Retinal Findings with Systemic Disease

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Course Objectives
Discuss Ophthalmic tests for evaluating retina
Discuss systemic conditions that affect retina, and how we factor into patient care
Discuss findings associated with systemic diseases, both common and uncommon
Know when to refer, and to whom

Medical optometry: A different kind of “liability”
More Than Meets the Eye

Macula off retinal detachment OD
LP vision
Systemic health: good?
Meds: Valium, Oxycodone, Methadone, Elavil
Tx: Vitrectomy and Scleral Buckle
Post op: Corneal Abrasion and HM
How did the abrasion happen???
Bottle Top

Laser Pointer
Robertson D. et al. Retinopathy from a Green Laser Pointer:
Arch. Of Ophth.2005;May:629-633
Commercially available laser caused retinal changes
Compared 60s, 5min, and 15min exposure
Beware of laser pointer!

Fundus Examination
Ophthalmoscopy
Indirect, Biomicroscope, Direct
Color Fundus Photography
Fluorescein Angiography
Optical Coherence
Tomography (OCT)
OPTOS
HRT
Others

**Fluorescein Angiography**

Used for diagnosis in AMD, diabetic maculopathy, vascular occlusive disease, and many more conditions
Location
- Subfoveal, Juxtafoveal, or Extrafoveal
- Affecting vision?
Type of lesion, as in AMD
- Classic, Occult, Mixed
Level of perfusion
- Diabetics, Vascular Occlusive
Activity of lesion
Treatment options
NaFl given intravenously
First goes through Choroid
Most common side affects are yellowing of tears, urine and complexion

**Fluorescein Angiography**

NaFl is an orange water-soluble dye injected intravenously with virtually no pharmacological properties
80% of dye binds proteins, so 20% available for fluorescence
Retina illuminated with 465-490nm with filters
NaFl absorbs this wavelength, and remits 520-530nm, which is captured by using barrier filter
Diffuses through choriocapillaris, but not normal retinal vascular endothelium or RPE

**FA cont.**

Informed consent signed and discussed with every patient
Very few contraindications
Ophthalmology 1991:98;1139-1142  series of over 2000pts with no incidence of anaphylaxis, MI or seizure
2-5% experience nausea approx 30sec after injection lasting about 1 minute
Caution used if previous difficulties with FA
Side effects
Skin and urine, and tear discoloration will wear off
Nausea, emesis, hives, bronchospasm: benadryl will help alleviate symptoms

**Normal Macula FA**
Early arterial phase showing cilioretinal artery
AV phase with laminar fill of veins
AV phase with higher intensity flash
Late AV phase early emptying
Late phase with emptying with no late leakage

Phases of Angiogram

Choroidal phase: (pre-arterial) 8-10 seconds, no retinal circulation seen yet
Arterial phase: 10-13 sec., arterial filling
Capillary phase: complete filling of arteries and capillaries, also increased choroidal filling
Venous phase:
Early 16-17 sec. Laminar venous flow
Late 18-20 sec. Complete venous filling with reducing concentration of dye in arteries
Late Phase: 5 minutes, demonstrates effects of recirculation, dilution and elimination. Some late staining of disc is normal

Abnormal FA

Hyperfluorescence
Transmission defect (RPE window defects)
   Early hyper that fades, no change in size or shape
Pooling
   Subretinal (ICSC) increases in size and intensity
   Sub RPE (PED) increases in intensity but not size
Leakage
   Abnormal choroidal or retinal vasculature, or breakdown of blood-retinal barrier (CME): generally increasing size and intensity
Staining results from prolonged retention of dye (drusen, vessels s/p occlusion)

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Abnormal FA: Idiopathic CNVM

50 yo with 20/200
CNVM subfoveal with small nasal heme
Early AV with irreg hyper of fovea. Subretinal heme obscures
Increase in size and intensity, still obscured nasally
Late phase intense hyper with fuzzy borders
Hyperfluorescence

Diabetic patient
Leakage at macula due to CSME at superior temporal aspect
Peripheral dot hemes/ma’s

Abnormal FA – (continued)

Hypofluorescence: reduction of fluorescence do to blockage or filling defects
Blockage of retinal fluorescence: (vitreous opacities or pre-retinal lesions, or deep retinal lesions
Blockage of background choroidal fluorescence: subretinal or sub-RPE lesions, increased density of RPE or choroidal lesions
Filling Defects: vascular occlusions or loss of vascular bed

Abnormal FA cont.

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Filling Defects: vascular occlusions or loss of vascular bed

Hypofluorescence

Blockage of dye
BRVO
Hemorrhage just inside ST arcade

Hypofluorescence

Filling defect
Diabetic
Enlarged FAZ
Poor Perfusion
Also, Hyperfluorescence with NVD and NVE

Optical Coherence Tomography

OCT provides a non-invasive, non-contact, quick, high resolution imaging of posterior segment
Likened to an “Optical Biopsy”
Objective, quantifiable, repeatable
Based on technology similar to ultrasound, but uses light waves
Resolution of 10microns
OCT
Easily interpreted, understood, and tolerated by patients
Mydriasis unnecessary
Can do with significant media opacities

OCT
Helps diagnose conditions unable to be seen with ophthalmoscopy
Objective means to monitor disease progression
Provides better understanding of vitreous/macula interaction

Heidelberg: HRA & HRT2 with Retina Edema Module
Heidelberg Retinal Analyzer
Not likely to be in optometric office
Excellent quality FA
Can also obtain ICG and autofluorescence
Dynamic study

HRT2 with Retinal Edema Module
Retina edema module add on to existing HRT
Detects retinal edema: not just leakage
May be able to detect edema before identifiable leakage on FA
Can detect vascular abnormalities

CME
49 y.o male s/p focal laser 9 months ago
Recent decrease in vision from 20/30 to 20/70
FA: Minimal findings
HRT edema module: significant edema
Tx: Acular and PF with resolution to 20/30

Healthy patient??...

32 yo male
2-3 month history of cough, dyspnea, chills, malaise
Recently returned from International travel
Lives in Midwest
Health care professional
No improvement with antibiotics and PO prednisone
Abnormal chest x-ray
Good vision
Referred to Pulmonologist

Chest X-ray

Calcified Granulomas
Differentials?
TB
Sarcoid
Histoplasmosis
Lymphoma

Case continued

CT ordered with contrast
Labs ordered
CBC Normal
Normal Liver function
ESR 46 mm/hr
Negative TB skin test
ACE 44 U/L (7-46)
Histo Mycelial Ab Normal
Histo Anti H Ab 1:32

Histoplasmosis

Treatment:
Sporanox (Itraconazole) 200mg BID x 1 mo
100mg BID x 2 mo

Aside:
Value of prescription drug coverage!
Importance of good doctor patient relationship!!!

In case you were wondering, Histo has remained quiet, with no radiologic changes

Systemic Histoplasmosis

Caused by Histoplasma capsulatum, a dimorphic fungus, that turns into a yeast at body temperature
Endemic to Ohio, Mississippi, and Missouri River valleys
Aerosolized fragments result in alveolar deposition
Most infected people are asymptomatic
Can involve CNS, liver, spleen, eyes, rheumatologic system, and
hematologic system

**Histoplasmosis cont.**

Symptoms can occur 3-14 days after exposure
Approximately 250,000 infected annually
Clinical manifestations in less than 5%
About 90% with acute pulmonary histo are asymptomatic
Enlarged hilar and mediastinal lymph nodes in 5-10% of patients
Affects males 4:1
Progressive disseminated histo mostly occurs in immunocompromised patients ex: AIDS

**Testing**

CBC generally normal
Sputum cultures yield positive results in only 10-15% of acute pulmonary histo
Complement fixing antibodies
Greater than 1:32 suggests active
  - Positive 5-15% of within 3 wks of exposure
  - Positive 75-95% at 6wks
Immunoprecipitating antibodies
  - Anti-M detected in 50-80%, and remains elevated for years
  - Anti-H detected in 10-20% and becomes undetectable after 6mos. This antibody is most specific for active histo
Imaging studies
  - Chest X-ray
  - CT scan

**Treatment**

No treatment needed if asymptomatic
Treatment if symptomatic, or progressive
Treatments
  - Amphotericin B: drug of choice for overwhelming active histo, administered by IV
  - Itraconazole: Fungistatic, very active against Histo, minimal side affects
    - Liver functions must be monitored
    - Approximately 86% success when treating > 2mos
  - Ketoconazole: Fungistatic, well tolerated, does not cross blood/brain barrier

**POHS**

Presumed ocular histoplasmosis syndrome
Never found post-enucleation in patients with typical POHS
Has been found in eye of patients with known Histo
Approx 1-10% pts. In endemic areas have ocular involvement, usually asymptomatic
10% will be bilateral
POHS

Histo Spots
Atrophic yellowish white scars from previous multifocal or disseminated choroiditis
Can form streaks

Peripapillary Atrophy
May represent atrophied granulomas that formed during active infective stage of disease around the ONH
Neovascular membranes can form here, and involve macula

POHS

Macular Involvement
CNVM tend to form in area of pre-existing histo spot
May be immune reaction against *H. capsulatum*
May be due to weakened Bruch’s membrane
10% become bilateral at 5 yrs, and 20% at 10 yrs

Treating CNVM from Histo

MPS
Argon laser to entire lesion effective if extrafoveal with 8% recurrence
Krypton laser if juxtafoveal with 23% recurrence
Submacular Surgery (SST)
Benefit seen in surgical group if entering acuity worse than 20/100 (76% vs 50% same or better)
PDT
>50% remain equal or show improvement
No cases of severe vision loss as has been reported as has been with AMD patients
3 recent studies published in Retina (most recent Jan 2005)
  Approx 50% improve by at least 2 lines
  All 3 retrospective reviews, and felt PDT may be beneficial

Central “Spot”

50yo female referred in with a “spot” in the center of her vision
Present for 1-2 wks
Referring OD noticed abnormality
VA 20/20 OU
Denies High stress or type “A” personality

Central Serous Choroidopathy

Characterized by breakdown of the outer retinal barrier, with leakage of fluid through
a defect in the RPE into the subretinal space, resulting in a neurosensory detachment
Often times associated with high stress
FA must be done to rule out CNVM
Other systemic associations
Use of corticosteroids, pregnancy, increased adrenaline level, hemodialysis, collagen vascular
disease, and hypertension
Treatment?
Letter of diagnosis to PCP to make aware
ICSC

New treatments proposed:
PDT
   Success found in multiple studies
IVTA
   May prevent leakage
   Not study proven

Is it too easy to be successful with new treatments??

Case study

32yo female
Good health
20/20 OU
"retinal changes"

Case Study

44 yo Native American male
Some blind spot recently
20/25 OU
No PEPS
Idiopathic
Warned of possibility of future CNVM

Angiod Streaks

Diagnosis: Angiod Streaks

Treatment: yearly exams, and home monitor with Amsler grid

Note: proximity of Angiod streak to fovea

Over 50% of Angiod streak patients have associated systemic disorders

Angiod Streaks

Represent breaks in an abnormal Bruch’s Membrane that may present spontaneously or as result of trauma
Eventual RPE and choriocapillaris degeneration
Generally radiate out from ONH, bilateral
Color depends on fundus color and degree of RPE atrophy
Red: Lightly colored fundi, reflect underlying choroid
Brown: Darker pigmented fundi
Orange: Specific type of RPE mottling
Angioid Streaks: associated systemic conditions

Pseudoxanthoma Elasticum  
80-90% have angioid streaks  
Degeneration of collagen  
Most common systemic

Paget’s Disease  
8-15% have angioid streaks  
Metabolic bone disease

Sickle Cell Disease  
<6% have angioid streaks

Ehler’s-Danlos Syndrome  
Skin fragility, joint hyperextensibility

Diabetes  
Others: maybe coincidental

PEPSI

Angioid Streaks  
Not problematic unless get CNVM  
If CNVM, standard is thermal laser, but >75% recur

Monitor with Amsler grid

Case of Missing Labs

RM is a 46 year old Caucasian male  
Referred for retinal changes, questionable macular edema

Last physical 2-3 years prior  
“No systemic health problems”, no medications

Paramedic  
Note: Not a very healthy looking patient  
“Healthy” Paramedic cont.

Visual acuity: OD: 20/100 OS: 20/30  
Pupils, CVF, Amsler all normal  
Anterior segment: Normal, no iris changes

Fundus exam:  
Widespread microaneurysms, several cotton wool spots, vascular engorgement and crossings, dot and flame hemorrhages in post-pole and equatorially

Macular edema present OD, and possibly OS

Fluorescein Angiogram ordered

Above changes noted, significant leakage in OD macula. Limited change to macula OS

TX: Focal laser recommended

TX Cont: Letter sent to PCP telling of findings, recommend blood workup for DM and other vascular problems

Unhealthy Paramedic

Vision after focal: OD: 20/70  
Retinal changes: worse
Pt notes that has been to doctor, and now on meds for DM
BP checked at visit and was 184/102

**Paramedic**

2 mos later he notes vision may be a little worse: OD: 20/200 OS: 20/40
BS poorly controlled
BP: 156/94
We called PCP for lab results.......

**Case of Missing Labs**

MD office had no records of any lab work done!
Pt self tested while on job, and treatment based on that
Fairly non-compliant patient
? Compliant PCP
Needs Endocrinologist consult...
**This patient not only has diabetes, but also hypertension!**

**Follow up**

Intravitreal steroid OD and focal OS on 6/30/05
f/u 8/29
f/u 11/25: Stable vision, poor BS control, no change in attitude

**Diabetes**

2 types
Type 1 (previously insulin dependent)
- Beta cell destruction leading to absolute insulin deficiency
- Glucose stays in blood since can not enter insulin dependent tissues
Type 2 (previously non-insulin dependent)
- Peripheral insulin resistance, maybe relative insulin deficiency or secretory defect
- Treatment to decrease hepatic glucose production &/or decrease peripheral insulin resistance
- May become insulin dependent

**Diabetes**

Lifetime risk of DM for Caucasian individuals born in 2000 is 32.8% for males and 38.5% for women (approx 20% more for hispanic)
DM affects approximately 1:16 Americans, and approx 50% unaware they have DM
NPDR may predate diagnosis of Type 2 DM by 6 years and detected in >20% at diagnosis
BMI and weight are major risk factors: for every increase in wt by 1kg, increase risk by 4.5%
Obesity by BMI in 2000 was 19.8%
Testing
Should be more frequent if obese, family history, birth to large baby, hypertensive or dyslipidemia

Diagnosis
Fasting BG >125mg/dl
Symptoms of DM plus casual BG >200mg/dl
2 hour BG >200mg/dl during OGTT
Repeat test to confirm

Diabetes
Most common retinal vascular disease
Typical findings
MA, intraretinal hemorrhages, hard exudates, CWS, macular edema,
IRMA, neovascularization, vascular changes..
Non-proliferative diabetic retinopathy vs Proliferative retinopathy
Macular edema

NPDR
Mild
At least 1 ma
Moderate
Hemorrhages &/or ma’s (2A), CWS, or VB(< 6B) or IRMA (<8A)
Severe
4/2/1
15% to PDR in 1yr¹
Very Severe
2 or severe findings without neo.
45% to PDR in 1 yr¹

Proliferative Diabetic Retinopathy
NVD or NVE
High risk
NVD >1/2 disk area
NVD and VH/PRH
NVE >1/2 disk area +VH/PRH
Untreated, can lead to VH or tractional RD
Without tx, 50% blind in 5 years
Current treatment: PRP when High Risk, may need vitrectomy
Macular Edema

3 criteria
Thickening <1/3DD from center of macula
Heme/exudate with thickening of adjacent retina <1/3dd from center of macula
Thickening >1dd size within 1dd center
Current treatment: Grid/Focal laser
Investigational treatment: IVTA

Diabetic Retinopathy Study
Randomized, prospective to evaluate PRP
Primary outcome was severe vision loss defined as 5/200
Demonstrated 50% decrease in SVL in PRP group
Recommendation: PRP
Complication: 11% lost 1 or more lines of acuity, and 5% had visual field loss

Early Treatment for Diabetic Retinopathy Study
Evaluated PRP and aspirin in pts with less than HR PDR OU, laser for DME
Outcome was Moderate VL (doubling of visual angle)
Results:
>50% less MVL with laser for CSME
PRP for PDR, not needed earlier, but may be beneficial for Type 2
ASA 650mg did not alter retinopathy, VA or VH, or rates of vitrectomy

Diabetic Retinopathy Vitrectomy Study
Is early vitrectomy beneficial?
20/40 was more common in early-vitrectomy group (1-6 mos.)
Benefit seen in eyes with most severe disease
In regards to VH, clear benefit to type 1, but not to type 2
Today: 25g vitrectomy

Diabetes Control and Complications Trial
Pts randomized to conventional or intense control
Showed slower progression for intense control group
For those with no NPDR at start, if intense, then 76% less devel. of retinopathy
7.9% of intense vs 30% of conventional needed focal laser
Benefits truly seen after 3 years
If A1c down by 2%, PDR would decrease by 50%
DCCT reported relationship of A1C and avg. Glucose

<table>
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<tr>
<th>%HbA1C</th>
<th>Avg. Glucose (mg/dL)</th>
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<tr>
<td>4.0</td>
<td>60</td>
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<tr>
<td>5.0</td>
<td>90</td>
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<tr>
<td>6.0</td>
<td>120</td>
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<tr>
<td>7.0</td>
<td>150</td>
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Control group in DCCT: 9-10%
Strict control group: 7%

VEGF and PEDF in Diabetes

VEGF causes increased permeability due to changes in tight junction proteins of vascular endothelial cells
PEDF effective inhibitor of angiogenesis
Decreases with hypoxia and/or hyperglycemia
Also decreases vascular permeability
VEGF and PEDF correlated independently with changes in eyes with DME
In DME (macular thickness) +VEGF and –PEDF
More pronounced with hyperfluorescent DME
VEGF levels more correlated with severe DR
Increased VEGF with PRP
Plasma levels not correlated

VEGF in DME

Previously known that VEGF plays role in diabetic retinopathy by increasing permeability
Also studied the affect of intercellular adhesion molecule 1 (ICAM1)- BRB breakdown
Showed increased VEGF and ICAM1 in diabetics compared to controls
Highest levels correlated to most hyperfluorescent DME

Relation Between Reduction of Foveal Thickness and VA in DME treated with IVTA

May 2005 issue of Archives of Ophth.
Measured both OCT and vision in patients with diabetic macular before and after injection of triamcinolone acetonide
All eyes had reduction of foveal thickness, but only 19/24 had improved acuity
Younger patients had more improvement in thickness, but not in acuity
So: If reduction in thickness, why not improved vision?
Ongoing Diabetes studies

Macugen
Phase II complete
Patients receiving Macugen were 2x as likely to gain 10 ETDRS letters, less likely to lose vision, and had improvement on macular thickness by OCT and less change in retinopathy severity. Less % ophthalmic AE’s in .3mg vs sham
Lacks power due to size, only 36mos flu, ? role of focal Ophthalmology 10/05
Decrease in PDR Ophthalmology 1/06
Ruboxistaurin
Protein kinase C inhibitor (PKC enzyme causes microvascular damage, leading to complications)
Initial studies marginally favorable: Some benefit when groups taken out
Intravitreal Triamcinolone Acetonide vs Laser for DME
Randomized, multicenter trial, in Phase 3 Diabetic Retinopathy Clinical Research Network
Ovine hyaluronidase
Dissolves hyaluronic acid, but does not affect collagen
Injectable to induce PVD, which may prevent scaffolding required for NV into vitreous
Can also be used to dissolve vitreous hemorrhages

“Paramedic’s Friend”

65yo male
Occupation: retired, but used to be field medic in military
“My optometrist referred me because of my right eye, I am not sure what is wrong”
“Good general health, my blood pressure runs low”
My exam...

Hypertension??

Vision: 20/400 OD
Anterior Segment: normal
Blood Pressure: 196/120
What next....
Sent to PCP directly from office
Started on HTN meds
Returned for laser 2 wks later

Hypertension

50-60 million Americans have systemic HTN (by today’s standards)
Usually asymptomatic, but can lead to MI, PVD, CVA, renal disease, retinopathy
Significant CVD risk at 140/90, and risk doubles with every increase of 20/10mmHg
Risk factors include smoking, dyslipidemia, DM, age, family history, race, sedentary, obese, sodium...

Hypertension

Refer to PCP in timely manner
Goal of BP reduction to as low as tolerated
Most patients will require 2 medications
Lifestyle modification
30 minutes of physical activity >4 days/wk can lower SBP by up to 9mmHg
Weight loss of 10kg can lower SBP by 5-20mmHg

**Hypertensive Retinopathy**
**Branch and Central retinal vein occlusions**
Vein occlusions are second most common ocular vascular abnormality
Arteriosclerosis is primary factor
Increased venous and capillary pressure cause decreased blood flow
Arterial thickening compresses vein
Endothelial cell loss, thrombus, or venous occlusion
Most common systemic conditions:
HTN, hyperlipidemia, DM, smoking, obesity

**Branch Retinal Vein Occlusion**
Major BRVO
1\(^{st}\) order temporal branch at ON or 1\(^{st}\) order away from ON but involving macula
Minor BRVO
Only macular branch
Peripheral BRVO
No macular involvement

**BRVO**
50% develop collaterals with visual return in 6 mos
NVD in 10% and NVE in 20-30%
Acute signs should resolve by 6-12 mos
May have macular RPE changes, even ERM

**Current Treatment of Branch Retinal Vein Occlusion**
Branch Vein Occlusion Study (BVOS)
65% of eyes treated with grid laser photocoagulation gain 2 or more lines of visual acuity (3 yrs)
37% of untreated eyes gain 2 or more lines of visual acuity (3 yrs)
Laser decreased NV by 50% but only 60% of treated eyes would have developed

*Therefore, grid laser photocoagulation is recommended for BRVO with macular edema*

**Central Retinal Vein Occlusion**
Non-Ischemic
Rare APD, occasional CWS, moderate VA loss
15% convert to ischemic at 4 mos, and 34% at 3yrs
50% VA <20/200
Ischemic
Severe decreased VA
Marked APD
Tortuosity and engorgement in all branches, numerous CWS, Severe ON edema
Iris NV in 50%
Monthly f/u for 6 mos

**Current Treatment of Central Retinal Vein Occlusion**

Central Vein Occlusion Study (CVOS)
Grid laser photoagulation reduces angiographic evidence of macular edema
Final median visual acuity in treated eyes was 20/200 (3 yrs)
Final median visual acuity in untreated eyes was 20/160 (3 yrs)
With or without treatment, approx. 33% Lose 3 lines of VA at 3 years
PRP did not prevent iris NV
*Therefore, grid laser photoagulation is NOT recommended for CRVO, unless NV develops*

**Investigative Treatments for Retinal Vein Occlusion**

Treatments Investigated (CRVO):
Troxerutin
Hemodilution
Chorioretinal venous anastomosis
Radial optic neurotomy
tPA
Anti-VEGF compounds
Corticosteroids
Treatments Investigated (BRVO):
AV sheathotomy
Corticosteroids

**Rationale for Additional Study**

Current state
Triamcinolone injections used frequently among ophthalmologists
No definitive data on safety or efficacy (especially long-term)
Therefore, a randomized trial is needed to provide definitive data on whether the benefits outweigh the risks
Furthermore, a triamcinolone acetonide preparation manufactured for intraocular use is desirable
Recent editorials in AJO

**Rationale for additional study.. Why studies are needed**

“When you have a hammer, everything looks like a nail”

Jost Jonas, M.D.
CRVO Treatment

IVTA for CME in Non-ischemic CRVO
AJO May 2005 by Williamson and O'Donnell
2mg of Triamcinolone Acetonide
Monitor OCT and VA
    acuity thickness
Initial  20/300   518
1 mo    20/166   363
2 mo    20/100   304
3 mo    20/130   353
6 mo    20/150   383
12 mo   20/270  406

SCORE Study

Multicenter, prospective, controlled, Phase 3, NEI funded study
Comparing traditional tx to IVTA
Measuring VA, OCT, and FA findings
Onset to 24 mos
VA 20/40 – 20/400
Center involved macular edema
Website:
http://spitfire.emmes.com/study/score/

Bull’s eye maculopathy

Drug Toxicity
Rarely seen due to less people on this drug
More common in overweight people, or very thin people

Chloroquine Retinopathy

First described in 1959
Defined by acquired paracentral scotoma on VF with parafoveal RPE atrophy
Dose related
Exams every 1-2 years depending on dose
Hydroxychloroquine
    Annually if on for >6 years, or >200g cumulative dose
    18 mos. if <6.5mg/kg
Chloroquine
    Annually if <3.0 mg/kg
**Chloroquine Maculopathy**

Much lower incidence in Hydroxychloroquine  
But, both have the same therapeutic index  
Higher incidence with Chloroquine may be due to 250mg pill size  
Testing should include fundus exam, Amsler grid, and red on white field  
(10-2)  
Multifocal ERG may be good screening exam to detect early (pre-clinical), reversible changes  

mtFERG changes in Hydroxychloroquine Therapy. Lai, T et al. AJO. November 2005  

**Drug Induced Maculopathies**

Tamoxifen  
1-6% incidence  
Related to total dose (10g) or daily dose  
Can happen very acutely  
Often improve after discontinue drug  
Similar reaction seen from canthaxanthin  

**Nevus**

Usually flat lesions of choroid, may have minimal elevation  
May develop drusen  
Estimated to be in 6-10% by Blue Mountain Eye Study  
May be pigmented or amelanotic  
Observation for growth critical  
Ophthalmology Oct 2005 Singh et al  
Estimate 8.64 million in US with nevus  
Estimate conversion to melanoma to be 1/8845

**Metastatic Disease**

Cancer is 2nd leading cause of death in US  
Choroidal met is most common ocular malignancy  
As high as 34% with choroidal met, have no previous dx of cancer  
Most common primary site is lung, followed by breast  
Despite rise in dermal melanoma, no rise in choroidal melanoma seen  
PET/CT scans most effective for detecting systemic met. BJO Sept. 2005

**Metastatic**

Most common primary sites:  
Men  
Lung 26-50%  
Unknown 6-29%
Metastatic

Most common primary sites:

Men
- Lung 26-50%
- Unknown 6-29%
- GI 3.5-12%
- Prostate 3-12%

Women
- Breast 68-85%
- Lung 8-12%
- Unknown 4-12%

Metastatic Disease

Most common sites of Choroidal Metastasis
- Breast 39.7 – 65%
- Lung 14-29.5%
- GI 2.6-6.3%
- Skin 2.0-4.5%
- Prostate 1.3-3.6%
- Kidney .9-4.0%
- Unknown 4-18.3%

Thorough systemic work-up needed in cases of ocular malignancies

Choroidal Melanoma

53yo caucasian female
- HTN and hypecholest.
- Referred by OD
- 20/20 OD  20/25 OS
- Suspicious lesion OD
- Sent for systemic w/u

Post treatment
- Systemic workup negative for metastasis or other ca
- Brachyplaque therapy
- Vision to 20/50 post tx
- CE and vision to 20/40
- Spread/mortality
- Tumor configuration
Quality of Life after Tx

Significant difference in vision for 1\textsuperscript{st} year (plaque > enucleation), fading after 5 yrs
Most notably driving and peripheral vision
Patients treated with plaque had increased psychological distress following therapy
This faded after survival rates announced
Still distress in both groups

Prognosis Continued

Closer look at COMS\textsuperscript{†}

Familial Adenomatous Polyposis (FAP)

Rare: 2.3-3.2/100,000
Avg onset at 16yo
Without Colectomy, colon cancer inevitable
Autosomal dominant 75-80\% have affected parent
78-88\% have 4 or more fundus lesions

Retinal Consult

37 year old female
Vision 20/20 OU
No pain or pain with movements
No APD
Normal Anterior segment exam

Optic Neuritis

What is the normal visual outcome?
Will this recur?
What is risk of MS?
What is eye treatment?
What is Systemic Treatment?
What tests are needed?

ONTT, CHAMPS and ETOMS
All 3 agree, and confirm likelyhood of progression to further
demyelinization

Recurrence of Optic Neuritis:
28% at 5 yrs
35% at 10 yrs
- Recurrence more frequent in those that eventually developed MS
- Single occurrence not associated with poor vision
- Multiple occurrence associated with worse vision, approx. 25% were 20/400 at 5 years

**Optic Neuritis and MS**

15-20% of MS present with ON
38-50% of MS will develop ON
Most predictive factor in who will develop MS is presence of white matter abnormalities (demyelinating lesions) on brain MRI
Overall 10-year risk of MS 38%
- risk with no baseline brain MRI lesions 22%
- risk with ≥ 1 baseline brain MRI lesions 56%

**Treatment?**

Oral steroids alone not affective
- At 3 years, MS risk for IV vs PO vs Placebo 17% vs 21% vs 25%
- IV methylprednisolone x 3 days followed by 11 days of oral pred.
- Treatment with IMA?
  - 12,000/yr with wkly injections and side effects

**ON predictive factors**

When no brain lesions were found, the following were not present in any cases of CDMS (clinically definite MS)
- Severe disc swelling, painless, NLP, retinal exudates, disc or peripapillary hemorrhage

**OCT: Predictive value**

RNFL thickness may be able to be predictive as to MS or level of vision loss
- RNFL thickness signif. reduced in MS eyes
- Disease free thickness > MS = fellow of ON > MS w ON
- Lower visual function with less RNFL
- Avg. RNFL thickness declined with increased neuro. impair. and disability
Lattice Degeneration…
30 year old male referred for evaluation of lattice degeneration and atrophic holes
Very healthy athlete, no medications
Exam findings:
VA: 20/20 OU
Anterior segment healthy
Peripheral retina: Lattice with holes
Posterior pole..

Plaques
Several Hollenhorst Plaques
Further questioning: No cardiovascular or carotid disease
Treatment: Laser to lattice and holes
Referral: To PCP for cardio and carotid work-up
Pt lost to follow up

Hollenhorst Plaques
Landmark article in AJO January 1973
Carotid disease and heart disease about same incidence at time of plaque seen
Patients 4x more likely to die of MI than CVA
If embolus, mortality 54% over 7 years (2x that of age matched norms)
Referral to PCP or internist

Carotid Artery
Artery Occlusion
HH plaque along IF artery
Acute finding due to retinal edema
Central vision good
Superior nasal scotoma
Edema decreases with time

Artery Occlusion
Rate reported by Will’s to be 1/10,000 with 1-2% bilateral
1/2 -2/3 have HTN, and 25% DM, 25% CVD, 45% carotid artery dz
Emboli see in approx. 20%
90% CRAO initial VA CF to LP if embolus
Cell death may occur as quickly as 90 minutes (Hayreh)

**Artery Occlusion**

Historically felt than 5% develop NV
Duker et al 1991: 18.2% NVI, 15.2% NVG
Hayreh: mean to NVI 5.5 weeks
  - Can develop NVI without carotid disease
Inner retinal cell death, but outer layers spared, and have high O₂ demand
**Treatment**
- PRP when NVI
- Acute treatment
  - AC paracentesis, massage, carbogen…
  - Acupunture³: marked visual improvement in 25%
- TPA
Referral to PCP or internist for treatment of underlying systemic disease
Article in Sept AJO by S.S. Hayreh

**One last systemic Disease..**

Primarily affects Doctors..
Bad Handwriting!
Charting should be: INTELLIGIBLE and CLEARLY Documented
Remember that record provides justification for billing and payment!
Standard medically acceptable abbreviations only
If in doubt, write it out!
Example: FLK w/ GLM

Funny looking kid with good looking mama

Thank You [igerson@hotmail.com](mailto:igerson@hotmail.com)  Online

**Resources**

- [www.theretinaexchange.com](http://www.theretinaexchange.com)
- [www.retinalphysician.com](http://www.retinalphysician.com)
- [www.pubmed.com](http://www.pubmed.com)
- [www.biosyntrx.com](http://www.biosyntrx.com)
- [www.optometricretinasociety.org](http://www.optometricretinasociety.org)
- [www.optos.com](http://www.optos.com)
- [www.optometricretinasociety.org](http://www.optometricretinasociety.org)
THANK YOU

Special thanks to the staff at my office:
As I tell them, “You make me look smart”