

## UBM: Anatomy, Pathology, and Case Studies

Brandy Hayden Lorek, CDOS, ROUB  
Cole Eye Institute, Cleveland Clinic

1

## UBM

Financial Disclosure: None

References:

- Maru Bretana, MD, CDOS
- Singh AD, Hayden BC Eds. Ophthalmic Ultrasonography. London: Elsevier, October 2011.

2

## Terminology

- Ultrasound Biomicroscopy
- UBM
- Anterior Segment Scan
- High Resolution Ultrasound
- 20 to 80 MHz Ultrasound

3

## Technology

- **Purpose:** Evaluation of the anterior segment and peripheral retina
- **Frequency:** 20 to 80MHz (posterior segment=10-20 MHz)
- **Depth of penetration:** about 5 mm

4

## Pathology Examined with UBM

Glaucoma:

- Angle Anatomy
- Glaucoma Tube positioning
- MIGS

Anterior segment tumors: diagnosis and measurement

- Iris and ciliary body nevi/melanomas/melanocytomas/metastases
- Medulloepithelioma
- Retinoblastoma invading the A/C
- Cysts

5

## Pathology Examined with UBM

Trauma/Foreign bodies

IOL position

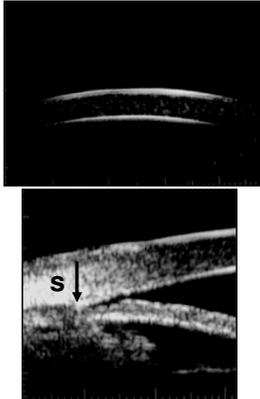
- Subluxation
- Dislocation of lens/haptic
- In the capsular bag

Anterior Uveitis

6

### Anatomy

- Epithelium and Bowman's layer
- Corneal stroma
- Endothelium and Descemet's
- Corneoscleral junction (C)
- Scleral spur (S)
- Iris
- Anterior Chamber (AC)



7

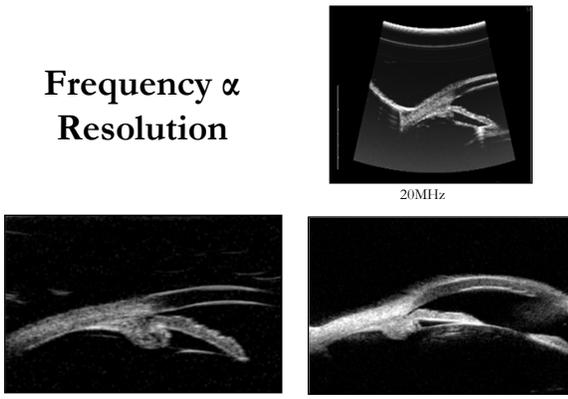
### Instrumentation

- Eye Cup
- Film
- Clear Scan\*



8

### Frequency $\alpha$ Resolution



9

### Probe positions

- Longitudinal
- Transverse
- Axial

10

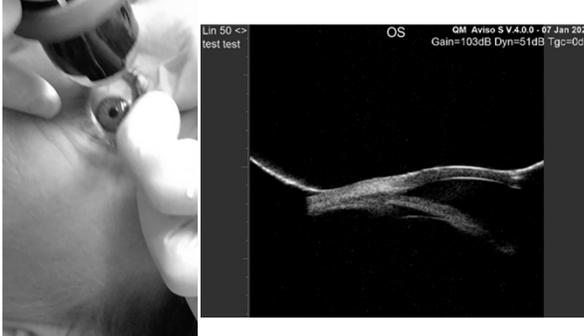
### Longitudinal: Technique

Place the probe over the area to be examined on the limbus with the marker against the cornea



11

### Longitudinal: Technique



12

### Transverse: Technique

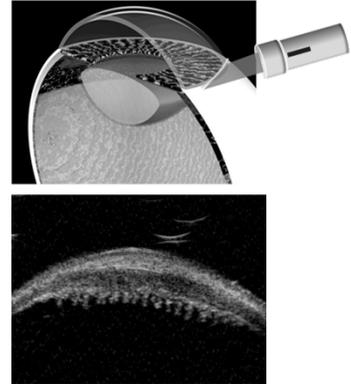
Place the probe over the area to be examined on the cornea with the marker parallel to the limbus



13

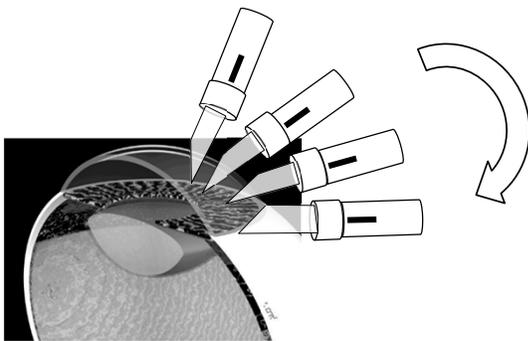
### Transverse: Technique

Place the probe over the area to be examined on the cornea with the marker parallel to the limbus



14

### Transverse screening

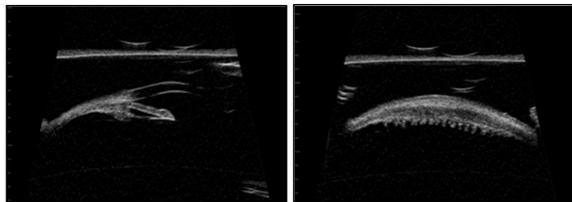


15

### Transverse: Technique



16



Longitudinal

Transverse  
Transverse

17

### Obtaining a Sharp Image

Place the image within the focal range



18

### Probe Preparation

- Cinescan fully filled
  - (+) pressure to get image in position
  - Decrease patient cooperation



- 1/3 filled tight fit
  - (-)pressure to get the image in position
  - Easy maneuver of the probe



19

### Probe Preparation

- Cinescan 1/3 filled soft fit
  - Least pressure to get the image in position
  - Balloon can slide to the side

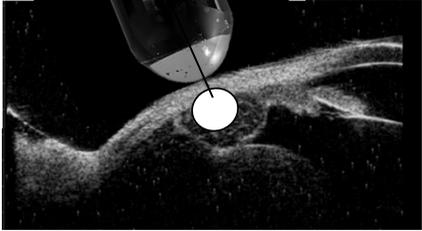


- Film
  - Better for open globe – eye is not touched
  - Difficult to obtain a good image
  - More gel needs to be used



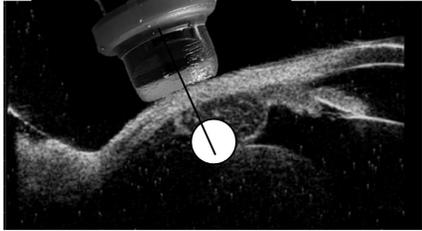
20

### Penetration depth versus pressure



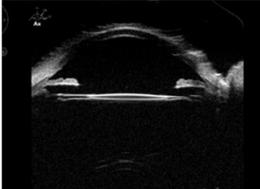
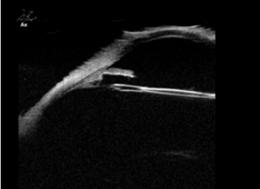
21

### Penetration depth versus pressure



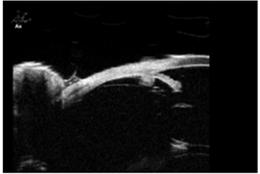
22

### Adjust the probe position to align with desired pathology

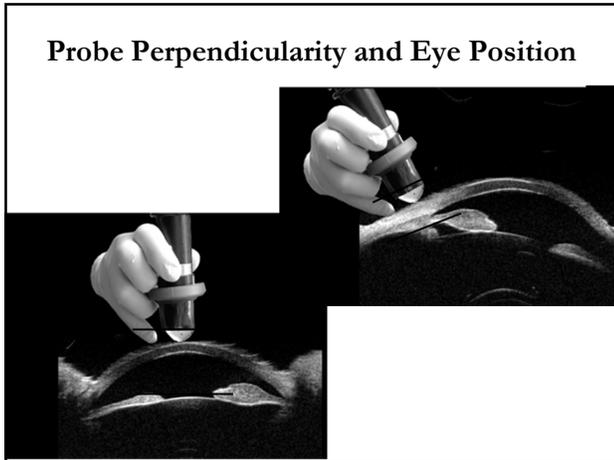

23

### Adjust the probe position to align with desired pathology

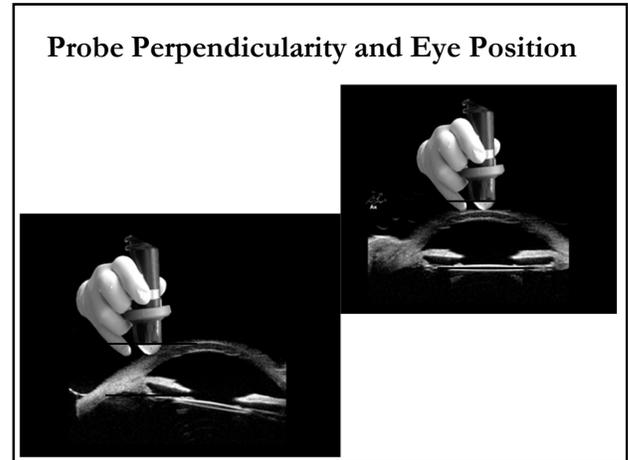




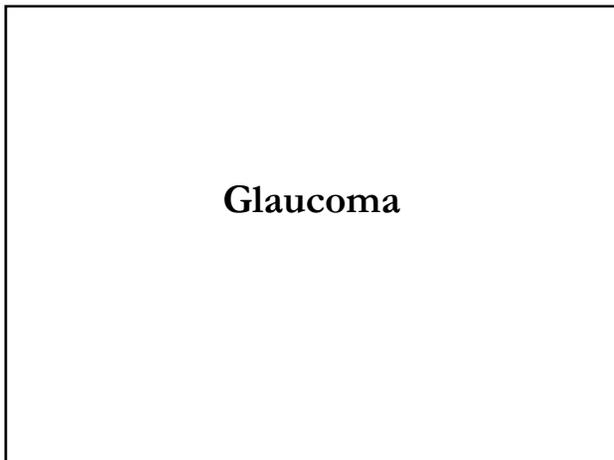
24



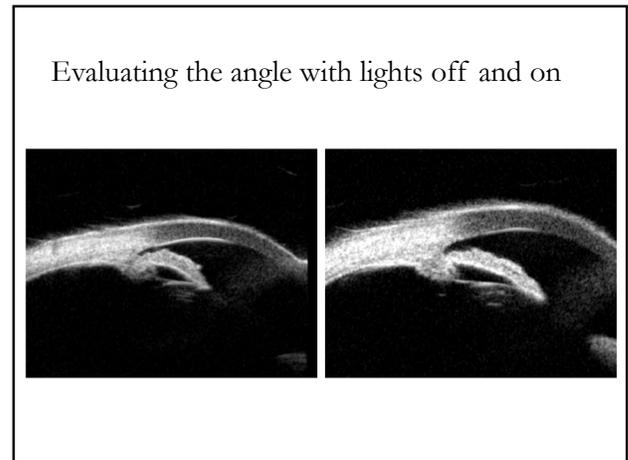
25



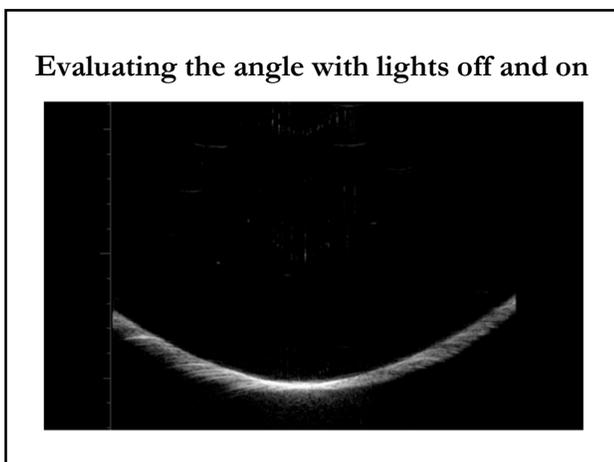
26



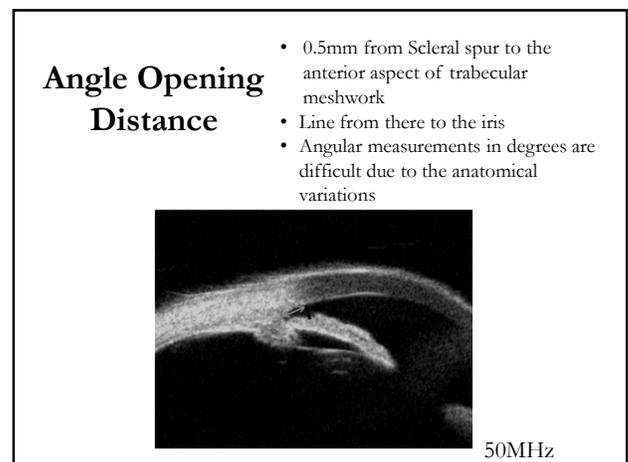
27



28

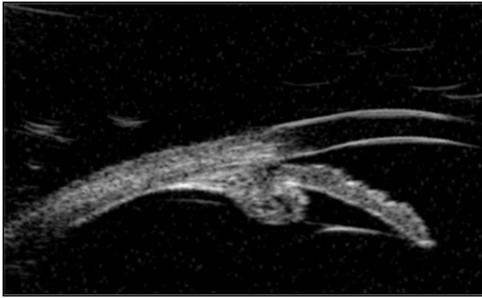


29



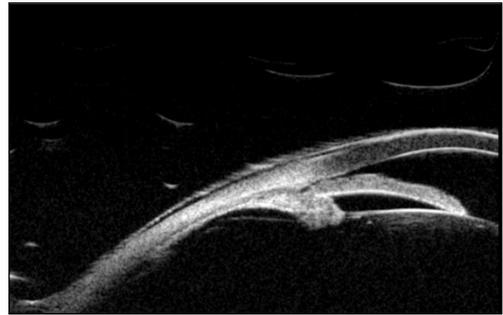
30

### Narrow Angle



31

### Narrow Angle



32

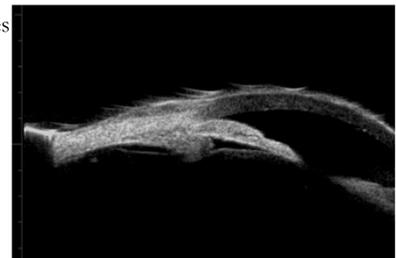
### Closed Angle



33

### Plateau Iris

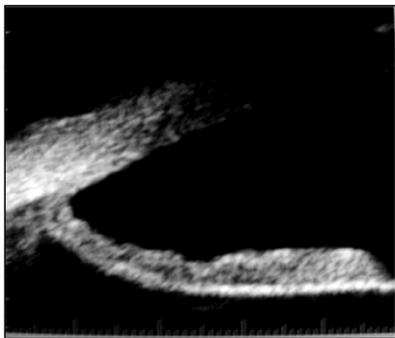
- Ciliary processes are forward
- Closing the ciliary sulcus
- Supporting the peripheral iris
- Narrow angle
- Straight iris profile



34

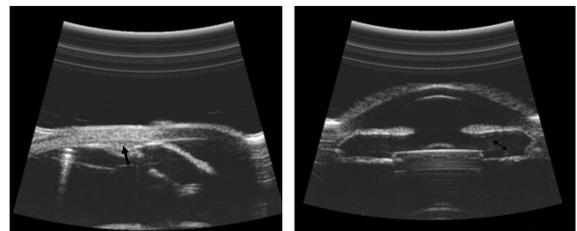
### Pigmentary Glaucoma

Posterior bowing of the iris with accommodation



35

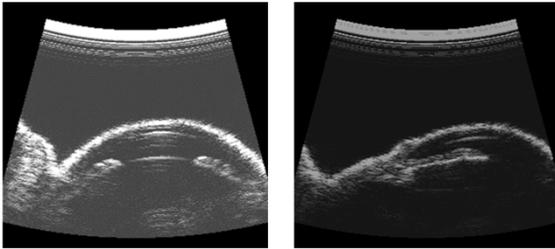
### Anterior Synechiae



Widening of the sulcus

36

### Malignant Glaucoma

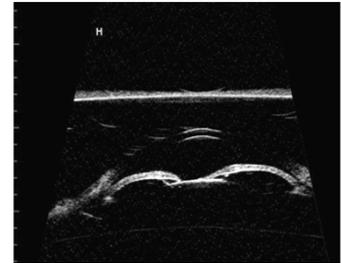


- Inflammatory diseases
- Vein occlusions
- After retinal detachment surgery
- Supraciliary effusion
- Rotation of ciliary processes and iris with a narrow AC

37

### Iris Bombe

- Iris bowed forward
- Angle narrow/close
- Minimal touch between iris/lens
- Iris lens synechia



38

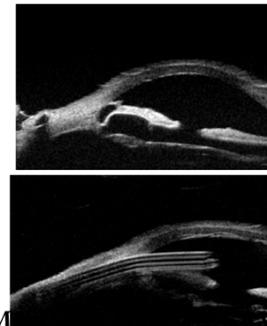
- Iris discontinuity



### Peripheral Iridotomy (PI)

39

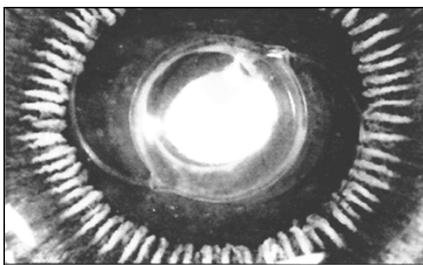
### Probe Perpendicularity and eye position



GLAUCOM (AHMED) ELDT,

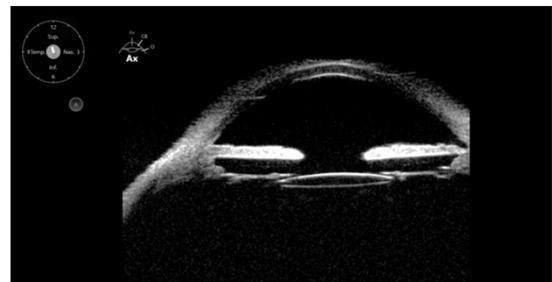
40

### IOL Position



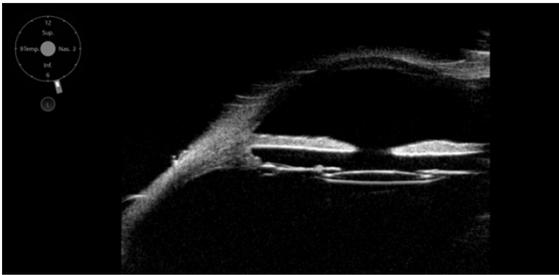
41

### Evaluating IOL position- Axial



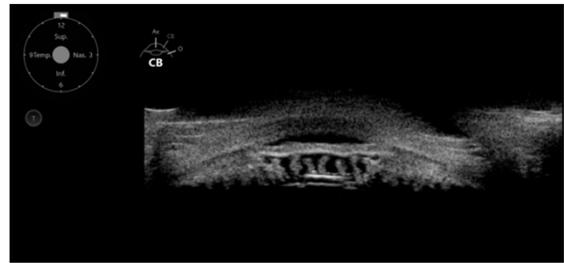
42

Evaluating IOL position: Longitudinal



43

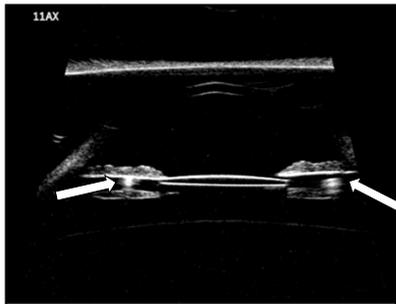
Evaluating IOL position: Transverse



44

**Uveitis-Glaucoma –Hyphema Syndrome (UGH)**

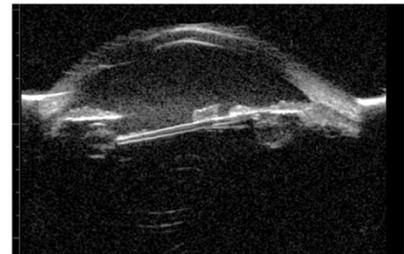
- Lens in the sulcus
- Haptic is in contact with the iris pigment epithelium



45

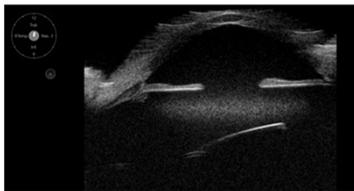
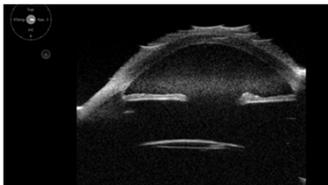
**Dislocated IOL**

- One haptic in the bag
- One haptic out of the bag touching the posterior surface of the iris



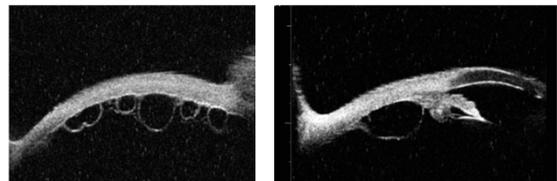
46

**Dislocated IOL**



47

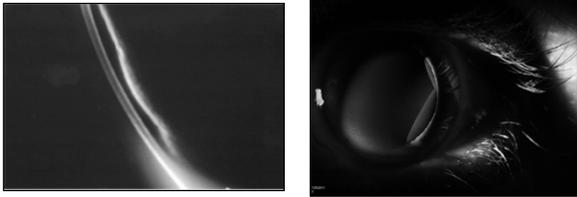
**Pars Plana Cysts**



- Hypochoic
- Multiple
- Round
- Thin capsule
- Bilateral

48

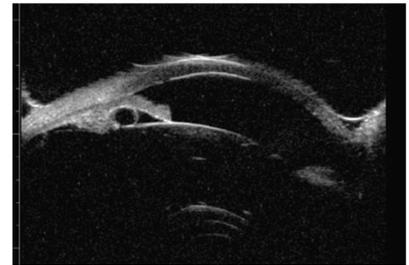
### Primary Iris Cyst



49

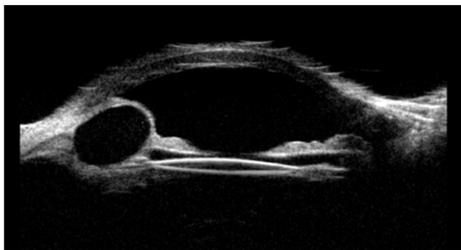
### Primary Iris Cyst

- Hypochoic round or oval lesion
- Can be multiple
- Location
  - iris stroma
  - iris pigment epithelium
- Any clock hour
- Can occur near pupil or angle
- Usually bilateral



50

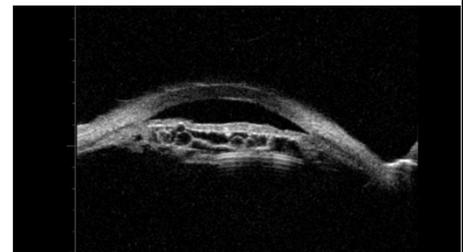
### Iris Stromal Cyst



51

### Iris Pigment Epithelial Detachment

Multiple iris cysts causing iris pigment epithelium detachment



52

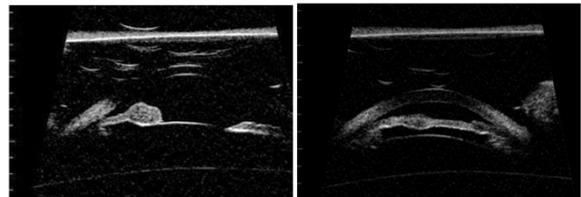
### Iris Nevus

- Solid lesion
- Iris Thickening
- Irregular, flat or dome Shape
- Small in size
- Hyperechoic or similar echogenicity to the iris stroma
- Not vascular
- Little or not variability in size over time



53

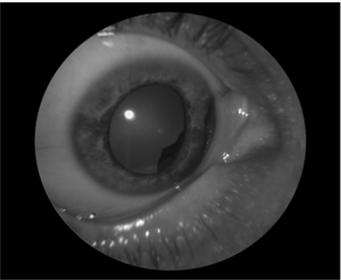
### Iris Nevus



54

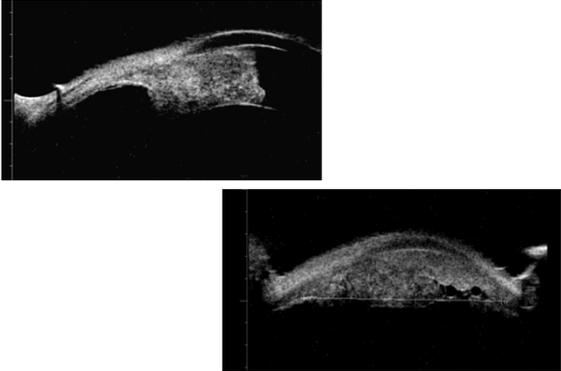
**Iris /Ciliary Body Melanoma**

- Medium or large in size
- Dome, irregular or collarbutton shape
- Hypochoic or heterogeneous
- Vascular
- Cysts
- Extraocular extension



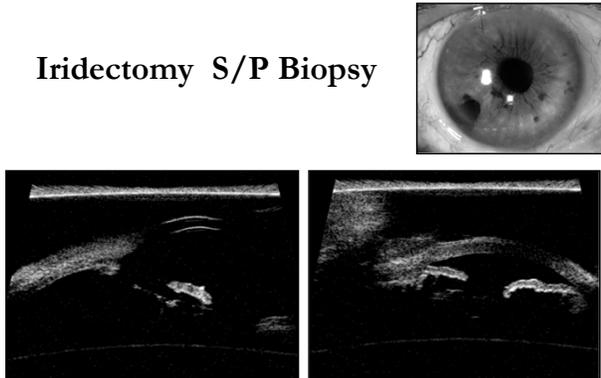
55

**Iris /Ciliary Body Melanoma**



56

**Iridectomy S/P Biopsy**

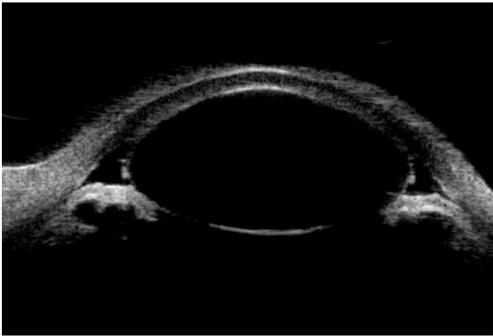


57

Case Studies

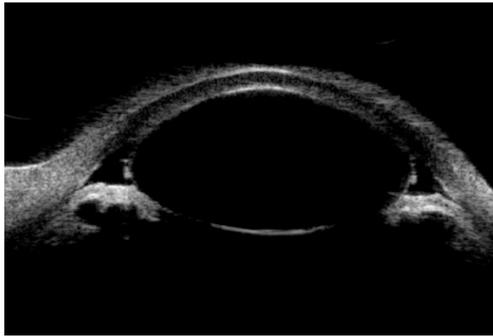
58

**Case #1: UBM AXH**



59

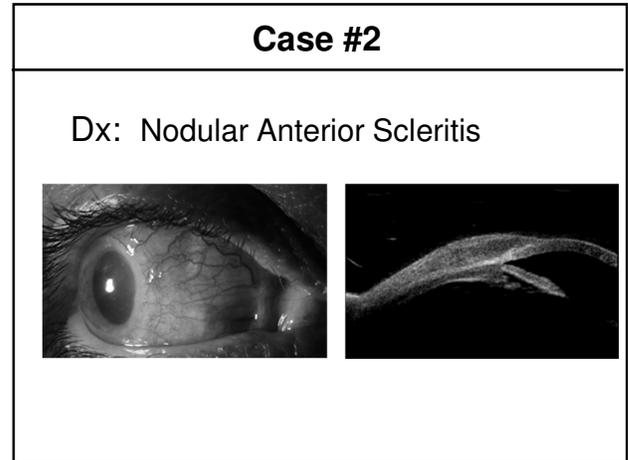
**#1: Crystalline Lens in AC**



60



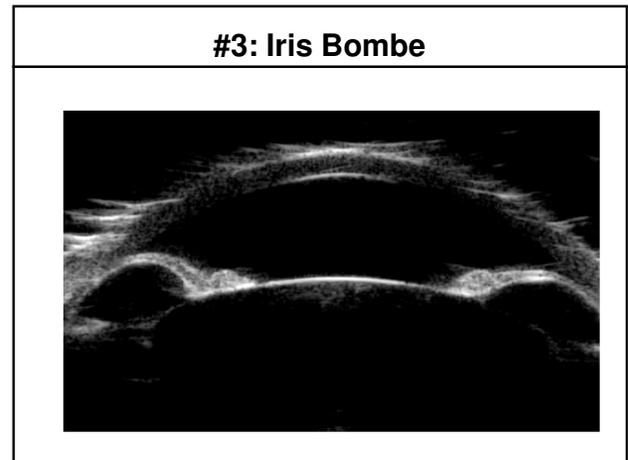
61



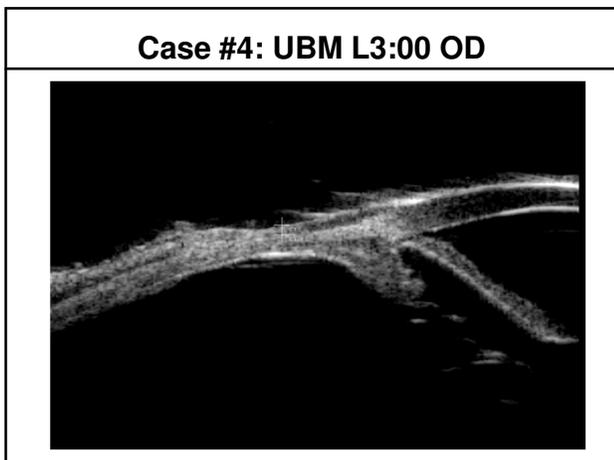
62



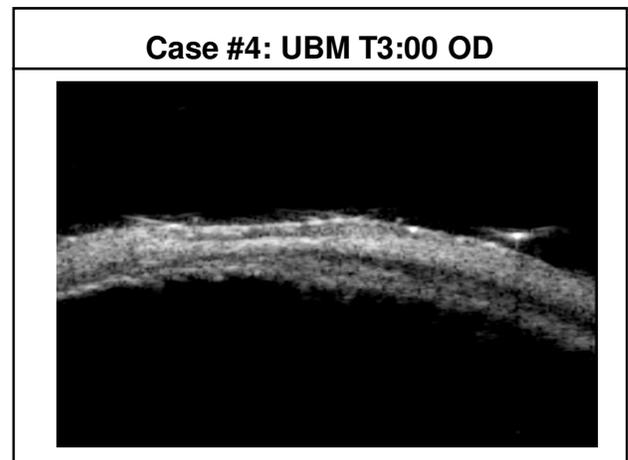
63



64



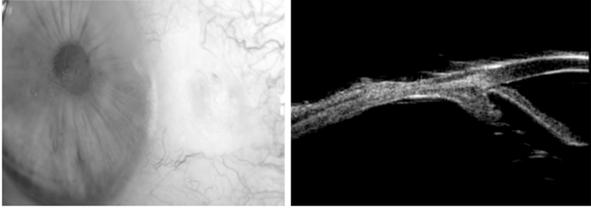
65



66

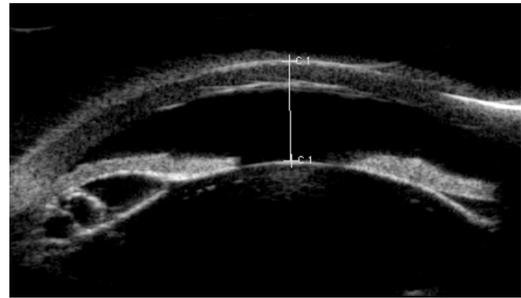
**Case #4**

Dx: Necrotizing Scleritis



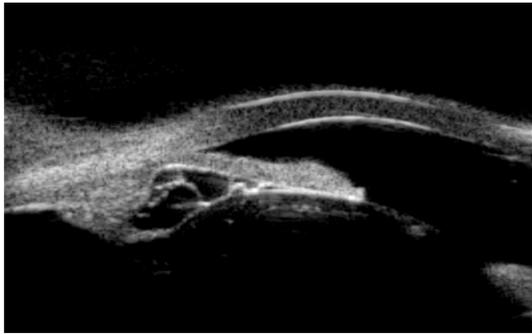
67

**Case #5: AXH**



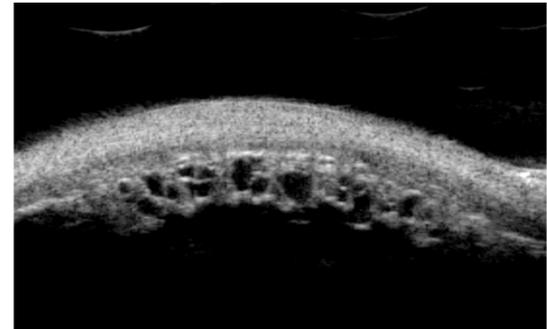
68

**Case #5: L3:00**



69

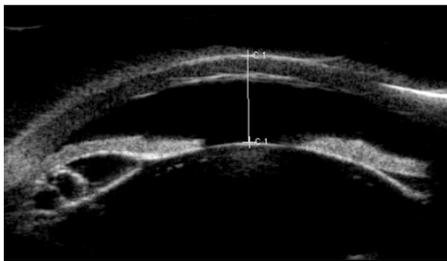
**Case #5: T8:00**



70

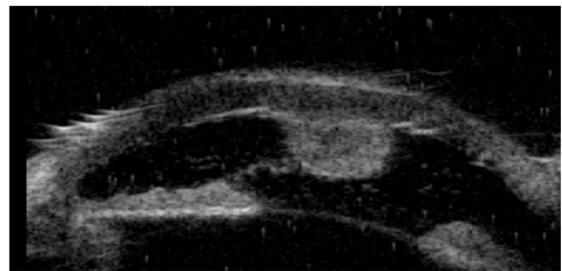
**Case #5**

Dx: Iris Cysts Causing Angle Closure  
360-degrees



71

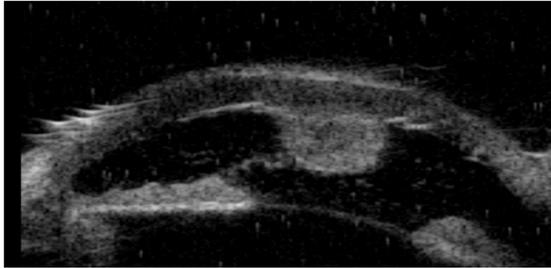
**Case #6: L8:00**



72

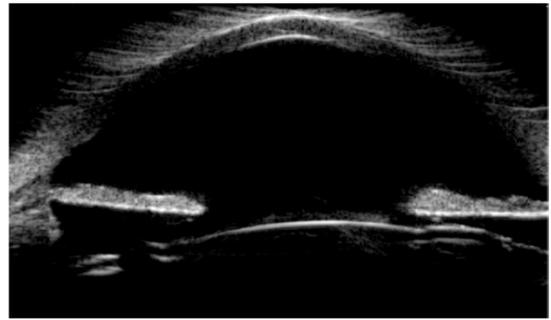
**Case #5**

Dx: Fungal Ball in the Anterior Chamber



73

**Case #7: AX H**



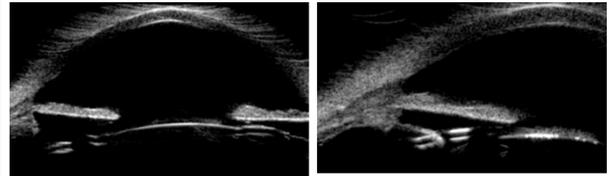
74

**Case #7: L10:00**



75

**#7: Dislocated Scleral Sutured IOL**



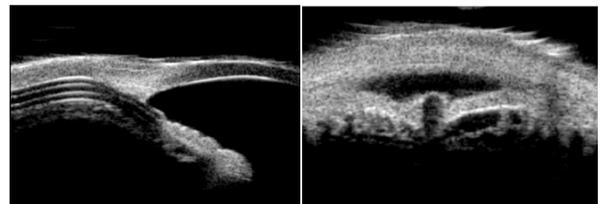
76

**Case #8: UBM OD L10:30**



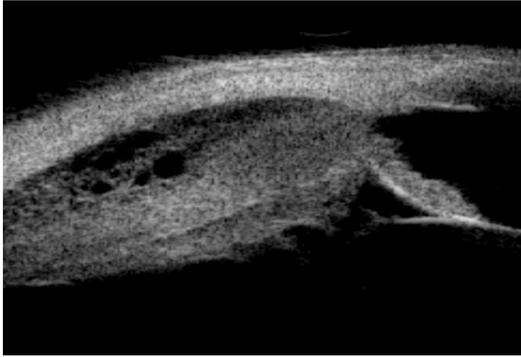
77

**#8: Retracted Glaucoma Tube**



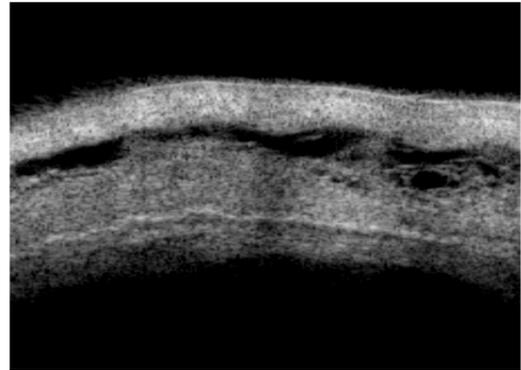
78

**Case #9: L10:30**



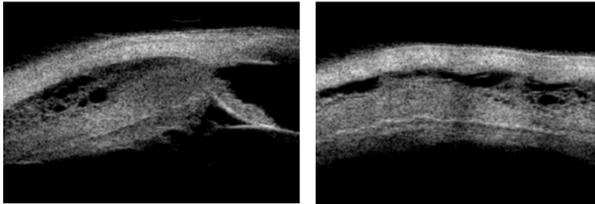
79

**Case #9: T9:30**



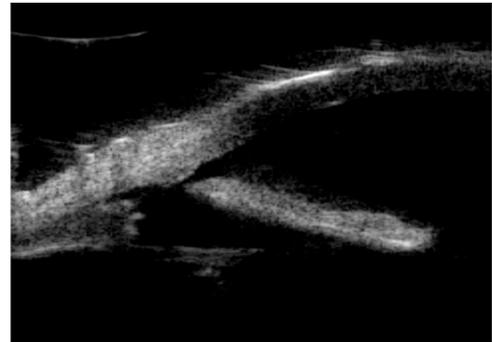
80

**#9: Ciliary Body Effusion**



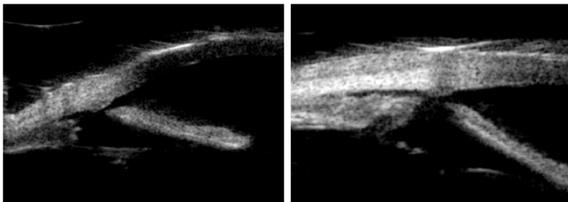
81

**Case #10: UBM OD L9:30**



82

**#10: Iridodialysis and Cyclodialysis**



83

Thank you

Questions?  
Brandy Hayden Lorek  
lorekb@ccf.org

Special thanks to the Cole Eye Imaging Team at the Cleveland Clinic Foundation and the Retinal Uveitis staff physicians for their commitment to education and patient care

84