Reading Between the Lines: OCT Interpretation

Mohammad Rafieetary, OD, FAAO
mrafieetary@charlesretina.com

Principle of OCT

- Introduction
  - Optical Biopsy
  - Morphologic Evaluation of Live Tissue
  - Measurements
    - Axial
    - Thickness and Depth

Advantage: High Resolution Cross Section Images

Disadvantage: Limited Scanned Area

Initial Concept

Talia 1990s
Interpretation of Data/Images

- Thickness Maps
- Actual Cross Sectional Images
  - In Plane view
  - 3D Modes
  - Resolution Mode
- Color Scheme

Interpretation of Data
Pros and Cons of Thickness Map

- (+) Ability to measure change over time
- (+) Overall assessment of an area in one glance
- (+) Use in Clinical Trials
- (-) Inability to make specific diagnosis
- (-) If not compared to actual tissue lead to judgment errors
- (-) Relies on automated algorithms and tissue reflectance for results

Topography/Thickness Maps

Thickness Map vs. Anatomy

A. Juxtapapillary CNV     B. One month s/p IVI (anti-VEGF)
Right superior quadrantanopia
Sent For Neuroimaging

Scanning Strategies
And adequacy for follow up scan

Scanning Mode to Avoid Missed Pathology

Tomography..........Morphologic Evaluation

Pathologic Dysmorphic Changes

Early diabetic changes that may be clinically undetectable

Advanced diabetic disease, ischemic/atrophic retina
**Vitreous and Vitreoretinal Interface**

- VMA
- VMT
- EMM
- LMH
- FTMH

**Neurosensor Retinal Anatomy**

- NFL
- GCL
- IPL
- INL
- DPL
- ONL
- ELM
- RPE
- Ellipsoid

**Retinal Anatomy: S**

- Neurons: ★★
  - GCL, INL, ONL
- Synaptic Layers:
  - IPL, OPL ★★
- Examples of Related Disease: RP, POAG

**Vascular Anatomy**

- Inner retinal changes due to vascular disease such as DR, RVO, BRA

**RPE**

- One of the most biologically active tissues of the body.
  - Normal
  - Degenerative AMD
  - Inflammatory/Autoimmune AMPPE
Effect of Disease on Vasculature

Compare the ratio in H vs V

Atherosclerotic changes

Variation of choroidal thickness in certain conditions (AMD, Myopic D, CSR).
Alteration of choroid by certain conditions (Choroidal Sclerosis).
Alteration of the retina by choroidal disease (Posterior Uveitis, Ischemic disease)

OCT-Peripheral Retina
Wide Field OCT

Melanoma?

ONH

Answering what isn’t vs what is!

OCT Dissection and Deduction

Email Consult: What is this on retinal surface?
Colleagues Opinion: “OCT Shows thickening of NFL and RPE”. Is this accurate?

Mixed Disease

Early AMD (Drusen)

AMD

Small Drusen
Intermediate (63-125 um)
Large (>125 um)

Drusen-Dynamic Evolution

Review of Structural Changes in Disease

Macular Degeneration and Degenerative Condition
Intermediate AMD

Large-Placoid-Soft Drusen

Progression

Large Drusen (coalesced, placoid)

RPE Abnormalities

Large Drusen (coalesced, placoid)

RPE Abnormalities

Fellow Eye

Large Drusen

Fellow Eye
RPE Abnormalities-GA

GA Progression

Advance AMD (Neovascular) 6 years follow-up

Challenges due to patient’s compliance
10/3/2017

R/O Wet AMD

OCT Guided Dx-Dissection

CNV

Dissection
10/3/2017

SRF SRH
PED
1 MO S/P IVI
4 Mo from onset
CNV
SRF
CNV
IRH
R/O Wet AMD
Outer Retina
Inner Retina
OCT Guided Dx-Dissection
BM
Choroidal Thickness
Drusen
Thin Choroid
Altered RPE and Drusen
No Contiguity
Dissection
Intact BM
Myopic Degeneration and CNV

Lacquer cracks

Angiod Streaks

3 months later
OHS

Multifocal CSR

OHS (Late)

Punched out lesion!

CSR

Pigmented Lesion and Tumors
CHRPE

Localizing Lesions (Choroidal Nevus)

Choroidal Nevus

Choroidal Tumor

Elevated Nevus

Choroidal Hemangioma
Retinal Hemangioblastoma

Retinal Vascular Disease
- DR
- RVO
- RAO

Inner Retina - Retinal Vascular Disease

MA-NPDR

Diabetic Retinopathy

Diabetic Retinopathy

Shorter Scan Line Better Resolution
NPDR (MA constriction resolution of ME)

Exudates

Cotton Wool Spots
DME

PDR-VH

Post-TX

Posterior Vitreous Cortex

Possible vessel wall in vitreous space

Invasion of retinal vessel to retinal surface

PDR-NV

PDR-TRD

PDR-TRD

PDR-TRD
In BRVO, there is uneven distribution of pathology.
RAO

New Onset Floaters
Do Not Use EDI for Surface Disease

BRAO OCT

Patient Referred R/O AMD
Retractile areas on fundus exam

Vitreous and Vitreoretinal Interface
PVD

VR Tufts (Traction)

VMT-Spectrum

Epimacular Membrane
Single layer vs overall assessment

Spontaneously Improved

Other Examples

EMM-Postop

Tractional Striae
Prognostic Markers

LMH Spectrum and Repair

Infectious/Inflammatory/Autoimmune Disorders
Toxoplasmosis

Conditions of Inner-Retina

Vit. Cells

White Dot Syndrome

Unilateral Recent Onset Vision Loss

Acute Posterior Multifocal Placoid Pigment Epitheliopathy

Recurrence
Multiple Evanescent White-Dot Syndrome

Vit Cells

2 weeks S/P Ozurdex Implant

Punctate Inner Choroidopathy

Acute Zonal Occult Outer Retinopathy
Peripheral Retinal Disease

RRD vs. Retinoschisis

Peripheral Microcystoid

Lattice (Snail Track) Degeneration

OCT-Lattice/RT/Subclinical RD
Absence of choroidal features

Optic Nerve

Peripapillary Atrophy

Tilted Disc (GL dilemma)
Bergmeister’s Papilla

Optic Pit

ONH Drusen

Papilledema

Young Obese Female
Pseudotumor Cerebri

Thank you