carotid artery dissection.

Special Case: Any Child with Horner Syndrome

Workup: Broad imaging (chest, neck, abdomen) + Urine VMA/HVA.

Purpose: High suspicion for **Neuroblastoma**.

AMC MCQ Challenge #1

A 65-year-old male with a 40-pack-year smoking history presents with a new-onset drooping right eyelid and a constricted right pupil. He also reports persistent, nagging pain in his right shoulder and arm. On examination, there is decreased sweating on right side **of his face**. Pharmacologic testing with apraclonidine reverses the anisocoria. A subsequent test with hydroxyamphetamine causes both pupils to dilate normally. **Where is the most likely location of the lesion?**

- A. Posterolateral Hypothalamus
- B. Cavernous Sinus
- C. Apex of the Lung
- D. Internal Carotid Artery
- E. Lateral Medulla

Case #1 Debrief & Second Challenge

MCQ #1 Answer and Rationale

Correct Answer: C. Apex of the Lung

Rationale: The clinical picture (smoker, shoulder pain) strongly suggests a **Pancoast tumor**, a classic cause of a **second-order (preganglionic) lesion**. The hydroxyamphetamine test confirms this: because the affected pupil dilated, the postganglionic (**third-order**) **neuron** must be intact, localizing the problem to the **first** or **second-order neuron**. Given the clinical context, the **lung apex** is the most likely site.

MCQ Challenge #2

Question: A 35-year-old woman presents to the emergency department with a sudden, severe, right-sided headache and neck pain after a yoga class. Examination reveals right-sided partial ptosis and miosis. There is no noticeable anhidrosis. Which of the following is the most appropriate next step in management?

- A. Instill hydroxyamphetamine drops to confirm localization.
- B. Order a plain chest X-ray.
- C. Administer high-flow oxygen and sumatriptan for cluster headache.
- D. Perform urgent CT Angiography of the head and neck.
- E. Discharge with a neurology outpatient referral.

Case Closed: Final Debrief and Core Takeaways

MCQ #2 Answer and Rationale

Correct Answer: D. Perform urgent CT Angiography of the head and neck.

Rationale: The triad of **painful Horner syndrome + neck pain + minor trauma** is a red flag for **internal carotid artery dissection**. This is a neurological emergency due to the high risk of stroke. Urgent vascular imaging is mandatory and takes precedence over further pharmacological testing or outpatient management. The lack of anhidrosis correctly points to a third-order (postganglionic) lesion.

The Clinical Detective's Final Summary

1. **Recognize the Triad:** Ptosis, Miosis, Anhidrosis. Anisocoria is greater in the dark.
2. **Map the Pathway:** The 3-neuron chain is the key to localization. The pattern of anhidrosis is your most reliable guide (Body → 1st; Face → 2nd; None → 3rd).
3. **Link the Red Flags:** **Pancoast Tumor** (2nd order, shoulder pain), **Carotid Dissection** (3rd order, neck pain), and **Brainstem Stroke** (1st order, neuro deficits) are the critical 'must-know' associations.
4. **Use Your Tools Wisely:** Apraclonidine **confirms** the diagnosis. Hydroxyamphetamine **localizes** the lesion. Imaging provides the **definitive proof**.