101- Forensic OCT Examination

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Two Steps to Receive CE Units

• Complete the course evaluation
• Hand in your course ticket at the conclusion of this course

Use of OCT in Detection of Disease

• Forensic: scientific tests or techniques used in connection with the detection of crime.

Speaker Disclosures

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Use of OCT in Detection of Disease

• Diagnostic Test to Detect and Aid to Diagnose Pathology
• Concept for this talk
  – OCT Scan = Pathology Blade
• Image Sources

Initial Concept

Talia 1990s

Advantage: High Resolution Cross Section Images

Principle of OCT

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

Computer Generated Images: Shortcomings

Disadvantage: Limited Scanned Area

Allowing you to make appropriate clinical decisions when the suitable scan is obtained!
Interpretation of Data/Images

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

Optical Coherence Tomography:
Tomography: a technique for displaying a representation of a cross section through a human body or other solid object using X-rays or ultrasound
Topography: the distribution of parts or features on the surface of or within an organ or organism

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
Thickness Map vs. Anatomy

A. Juxtapapillary CNV
B. One month s/p IV (anti-VEGF)

Disease Guided Imaging

Right superior quadrantanopia
Sent For Neuroimaging

Scanning Strategies
And adequacy for follow up scan

Scanning Mode to Avoid Missed Pathology

Tomography...Morphologic Evaluation
Interesting Layers

Disease Detection - Anatomy/Pathology

Diabetic Retinopathy Progression

AMD Progression

Vitreous and Vitreoretinal Interface

VMA
VMT
EMM
LMH
FTMH
Neurosensory Retinal Anatomy

- NFL
- GCL
- IPL
- INL
- OPL
- ONL
- ELM
- RPE

Ellipsoid

Examples of Related Disease: RP, POAG

Retinal Anatomy: S

- Neurons: ★ GCL, INL, ONL
- Synaptic Layers: ★ IPL, OPL

Examples of Related Disease: RP, POAG

RPE

One of the most biologically active tissues of the body.

Normal
- Degenerative
- AMD
- Inflammatory
- Autoimmune
- AMPPE

Vascular Anatomy

Inner retinal changes due to vascular disease such as DR, RVO, RAO
Effect of Disease on Vasculature

Vascular Anatomy

- 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).

Atherosclerotic changes
OCT-Peripheral Retina

Wide Field OCT

ONH

OCT Dissection and Deduction

Melanoma?

Answering what isn’t vs what is!
Email Consult: What is this on retinal surface?

Review of Structural Changes in Disease

Macular Degeneration and Degenerative Condition

Colleagues Opinion: "OCT Shows thickening of NFL and RPE". Is this accurate?

Early AMD (Drusen)

Mixed Disease

AMD

Small Drusen

Intermediate (63-125 um)

Large (>125 um)
Drusen-Dynamic Evolution

Intermediate AMD

Large-Placoid-Soft Drusen

Large Drusen (coalesced, placoid)
RPE Abnormalities

Large-Placoid-Soft Drusen

Progression

RPE Abnormalities
Large Drusen

RPE Abnormalities-GA

GA Progression

Choroidal sclerosis

GA-Choroidal Sclerosis
Advance AMD (Neovascular) 6 years follow-up

Challenges due to patient’s compliance

CNV

Pre-ex GA CNV

R/O Wet AMD
Outer Retina
Inner Retina
OCT Guided Dx-Dissection
BM
Choroidal Thickness
Drusen
OS
Choroidal Thickness
BM
Intact BM
No Contiguity
Altered RPE and Drusen
Thin Choroid
RPE Tear
Localizing Cause Of Hemorrhages
Subretinal Hemorrhage
Hemorrhagic PED
Localizing Cause of Hemorrhages

- Pre-retinal Hemorrhage
- Note the RPE Status

AMD + Coexisting Disease

- AMD patient Experiencing Changes

Best Disease-CNV

Adult Vitelliform (-)AMD

Best Disease

10/8/2019
Adult Vitelliform Dystrophy+AMD

Stargardt’s

Cone Dystrophy

Plaquinil
Acquired Macular Schisis

MacTel CNV

Juvenile X-linked retinoschisis

Myopic Degeneration and CNV
3 months later

Lacquer cracks

Angiod Streaks

OHS
OHS (Late)

Punched out lesion!

CNV

SRF

CSR

6 weeks later

Simultaneous FA/OCT

Choroid

RPE

Multifocal CSR

1 Mo later

2 mo later

Chronic CSR

Retinal Vascular Disease

- DR
- RVO
- RAO
Diabetic Retinopathy

Inner Retina - Retinal Vascular Disease

MA-NPDR

NPDR (MA constriction resolution of ME)

Shorter Scan Line Better Resolution

JUN 2014
DEC 2014
APR 2016
SEP 2016

NPDR (MA constriction resolution of ME)

S/P Focal

NPDR
In BRVO there is uneven distribution of pathology.

Exudates Outer Migration

RVO – Proliferative Retinopathy

RAO

BRAO OCT
Vitreous and Vitreoretinal Interface

New Onset Floaters
Do Not Use EDI for Surface Disease

Patient Referred R/O AMD
Retractile areas on fundus exam

VMT-Spectrum
Spontaneously Improved
Other Examples

PVD
VMA
Tractional Striae

Epimacular Membrane
Single layer vs overall assessment

EMM-Postop

Prognostic Markers

MH (Partial- Full-thickness)
10/8/2019

**LMH Spectrum and Repair**

**MH-S/P Repair**

**White Dot Syndrome**

Unilateral Recent Onset Vision Loss

**Acute Posterior Multifocal Placoid Pigment Epitheliopathy**
Multiple Evanescent White-Dot Syndrome

Vit Cells

Punctate Inner Choroidopathy

Optic Nerve

2 weeks S/P Ozurdex Implant

Ozurdex Implant

RNFL

PPA

Termination of BM

BM

Posterior Ciliary Artery

Peripapillary Atrophy
1. PPA (OR atrophy)
2. Choroidal sclerosis
3. Pigment clumping
4. Pigmented old CNV

Tilted Disc (GL dilemma)

ONH Drusen

Papilledema

Young Obese Female
Pseudotumor Cerebri
Thank you