

Brain Stem LESIONS

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MEDIAL SYNDROMES OF MEDULLA AND PONS 4
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- brain stem sandara labai sudėtinga – kompaktiškai susiglaudę guli įvairiausios struktūros.
- neįmanoma aprašyti visų galimų sindromų.
- patogiausia nagrinėti *kraujagyslinius sindromus* – geriausiai koreliuoja su topografija.

Clinical features depend on:

1. **LONGITUDINAL site** (midbrain, pons, medulla)
2. **CROSS-SECTIONAL site** (tegmentum vs. basis; medial vs. lateral)

Unilateral brain stem syndromes – alternating signs:

1. **IPSILATERALLY** – lesion of *cranial nerves* (LMN paralysis or loss of sensation) – specifies **LONGITUDINAL site**.
2. **CONTRALATERALLY** – lesion of *long tracts*, which will decussate (descending) or has decussated (ascending) – specifies **CROSS-SECTIONAL site**;
 - **ALTERNATING HEMIPLEGIA** – *tr. pyramidalis* (dažnai kartu pažeidžiami somitiniai nervai CN3 (Weber syndrome), CN6 (Foville syndrome), CN12 (Dejerine syndrome) – jie išeina ventraliai paramedianinėje plokštumoje, šalia *tr. pyramidalis*).
 - **ALTERNATING HEMIANESTHESIA** – *medial lemniscus, tr. spinothalamicus*.
 - **ALTERNATING HEMIHYPERKINESIA** – *subst. nigra* (tremor), *red nucleus* (hemichorea).

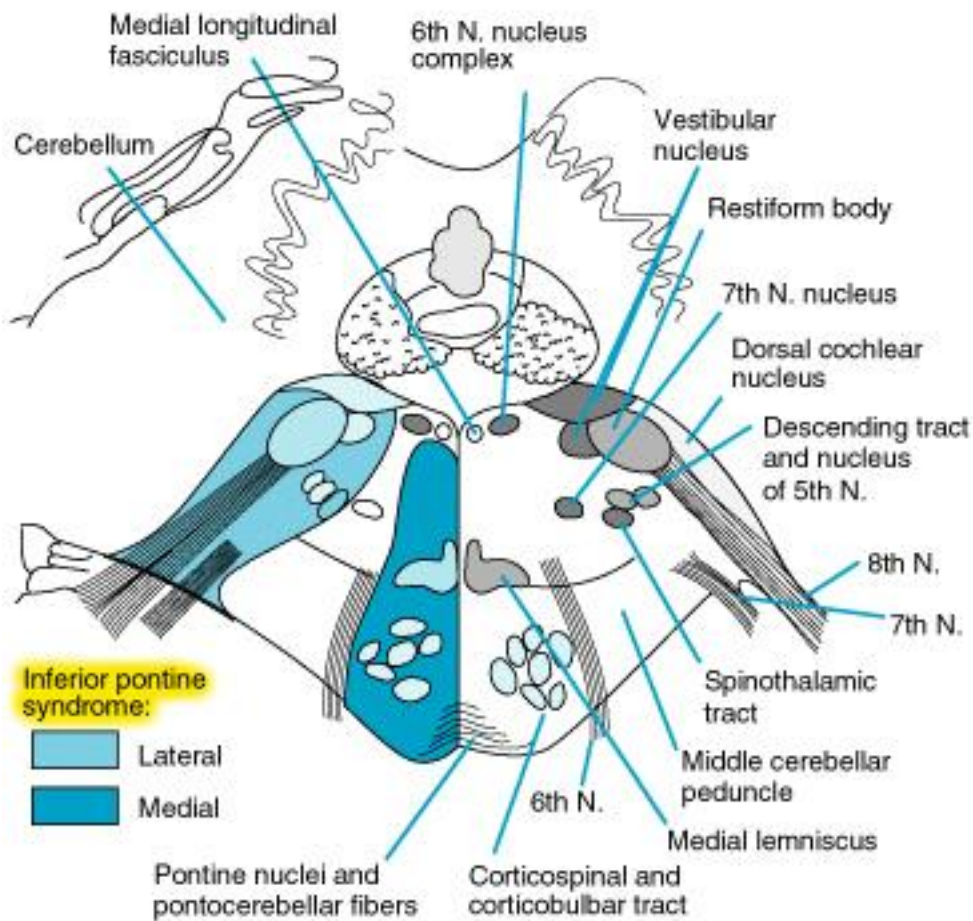
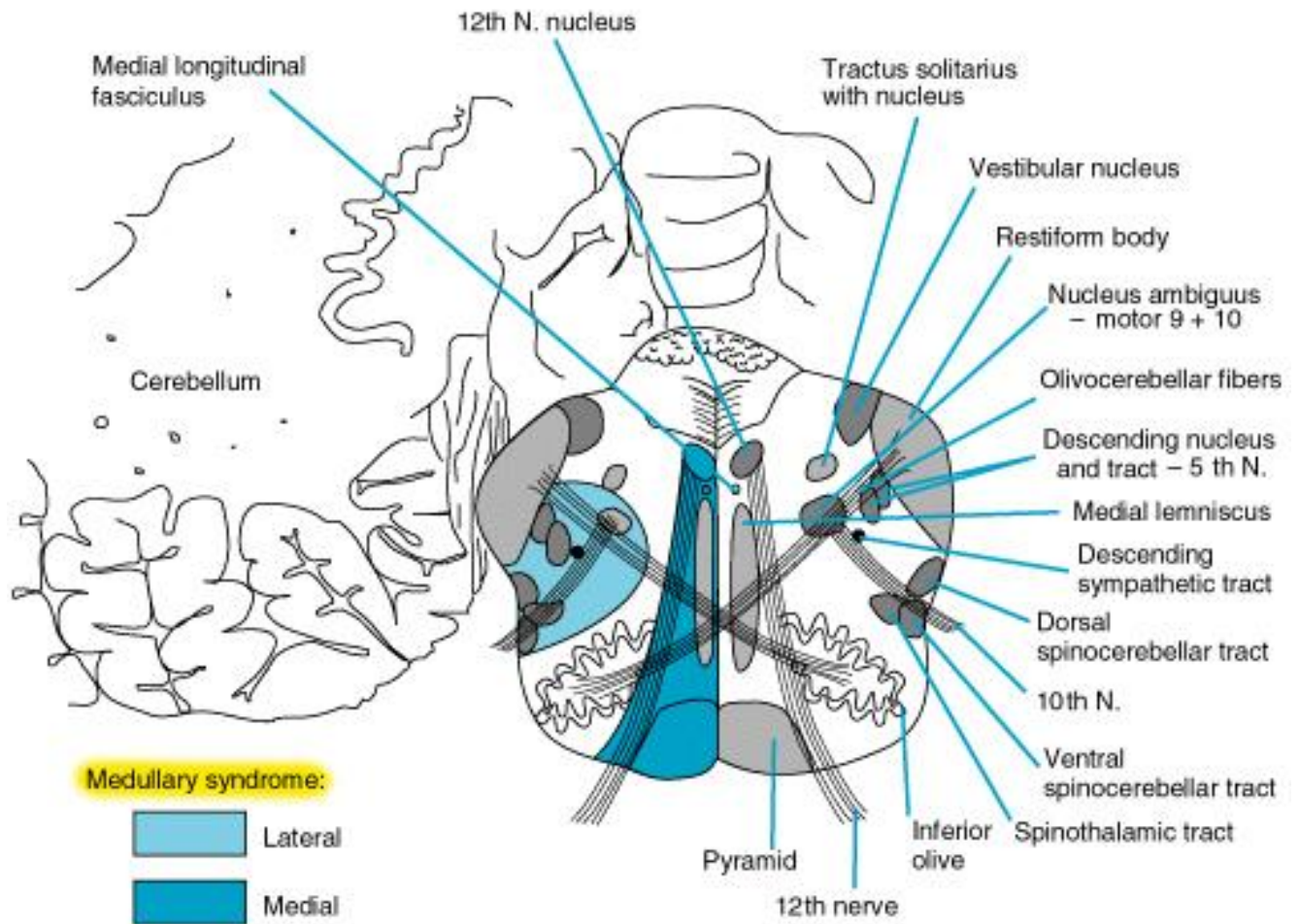
		LATERAL		MEDIAL		
		Long tracts	Cranial nerves	Long tracts	Cranial nerves	
Pons	Hiccup	TrSpinthal	CN5 (touch)	TrPyr	CN6 + pontine gaze center, MLF	
		TrRetspin	CN7 (motor)	MedLem		
Medulla	Hiccup	VestConn	CN8	CerebellConn	Palatal myoclonus, etc	
		LatLem				
		TrSpinthal	CN5 (pain + t-re)	TrPyr		CN12
		TrRetspin	CN7 (taste)	MedLem		
VestConn	CN9					
		CerebellConn	CN10			

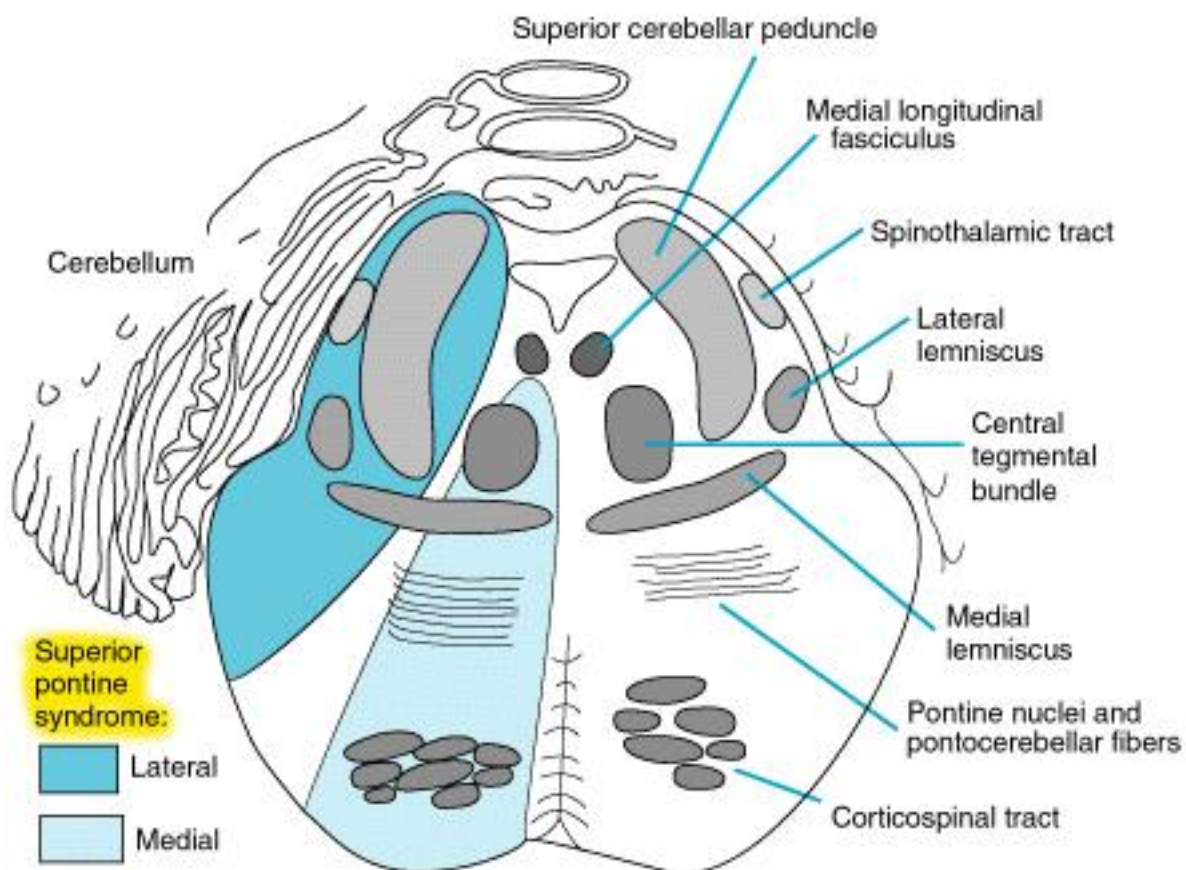
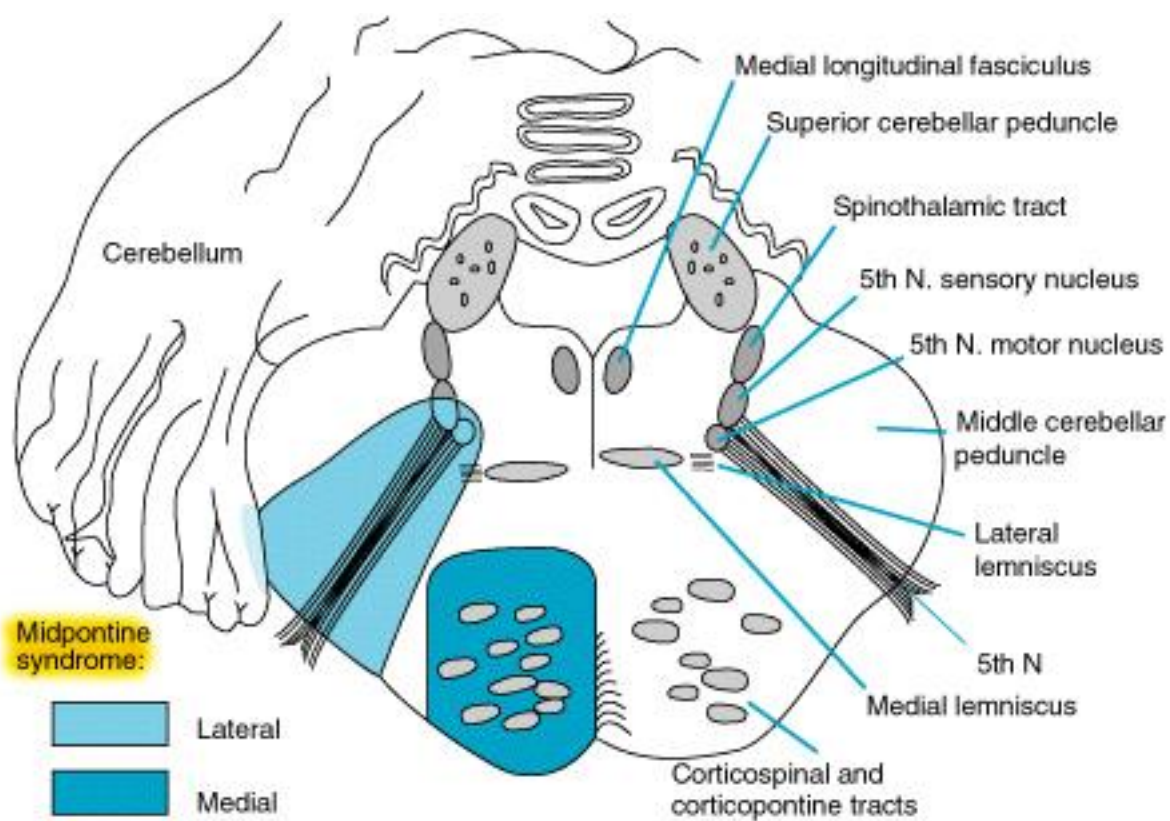
Bulbar Palsy – peripheral paralysis of CN9, CN10, CN12. see p. Mov3 >>

Pseudobulbar Palsy – central paralysis of CN7, CN9, CN10, CN12. see p. Mov3 >>

Bilateral lesion of *tegmentum above midpontine level* (rostral RF – ARAS) → **COMA**. see p. S30 >>

RESPIRATORY DRIVE DISTURBANCE – kuo kaudalesnis pažeidimas, tuo labiau trinka kvėpavimo dažnis ir ritmas; medulocervikalinis pažeidimas → apnea. see p. 2115 (4-5) >> (RESPIRATORY)





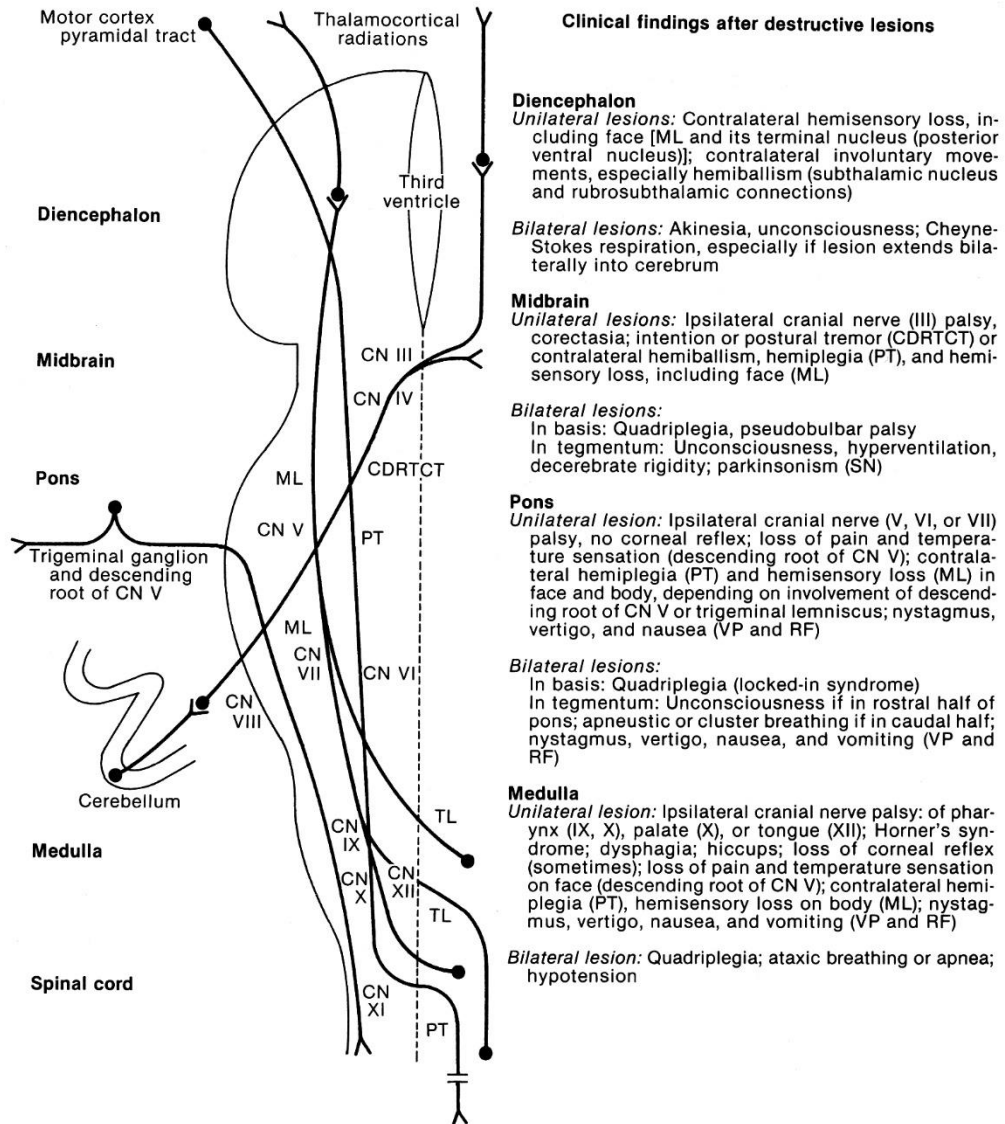


FIGURE 7-43. Localizing diagnostic for clinical signs of brain stem lesions (exclusive of central ocular pathways). CDRTCT = cerebello-dentato-rubro-thalamo-cortical tract; ML = medial lemniscus; PT = pyramidal tract; RF = reticular formation; Roman numerals = cranial nerve nuclei; SN = substantia nigra; TL = trigeminal lemniscus; VP = vestibular pathways.

MEDIAL syndromes of MEDULLA and PONS

- paramedian branches of **A. VERTEBRALIS** / **A. BASILARIS**.

Long tracts:

1. **Tr. pyramidalis** → (contralateral) **hemiplegia**
2. **Medial lemniscus** → (contralateral) **loss of tactile (?), position and vibratory sensation.**
3. **Cerebellar connections** (superior / middle cerebellar peduncle; in pons only) → (ipsilateral) **limb ataxia** or **nystagmus.**

Pažeidimo aukštji nurodo įtraukti nervai:

Medial MEDULLARY (s. Dejerine) syndrome:

CN12 → (ipsilateral) **tongue hemiparalysis.**

Medial PONTINE syndrome:

1. **CN6 nucleus, pontine gaze center** → **paralysis of horizontal gaze** to side of lesion.

2. **MLF** → **internuclear ophthalmoplegia** (failure of adduction in horizontal gaze but preservation of convergence). see p. Eye64 >>
3. **Central tegmental tract** → palatal myoclonus accompanied by rhythmic movements of pharynx, larynx, face, eyes, or respiratory muscles.
- **gaze-evoked nystagmus** – due to vestibular connections, cerebellar connections, MLF.

FOVILLE syndrome (variant of alternating hemiplegia) – ipsilateral CN6, contralateral hemiplegia.

MILLARD-GUBLER syndrome (variant of alternating hemiplegia) – ipsilateral CN7, contralateral hemiplegia.

Locked-in Syndrome – complete lesion of **basis pontis**. see p. Mov3 >>

Drop Attacks – TIA in bilateral **pontine / medullary pyramidal tract**. see p. Mov3 >>

LATERAL syndromes of MEDULLA and PONS

- specific clinical features due to lateral structures:

1. **Tr. spinothalamicus** → (contralateral)* **loss of pain-temperature sensation** in **trunk** and **extremities**.
2. **Nucl. sensorii of CN5** (descend from midpons to C₃) → (ipsilateral)* **loss of cutaneous sensation** in **face**: *i.e. crossed sensory loss
 nucl. pontinus (pons) – touch;
 nucl. spinalis (medulla) – pain and temperature (hypalgesia, thermoanesthesia, corneal hypesthesia).
3. **Tr. reticulospinalis** (descending sympathetic fibers from hypothalamus) → (ipsilateral) **Horner's syndrome**.
4. **Vestibular connections** → **vertigo, nystagmus, nausea, vomiting**.
5. **Cerebellar connections** (inferior / middle / superior cerebellar peduncles) → (ipsilateral) **limb ataxia, asynergia, intention tremor**.
6. **Hiccup** – unclear cause.

No plegia, no loss of touch-proprioception!

The only CONTRALATERAL sign - **loss of pain-temperature sensation** in **trunk** and **extremities**.

Pažeidimo aukštį nurodo įtraukti nervai:

Lateral SUPERIOR PONTINE syndrome – SUPERIOR CEREBELLAR ARTERY (SCA):

Lateral lemniscus → partial **hearing loss**.

- vertigo is less common.
- in lesions at and above superior pons (lesion of **trigeminal lemniscus**) – sensory loss in face becomes contralateral (as in rest of body), i.e. sensory loss is no longer crossed.

Lateral INFERIOR PONTINE (s. **Marie-Foix**) syndrome – ANTERIOR INFERIOR CEREBELLAR ARTERY (AICA):

1. **Pontine gaze center** → **paralysis of horizontal gaze** to side of lesion.
2. **CN7** → (ipsilateral) **facial paralysis**

3. **CN8** → (ipsilateral) **tinnitus, deafness**

+ crossed hypesthesia (ipsilateral face loss of touch / contralateral body hypalgesia-thermoanesthesia)

Lateral MEDULLARY (s. Wallenberg) syndrome – **POSTERIOR INFERIOR CEREBELLAR ARTERY (PICA)**

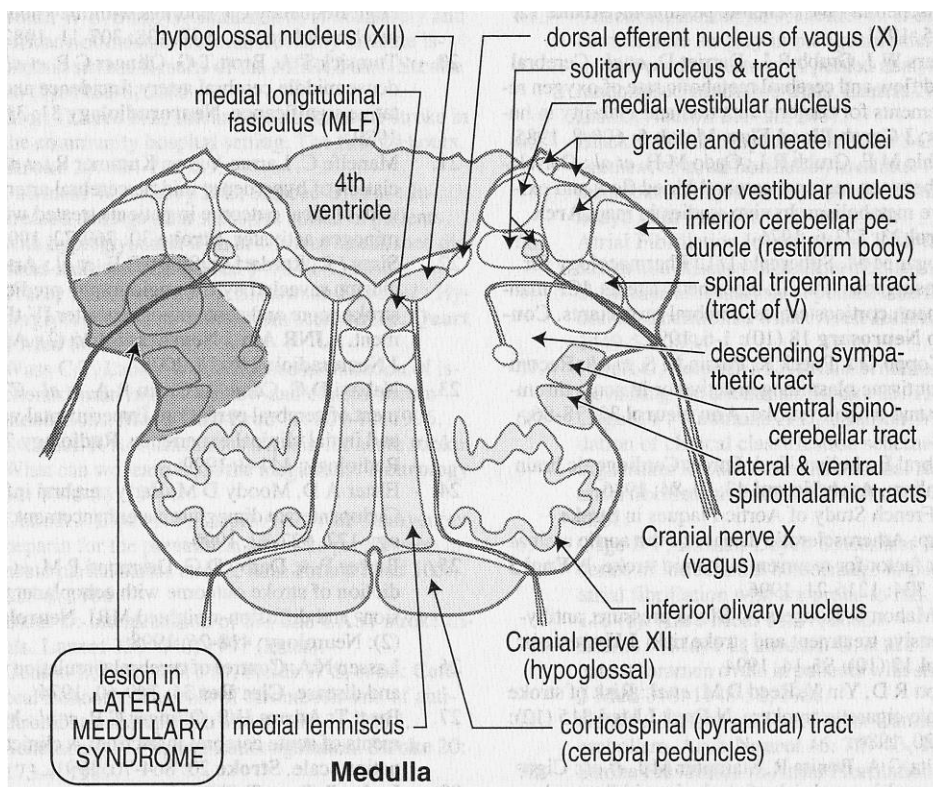
(in 80-85% cases also **VERTEBRAL ARTERY** – exclude VA dissection):

1. **Nucl. tractus solitarii** (CN7) → (ipsilateral) **loss of taste.**
2. **CN9, CN10** → **dysphagia, dysarthria, etc.**

+ crossed* hypalgesia-thermoanesthesia (ipsilateral face / contralateral body)

*this is essentially the only location where lesion will produce crossed sensory loss

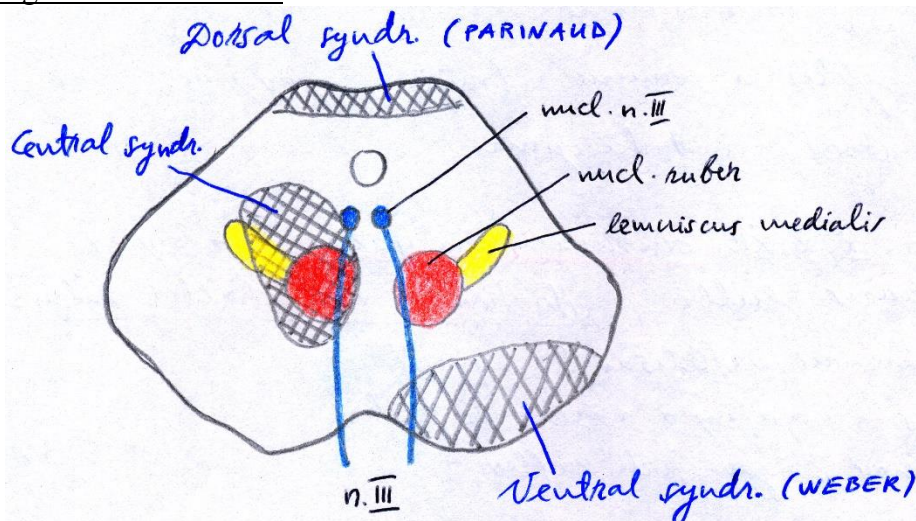
Absence of **pyramidal tract** findings + no change in **mental status**



GENERALIZED symptoms	Responsible lesion
• vertigo, N/V, nystagmus, diplopia, oscillopsia	vestibular nuclei & connections
• hiccups	?
IPSILATERAL to lesion	Responsible lesion
• facial pain, paresthasias, & impaired sensation	descending tract and nucleus V over half of face
• ataxia of limbs	(restiform body?)
• Horner's syndrome	descending sympathetic tract
• dysphagia, diminished gag, hoarseness	exiting fibers of IX & X
• numbness of arm, trunk, or leg	cuneate & gracile nuclei
CONTRALATERAL to lesion	Responsible lesion
• impaired pain & temp sense over half of body	spinothalamic tract

MIDBRAIN syndromes

Išskiriami trys pagrindiniai sindromai:



DORSAL midbrain (s. midbrain pretectal, collicular, Parinaud) syndrome – lesion of **pretectal area, superior colliculi** (e.g. compression from above by pineal mass; PCA infarct) → supranuclear paralysis of conjugate upward gaze → downward eye deviation (rarely, if unilateral → skew deviation);

+ *COLLIER sign* (pathological lid retraction) with *BELL phenomenon* (on attempt to close eyes, eyeball rolls up), *mydriasis*, *anisocoria*, *light-near dissociated pupils*, *defective convergence*, *convergence-retraction nystagmus*. further see p. Eye64 >>

VENTRAL midbrain (s. Weber) syndrome - **PARAMEDIAN PCA BRANCHES TO MIDBRAIN** - variant of alternating hemiplegia:

1. **Tr. pyramidalis** → (contralateral) **hemiplegia**, incl. supranuclear CN7 palsy.
2. Ipsilateral emerging **CN3** fibers.

CENTRAL (s. tegmental) midbrain syndrome

1. **CN3** nucleus
 2. **Medial lemniscus, tr. spinothalamicus** → (contralateral) **hemianesthesia**
 3. **Nucl. ruber, subst. nigra** → (contralateral) **hemichorea, hemiparkinsonism**.
- if bilateral (**rostral RF** – ARAS) → **coma**.

Eilė papildomų sindromų: further see p. Eye64 >>

1. **CLAUDE syndrome**
2. **BENEDIKT syndrome**
3. **NOTHNAGEL syndrome**

BIBLIOGRAPHY for ch. “Brain Stem” → follow this [LINK](#) >>

NMS Surgery 2000, Medicine 2000, Pediatrics 2000, Emergency Medicine 1997, Neuroanatomy 1998, Radiographic Anatomy 1990, Physiology 2001

Viktor's NotesSM for the Neurosurgery Resident
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