THE VALUE OF VISUAL FIELDS

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Nothing to Disclose

REASONS FOR VISUAL FIELD DEFECTS

• Glaucoma
• Retinal abnormalities
• Developmental optic disc anomalies
• Optic neuropathies
• Chiasmal lesions
• Homonymous hemianopia
• Functional vision loss

Visual Field Interpretation

• Visual Field Defects Obey the Anatomy
• Interpretation Reveals the Location
• Location Reveals the Lesion

CLUES FROM EXAMINATION

• VISUAL ACUITY
• CONFRONTATION FIELDS
• NEURORETINAL RIM & NERVE FIBER LAYER (pallor only anterior to LGN)
• RAPD (present only anterior to LGN)
• COLOR VISION (affected only anterior to LGN)
5 IMPORTANT QUESTIONS REGARDING VF INTERPRETATION and LOCALIZATION

• 1. Does the VF defect respect the vertical or horizontal meridian, both, or neither?
• 2. Is the VF defect monocular or binocular?
• 3. If monocular, which nerve fiber bundle is affected?
• 4. If binocular, and respecting the vertical, is the defect on the same (homonymous) or opposite (bitemporal) side?
• 5. If a homonymous defect, how congruous is it?

DOES FIELD RESPECT HORIZONTAL OR VERTICAL MERIDIAN?

• FAILS TO RESPECT EITHER:
  » OUTER RETINA OR CHOROIDAL

• RESPECT OF THE HORIZONTAL
  » ARCUATES

• RESPECT OF THE VERTICAL
  » CHIASM OR RETROCHIASM

• RESPECT OF THE HORIZONTAL & VERTICAL
  » OCCIPITAL CORTEX

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Unilateral Vision Loss

• Problem with afferent visual system - ANTERIOR to chiasm

Homonymous Hemianopia
- Lesion between chiasm and occipital cortex
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Glaucoma is a Disease of the Arcuate Bundles

• Nasal Step
• Bjerrum Scotoma
• Arcuate Defect

• Glaucotomous defects are mainly nasal
• Be suspicious of a “glaucotomous defect” which is mainly temporal

• Optic disc pallor is not associated with glaucoma. Glaucoma causes thinning and loss of NRR, but not pallor of rim tissue.

WE NEED TO MATCH THE OPTIC DISC APPEARANCE WITH THE VISUAL FIELD DEFECT.

IF THEY DO NOT MATCH, RECONSIDER THE DIAGNOSIS.

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HOMONYMOUS HEMIANOPIA VS. BITEMPORAL HEMIANOPIA

INCONGRUOUS HOMONYMOUS HEMIANOPIA VS. CONGRUOUS HOMONYMOUS HEMIANOPIA

HOMONYMOUS HEMIANOPIA LAWS OF CONGRUITY

• THE MORE ANTERIOR THE LESION, THE MORE INCONGRUOUS

• THE MORE POSTERIOR THE LESION, THE MORE CONGRUOUS

• CONGRUITY CANNOT BE ASSESSED IN A TOTAL or COMPLETE HEMIANOPIA

MOST COMMON VF MISTAKES

• VF done incorrectly
• Calling VF loss glaucoma when it is not
• Calling VF loss something else when it is glaucoma
• Not recognizing that suprasellar masses do not have to present with the textbook bitemporal defect
• Not properly localizing homonymous defects, which can lead to missing abnormalities on imaging, and patient not getting proper treatment

CASE 1

47 Year Old Man

• Asymptomatic
• Presents for 2nd opinion
• He has been under the care of an ophthalmologist for years
• He has been called a glaucoma suspect due to large cupping and visual field defects in the left eye
• His mother has a family history of glaucoma
  – Narrow angle
• It was recommended that he start using pressure lowering drops
  – Xalatan was recommended
  – He opted not to use it because of possible iris pigmentation
• Therefore, a SLT was recommended and has been scheduled

• Obtained past records from ophthalmology
• Highest documented IOP: 18 mm Hg in each eye
• IS THIS NTG?? If so, do we need to do a work-up to rule out other treatable causes of non-glaucomatous optic neuropathy?

• BVCA: 20/15 OD and 20/15 OS
• Color (Ishihara): 14/14 OD and 14/14 OS
• PERRL (-) RAPD
• Confrontation fields: unremarkable OU
• Normal ductions and versions
• Cover testing: Orthophoric and comitant
• No ptosis or proptosis
CASE 2

78 yo asymptomatic man
Asymmetric VF loss, borderline IOPs

BCVA: OD 20/25 OS 20/20
Color: 11/14OD, 14/14OS
PERRL (+) RAPD OD (1.2 log NDF)
IOP: 23 mm Hg OD, 20 mm Hg OS
Mean deviation OS: -14.02 DB
Mean deviation OD - 1.48 DB
Difference: 12.54 DB
Divide by 10: 1.25 DB
(1.2 log-unit NDF needed OD to balance RAPD OS)

This one IS consistent with glaucoma!

Matching the VF with the ONH

• If the VF does not match the optic disc appearance, you must look for other apparent causes

• Additional work-up may be needed

Normal Tension Glaucoma

• Diagnosis of Exclusion

• Many things can mimic NTG

• Especially if there is optic disc pallor and the VF does not match the ONH, additional work-up is needed
  – Lab testing to r/o infectious, inflammatory, nutritional
  – Neuro-imaging to r/o mass, abnormal enhancement

CASE 3
67 yo woman

Yesterday – complete vision loss OD x 2 hrs, then returned as if curtain lifted, thinks vision back to normal

BCVA: OD 20/80 OS 20/60
Color: 1/14OD, 12/14OS
PERRL (+) RAPD OD
IOP: 13 mm Hg OD and 14 mm Hg OS
BP 148/88

Is this glaucoma...why or why not?

History of longstanding glaucoma
Is that an accurate diagnosis?

CASE 4
CASE 5 & 6

Which is more concerning for a neurologic defect?

CASE 5

43 yo woman
c/o problem with vision OS
BCVA: OD 20/20  OS CF @ 3ft
Color: 14/14 OD, unable to see plates OS
PERRL (2-3+) RAPD OS
CF: nasal defect OS, seems to respect Vertical
Normal anterior segment health OU
Respecting the Vertical

- Not all apparent vertical respecting VFs are neurologic
- Humphrey VFs do NOT test about 3 degrees on either side of the vertical
- Some apparent vertical respecting VFs are unilateral and anterior to the chiasm
- Some chasmal lesions present with VFs that respect the vertical but only 1 eye is affected

CASE 6

64 year-old woman

- CC: lost last glasses Rx, had replacement pair made, but vision has not been right since.
- BCVA:
  - OD 20/40
  - OS 20/25
- Pupils: PERRL (-) APD
- Color:
  - OD 5/7
  - OS 7/7
- Confrontation Fields: Full to finger counting OU
- GAT: 12 mmHg OD
  - 15 mmHg OS
- DFE: C/D
  - OD 0.65/0.65
  - OS 0.6/0.6
- Optic nerves distinct with no pallor

Visual Fields

MRI

Rathke’s Cleft Cyst is a benign, epithelium-lined intrasellar cyst believed to originate from remnants of the Rathke pouch. The pituitary gland develops from the anterior wall of the pouch.

Follow-up Visual Field
s/p endoscopic transsphenoidal resection
46 year old woman with vision loss OD

- Vision loss OD x 2-3 weeks
- Driving and didn’t see a truck
- Then covered OS and realized OD blurry
- Occasional frontal headaches (stable)
- Nasal congestion

CASE 7

• Systemic history
  - Biopsy-proven sarcoid x 18 years
    • Breathing difficulties
    • Large lacrimal gland
  - On steroids x 18 yrs, but self d/c x 3 months
  - Followed by pulmonologist
    • Wanted her to remain on steroids (so she didn’t go back)
    • Wanted her to have a bone density test

• VA OD 20/200  OS 20/25
• Color: OD 0/14  OS 13/14
• PERRL (+) 1.8 log RAPD OD
• No ptosis or proptosis
• Normal ocular motility exam
• SLE: no cells /flare
• TA: 16 mm Hg OD and 16 mm Hg
• Normal neurologic examination
DX: Neurosarcoidosis
TX: IV methylprednisolone – significant improvement in vision within a month

**CHIASMAL PRESENTATION**

- **ANTERIOR CHIASM**
  - central vision loss with temporal VF loss in fellow eye

- **MIDDLE CHIASM**
  - Bitemporal VF loss, denser superiorly

- **POSTERIOR CHIASM**
  - central bitemporal VF loss
  - Bitemporal VF loss, denser inferiorly
  - Non-congruous homonymous hemianopia

**ANATOMIC VARIANTS OF RELATION BETWEEN OPTIC CHIASM AND PITUITARY GLAND**

**ANTERIOR CHIASMAL SYNDROME**

**POSTERIOR CHIASMAL SYNDROME**

**CYSTIC CRANIOPHARYNGIOMA**
77 year old man

- Reports 3 week history of blurred vision OD
  - Notices especially when reading
  - Right-sided weakness
- Visual acuities 20/20 OD 20/20 OS
- PERRL (trace +) RAPD OD
- Confrontation fields: right homonymous hemianopia denser superiorly
- Medical history
  - Hypertension
INCONGRUOUS RIGHT HOMONYMOUS HEMIANOPIA

CASE 9

35 YEAR OLD WOMAN

- Was in the peds department with kids and referred to us
- CC:
  - Last week noticed trouble seeing on right side. Now realizes it is the right side of both eyes.
- Saw OD — prescribed reading Rx
- Sought 2nd opinion — told of homonymous hemianopia; sent to ER
- Had MRI in ER told of white matter lesions suspicious for MS.

- Not admitted to hospital, to follow-up in neurology in 3 weeks
- Systemic History —
  - Saw PCP yesterday prescribed sleep medicine, muscle relaxer for back pain, and oral steroid presumably for vision loss.

EXAM FINDINGS

BCVA:  
OD 20/20  
OS 20/20

Pupils:  
PERRL No APD

Color:  
OD 14/14  
OS 14/14

EOMs: full and smooth
VISUAL FIELD

DIFFERENTIAL / WORK-UP

• Homonymous Hemianopia
  – Lesion at optic chiasm or behind
    • Stroke/Infarct
    • Tumor
    • Others??

RADIOLOGY REPORT

• Enhancement associated with the lesion in the left lateral geniculate just posterior to the optic tract, which was read to likely represent an active demyelinating plaque

FOLLOW-UP 3 WEEKS LATER

• Now need to ask, does she need to be treated?

  Sent back to ER for IV steroids
  Within 2 weeks vision returned to normal
  Started on Copaxone treatment (Neurology)
Complete Homonymous Hemianopias

- Can only be localized to behind the chiasm and either the right or left side
- Cannot determine congruity
- Could be due to a lesion in either the optic tract, lateral geniculate, optic radiations, or occipital lobe

**CASE 10**

21 year old woman

- c/o vision loss, VF loss, red eye OD
- 1 week prior, she fell back and hit her head — Had imaging, which was unremarkable
- The next day, she noticed a reduced vision and a black spot in her right eye

**Clinical Exam**

- VA: OD 20/200   OS 20/20
- Color: OD 0/14   OS 13/14
- PERRLA ( - ) RAPD
- CF: OD temporal constriction   OS: full
- Palpebral apertures: OD 10mm   OS 11mm
- Exophthalmometry: OD 17 mm   OS 17 mm
- Applanation tensions: 10 mm Hg OD, 10 mm Hg OS
- DFE: Healthy optic discs and maculae OU
* Later, re-checked visual acuity with both eyes open
  * Using OD: +0.12D OS +10D
  * VA: OU: 20/30

**Visual Fields in Functional Vision Loss**

* Generalized constriction
* Spiral Visual Field
* Temporal crescent present when VF tested OU
* Re-test VF with or after “placebo” treatments
  * Correcting lenses (+0.25D)
  * Thick “magnifying” lenses (+20D and -20D)
  * Placebo drop and/or spray treatment
  * Other placebo treatments (eg. Heated goggles)

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**CASE 11**

59 year old man

* difficulty reading words at distance and near x 3 months
  * letters look fragmented with a ghost image
  * cannot see entire word / has to scan more to read
* peripheral vision seems reduced on both sides
  * “Ocular Migraines” x 2 years
  * large spot in the center of his vision x 20 minutes
  * 1-2 x week after physical exercise (riding his bike)
* Headaches – worsening over the past few months
  * daily - mild to moderate (4 out of 10) headaches
  * improvement with aspirin or Tylenol
  * 2 severe headaches in the last month
  * one woke him out of sleep

**Clinical Examination**

* VA: OD 20/20 and OS 20/20
* Color Vision (Ishihara) OD 14/14, OS 14/14
* PERRL (J) RAPD
* No ptosis or proptosis
* Ocular Motility: normal ductions, versions, and saccades
* SLE: right corneal opacity from past zoster involvement
* TA: normal OU
* BP: 130/90
* DFE: 0.3/0.3 cupping OD and OS
  * Normal optic nerve, macula, vasculature
Radiologically the lesion was thought to be a glioblastoma multiforme (Grade IV Astrocytoma). However, after surgical removal and biopsy, it was determined to be a rare primary CNS melanoma.

SUMMARY

- **QUESTIONS:**
  1. Respect?
  2. One or both eyes?
  3. If one eye, which nerve fiber bundle?
  4. If both eyes, is defect on same or opposite side?
  5. If on same side, congruous or non-congruous?

- **CONDITIONS:**
  - Glaucoma
  - Retinal abnormalities
  - Developmental optic disc anomalies
  - Optic neuropathies
  - Chiasmal lesions
  - Homonymous hemianopia
  - Functional vision loss
  - Assessing driving ability

**THANK YOU.**

ANY QUESTIONS?