Visual Field Defects: the basics of localization

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1.2 million axons coalesce to form optic nerve
Optic Nerve

- Intraocular – 1mm
- Intraorbital – 25mm
- Intracanalicular – 9 mm
- Intracranial – 16mm
ON Blood Supply

- **ON Head** – circle of Zinn Haller arises from anastamoses of posterior ciliary arteries and pial vessels
- **Posterior to globe** – Pial vessels
Chiasm anatomy
Chiasmal Defects

- Bitemporal scotomas
  - Junctional – anterior
  - Central hemianopic – posterior
- Pituitary adenoma most common cause
  - Sphenoid meningioma
  - Cranipharyngioma
  - ICA aneurysm
Visual field
Tract defects are often incongruous
Tract Defects

- Uneven decussation of nasal fibers - 55% (temporal field).
  - Contralateral RAPD
  - Contralateral "bow-tie" atrophy
15 year old girl

“missing objects to the right”

Otherwise completely normal ROS
Lateral Geniculate Body

- Pairs corresponding axons from each retina
- 6 layers
- 2 main patterns of VF loss
Anterior choroidal artery

Lateral choroidal artery
Optic Radiations

- Fibers take on a retinotopic distribution
- Inferior fibers move laterally – temporal lobe
- Superior fibers move medially – parietal lobe
Temporal Lobe
Parietal Lobe

- Inferior quadrant anopia
- Impaired smooth pursuit to side of lesion
- Perceptual problems
  - Gerstmann syndrome
    - acalculia,
    - agraphia,
    - finger agnosia,
    - left-right confusion
Occipital lobe
Localizing value

- Homonymous paracentral scotoma
  - systemic hypotension
  - Embolic disease
  - Vertebrobasilar insufficiency

- Macula-sparing homonymous hemianopia
  - posterior Cerebral Artery occlusion.
Case
Relationship to sulcus
DTI pre
Post-op day 1
GVF – post op day 6

Right eye
Loss of temporal crescent

left eye
Walsh and Hoyt’s Clinical Neuro-ophthalmology
3 months post-resection
What deficits would this patient have?
Complete right homonymous hemianopsia
Preserved ability to write
Inability to read
Sees in the left visual field (preserved right occipital cortex)

Cannot transmit seen information to speech and language centers in dominant temporal lobe
Summary

- The performance of a careful visual field is a crucial part of any ocular examination, regardless of the reason the patient has come for an assessment.

- Understanding the anatomy of the visual sensory system helps to understand the nature and appearance of visual field defects.
Thank you!

Questions or comments?