OCT: The Optometrist’s MREye

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Course Title:
The Optometrist’s MREye

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Financial Disclosure

- No financial conflicts
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OCT

- **in vivo** histology
- Working mechanism: similar to B scan (optical vs. acoustic reflectivity) but uses infrared light
- Resolution: 3-5 microns with SD technology
- Different optical reflectivity in various tissue structures

Spectral Domain OCT

- Time Domain----------then.....
- Spectral Domain--------now....
- Swept Source and OCT dye less angiography

Swept Source OCT

- Twice as fast (twice as many A-scans / second) as SD OCT
- Allows for wide field imaging (12mm vs. 6-9 mm). Easily gets ONH and macula in the same scan
- Longer wavelength of light, so can image much more effectively through media opacities, and penetrates much better in to the choroid (2.6 mm depth vs. 2.3mm)
OCT angiography

Image: Oct.optovue.com

OCT Angiography

Image: oct.optovue.com

Adaptive Optics (Images courtesy of Dr. Steve Burns)

Different Companies

- Carl Zeiss Meditech
- Heidelberg
- Optovue
- Topcon
- Others

Importance of normative database

- Typically take demographic factors into account, but not refractive error. This can be very important with high myopes, who will have thinner NFL than their counterparts with equal demographics.
- Composition of normative database also very important.

Cirrus normative database

- 284 individuals
- Age 18 to 84
- Refractive error +8.00 to -12.00
- 43% Caucasian
- 24% Asian
- 18% African American
- 12% Hispanic
- 1% Indian
- Small amount of others combined
PIL

- Line seen at junction of inner and outer segments of the photoreceptors
- Extremely useful for evaluating disease state and visual potential
- Ophthalmology calls it the “ellipsoid line” or “ellipsoid zone"

Very important!
BRVO x 4 months VA= 20/70

S/P Intravitreal Kenalog Injection x 2 mos 20/20-

Central Retinal Vein Occlusion

S/P 2 Intravitreal Steroid Injections

Pars planitis with chronic CME

Diamox!

What else is going on?

Good eye?
**Vitreoretinal Interface Disorders**

- Idiopathic Epiretinal Membrane
- Vitreomacular Traction Syndrome
- Idiopathic Macular Hole
- Full thickness Macular Hole

**Macular hole sizes**

- Small <= 250 microns
- Medium 250-400 microns
- Large > 400 microns
- Horizontal diameter at narrowest point

**New grading system**

- VMA with no change in foveal contour: Stage 0
- VMT with disruption of foveal contour: Stage 1
- VMT with small or medium FT hole: Stage 2
- VMT with medium or large full thickness hole: Stage 3
- Any full thickness hole without VMT: stage 4
- Lamellar hole
- Psuedohole from ERM
ERM

- Membranous growth of glial cells on retina surface
- Can be asymptomatic or very bothersome
- Metamorphopsia is common
- More common after PVD
- Tractional macular holes, cysts, CME, neurosensory RD’s; retinal and choroidal folds, etc.

ERM + Cystoid Edema

ERM with Macular Edema

ILM fracture
Macular Holes: 70 Y/O female

- Full thickness macular hole & ERM- OS BCVA 20/400
- Pseudohole 20/25- OD
Pseudo-hole

Posterior hyaloid

Photoreceptors

Macular hole repair

20/25!

VMTS
3 yrs later 20/20-

VFTS with early hole

Foveal detachment
VMTS & ERM

Posterior hyaloid

ERM

VFTS spontaneous resolution after 3 months

Jetrea (ocriplasmin)

- Effective at breaking VMA about 26% of the time in clinical trials
- Costs $3000-$4000 per injection, covered by some insurance carriers
- Reports of decreased visual function after injection, usually not permanent
Jetrea

- Factors that increase success in real world settings (Ophthalmology Times on-line) to about 50%....
- VMA < 1500 microns in diameter
- Age < 65
- Full thickness macular hole present
- Phakic eye
- No ERM

- If PIL line disrupted at one week after injection (recovers by one month), then 75% chance of success
- This PIL disruption may correlate with reports of temporary reduction in visual function

Oasis study

- 2 year trial post approval
- 220 patients: 146 Jetrea, 74 sham injections
- VMA resolution at 28 days: 41.7% Jetrea, 6.2% sham
- Macular hole closure (if applicable) 30% Jetrea, 15.4% sham
- BCVA improvement of 2 lines or more: 50.5% Jetrea, 39.1% sham

VFTS

- Full thickness hole OD, VMTS OS
Macular Hole Formation

Attached Operculum

Macular Hole

Posterior Hyaloid
Operculum
Cystic spaces

Macular Hole

Central Serous Retinopathy
ICSC with “LEMON DROPS”

Old ICSC

- ICSC has abnormally thick choroid on SD OCT EDI: Normal is 250 microns.

ICSC FAF

“drops of water on a windshield”
Macular Degeneration

Drusen - Dry AMD

Drusenoid PED - Soft Drusen
Pigment Epithelial Detachment

- 73 year old with mild blurring & metamorphopsia OD X 1 month
- Longstanding history of dry AMD OU
- BCVA: OD 20/25- OS 20/20- + Amsler OD
- OCT: See slides

PED VA= 20/70

Subretinal fluid….or is there something else?
Miscellaneous Retinal Conditions

Chloroquine maculopathy

Chloroquine OCT

Plaquenil toxicity
S/P RD surgery 6 Mos. 20/40

Macula off RD

PDR with traction RD

Development of Foveal Retinoschisis

Foveal Retinoschisis

Another Patient Foveal Retinoschisis
hypotony

- Choroidal Folds

Solar Maculopathy

Focal defect in PR outer segments and RPE

Solar Maculopathy

Solar maculopathy

Solar maculopathy (images courtesy Dr. Jerome Sherman)
Adult Vitelliform

Also Adult Vitelliform

Best's dystrophy

Cone dystrophy

IJXT with ILM drape
20/40
(Mac Tel II)
Macular Scar

ORT's

Optic nerve head and glaucoma

Granule Cell
Stroke and GCC loss #2

Drance and wedge defect: are they all like this?

Optic Nerve Pit

Optic Nerve Pit

ONH Colobomas

ONH Coloboma OCT
PARTIAL PVD

Papilledema - IIH

25 Y/O female
Dg: IIH Diamox Tx

Resolving

23 y/o male - IIH

Resolution
ONH Drusen

ONH DRUSEN SD-OCT

Improved with EDI

ONH DRUSEN SD OCT

Color SD-OCT

Shadows from drusen

Lack of SRF in all cases

ONH drusen
FAF ONH drusen

Anterior Segment OCT
- Many units available with anterior segment capability

Wide angle to angle
OCT pachy

Plateau Iris

Wound leak with choroidals

Wound leak post repair

Scleral lens
Two for the price of one!

THE END!