Wide Angle Imaging

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No financial interest.

Wide Angle Fundus Photography

- Diabetic Retinopathy
- Peripheral Tumors
- ROP
- Coat’s Disease
- Sickle Cell Retinopathy
- Central Retinal Vein Occlusion (CRVO)

Overview

- History
- Montages
- Commercially Available Systems
  - Heidelberg with Staurenghi Lens
  - Retcam
  - Optos

History of Wide Angle Fundus Photography

- Retinal Drawings
- Late 1890s - Jackman and Webster
- Began photographing human retina
- 1950s - Electronic flash and 35mm cameras
- Adapted to ophthalmic instruments
- 1970s - First Wide Angle system
- 1990s - Digital camera backs
- No more darkrooms!
- 2000s
- Optos
- Panoret
- Staurenghi lens
Equator-Plus

- Traditional Fundus camera optically
- Transscleral Fiber Optic illumination
- Spring-loaded Contact Lens
- Calculated to exert a max pressure of 20mm Hg.
- Buzzer indicates if pressure is exceeded.
- 148 degree field of view

Panoret

- Medibell Medical Vision Technologies Ltd
- Early 2000s
- Named for capturing "panoramic" retinal images
- Handheld Fundus camera
- Transscleral Fiber Optic illumination
- 130 degree field of view

Panoret

Disadvantages
- Steep learning curve
- No longer commercially available

Advantages
- Great with people of all ages
- Portable
Think twice before trusting a montage....
Think twice before trusting a montage….

Montages

**Advantages**
- Software modification of current system
- Easy to change eye
- Easy to learn technique

**Disadvantages**
- Time consuming
- Artifacts
- Hard to perfect technique

Heidelberg with Staurenghi Lens

- Additional lens used with Heidelberg HRA / Spectralis
- 2005
- Contact lens
- 150 degree field of view

Imaging Technique

Lens Placement

- Images are inverted and reversed just like an indirect ophthalmoscope.
- Heidelberg software has a button to invert the image back to "normal".

After Acquisition
Scanning Laser Ophthalmoscopy and Angiography With a Wide-Field Contact Lens System

**Objective:** To perform fluorescein and indocyanine green angiography for large- or peripheral choroidal processes. The main indication for this system is the ability to achieve the full field of view of a custom scanning laser ophthalmoscope (SLO).

**Methods:** Logistic: handheld contact and nonsurgical ophthalmoscopic images were reproducibly aligned with the optical axis of a custom SLO to demonstrate the large fields of wide-field (WFO) angiography as compared with conventional SLO imaging. The lens is designed to have 50°, 100°, and 150° imaging fields in 30°, 10°, and 5°, respectively.

**Results:** Fluorescein and indocyanine green angiography was performed with the integrated wide-field contact lens system to acquire the images of peripapillary retina and choroid. Initial and chronic abnormalities, including neovascularization and retinal neovascularization, were easily detected.
Macular exudates from capillary hemangioma

Complete closure after laser

Heidelberg with Staurenghi Lens

**Advantages**
- Modification of current system
- Can manipulate to get very far into periphery
- Video of FA / ICG

**Disadvantages**
- Difficult to switch between eyes
- Possibility of corneal abrasion
- Steep learning curve
- Difficult for some patients to tolerate

Retcam

**Advantages**
- Designed for children
- Portable
- Can be used in operating room / incubator
- Can get into far periphery
- Video capability

**Disadvantages**
- Steep learning curve
- Low resolution
- Possibility of corneal abrasion

Clarity Retcam

- Captures images with video.
- Transpupillary Fiber Optic illumination
- First system sold in 1997
- Portable
- 110 degree field of view

Images courtesy of www.claritymsi.com

Handheld Fundus

Lid Speculum

Contact with gel

Images courtesy of www.claritymsi.com
Handheld Fundus

Positions
Captures Images

Focus
Exposure

Pediatric Imaging

- Coat's Disease
- Familial Exudative Vitreoretinopathy (FEVR)
- Cystoid Macular Edema (CME)
- Retinopathy of Prematurity (ROP)
- Retinoblastoma
- Non accidental trauma
- Gonio imaging

Coat's Disease
09-2008
02-2011

Coat's Disease
06-2009
09-2009
11-2009

Coat's Disease
11-2009

Familial Exudative Vitreoretinopathy (FEVR)
Familial Exudative Vitreoretinopathy (FEVR)

• Avascular
• Traction

Retinopathy of Prematurity (ROP)

Cystoid Macular Edema (CME)
Secondary to Acute Myeloid Leukemia (AML)

6 year old
Optos

- Scanning Laser Ophthalmoscope
- Non-mydriatic
- 200 degree field of view / 80% of retina
Because I'm a perfectionist...
Let's talk about color…
What's missing??

Green filter  Blue filter

Blue + Green filter

Simulated White
Tip: Use Chinrest to move up and down

Tip: Use Chinrest to move up and down

Artifacts
Optos

Advantages
• Easy to learn
• Fast
• Easy for children

Disadvantages
• Artifacts (lids, exposure, lens)
• Bulk export
• Personal space

If I’m on time…

• How Wide Angle imaging benefited genetic testing….
Thank you!

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