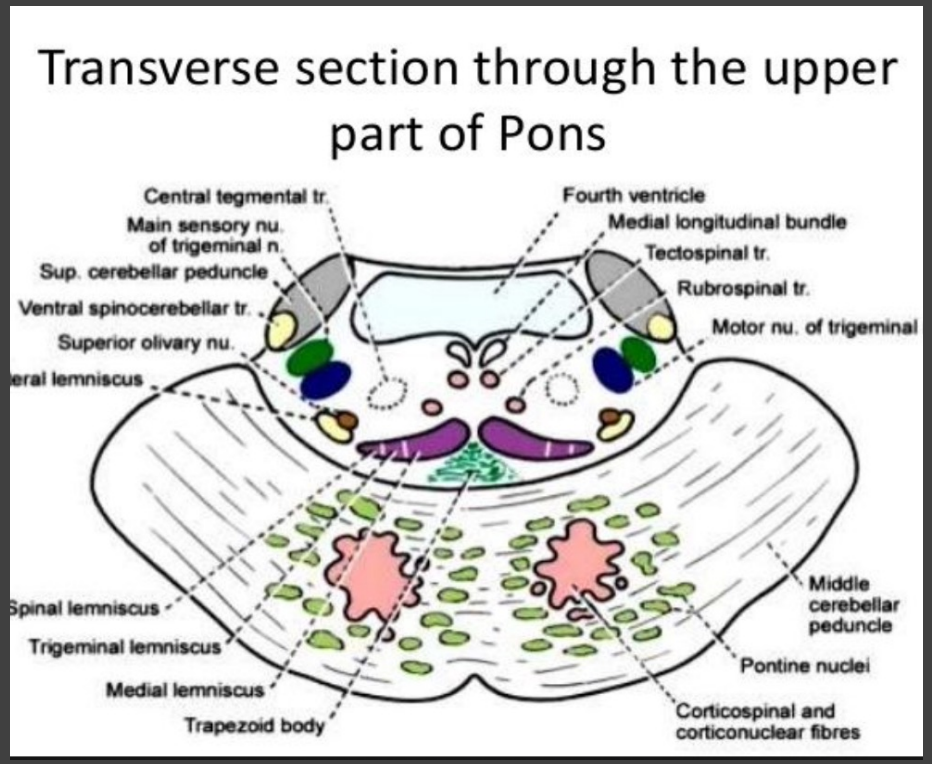
BRAINSTEM VASCULAR SYNDROMES

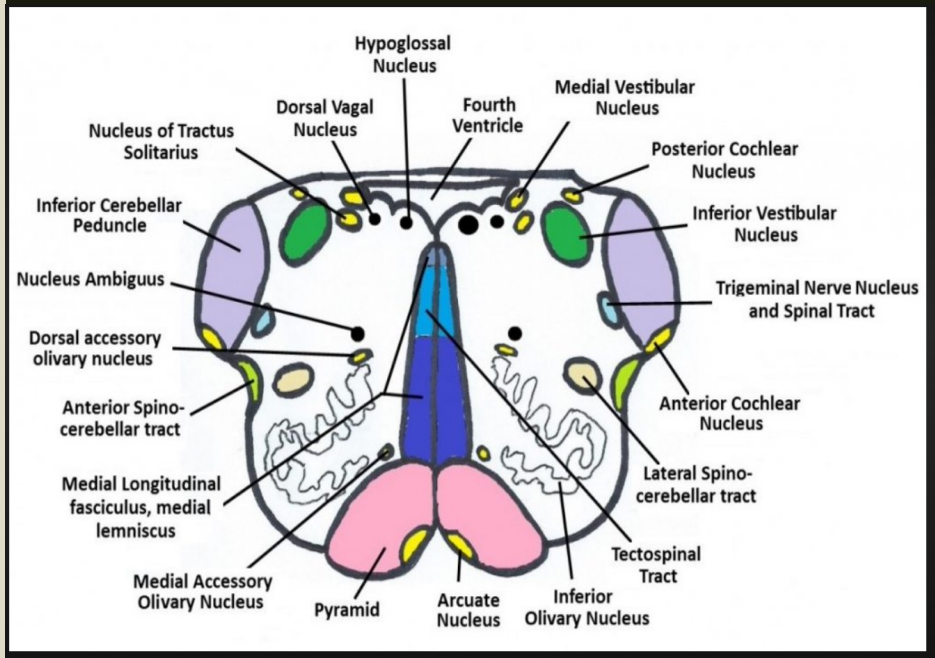
-VINAY CHANDRA POKALA

ANATOMY OF BRAINSTEM

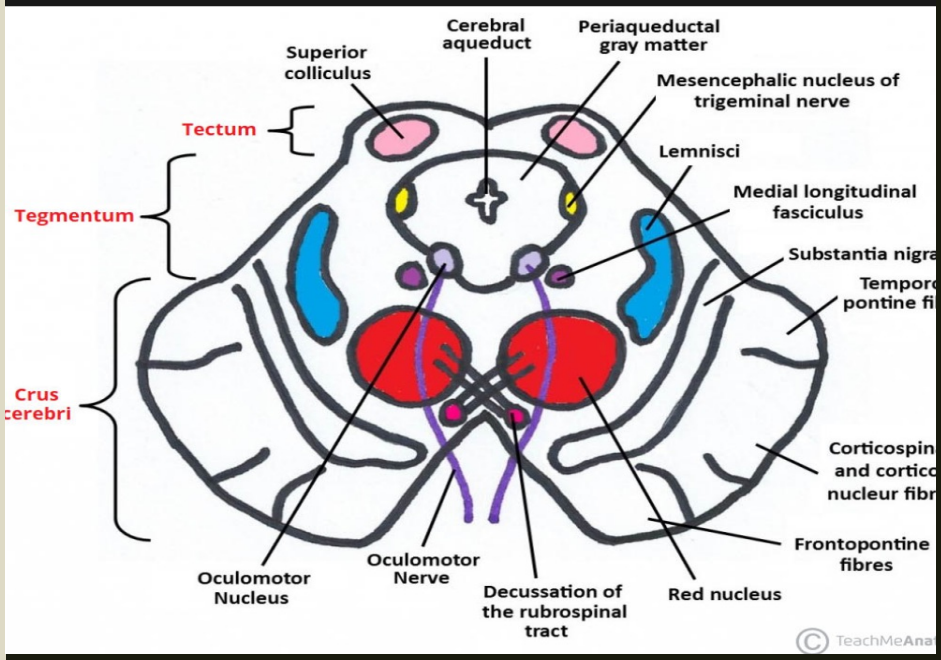
- Brain stem is divided into 3 sections- mid brain , pons and medulla
- Each section is divided into medial and lateral
- In general if the lesion is on the medial side corticospinal tracts and medial lemniscus are involved and if there is a lateral lesion spinothalamic tracts sympathetic fibers are involved
- Motor cranial nerves nuclei are to the medial side , mixed cranial nerve nuclei to the lateral side
- All cranial nerve nuclei are present in the brainstem except CN I and II

TRANSVERSE SECTIONS OF MIDBRAIN , PONS AND MEDULLA





Medulla

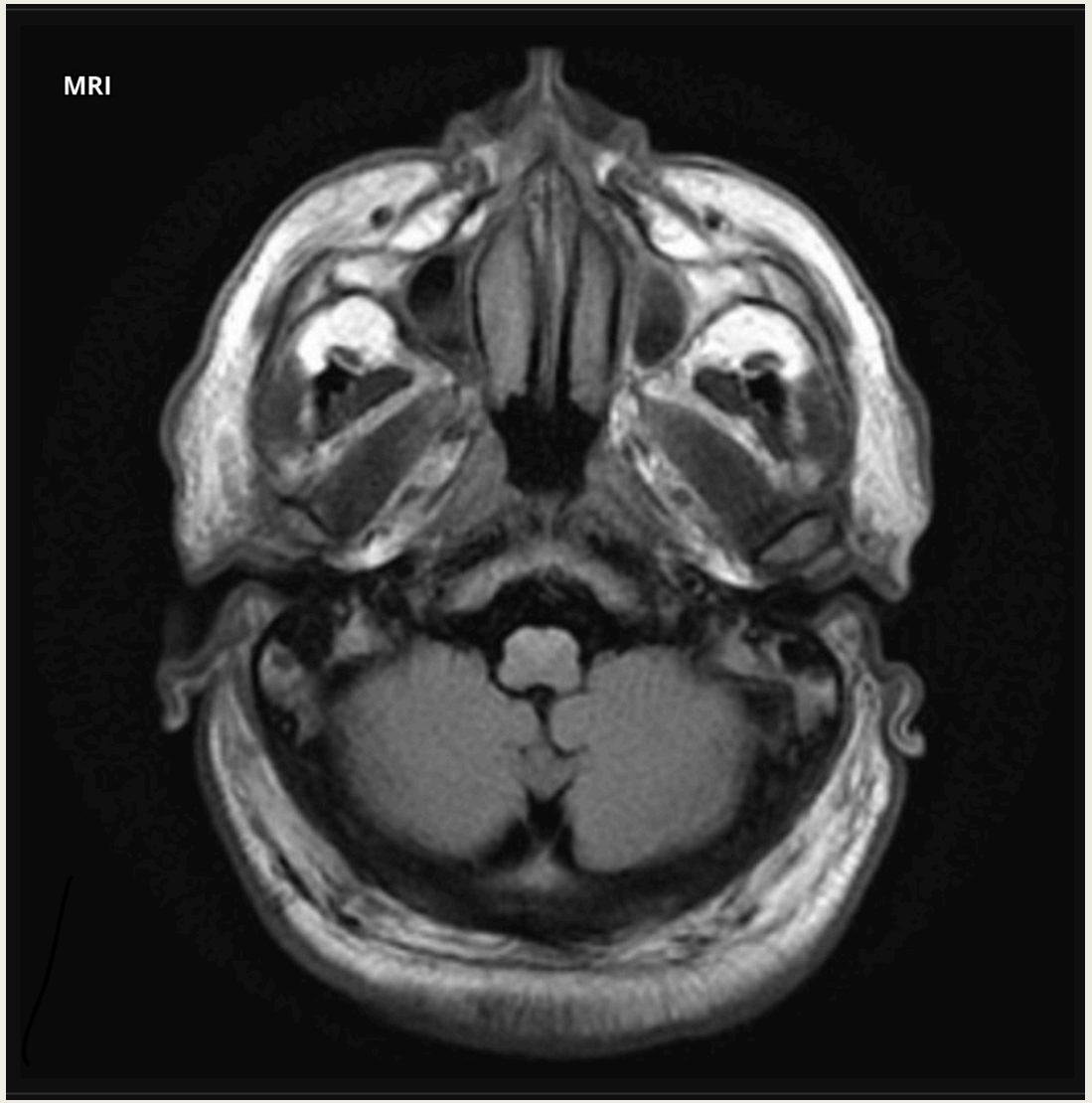


Midbrain

MEDIAL MEDULLARY SYNDROME(Déjérine syndrome)

- CAUSE – occlusion of paramedian branches of anterior spinal artery and/or vertebral arteries, ipsilateral vertebral artery dissection
- Incidence- less than 1% of all ischemic strokes
- Lesion involves corticospinal tracts , medial lemniscus ,hypoglossal nerves in caudal medulla are damaged inferior olivary nucleus, nucleus ambiguus
- Signs and symptoms- contralateral hemiparesis , decreased proprioception fine touch vibration on the contralateral side , tongue deviation to the same side of lesion ,dysarthria
- Dysphagia can be seen in bilateral medial medullary infract

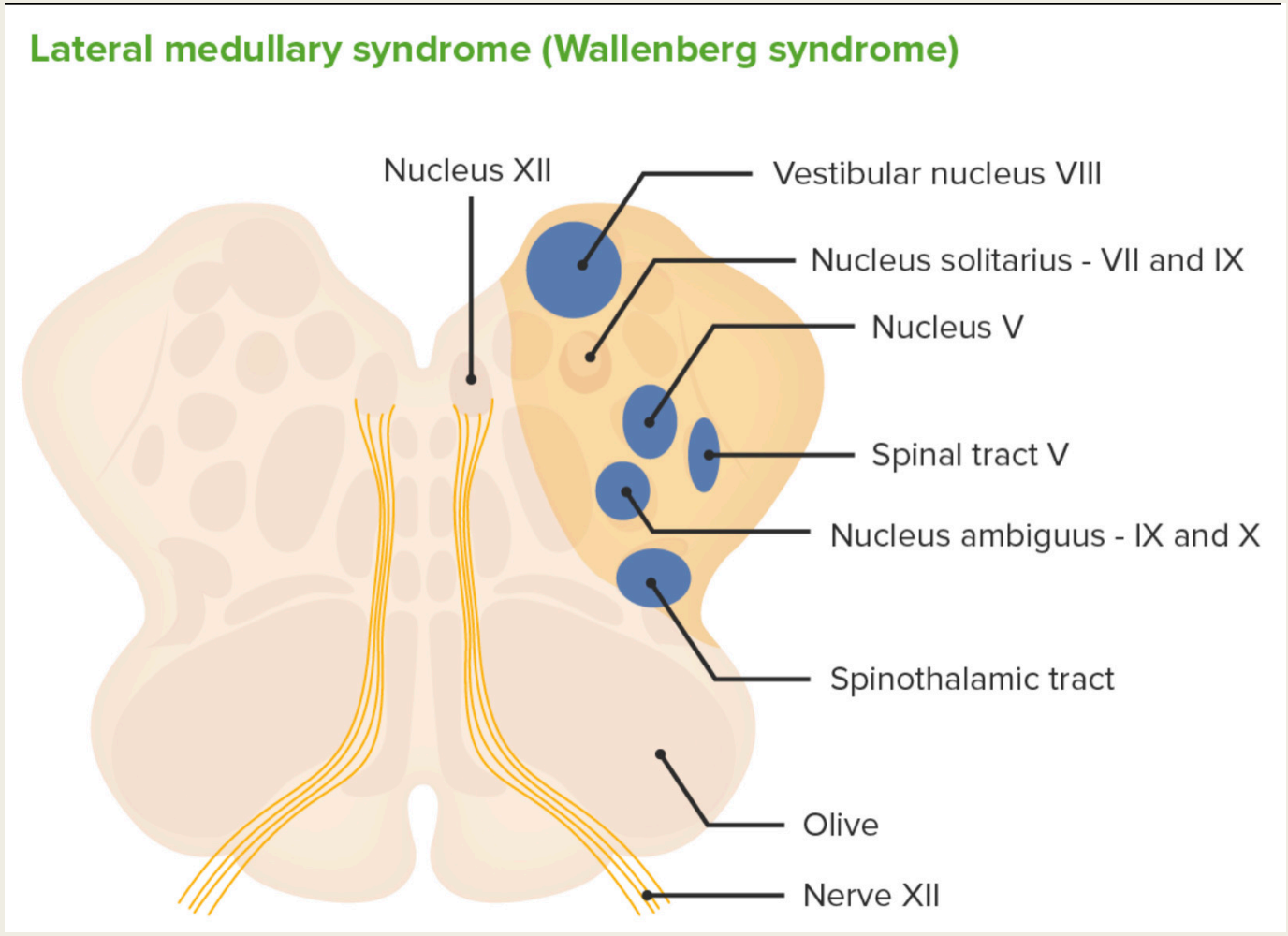
- MRI showing bilateral medial medullary stroke



LATERAL MEDULLARY SYNDROME (Wallenberg syndrome)

- CAUSE- mostly due to vertebral artery occlusion , second most common cause is due to posterior inferior cerebellar artery occlusion, vertebral artery dissection is a common cause in younger patients
- Incidence – most common posterior circulation ischemic stroke
- Lesion involves inferior cerebellar peduncle , spinothalamic tracts, nucleus of CN V, fibers of CN IX, X, vestibular nuclei , descending sympathetic fibers , nucleus ambiguous and nucleus tractus solitarius
- Signs and symptoms – patients present with ipsilateral vertigo with nystagmus (inferior vestibular nuclei)
- Hiccups
- Dysphonia , dysarthria and dysphagia
- Horner syndrome
- Ipsilateral ataxia with tendency to fall on the effected size
- Ipsilateral sensory loss on the face (pain and temperature)
- ipsilateral Trismus

- CONTRALATERAL
- Impaired pain and temperature in upper limb and lower limb



LOCKED IN SYNDROME

- CAUSE- hemorrhage or occlusion of the basilar artery , trauma , tumors, infection and demyelination(metabolic demyelination)
- Lesion involves the structures present on ventral pons.
- SIGNS AND SYMPTOMS- patients present with quadriplegia , difficulty in voluntary respiration, apnea
- Dizziness and vertigo
- Anarthria , dysphagia
- Loss of voluntary facial mouth and tongue movements
- If reticular activating system is spared – consciousness is preserved
- Vertical eye movement and blinking ability is preserved

MILLARD-GUBLER SYNDROME

- CAUSE- vascular(hemorrhage or occlusion of paramedian penetrating branches of basilar artery) and tumors (children)
- The lesion involves CN VI fasciculus and CN VII along with corticospinal tracts
- SIGNS AND SYMPTOMS – patients present with contralateral hemiplegia and ipsilateral lateral rectus weakness with diplopia
- Cranial nerve VII involvement leads to ipsilateral flaccid paralysis of the muscles of facial expression with loss of corneal reflex (LMN type)

FOVILLE SYNDROME

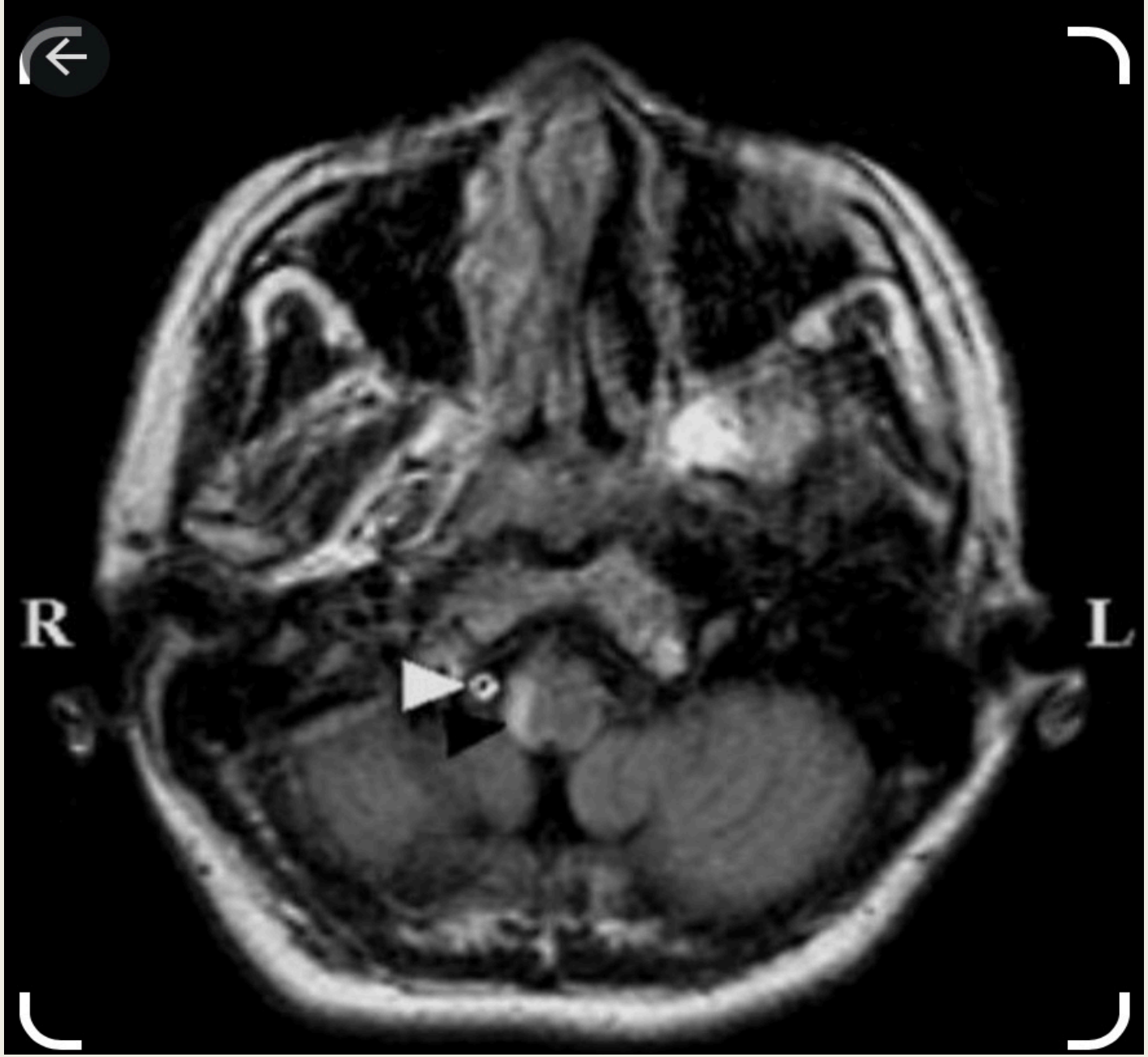
- CAUSE- occlusion of the paramedian penetrating branches of basilar artery and hemorrhage
- Lesion involves the CN VI(nucleus),VII and corticospinal tracts , medial lemniscus, and paramedical pontine reticular formation (gaze center)
- SIGNS AND SYMPTOMS - impaired horizontal gaze on the effected side (gaze center) vertical gaze remains normal , mild ptosis
- Ipsilateral facial palsy in both upper and lower type (LMN type)
- Contralateral hemiparesis, contralateral hemisensory loss

RAYMOND-CESTON SYNDROME

- CAUSE –occlusion of paramedian pontine branches of basilar artery
- There are two types of presentations for Raymond-ceston syndrome
- 1) classical type – involves the CN VI , corticofacial and corticospinal fibers , patients presents with ipsilateral lateral rectus weakness , contralateral facial palsy in the lower face(central facial palsy/UMN type) and contralateral hemiplegia
- 2) common type – involves CN VI and corticospinal fibers sparing the corticofacial fibers

LATERAL PONTINE SYNDROME(mari foix syndrome)

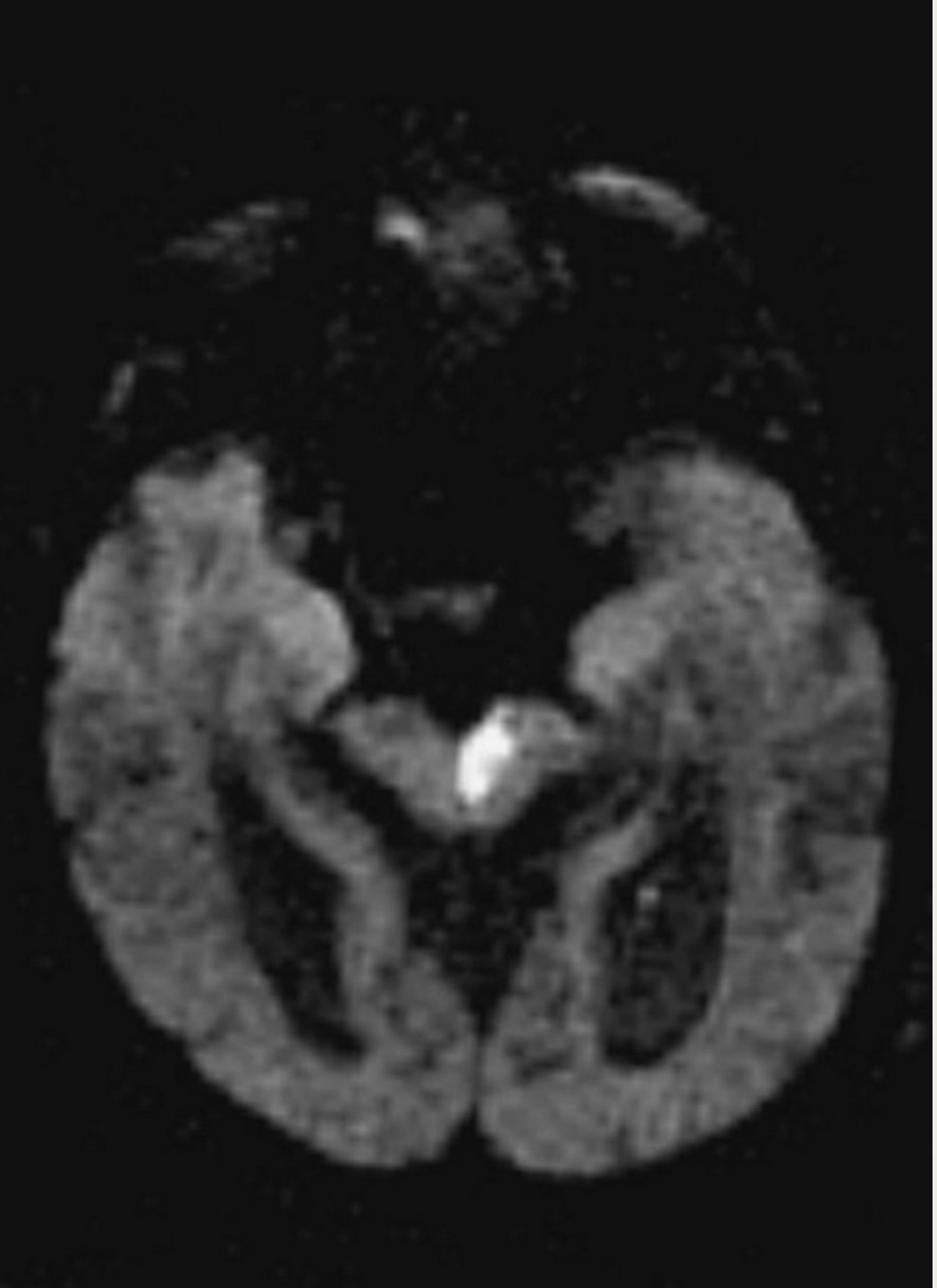
- CAUSE- occlusion of anterior inferior cerebellar artery
- Nucleus of cranial nerve V, VII,VIII(vestibular nuclei) , spinothalamic tracts, sympathetic fibers , middle and inferior cerebellar peduncles are involved in the lesion
- Patient presents with ipsilateral facial palsy , decreased lacrimation, decreased salivation , decreased taste in the anterior 2/3rd of tongue , vomiting ,vertigo, nystagmus , decreased pain and temperatue on ipsilateral side
- Sensorineural deafness if labyrinth artery arises from AICA
- Decreased pain and temperature on the contralateral side
- Ipsilateral Horner's syndrome
- Ipsilateral ataxia and dysmetria



MRI showing right lateral pontine infract

WEBER'S/ VENTRAL MIDBRAIN SYNDROME

- CAUSE-most common cause is occlusion from posterior cerebral artery and paramedian mesencephalic branches of basilar artery , less common hemorrhage , tumors and demyelinating diseases
- The CN III fascicles and the corticospinal tracts are effected
- SIGNS AND SYMPTOMS -Patients present with ptosis , downward and outward eye due to unopposed action of superior oblique and lateral rectus
- If the upper and middle midbrain are effected dilated unresponsive pupils can be seen
- Contralateral hemiplegia



DIFFUSION WEIGHTED IMAGING MRI SHOWING INFRACT IN THE VENTRAL MEDIAL MIDBRAIN

BENEDIKT'S SYNDROME

- CAUSE- occlusion of branches of posterior cerebral artery(perpendicular perforator branches of PCA)
- Structures effected are oculomotor nerve fasciculus , red nucleus and substantia nigra sometimes
- SIGNS AND SYMPTOMS – ipsilateral CN III palsy with contralateral abnormal movements of limbs . Abnormal movements involves chorea , resting tremors
- If the infraction effect substantia nigra features of parkinsonism can be seen

NOTHNAGEL SYNDROME

- CAUSE –occlusion of perpendicular perforator branches of PCA
- Lesion involves Third nerve nucleus or its fibers and superior cerebellar peduncle before it decussates
- SIGNS AND SYMPTOMS – patient presents with ipsilateral third nerve palsy and contralateral gate ataxia (cerebellar ataxia)

CLAUDE SYNDROME

-It is a combination of benedickt's and nothnagel syndrome

-Patient presents with ipsilateral cranial nerve III palsy and contralateral ataxia with rest tremors and chorea

MIDBRAIN SYNDROMES

Name	Picture	Localization	Vascular supply	Clinical symptoms (anatomy)
Midbrain syndromes				
Weber's syndrome		Medial midbrain	PCA perforatoes	Contralateral hemiparesis (cerebral peduncle) Ipsilateral CN III palsy (fascicles of CN III) Impaired ipsilateral pupillary reflex (CN III) and dilated pupil
Benedikt's syndrome		Midbrain tegmentum	PCA perforatoes	Ipsilateral CN III palsy usually with dilated pupil (CN III fascicles) Contralateral involuntary movements (red nucleus, subthalamic nucleus)
Claude's syndrome		Midbrain tegmentum (dorsal)	PCA perforatoes	Ipsilateral CN III palsy (CN III fascicles) Contralateral hemiataxia and dysmetria (dentatothalamic fibers within the superior cerebellar peduncle) Contralteral tremor (red nucleus)
Nothnagel's syndrome		Midbrain	PCA perforatoes	Ipsilateral CN III palsy (CN III fascicles) Contralateral hemiataxia (dentatothalamic fibers in superior cerebellar peduncle)

PARINAUD SYNDROME

- CAUSE- pineal gland tumor is the most common cause.
- Pineal gland tumor causes compression of dorsal rostral midbrain at the level of superior colliculus compressing vertical gaze center.
- SIGNS AND SYMPTOMS – conjugate upward gaze palsy
- Convergence retraction nystagmus on attempted upward gaze
- Pupillary light reflex lost but accommodation intact
- Lid retraction (colliers sign)

MRI showing pinealoma compressing the midbrain

THANK YOU