Clinical Decisions in Glaucoma: A Grand Rounds

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Mark Dunbar: Disclosure

- Optometry Advisory Board for:
  - Allergan
  - Carl Zeiss Meditec
  - Inspire

- Speakers Bureau
  - Allergan
  - Carl Zeiss
  - Inspire
  - VSP

Mark Dunbar does not own stock in any of the above companies.

Antonio 63 yo Hispanic Male

- 30 yr history of glaucoma Dx in Cuba
- Has been on Pilo OU when he moved to the US 4 yrs ago
- d/ced pilo, started sister-in-law's timoptic (gets a HA when he does not use)
- Has never seen a Dr here in the US
- Strong Fam Hx GL: gm, sister, bro
Antonio 63 yo Hispanic Male

- VA: 20/20 OU
- Ant Seg: Unremarkable
- TA: 20 OD; 19 OS
- Gonio: CBB 360 OU
- C/D: 0.70 OU

What is your management?

A. Continue present med (CPM), return 2-4 weeks for VF
B. Switch to a PGA
C. Stop Timoptic, return 2-4 weeks for VF
D. Add 2nd med
Antonio 63 yo Hispanic Male

Do you think he has glaucoma?

Antonio 63 yo Hispanic Male

- Was followed in the “Comprehensive MD” for 1½ yrs, where he eventually ran out of drops
- VA 20/20
- TA 25 OU
- HVF:

TA 25 OU
Issues Relevant to Antonio

- Diagnosis: Ocular Hypertension
- Decision: Treat or not to treat?
  - What do you base your decision on?
- What is his risk of progression and/or actually developing glaucoma?

Issues Relevant to Antonio: What if his nerves looked like this?

And his pachymetry measured 590µ

Issues Relevant to Antonio

- What is his risk of actually developing glaucoma?
  - Depends mostly on corneal thickness…?
  - IOP of 25.75 mmHg
    - Ave Corneal thickness < 556 µ: 36% Risk
    - Corneal thickness 565 to 588 µ: 13%
POAG Risk Over 5 Years by Central Corneal Thickness and Baseline IOP in Observation Group

- Baseline IOP (mmHg)
  - >25.75
  - >23.75 to ≤ 25.75
  - ≤ 23.75

- Central Corneal Thickness (microns)
  - < 23.75
  - 23.75 to < 25.75
  - ≥ 25.75

POAG Risk Over 5 Years by Corneal Thickness and Baseline Vertical C/D Ratio in Observation Group

- Vertical C/D Ratio
  - >0.50
  - >0.30 to <0.50
  - ≤ 0.30

- Central Corneal Thickness (microns)
  - < 555
  - 555 to < 588
  - ≥ 588

OHTS
Arch Ophthalmol
June 2002;120:701-713

- 55% of POAG endpoints involved ON changes in the absence of VF endpoint
- EMGT: < 10% progressed based on ON
  - > 90% progressed based on VF
### EGMT

<table>
<thead>
<tr>
<th></th>
<th>Treatment Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Progression</strong></td>
<td>58 (45%)</td>
<td>78 (62%)</td>
</tr>
<tr>
<td>based on VF</td>
<td>53 (41%)</td>
<td>64 (51%)</td>
</tr>
<tr>
<td>based on ON</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>based on VF + ON</td>
<td>4 (3%)</td>
<td>14 (11%)</td>
</tr>
</tbody>
</table>


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### Antonio 68 yo Hisp Male

Lost to follow up – Returns 3 yrs later

- **3/28/06:** Lumigan hs OU
- Ce: blurred VA RE:
  - VA: 20/50 OU current Rx, BVA: 20/25
- TA: 25 RE; 22 LE
- ON: 0.7 RE; 0.65
- VF scheduled….

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### Next Case
**DB: 55 y/o Black Male**
- Works for the Coast Guard Merchant Marines
- 2/27/2005: Referred by OD in Sam’s Club for retinal evaluation
- (+) Borderline DM, HTN

**DB: 53 y/o Black Male**
2/27/2005
- VA: 20/20 each eye
- TA: 13/13
- C/D: 0.6 RE; 0.65 LE
- Lattice degeneration OU with atrophic holes
- Noted large physiologic cups – RTC in 3 mo for HVF, OCT RNFL

**DB: 55 y/o Black Male**
3/13/2007 (2 Yrs Later)
- VA: 20/20
- TA: 15/16
- C/D: 0.65 X 0.75 RE; 0.7 Round
  - Thin superior
3/20/2007
- TA: 18/18
So What Do You Think?

- Does he have glaucoma?
- Would you begin treating him?

DB: 9 Months Later

12/17/2008
- VA: 20/20 OU
- TA: 14/14
- ON:
- OCT:
- HVF: - Done on 2/25/09

Have the Nerves Changed?

3/07

12/08
2/25/2009

- VA: 20/20 OU
- TA: 17/19
- HVF:
So What Do You Think?

- Does he have glaucoma?
- Would you treat?

Next Case
Rogelia 62 y/o Hispanic Female

- CC -> pain/burning in the both eyes c/w dry eye
- VA: 20/20 OU
- Ant Segment unremarkable
- TA: 12 OU
- Fundus

How good is OCT as Diagnosing Glaucoma….

…or Detecting Progression
RNFL Sensitivity and Specificity of the OCT for Diagnosing Glaucoma

Budenz et al Ophthalmology. January 2005;112:3-9

- 109 normal and 63 glaucoma subjects
  - 18 mild, 21 moderate, 24 severe (VF)
- Avg RNFL < 5% 84% sensitivity; 98% specificity
- 1 or more quad <5% 89%, 95%
- 1 or more clock hours <5% 89, 92%
- Inferior and superior sectors and quadrants better than others

Sensitivity and Specificity of Stratus OCT


<table>
<thead>
<tr>
<th>OCT Parameter</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave RNFL Thickness &lt; 5%</td>
<td>84% (75-93%)</td>
<td>98% (96-100%)</td>
</tr>
<tr>
<td>Ave RNFL Thickness &lt; 1%</td>
<td>68% (57-80%)</td>
<td>100%</td>
</tr>
<tr>
<td>≥ 1 Quad with Ave RNFL Thickness &lt; 5%</td>
<td>89% (81-97%)</td>
<td>95% (90-99%)</td>
</tr>
<tr>
<td>≥ 1 Clock Hr with Ave RNFL Thickness &lt; 5%</td>
<td>89% (73-92%)</td>
<td>92% (87-97%)</td>
</tr>
<tr>
<td>≥ 1 Clock Hr with Ave RNFL Thickness &lt; 1%</td>
<td>83% (73-92%)</td>
<td>100%</td>
</tr>
</tbody>
</table>

RNFL Sensitivity and Specificity of the OCT for Diagnosing Glaucoma

Budenz et al Ophthalmology. January 2005;112:3-9

- Excellent sensitivity and specificity of RNFL measurements using Stratus OCT for glaucoma with manifest VF defects
- The best parameters seem to be ≥1 quadrants abnormal at the ≤5% level or ≥1 clock hours abnormal at the ≤5% level
Correlation of RNFL Thickness to Having Glaucoma

- Inferior Quadrant 0.971
- Mean 0.966
- Inferior Temporal 0.959
- Superior Quad 0.952


Rogelia 62 y/o Hispanic Female

[Images of ocular scans are present here]

Rogelia 62 y/o Hispanic Female

[Images of ocular scans are present here]
Mean OCT RNFL Thickness

<table>
<thead>
<tr>
<th>&gt; 80</th>
<th>Normal</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-79</td>
<td>Borderline</td>
<td>Glaucoma Suspect</td>
</tr>
<tr>
<td>60-69</td>
<td>Early Thinning</td>
<td>Glaucoma, Early</td>
</tr>
<tr>
<td>50-59</td>
<td>Moderate Thinning</td>
<td>Glaucoma Moderate</td>
</tr>
<tr>
<td>40-49</td>
<td>Advanced Thinning</td>
<td>Glaucoma Advanced</td>
</tr>
<tr>
<td>&lt; 30</td>
<td>Advanced Thinning</td>
<td>Primarily Retinal Dz</td>
</tr>
</tbody>
</table>

Rogelia - Summary

- 63 y/o Hispanic Female presents with dry eye complaints
- Suspicious Cups RE inferior thinning and a superior nasal field defect RE (Normal LE), consistent with OCT RNFL findings, IOP 12
- Diagnosis -> NTG RE, No GL LE
- Management…Tx vs NoTx
NTG: The Big Question?

- What is the relationship between IOP and visual field loss?
- Is there a benefit of lowering IOP in patients with normal tension glaucoma?

Collaborative Normal Tension Glaucoma Study

- Collaborative effort of 24 research and medical centers around North America and Europe
- Study conceived in 1984 out of the Glaucoma Research Foundation meeting
- Enrolled 230 patients
  - 140 eyes of 140 patients met randomization criteria. 90 excluded (38%)

NTG Study Criteria

- Only patients with progressive disease were enrolled, or fixation was threatened
- 20 and 90 years old
- No previous recorded IOP of >24 mmHg
- 4 week washout period from previous meds
- 10 baseline IOPs, 6 between 8 am - 6pm in 1 day, 4 reading other days
  - Median IOP had to be ≤ 20
- 3 Baseline VFs
**NTG Study: Natural History**

*Ophthalmology 2001;108:247-253*

160 subjects (of the original 260) that were initially not treated

- 1/3 showed localized progression in 3 yrs
  - Rate of progression was variable
- 50% showed progression 5-7 yrs
- > 50% not treated show no progression
- Conclusion: Rate progression highly variable

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**NTG General Considerations**

How should we manage NTG?

- Because many pts showed no progression
  - Wait to treat, until rate of the disease can established
- For those in high risk groups, watch more closely
  - Women with history migraine, and disc hemorrhages are at the highest risk for progression
  - Asian and men had the least risk for progression
- For those with advanced disease: Treat more aggressively

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**Rogelia – 4 mo later 9/20/06**

TA 15 OU
Rogelia: 7 mo after 1st visit
12/20/06  TA: 11/10

1st Field 5/06  3rd Field 12/06

12/20/06
Rogelia: 2 Yrs Later
3/26/08  TA: 13/13

3/26/2008

3/26/2008

4/16/08
Rogelia - Summary

- 63 y/o Hispanic Female presents with dry eye complaints
- Suspicious Cups RE inferior thinning and a superior nasal field defect RE (Normal LE), consistent with OCT RNFL findings, IOP 12
- Diagnosis -> NTG RE, No GL LE
- Management...initial observation until documented progression...then Tx
Next Case

Mrs. Smith 58 y/o AA

- I initially saw her 12/27/2005
- Difficulty reading at near
- Medical History: HIV (+), HTN
- VA: 20/20 OU
- Pupils: 1+ R APD
- TA: 40/32
- Gonio: CBB OU
- CD: RE: 0.6X0.8 LE: 0.4

Mrs. Smith 12/27/2005

- Diagnosed with POAG R >> L
  - Start Travatan hs OU
  - Should have done RE only
- Return 3 wks for VF, Photo, OCT
Mrs. Smith: 1/24/2006

- Travatan hs OU
- TA: 23/20
- Pach: 496µ RE; 510µ

What Do You Think?

- Are you happy with the IOP’s?
- Do they need to be lower?
- Does the LE even need to be treated?
Mrs. Smith

- Advanced POAG R >> L (?)
  - Advanced VF Loss RE
  - Thin corneas OU
  - Good response to Trav hs OU

- Add T5 qd RE only
- Return 3 weeks

Mrs. Smith – 3 weeks later

2/14/06
- Trav hs OU; T5 qd (am) RE only
- TA: 14/14 (both intern and me)
- OCT

OCT

2/14/2006
Mrs. Smith 2/14/2006

- Good response to Trav OU, T5 RE
- CPM’s
- RTC 4 months

Mrs. Smith: 6 Months Later

8/07/2006
- Ran out of drops 4 weeks ago
- TA: 36/32
- Restart – all OU

09/11/06
- Trav/T5 OU
- TA: 19/18

Mrs. Smith: 1/17/2007

- Stopped taking her drops 2 weeks ago due to redness and irritation
- VA: 20/20 OU
- TA: 28/28
- HVF:
Mrs. Smith 1/17/2007

- Re start Meds


- Unable to get refills
- TA: 32/25
- OCT RNFL

ON Photos 4/11/2007
Mrs. Smith

Final Impression
- Gave her the seeing eye dog spiel
- Consider Surgery