Case Report Format for Glaucoma Section Diplomate Program

I. Topic Type (check one)
   □ Core
   □ Non-Core

Core Topics include: (choose type of case)
   □ Ocular Hypertension/Glaucoma Suspect
   □ Mild/Moderate Primary Open-angle Glaucoma
   □ Advanced glaucoma (Severe glaucomatous optic neuropathy and/or severe visual field defect on standard automated perimetry)
   □ Primary angle closure glaucoma
   □ Pseudoexfoliation syndrome/glucoma OR pigment dispersion syndrome/pigmentary glaucoma

Reminder: Case reports must meet the following criteria to be accepted:
   i) Comprehensive description of the case with all ocular findings clearly documented and detailed;
   ii) Comprehensive review of pertinent aspects of the case including:
       (1) Pathophysiologic factors
       (2) Epidemiology: Prevalence of Incidence
       (3) Diagnostic Assessment
       (4) Risk Assessment
       (5) Management considerations

II. Introduction

   (1) Case Review
       (a) Chief Complaint (what precipitated your workup of this patient)
       (b) History of Present Illness
       (c) Last Eye Examination
       (d) Review of Systems
           1. Systemic symptoms
           2. Otolaryngeal symptoms
           3. Cardiovascular symptoms
           4. Pulmonary symptoms
           5. Gastrointestinal symptoms
           6. Genitourinary symptoms
           7. Endocrine symptoms
           8. Hematologic symptoms
           9. Musculoskeletal symptoms
           10. Neurological symptoms
           11. Psychological symptoms
           12. Skin symptoms

       (e) Medical/Surgical History
           1. Active Problems
       (b) Current Medications
       (c) Allergies
III. Results

i. Best Corrected Visual Acuities
ii. Refractive Findings
iii. Pertinent External Findings
iv. Pupils
v. Pertinent Slit Lamp Findings
vi. IOP
vii. Detailed gonioscopy
viii. Fundus Exam including
   1. Detailed ONH/RNFL assessment
   2. Please include photos if available
ix. Visual Fields
   1. Please include files for review
x. Imaging
   1. Please include files for review
xi. Pachymetry
xii. Other

IV. Discussion

For the Assessment, Plan and Patient Education portion of your case report, please include citations to all pertinent evidence to justify your decisions and list the citations in the Reference Section.

Assessment

What is your provisional diagnosis and how did you arrive at this conclusion?

Plan

What is your first line management of this patient?
How did you arrive at this choice of management option?
Do you require any additional testing?
What additional tests are required, and for what purpose? (please include references to support this decision)
When do you want this patient to return for follow-up?

If you chose a therapeutic intervention:
What therapeutic option would you choose for first line management and why?
What target range of IOP are you striving for?
Do you expect your first line management to reach this range?
If you do (did) not reach your target range following your first line treatment option, how could you explain this?
If you do (did) not reach your target range following your first line treatment options, what action would you take?
If you decide that an additional agent or intervention is necessary to reach your target range, how would you decide your next course of action and what agent/ intervention would you choose?

Patient Education

How will you explain your findings, assessment and plan to your patient? If you choose gtts as a therapeutic option, what instructional set will you provide to your patient?

V. Conclusions

Please provide a general synopsis of the pathophysiologic factors and epidemiology (prevalence and incidence) of the type of glaucoma represented in this case in addition to any additional information or pertinent findings that has been acquired as a result of ongoing care.

VI. References (full citations required)
Sample Case Report for Glaucoma Section Diplomate Program

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☐ Core
☐ Non-Core

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Case Description

Chief Complaint

• 47 y/o F c Ocular Hypertension here for IOP check, Visual Field OU, and Dilated Fundus Exam (DFE)

History of Present Illness (HPI)

1) Ocular Hypertension
   a) Last IOP 19/20
   c) Risk of conversion is less than 5%
   d) No treatment (gtts or laser)
   e) (-) changes in health/vision since October 2013
   f) (-) flashes, floaters, halos, headache, diplopia, burning, itching, redness, tearing
   g) CCT: 600/604.

(+) Fam Hx - mother, being Tx in this office for open angle glaucoma (gtts)

Last Visual Field (LVF) 24-2 (04/2013) (enclosed along with progression analysis)

VF Current (baseline)

24-2: OD MD +0.06 (+0.86) PSD 1.28 (1.47) GHT WNL (WNL)
       Repeatable singular dense superior defect within central 10 degrees OD

       OS MD -0.85 (+0.65) PSD 1.68 (1.49) GHT WNL (WNL)

       No definitive defects
VF Threshold  10 Apr 2014 09:17 AM (enclosed). Prior 24-2 showed repeatable loss of sensitivity within central 10 degrees

10-2  OD  MD -1.91  PSD 0.98
OS  MD -1.81  PSD 1.03

Last HRT  03/12:
Note: Subsequent to 2012, OCT technology was integrated into the clinic

OD:
Moorfields Regression Analysis (MRA)
All quadrants WNL, borderline thinning nasal and temporal on TSNIT curve
No significant change from baseline 2005-2012

Glaucoma Probability Score (GPS):
Outside normal limits in all quadrants (2005)
Borderline on global score and superior temporal quadrant, within normal limits in all other quadrants (2012)

OS:
Moorfields Regression Analysis
All quadrants WNL, mild thinning nasal/temporally on TSNIT curve
No significant change from baseline 2005-2012

Glaucoma Probability Score (GPS): within normal limits in all quadrants (2005-2012)

LOCT (04/13):
OD: SS 7/10; flagged at 1:00 otherwise RFNL WNL; AT 96; DA 1.92, stable to LOCT
OS: SS 7/10; RFNL WNL 360; AT 92; DA 1.58

Last Gonio (04/2013)
OD: open to CB 360, flat approach, tr IP and TM pigm 360, no PAS/anomalies
OS: open to CB 360, flat approach, tr IP and TM pigm 360, no PAS/anomalies.
LGDX: (03/2011) NFI 26/16

OD: Superior RNFL thin inferior >superior

OS: TSNIT: Isolated area of RNFL thinning nasally

LDFE 04/13:

OD: ONH 0.50V/0.45H, borders distinct, rim pink and healthy; Retinal nerve fiber layer no diffuse or local defects; vessels 2:3, normal caliber; macula clear and flat; periphery flat, intact, no holes or tears 360.

OS: ONH 0.45, borders distinct, rim pink and healthy; Retinal nerve fiber layer no diffuse or local defects; vessels 2:3, normal caliber; macula clear and flat; periphery flat, intact, no holes or tears 360.

2) Review of Systems (ROS)
   a) Encounter background information: ROS unchanged.
   b) Systemic symptoms: No systemic symptoms.
   c) Otolaryngeal symptoms: No otolaryngeal symptoms.
   d) Cardiovascular symptoms: No cardiovascular symptoms.
   e) Pulmonary symptoms: No pulmonary symptoms.
   f) Gastrointestinal symptoms: No gastrointestinal symptoms.
   g) Genitourinary symptoms: No genitourinary symptoms.
   h) Endocrine symptoms: No endocrine symptoms.
   i) Skin symptoms: Skin symptoms.
   j) Hematologic symptoms: No hematologic symptoms.
   k) Musculoskeletal symptoms: No musculoskeletal symptoms.
   l) Neurological symptoms: No neurological symptoms.
   m) Psychological symptoms: No psychological symptoms.

3) Family Hx
   a) Mother: POAG

4) Current Meds

5) Allergies: None
   a) No Known Allergies
   b) No Known Drug Allergy
6) Exam Results  10 Apr 2014 09:04 AM

a) OD dva c 20/20 OD/OS:
b) Spec Rx - 1.50 DS OD, -1.75 DS OS (10/2014)
c) Pupils: perrl apd-
d) OD lid/lash: cl
e) OS lid/lash: cl
f) OD periorb: cl
g) OS periorb: cl
h) OD ConjScl: cl
i) OS ConjScl: cl
j) OD tear film: cl
k) OS tear film: cl
l) OD cornea: cl
m) OS cornea: cl
n) OD Iris: flat and intact
o) OS Iris: flat and intact
p) OD A/C: deep and quiet
q) OS A/C: deep and quiet
r) OD Angle: 4x4 (Von Herrick)
s) OS Angle: 4x4
t) OD Lens: trace NSC
u) OS Lens: trace NSC
v) OD Vitreous: cl
w) OS Vitreous: pvd

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IOP  10 Apr 2014 09:10 AM

- Method: TAP
- Drops: 1 gtt fluress
- OD IOP: 19mmHg
- OS IOP: 20mmHg
- Time: 9:04am.

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DFE- OD Fundus: dilated 1%T, 2.5%PE: Disc is of average size, although there is an asymmetry between the OD and OS (OD 2.22 mm^2, OS 1.92 mm^2 HRT; OD 1.82 mm^2, OS 1.61 OCT) there is no evidence of thinning of the neuro-retinal rim consistent with glaucomatous optic neuropathy, no evidence of a retinal nerve fiber layer defect; zone beta; bayonetting or baring of the OHN vessels, the CD is 0.45 X 0.55 (H/V), there are no Drance hemes or laminar dots present. Macula clear, flat, +FLR, periphery flat and intact with no holes, tears or anomalies
- OS Fundus: dilated 1% T, 2.5% PE: Disc is of average size, there is no evidence of thinning of the neuroretinal rim consistent with glaucomatous optic neuropathy, no evidence of a retinal nerve fiber layer defect; zone beta; bayonetting or baring of the OHN vessels, the CD is 0.45 (H/V), there are no Drance hemes or laminar dots present. Macula clear, flat, +FLR, periphery flat and intact with no holes, tears or anomalies.

Impression/Plan

7) Assessment

1. OcHTN

--IOPs 19/20 today (Tmax 23/28 in 2005)

--Risk of conversion is less than 5% based on risk calculator

![Continuous Method for Estimating 5-Year Risk of Developing POAG](image)

--dilated fundus exam showed ONH appearance to be non-glaucomatous OU

--HVF 10-2 done today: reliable, wnl OU

8) Plan

--RTC 6 mos for IOP check. No IOP-lowering treatment indicated at the present time.

Annual DFE, VFE, and Optic Nerve Assessment (including OCT and extended ophthalmoscopy).

Repeat Stereo-photos every other year.
9) Patient Education

Patient Educated regarding the risk of conversion from OHTN to OAG. She was reminded of the condition of her mother who has been medicated for OAG for the past 10 years.

Patient understands and is able to accurately describe the nature and prognosis of her condition.

10) Supplemental data

Risk Calculation

A quantified measure of the risk of conversion from ocular hypertension to open angle glaucoma can be calculated using a validated model developed from combining outcomes from the Ocular Hypertension Treatment Study Group and European Glaucoma Prevention Study Group. Results from this effort lead to the development of a web-based risk calculator: [http://ohts.wustl.edu/risk/calculator.html](http://ohts.wustl.edu/risk/calculator.html)

Populating this device with data gathered for this patient produced the following results:

In 9+ years and 25 tonometry readings, the patient’s IOPs range from a low of 18 mmHg to a high of 23 (OD) and 28 (OS) (see above). Her mean IOP OD: 19.7, SD: 3.5; OS: 21, SD 5.7.
IOP is a significant risk factor for conversion from ocular hypertension to glaucoma. To demonstrate this, I replaced the patients actual IOPs with higher values in the risk calculator:

Note that the patient’s risk of developing glaucoma has increased almost two fold from 3.1-5.7%

Visual Fields, including progression analysis (Appendix 1-2)

Imaging (Appendix 3-4)

10. Conclusions/Case Summary:

This case details the findings and management of a patient with Ocular Hypertension, with a low risk of converting to open angle glaucoma. Her age and intraocular pressures are within the range of the OHTS (40-80 years old, IOP of 24-32 in at least one eye and at least 21 mm Hg in the other), so it is reasonable to use the results of this study as a guide for her management.

A quantifiable assessment of risk can augment the analysis used in clinical decision making and patient education. A quantitative model using a logistic regression equation and incorporating the results of the OHTS has been developed and provides an estimate of the mean probability of developing open angle glaucoma. The OHTS multivariate Cox Proportional Hazard Model included the covariates of age, central corneal thickness (CCT), intraocular pressure (IOP), the pattern PSD, and vertical dimension of the C/D ratio (1). Each was determined to be a significant risk factor for the conversion of OHTN to OAG.

In this case, the estimated 5 year risk of developing glaucoma in at least one eye is approximately 3% (2,3). Given preference to be monitored instead of treated, and low risk of delaying treatment,(3) she has been rescheduled for follow-up in 6 months.

Results from the OHTS revealed that thin central corneal thickness was found to be a powerful predictor for the development of POAG (4-6).

This patient has thicker than average CCTs, similar to the subjects enrolled in the OHTS (mean CCT in OHTS was 573.0 ± 39.0 μm). Twenty-four percent of the OHTS subjects had central corneal thickness >
600 μm and factors associated with greater mean CCT were younger age, female gender, and diabetes (7).

Remarkably, in the OHTS treatment arm, CCT was inversely related to the IOP response after the initial one-eyed therapeutic trial and during 12 to 60 months of follow-up (P < .05). Individuals with thicker corneas had smaller measured IOP responses to ocular hypotensive medication than those with normal or thin corneas (8).

The results from the OHTS CSLO Ancillary Study Group, suggested that baseline Glaucoma Probability Scores (GPS), Moorfields Regression Analysis (MRA), and stereoparameters alone or when combined with baseline clinical and demographic factors can be used to predict the development of POAG end points in OHTS participants and are as effective as stereophotographs for estimating the risk of developing POAG in ocular hypertensive subjects (9).

One of the limitations of the MRA is its dependence on the position of the contour line. Several groups have shown that, with some optic discs, even expert users of the HRT may differ considerably in the placement of the contour lines, introducing an element of subjectivity into an otherwise objective classification process (10).

The HRT Glaucoma Probability Score (GPS) is an automated diagnostic decision-support system that, unlike the traditional HRT analysis, does not rely on a manually drawn contour line. This technique was originally proposed by Swindale et al (11) who fit a surface over the area of the optic disc and parapapillary retina. In the HRT software, a Bayesian machine-learning classifier then compares the parameters of the fitted surface to those obtained in healthy and glaucomatous optic discs and derives a numerical index for the likelihood of damage.

Although a theoretical advancement, the use of the GPS did not gain wide acceptance in clinical practice due, in part, to its limitations. When investigated systematically, the diagnostic performance of the contour line–independent GPS analysis is similar to that of the Moorfields Analysis. Remarkably, both techniques show a significant dependence of optic disc size. Smaller discs classified as outside normal limits are more likely to be true positives v. large discs which more often produce false positive results. With increasing optic disc size, the probability of a borderline or outside-normal-limits result increases in both the patients with glaucoma and the healthy control subjects, to a similar extent (12).

This patient has averaged sized but asymmetric discs. Mean disk size measurements using histomorphometric techniques in normal eyes range from 2.57 mm$^2$ to 2.81 mm$^2$ (13-15). The average disk area measured with HRT in normal Caucasian subjects ranges from 1.74 mm$^2$ to 2.47 mm$^2$ (16-20). The average disk area measurement in the normal white population using the OCT ranges from 2.10 mm$^2$ – 2.35 mm$^2$ (21-23).

This patient’s asymmetric optic discs (OD 2.22 mm$^2$, OS 1.92 mm$^2$ HRT; OD 1.82 mm$^2$, OS 1.61 OCT, might account for the outside normal limits findings in her right eye. I cannot fully account for the change in GPS results from outside normal limits in each quadrant of the right eye at baseline and subsequent significant change to near within normal limits.

In the OHTS, glaucomatous patterns of loss (partial arcuate, paracentral, and nasal step defects) composed the majority of VF defects among the subjects who converted to glaucoma (24).
Approximately 40% of patients reaching the glaucoma endpoint were classified as such based upon the findings of the visual fields alone, 50% on structural analysis alone and 10% simultaneous structural and functional (visual field changes) (25).

<table>
<thead>
<tr>
<th>Table 4. First POAG Endpoint for Each Participant*</th>
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<tbody>
<tr>
<td>Medication Group, No. (%)</td>
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<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>Visual field</td>
</tr>
<tr>
<td>Optic disc</td>
</tr>
<tr>
<td>Concurrent visual field</td>
</tr>
<tr>
<td>and optic disc</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

*POAG indicates primary open-angle glaucoma. Other POAG endpoints may have occurred in these eyes or the other eyes at a later time.

This patient did not have visual field loss consistent with glaucoma but did have a repeatable loss of sensitivity within the central ten degrees of visual field. It is widely known that the standard 24-2 (54 test points, separated by 6 degrees), provides very few stimulus locations within this central region (~9 points). It is also known that early glaucomatous damage can involve the macula (26). The 10-2 test pattern (68 test points, separated by 2 degrees), provides a less course assessment of macular function and may be a more sensitive assessment tool in the setting of early glaucoma.

11. References


5. Several well-designed studies have since expanded on this hypothesis, confirming that CCT bears an inverse relation with the risk of developing glaucoma damage in patients with ocular hypertension.


Appendix 1

Attached files with images of Visual Field, HRT, and OCT reports

<table>
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<th>OD</th>
<th>VFI Analysis</th>
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<td>Single Field Analysis</td>
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<tr>
<td>Page 23-32</td>
<td>OD/OS</td>
<td>HRT printouts</td>
<td>2005-2012</td>
</tr>
</tbody>
</table>

*cannot recover 2013 results from database