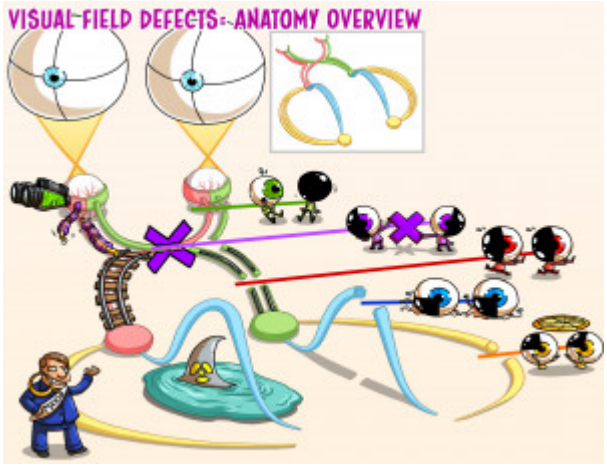
Visual Field Defects - Anatomy Overview



PLAY PICMONIC

Optic Nerve

Eye Nerve wearing Optics

The nasal portion of the retina processes visual information from the temporal side of the ipsilateral (on the same side) eye, while the temporal portion of the retina processes visual information from the nasal side of the ipsilateral eye. This visual information, such as color, contrast, and brightness, is related from the retina to the brain. If there is a lesion in the optic nerve, the patient will have complete vision loss in the eye innervated by the damaged nerve.

Vision Loss in One Eye

One Blind Eye

The optic nerve relays all sight, which includes visual information, such as color, contrast, and brightness, from the retina to the brain. A lesion to the optic nerve will result in complete vision loss in the eye innervated by the damaged nerve.

Optic Chiasm

Eye Crossing

The optic chiasm is where the outside half of each visual field crosses in the midline just above the pituitary gland. A lesion or compression of the optic chiasm will cause bitemporal hemianopia. Common causes of optic chiasm compression include anterior communicating artery aneurysms, pituitary tumors or craniopharyngiomas.

Bitemporal Hemianopia - Both Eyes Outside Vision Loss

Both Eyes showing Outside Vision Loss

A lesion or compression of the optic chiasm will cause bitemporal hemianopia, which is loss of bilateral vision in the temporal (lateral) visual fields. Patients who cannot see in the outer half of both visual fields may complain of bumping into objects on either side, have difficulty reading or difficulty driving, especially changing lanes. Their visual field is as if they have blinders on.

Optic Tract

Eye Track

Each optic tract carries visual information from the contralateral (opposite side) visual field from both eyes. Therefore, lesions to the left optic tract cause loss of vision in the right half of both eyes, also known as homonymous hemianopia. Damage to the optic tract may be caused by occlusion of the anterior choroidal artery, stroke, infection, or surgery.

Homonymous Hemianopia - Both Eyes Same Side

Both Eyes showing Vision Loss on Same Side

Any type of intracranial lesion in the appropriate location can cause a homonymous hemianopia. However, vascular causes (cerebral infarction and intracranial hemorrhage) are the most frequent in adults, followed by brain tumors, trauma, surgery, infections and other CNS diseases.

Dorsal Optic Radiation

Radioactive Dorsal-fin

The dorsal optic radiations carry visual information about the inferior visual fields from the lateral geniculate nucleus to the primary visual cortex, located along the calcarine fissure. Because these nerve fibers run through the internal capsule, any damage to the internal capsule, such as a lacunar infarct, may lesion the dorsal optic radiations resulting in lower quadrantic visual loss. These patients are unable to see the contralateral inferior quadrant in both eyes. In other words, patients with a lesion in the region of the the right dorsal optic radiation will lose vision in the lower left quadrant in both eyes.

Lower Quadrantic Vision Loss

Eye showing Vision Loss in Lower Quadrant

Vision loss that involves only one-fourth of the visual field in both eyes. It is also commonly referred to as “pie on the floor” visual defect. It involves damage to the dorsal optic radiations, parietal lobe through trauma or a middle cerebral artery infarction.

Meyer's Loop

Mayor's Loop

Meyer's loop is the ventral part of the pathway that carries information to the visual cortex. It wraps around the inferior horn of the lateral ventricle. Lesion of the loop on one side leads to vision loss in the contralateral upper quarters of both eyes.

Upper Quadrantic Vision Loss

Eye showing Vision Loss in Upper Quadrant

Also commonly referred to "pie in the sky" visual defect involving one-fourth of the superior visual field. The temporal lobe houses Meyer's loop and lesions of the right loop leads to left upper quadrantic anopia. Traumatic injuries to the right temporal lobe are a common cause or a middle cerebral artery infarct.