



Rehabilitating Posterior Stroke: A multidisciplinary Approach

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Introduction to Posterior Strokes

- Definition: Ischemic or hemorrhagic strokes in the vertebrobasilar circulation
- Epidemiology:
 - 20-25% of all ischemic strokes
 - Varied presentation

Importance of multi-disciplinary approach:
symptoms impact balance, coordination, mobility,
ADLs, dysphagia, cognition



Neuroanatomy



Vascular Territories Affected:

Vertebral arteries

Basilar artery

Posterior cerebral arteries

Cerebellar arterioes (PICA, AICA, SCA)



Structures Commonly Affected:

Brainstem (midbrain, pons, medulla)

Cerebellum

Occipital lobes

Thalamus

Other cortical regions (including medial temporal and parietal lobes)

Blood supply—Supplied by posterior cerebral artery in some but not all people
Ischaemia symptoms—Neuropsychological such as memory deficits, alexia, acalculia, agraphia, prosopagnosia

Thalamus

Blood supply—Posterior cerebral artery
Ischaemia symptoms—Sensory loss or disturbance

Occipital lobes

Blood supply—Posterior cerebral artery
Ischaemia symptoms—Visual field defects

Brainstem (midbrain, pons, medulla)

Blood supply—Basilar, superior cerebellar, and anterior inferior cerebellar arteries
Ischaemia symptoms—Limb weakness, sensory loss, cranial nerve palsies; classical brainstem syndromes with crossed signs; "locked-in" syndrome; "top of the basilar" syndrome

Cerebellum

Blood supply— Superior, anterior inferior, and posterior inferior cerebellar arteries
Ischaemia symptoms—Vertigo, ataxia, nystagmus, and other cerebellar signs



Neuroanatomy

- Midbrain: eye control, regulates posture and balance, processing of vision and hearing
- Pons: bridge to the cerebellum, coordinates face and eye movements, facial sensation, hearing, and balance
- Medulla: important for speech production, regulates breathing, heartbeat, blood pressure, and swallowing
- Occipital Lobes: Visual cortex, depth perception, object recognition
- Thalamus: central hub for processing, motor control, sleep/wake cycles, attention and consciousness, emotional processing, memory, language processing

Cranial nerves and Areas Affected

- 10 of 12 Cranial nerves emerge from the brainstem:
 - III Oculomotor – eyeball, pupil, and upper lid movement
 - IV Trochlear – innervation of superior oblique eye muscle
 - V Trigeminal – mastication and facial sensation
 - VI Abducens – eye abduction
 - VII Facial – facial movement, taste, and salivary glands
 - VIII Vestibular Acoustic – equilibrium and hearing
 - IX Glossopharyngeal – taste, elevation of palate, and larynx
 - X Vagus – taste, swallowing, elevation of palate, phonation, parasympathetic outflow of visceral organs
 - XI Accessory – turning head and shrugging of shoulders
 - XII Hypoglossal – tongue movement

Pathophysiology

Pathophysiology Highlights:

- Ischemia leads to infarction of brainstem nuclei and tracts
- Affects cranial nerve function, proprioception, and coordination

From a Therapy lens:

- Disruption of vestibular pathways
- Dysmetria, ataxia, postural instability
- Visual-vestibular mismatch

Clinical Presentation

Common Symptoms:

- Ataxia (limb and truncal)
- Vertigo, nausea, vomiting
- Diplopia, nystagmus
- Dysphagia, dysarthria
- Hemiparesis or quadriparesis
- Sensory deficits
- Impaired balance and gait

Key Syndromes:

- Wallenberg Syndrome (Lateral Medullary) – most common
- Locked-In Syndrome – severe but rare
- Cerebellar Infarcts – truncal ataxia, falls
- ** Posterior strokes often *appear mild* but have **severe functional impacts**, especially for mobility and ADLs

Physical Therapy Assessment

- Core PT assessment areas:
 - Balance and Coordination
 - Romberg, tandem stance, SLS, Berg Balance Scale
 - Finger to nose, heel to shin
 - Gait Analysis
 - Wide based gait
 - Difficulty initiating
 - Oculomotor Function
 - OT to speak to
 - Vestibular Assessment
 - Dix-hallpike, Head impulse test
 - Muscle Strength and Tone
 - May be normal or mildly impaired
 - Cognitive Screening
 - Especially if occipital lobe or thalamus involved
 - ST/OT

Physical Therapy Intervention

- Core Goals:
 - Restore functional mobility
 - Re-establish balance and postural control
 - Reduce fall risk
 - Compensate for visual/vestibular deficits
 - Patient and care-giver education

Physical Therapy Intervention



Balance and Gait Training

Dynamic Balance

Dual-Task Training

Gait re-training (AD if needed)



Vestibular Rehab

Gaze stabilization

Habituation exercises

Canalith re-positioning if BPPV suspected

Physical Therapy Intervention

Coordination Training

- Frenkel's exercises
- Rhythmic stabilization
- Task-specific activities

Functional Training

- Sit-to-stands, bed mobility
- Transfers (with and without compensation)
- Fall recover training

Neuromuscular Re-Education

- Coordination and stability
- Weight bearing
- Visual cuing for gait and ADLs

Key Takeaways

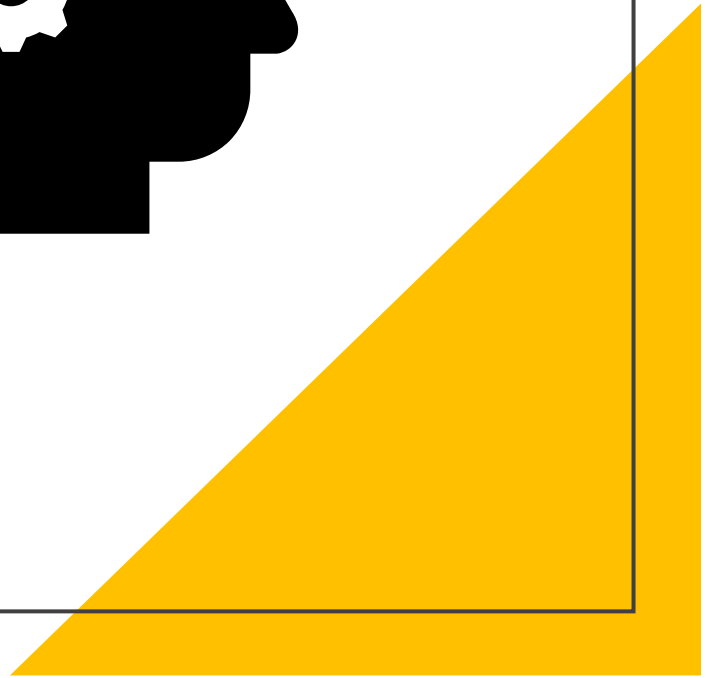
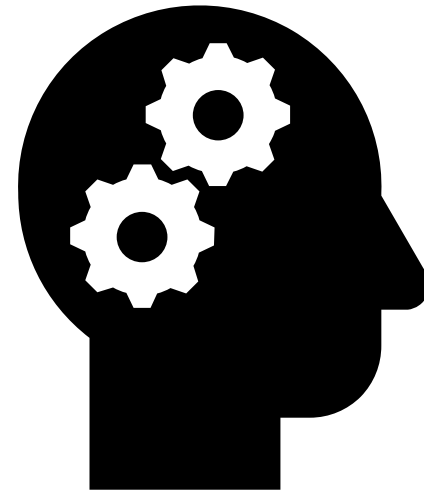
Posterior strokes require early and tailored PT to address vestibular and cerebellar deficits

Standard motor assessments may miss key impairments → prioritize balance, coordination, and vestibular evaluation

Recovery can be slow – progress requires persistence and adaptation

Speech Therapy

Kelli Nelson, MS, CCC-SLP





Speech Therapy Evaluation and Treatment

- Speech therapy areas (assessment and treatment) for posterior stroke
 - Swallowing
 - Articulation
 - Voice
 - Cognition
-

Dysphagia

Motor and/or sensory issue with
anatomy and/or physiology of
the swallowing mechanism



3 Components:

Oral Phase

Pharyngeal
Phase

Esophageal
Phase

Assessment of Swallow

Bedside Clinical Swallowing Examination

Flexible Endoscopic Evaluation of Swallowing (FEES)

Video Fluoroscopy/VFSS (gold standard)

17 Components Assessed via VFSS

- **Oral:** lip closure, tongue control, bolus preparation/mastication, bolus transport/lingual motion, oral residue, and initiation of pharyngeal swallow
- **Pharyngeal:** soft palate elevation, laryngeal elevation, anterior hyoid excursion, epiglottic movement, laryngeal vestibular closure, pharyngeal stripping wave, pharyngeal contraction, pharyngeoesophageal segment opening, tongue base retraction and pharyngeal residual
- **Esophageal:** esophageal clearance in the upright position

Recommendations



NPO vs modified diet vs regular diet



Identify any dysfunction and develop treatment plan

Diet modifications

Exercises



May need alternative nutrition access

Corpak

PEG tube

Articulation or Speech Impairment

- Dysarthria: "refers to a group of neurogenic speech disorders characterized by abnormalities in the strength, speed, range, steadiness, tone, or accuracy of movements required for breathing, phonatory, resonatory, articulatory, or prosodic aspects of speech production." (Duffy, 2020, p.3)

Types of dysarthria related to posterior strokes

Flaccid

- Lower motor neuron damage
- Weakness and low muscle tone
- Patient exhibits: imprecise consonants, breathiness, hypernasality, and short phrases
- Monotone and low volume

Spastic

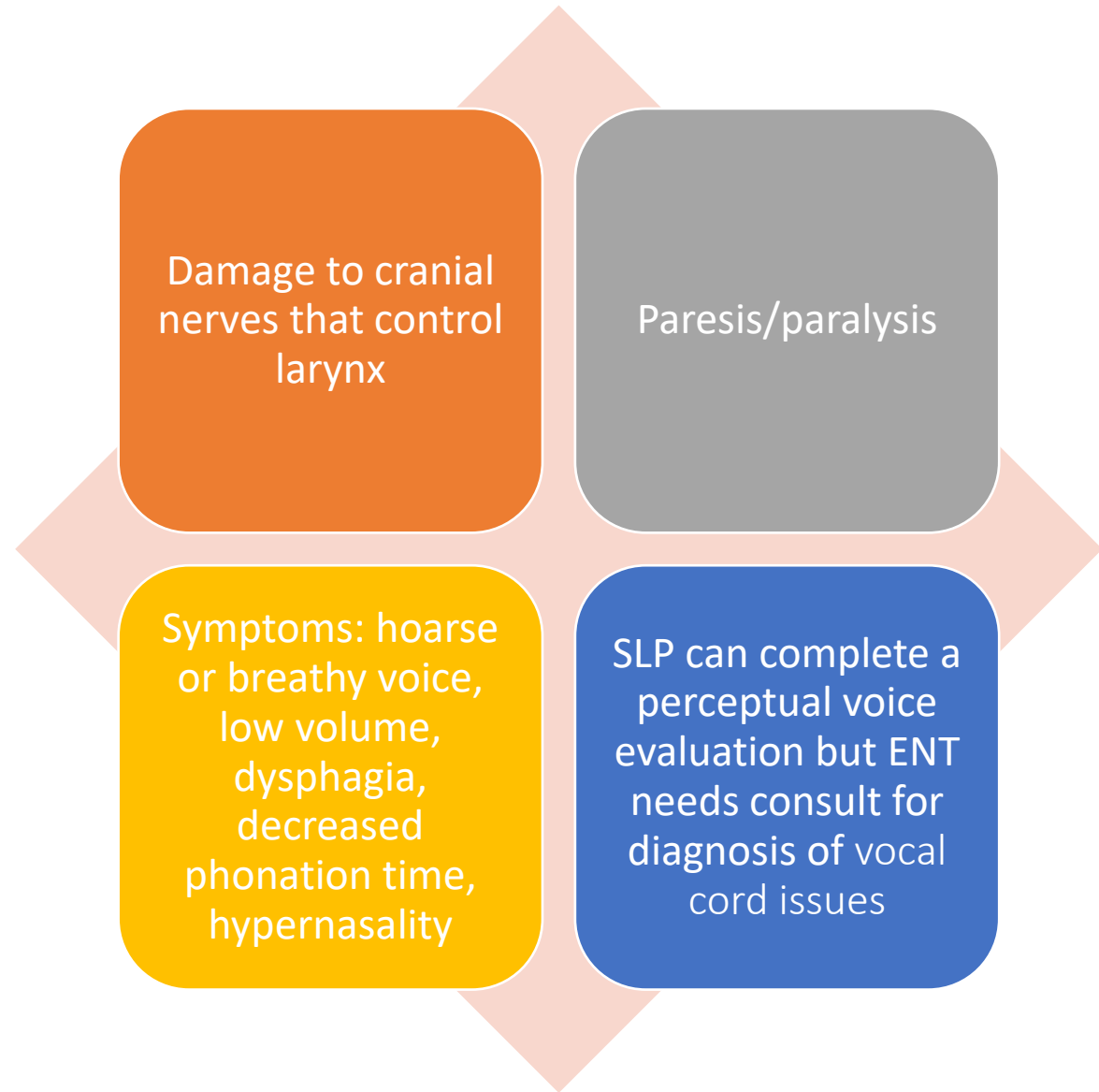
- Bilateral upper motor neuron damage
- Increased muscle tone, hyperactive reflexes, and weakness
- Patient exhibits: strained or strangled voice, low pitch, slow/irregular and slurred speech, and monopitch/monoloudness

Ataxia
dysarthria

Due to injury to the
cerebellum

Persons will describe
this as they if sound
intoxicated

Voice Disorders: Posterior Stroke



Cognition: Posterior Stroke

Disruption in pathways
through brainstem to
cerebellum and
cerebrum

Visual problems

Memory impairments

Attention deficits

Executive dysfunction

Not typically leading to
aphasia

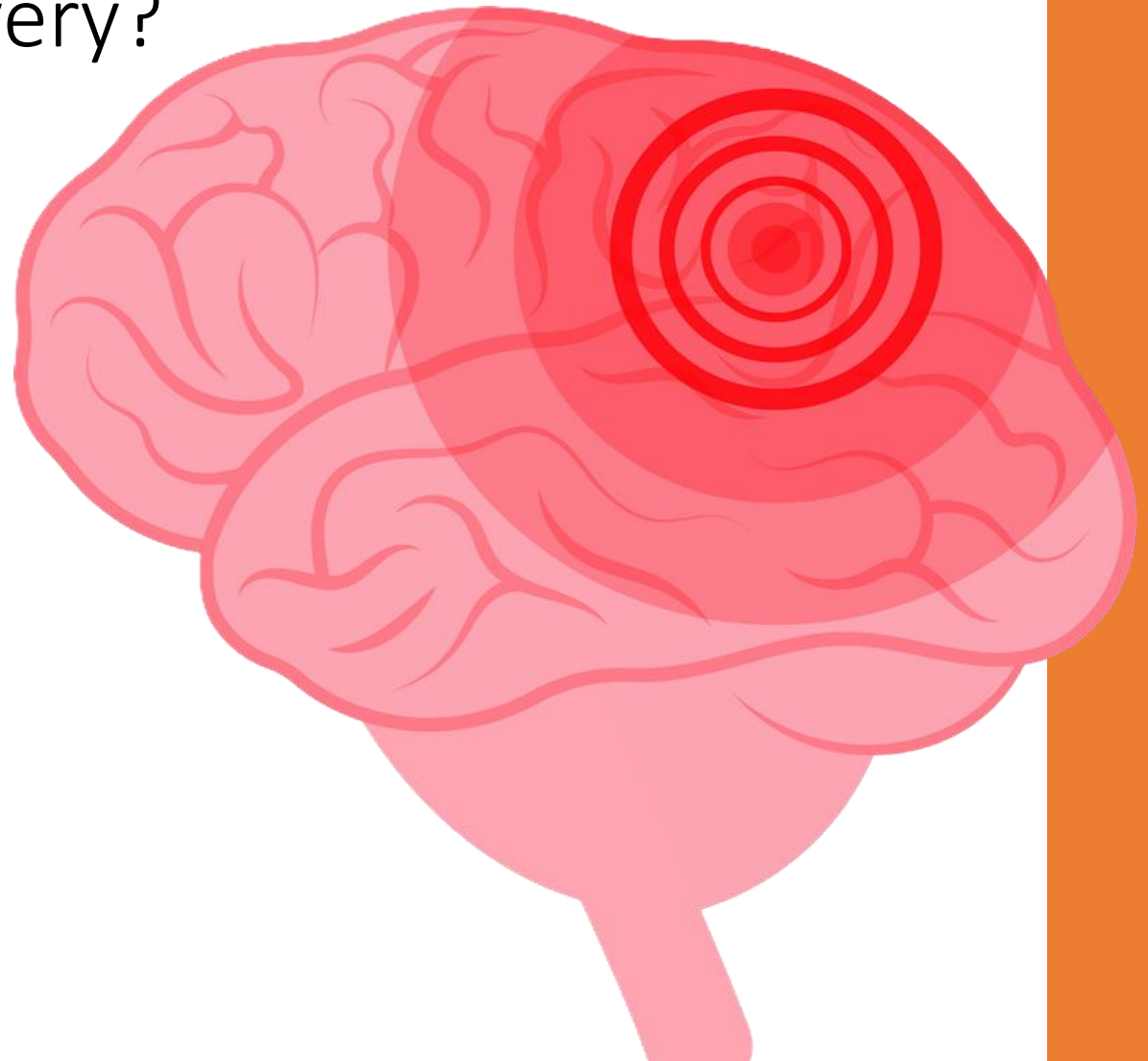
Occupational Therapy (OT)

Taylor Tschetter, OTD, OTR/L, CSRS



What is OT and why is it important for stroke recovery?

- About 14% of U.S. stroke survivors report difficulty with basic ADLs (Knoll, et al., 2023)
- Over 66% of U.S. stroke survivors report being limited in their higher-level daily activities (Pallin, et al., 2020)

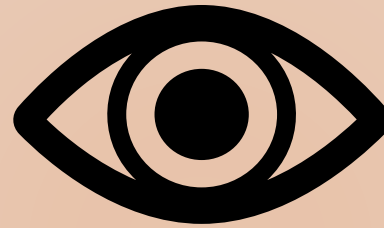


Common OT Assessments/Screens



Section GG Functional Abilities & Goals (QI's)

- ADL observation/assessment



Vision/oculomotor tests:

- Developmental Test of Visual Perception
- Saccades
- Smooth Pursuits
- Catherine Bergego Scale



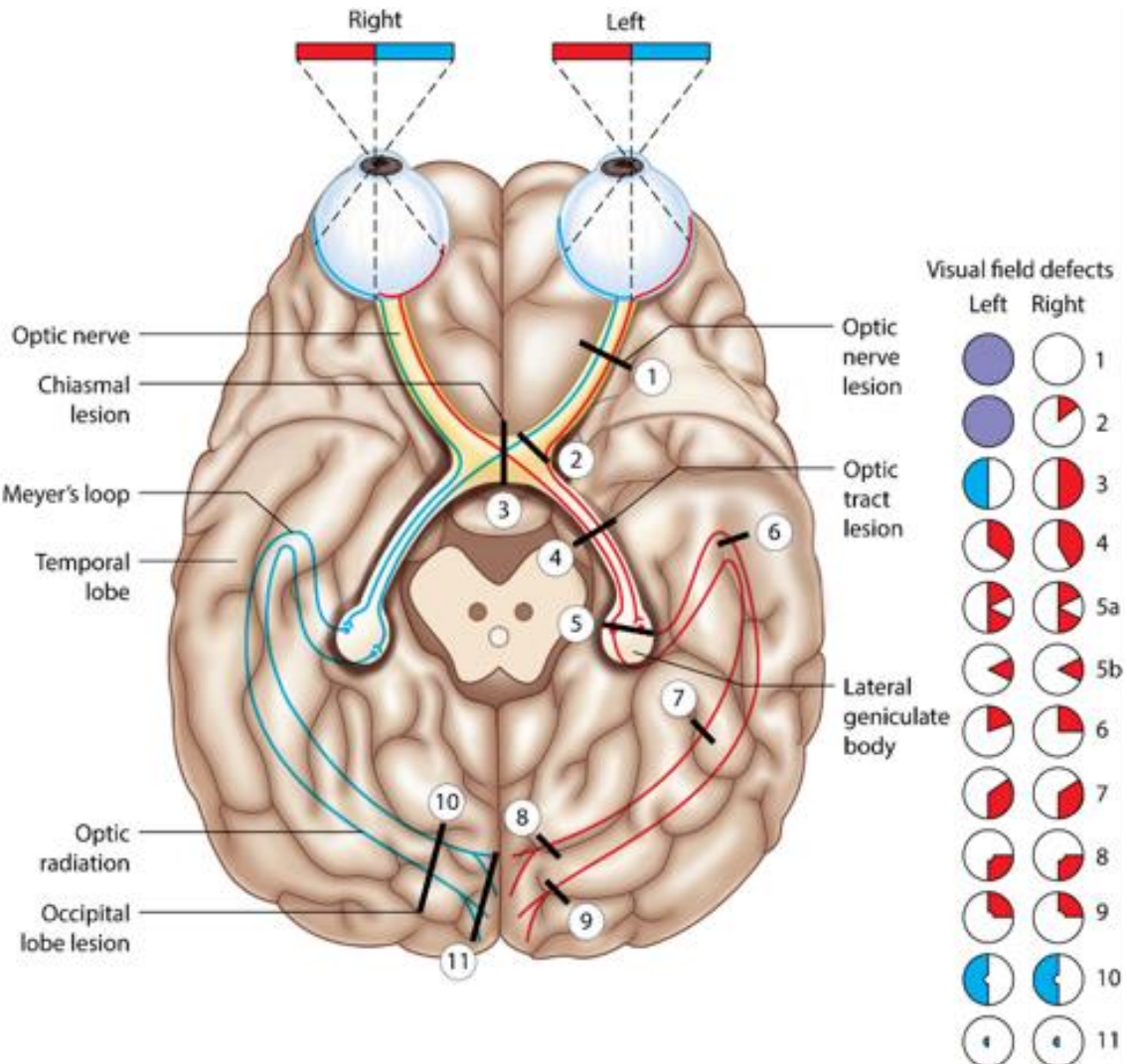
Cognitive screens

- MoCA
- Short-Blessed
- Independent Living Scales

Visual Impairments After Posterior Stroke

- Anopia (field cut)
- Visual neglect
- Oculomotor palsy
- Diplopia
- Cortical blindness (rare)

Anopia/Anopsia (Visual Field Deficit)



Left side homonymous hemianopia



Normal visual field





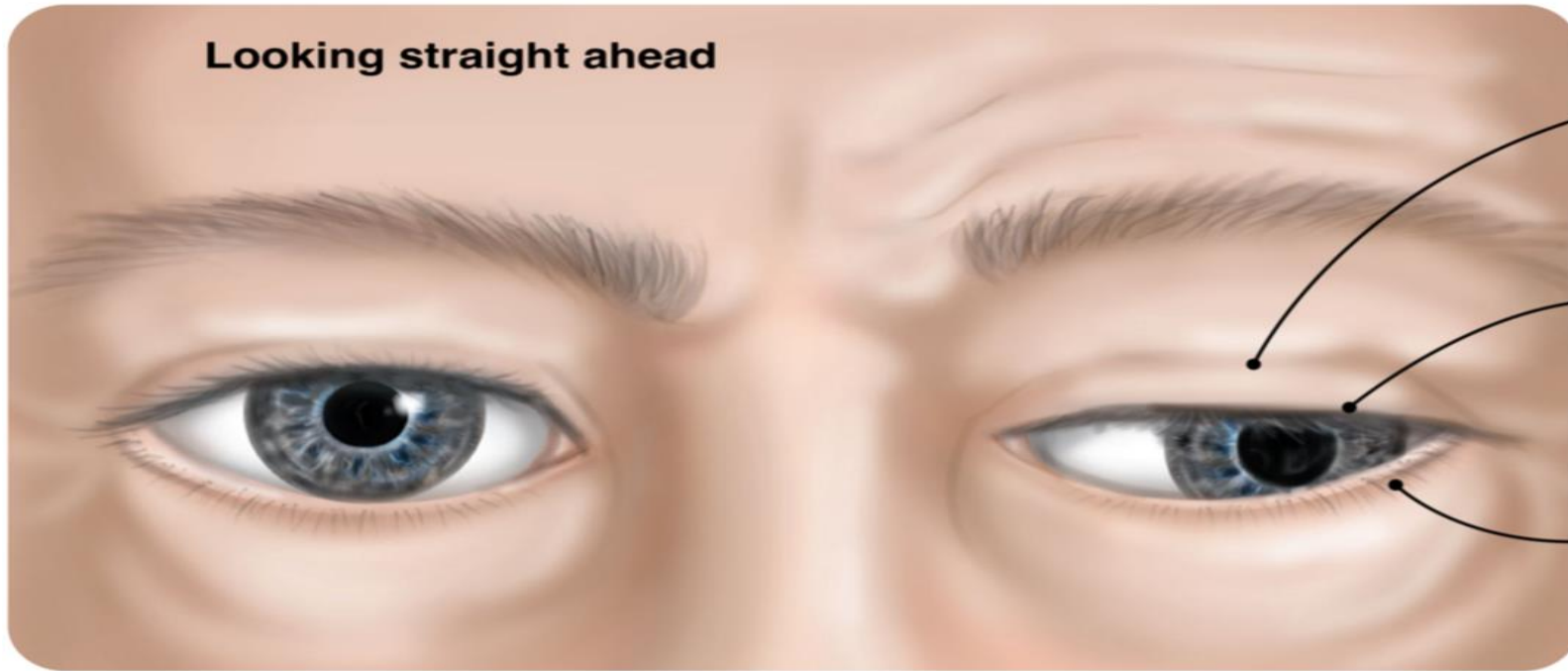
Unilateral Neglect

Oculomotor Nerve (CN III) Palsy

Normal eye

Abnormal eye

Looking straight ahead



Ptosis

Inactivation of the levator palpebrae

Mydriasis

Decreased tone of the constrictor pupillae muscle

Down and out

Unopposed left superior oblique and lateral rectus muscles

OT Intervention for Posterior Stroke

- Core Goals:
 - Promote independence in meaningful activities
 - Improve functional mobility
 - Improve, adapt, or re-learn skills
 - Address and compensate for physical, visual, vestibular, and/or cognitive deficits
 - Promote safety & fall prevention



OT Intervention for Posterior Stroke

- Vision
 - Scanning training
 - Visual aids/anchors
 - Environmental modifications
 - Contrast (high vs low)
 - Lighting
 - Placement
 - Referral to an optometrist/ophthalmologist
- Balance
 - Gaze stabilization
 - Habituation
 - Incorporating balance into daily activities
- Coordination
 - Proprioceptive feedback
 - Adding weight
 - Fine motor activities
- Cognition
 - Memory aids
 - Environmental cues
 - Caregiver education
- Adaptive Techniques/Compensation
 - Visual aids
 - Adaptive equipment for ADL/IADLs
 - Weighted utensils

Education, Safety, & Discharge Planning

Communication

- Patient, caregiver(s), & IDT
- PT, OT, SLP, nursing, physicians, recreational therapists, dietitians, case management, social work, etc.

Continued Therapy

- Refer and set up additional therapy
- Home exercise programs

Home assessments

- Safety assessment
- Fall recovery
- Home modifications
- Equipment needs

Driving Assessment

- Driving evaluation
- Training programs

Community re-integration activities

- Stroke support group
- Adaptive wellness
- & more!

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