Cranial Nerve Pathologies

The cranial nerves are a set of 12 nerves that originate from the brain and exit the skull through small openings to innervate various structures of the head, neck, and thorax. Pathologies affecting the cranial nerves can result in a variety of symptoms depending on the affected nerve, including facial weakness or paralysis, difficulty swallowing, loss of vision, hearing loss, balance problems, and altered sensation in the face or mouth. Common tested causes of cranial nerve pathologies include Horner syndrome, trigeminal neuralgia, Bell's palsy, brain or brainstem lesion, microvascular cranial nerve palsy, glossopharyngeal neuralgia, multiple sclerosis, Arnold Chiari Malformation, amyotrophic lateral sclerosis (ALS), Guillain Barre' syndrome, and Parkinson's disease.

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Cranial Nerve Pathologies

Horner Syndrome

Horny PAM

Horner syndrome is caused by a lesion along the oculosympathetic pathway. Etiologies disrupting the oculosympathetic pathway include herpes zoster virus, tumors, Pancoast tumors of the lung, Lyme disease, demyelinating disease, thoracic outlet syndrome, and stroke. Signs and symptoms associated with Horner Syndrome include ptosis of both the upper and lower eyelid, meiosis (excessive pupillary constriction), and facial anhidrosis (inability to sweat). Cranial nerve testing for Horner would include oculomotor CN III observation of eyelids checking for ptosis, pupillary response testing, and observation and subjective findings of facial anhidrosis.

Trigeminal Neuralgia

Tri-gem Nerve-algae

Trigeminal neuralgia is caused by damage to the trigeminal nerve CN V resulting in severe sharp stabbing pain in the face when talking, eating, and touching the face. Trigeminal Neuralgia comes and goes in 2-minute intervals or less and rarely affects the V1 division of the trigeminal nerve.

Bell's Palsy

Drooping-bell

Bell's Palsy causes paralysis of one side of the face due to damage to the facial nerve CN VII caused by a viral infection or immune disorder. Signs and symptoms reported may include facial drooping, subjective numbness to the face, and louder hearing on the affected side as CN VII signals the stapedius muscle to dampen sound in the inner ear.

Brain or Brainstem Lesion

Brain or Brain-stem Leeches

A brain or brainstem lesion, which could be a stroke, tumor, or neurological lesion, can affect the function of one or many cranial nerves. This functional deficit is dependent upon the lesion's location within the brain. If the lesion occurs in the midbrain, it can affect CN III and CN IV. If the lesion is in the pons, it can affect CN V, CN VI, CN VII, and CN VIII. If the lesion is in the medulla, it can affect CN IX, CN X, CN XI, and CN XII. You would notice deficits in a cranial nerve exam which would lead you to which area of the brain a lesion may be located. An example of this is if there was a lesion or stroke to the pons, you may see vertigo symptoms as it can affect CN VIII.

Microvascular Cranial Nerve Palsy

Microscope-vascular Brainstem Nerve-pause

Microvascular Cranial Nerve (MCNP) Palsy is caused by an obstruction of blood supply to a cranial nerve as a result of diabetes, hypertension, or high cholesterol, causing paralysis. Microvascular Cranial Nerve Palsy affects CN III, CN IV, and CN VI, resulting in diplopia with both eyes open, blurry vision, droopy eyelids, and severe pain. Symptoms of MCNP tend to resolve in 2-3 months and are treated with pain relievers, eye patching, and temporary prisms.

Glossopharyngeal Neuralgia

Glass-pharaoh Nerve-algae

Glossopharyngeal Neuralgia is a cranial nerve pathology affecting CN IX. Signs of Glossopharyngeal Neuralgia include severe unilateral pain in the back of the throat that is intermittent in nature and lasts seconds to minutes in duration. The cause of Glossopharyngeal Neuralgia can range from tumor to compression to multiple sclerosis. Oftentimes CN X is also affected, as CN IX and X both exit at the jugular foramen.

Multiple Sclerosis

Multiple Skull-roses

Multiple Sclerosis MS is a disease involving demyelination of the central nervous system. This demyelination is caused by an immune system response producing antibodies that attack and destroy oligodendrocytes in the central nervous system. MS affects three times as many women as men, and the average age for onset of symptoms is 20-40 years old. Symptoms of MS include paresthesias, bladder disorders, general weakness, coordination issues, and changes to reflexes. MS can affect cranial nerves and presents as blindness, diplopia, and eye movement disorders (CN II, III, IV, VI).

Arnold Chiari Malformation

Arnold Car-race Malformed

Arnold Chiari Malformation is a neural tube developmental hindbrain deformity. It has four types of classifications. Type I is caused by a herniation of the cerebellar tonsils through the foramen magnum. In this type, the medulla and pons are small and atypical. Type I may be asymptomatic, or symptoms may occur in early adulthood. Symptoms may be a result of hydrocephalus and can include severe headache, neck pain, and suboccipital pain. Cranial nerves may be affected in type I resulting in tongue and facial weakness, dizziness, hearing loss, and visual disturbances. Type II normally presents with another neural tube disorder, such as spina bifida. Type II is present at birth and presents with an atypical formation of the brainstem and cerebellum, resulting in a herniation of the medulla and cerebellum through the foramen magnum. Symptoms of type II include progressive hydrocephalus, paralysis of the sternocleidomastoid, deafness, visual disturbances, and facial paresis. Arnold Chiari Malformation can cause central vertigo, difficulty swallowing, and visual disturbances. Type III has similar symptoms as type II; however, it is more severe, as the cerebellum and brainstem herniate through the foramen magnum. Type III can cause neurological deficits and can be fatal. Type IV results in an underdeveloped cerebellum and is fatal.

Amyotrophic Lateral Sclerosis (ALS)

Emmy-trophy Ladder Skull-roses

Amyotrophic Lateral Sclerosis (ALS), or Lou Gehrig's Disease, is a progressive disease that destroys motor neurons of the brainstem, lower motor neurons, and upper motor neurons. This disease affects the motor portion of the cranial nerves, causing progressive difficulty with breathing, speaking, and swallowing. Special testing will show upper and lower motor neuron signs, a positive Babinski sign, hyperreflexia, and abnormal cranial nerve testing. ALS is rapidly progressive and fatal, with an average life expectancy of 3 years post-diagnosis.

Guillain Barre' Syndrome

Green Beret

Guillain-Barre Syndrome (GBS) is a neuropathic syndrome developed after contracting an infection, after a stressful time, or after surgery. These events cause an autoimmune inflammatory response that demyelinates peripheral motor and sensory nerve fibers, resulting in bilateral muscle paresis or paralysis, paresthesia, pain, blood pressure irregularities, and altered cardiac rhythms. GBS affects motor cranial nerves of the eye or facial movement, swallowing, and chewing (CN III, IV, V, VI, VII, IX, X, XII). The recovery rate for GBS is 97%, with 75% of people making a complete recovery.

Parkinson's Disease

Park-in-sun garage

Parkinson's disease (PD) is a movement disorder of the basal ganglia caused by the death of dopamine-producing cells. Signs of Parkinson's disease include rigidity, dyskinesia, difficulty producing and regulating muscle force, difficulty initiating movement, resting tremors, freezing, and lack of postural control. Patients with Parkinson's disease may develop supranuclear nerve palsy, which results in a loss of control of eye movement and will be seen in cranial nerve testing of eye movements, including CN III, IV, and VI. Patients with PD may also demonstrate dysarthria (CN V, VII, X, or XII) and dysphagia (CN V, VII, IX, X, or XII).