Visual Fields – A Road Map to Management.

Beth A. Steele, OD, FAAO
bsteele@uab.edu

Disclosures – Dr. Beth Steele

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<th>Company</th>
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<td>Optos</td>
<td>Advisory Board</td>
<td>Honorarium</td>
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<tr>
<td>Med Op</td>
<td>Consultant</td>
<td>Honorarium</td>
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FACTS

1. Visual fields tell us more about vision function than acuity
2. Visual fields can lead us to the anatomical area of concern
3. Running a VF is:
   a. lengthy and cumbersome
   b. often a waste of time
   c. like opening a can of worms

Moving from the BACK to the FRONT...

1. Optic Tract lesion
2. Optic Chiasm lesion
3. Post-laminar optic nerve lesion
4. Pre-laminar optic nerve disease
5. Retinal disease

Some Review and some New....
48 WM
C/c: blurry vision, bumping into things

- Never worn glasses
  - LEE, LPE: "over 10 years ago"
- VA: 20/30 OD, 20/30-2 OS
- Pupils: normal, -APD
- Confrontations: left field restricted OD, OS
- Refraction:
  - OD +1.00 -0.50 x 175  20/15
  - OS +1.25 – 0.75 x 008  20/15
- Normal IOP and ant/post seg exam

Imaging considerations for this patient...
- CT vs MRI
- ± contrast
- ± angiography
- Location to scan
- ± urgency
  - CT with Diffuse Weighted Imaging (DWI) if acute

All of these conclusions based on the VF...
- Cc: “severe headaches and poor vision in right eye”
- VA: LPO OD, 20/20- OS
- Pupils:
  - PERRL-APD
- CF
  - OD (with transilluminator): brighter light nasally than temporally
  - OS: temporal constriction
- SLE: clear OU
- DFE: healthy ONH OU, healthy and flat macula OU

Optic chiasm—anatomy review

Variations to chiasm anatomy
Imaging considerations for this patient...

- CT vs MRI
- ± contrast
- ± angiography
- Location to scan
- ± urgency

57 WM, Hx intracranial tumor with shunt

- Referred by neurologist who suspected swollen optic nerves
- Hx:
  - Successful triple bypass
  - Optic atrophy 2 months prior, 20/25 VA

- Patient complaining of
  - Reduced vision
  - Worsening headaches last 2 mos
- VA: 20/70 OD, OS
• Our role at this point..?
Optic Disc Drusen and VF Defects

- 24-87% have VF defects
  - Most commonly nasal, arcuate or partial arcuate
  - Worsen over time
  - Degree of VF defect correlates with RNFL thinning around the disc

- What about in kids?
  - Around 20% have VF defects
  - Up to 24% have CNVM associated!

74 Caucasian M, ONH Drusen
Goldmann Kinetic VF Testing

At what point do you lower IOP in patient with drusen?

- 71 year old with longstanding ONH drusen
- Progressive VF loss OD>OS
- IOP averages 21mmHg OU

Decrease in IOP:
- ↑ of retinal ganglion cell function
- Stabilizes RNFL thickness
- May delay the progression of optic neuropathy
Visual Fields: still the standard of care for glaucoma patients.... ??

- Significant structural damage of RNFL before VF defects ...up to 50%

- We have OCT now...?!
  - RNFL thickness
  - GCC

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Yes! And...

- VF is more sensitive than GCC and RNFL for some anatomical locations of damage
  - InferioTemporal damage –
    - Most sensitive for early diagnosis
    - Most consistent with VF defects
  - RNFL scan: most sensitive when changes are at InfTemp disc
  - GCC scan: most sensitive when damage is InfTemp macula

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Are we missing glaucoma with a 24-2?

- >1/3 of RGCs are located w/in 10° region of VF
  - Only 4 points from 24-2 / 30-2 test this area
  - And: points are 6 degrees apart (vs. 2)

  - 10-2 for early glaucoma
    - Early arcuate
    - Paracentral

  - And what about in the other direction?
    - 60-4 – if you have an edge defect

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RGC axons from inf macula enter high-risk inf arcuate region of disc vs. sup macular enter less-at risk temp quadrant

GCC scan may not pick up superior damage!
Predicting progression

- Predictive information even when appears normal
  - Global indices more predictive than point values
- When VF defect already present, VF is 4x more likely to pick up progression than structural damage
- Frequency - Should vary based on severity / risk

We need a more sensitive test...

- RGCs must die before we see VF loss
- Earlier detection reported with...
  - FDT? better able to predict the converting eyes, but with less specificity
  - SWAP? Conflicting reports. Both SAP and SWAP can provide early detection of glaucomatous visual field damage, and there is only partial overlap

Gold standard in dx / tx glaucoma
- Primary goal in glaucoma – maintain quality of life
- In the future..??
  - Improved efficiency, pt-friendliness
  - Detecting rate of progression
  - Virtual reality technology, home monitoring being explored

Virtual reality VF testing?
And when it’s not glaucoma...?

What about this one...?
• 42 AA female
• R/v: headache
• Father has glaucoma
• ROS: arm weakness

• BVA 20/20 after corrected significant cylinder
• Pupils normal
• Color (HRR) normal OD, OS
• IOP 21, 20

Glaucoma, or ... ?
VF Loss in Demyelinating Disease

- Often seen as presenting symptom – crucial to early diagnosis!

- **MS**
  - Most common is central scotoma – 90%

- **NMO**
  - Only 54% with central scotoma
  - 33% central and non-central
  - 13% non-central (mostly altitudinal)

VF Loss in your Plaquenil Patients....

Damage can progress up to 3 years after discontinuation of medication....

2016 - Revised Recommendations on Screening for Chloroquine and Hydroxychloroquine Retinopathy

- Risk of toxicity increases sharply towards 1% after 5-7 yrs of use, or cumulative dose of 1000 g HCQ
- Initial baseline exam, then annual screenings after 5 years
- Screening:
  - Regular exams with DFE
  - 10-2
  - 24-2 or 30-2 for Asian patients
  - SD OCT*, FAF or mfERG

*most objective, lowest variability
Migraine VF Loss – *Anything and Everything*

- Small peripheral scotomas, constricted fields, total loss....
- Can last up to 75 days

- Progressive cortical depression – associated with vascular changes
  - Leads to vasoconstriction,
  - Then vasodilation
  - Brief neuronal excitation, followed by prolonged inhibition
  - Triggers headache phase

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62 WF, “wavy and zig-zag lines, flashes of light”

- Brief span of 5-10 minutes
- Occurred 4 days ago
- Denies H/A

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Migraine Patient in “attack” period

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....vs. tension headache
VF Loss – Migraine vs. Tension H/A

Table 2. Visual field defects in migraines and TTH patients.

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<th>Migraine</th>
<th>TTH</th>
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<tr>
<td>VF defect</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Normal</td>
<td>28 (56%)</td>
<td>32 (64%)</td>
</tr>
<tr>
<td>Constricted field</td>
<td>7 (14%)</td>
<td>5 (10%)</td>
</tr>
<tr>
<td>Peripheral island</td>
<td>4 (8%)</td>
<td>7 (14%)</td>
</tr>
<tr>
<td>Total field defect</td>
<td>3 (6%)</td>
<td>—</td>
</tr>
<tr>
<td>Nasal step</td>
<td>3 (6%)</td>
<td>—</td>
</tr>
<tr>
<td>Superior altitudinal defect</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Inferior altitudinal defect</td>
<td>—</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Hemisectomy</td>
<td>—</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Unilateral field defect</td>
<td>4 (8%)</td>
<td>3 (6%)</td>
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</tbody>
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Note. VF = visual field; TTH = tension-type headache.

Migraine as it relates to ocular blood flow...

- High frequency of migraine in patients with NTG and ION
  - Chronic ischemic attacks
  - State of hypoperfusion

- NTG in migraine patients associated with faster progression of visual field loss

- RNFL thinning around ONH

Psychogenic Amblyopia – Update?

- 62 year old WF
- 20/50 BCVA OD, OS
- Significant emotional distress and psychological disorders
- Multiple brain images – clear
- VEP – normal

Functional Disorders

- Somatoform disorders ("hysteria") - thought to occur outside the patient’s conscious awareness
  - "tunnel vision" is a type of a conversion disorder

- Vs. Factitious disorders - intentionally produced symptoms for the purpose of assuming the sick role

- V. Malingering - purposeful feigning or exaggeration for secondary gain
In the literature??

• Not much

• Comorbidities
  • depression (38-50%)
  • anxiety disorders (10-16%)
  • Some – no uniform psychological disorder

• Not considered a diagnosis of exclusion!
  • Normal visual function must be proven
    • VEP of normal and symmetric amplitude and latency
    • Neoplasms involving CNS – VF loss with psychiatric features