Malignant Glaucoma – Misdirected Notions Redirected

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Disclosures

Glaukos – C, S

Allergan – C, S

Katena – C

Carl Zeiss Meditec - C

Patient 1

40 year old female

- AL > 24.0 (no comment on other biometric parameters)
- Elevated IOPs on presentation with appositional angles
  - Cataract extraction performed OU, patient left on cycloplegics after
- Upon discontinuing cycloplegics, AC shallowed OU

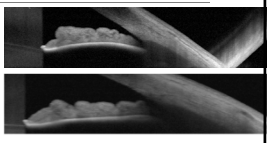
- Fast forward *18 months*…
  - IOP 30/20
  - Core vitrectomy recommended, but patient declined
  - Referring doctor thinks he needs to do a trabeculectomy to control IOP
  - Referred for a second opinion

Patient 1

What's the Mechanism?

Think of pupillary block

- Pressure is higher in posterior chamber than anterior chamber
  - Because of resistance to flow across lens-iris channel
- Can be fixed with an iridotomy – bypass this resistance



So, what happens in the eye to precipitate malignant glaucoma?

Step 1: Choroidal Expansion

- Root cause is often intraoperative transient hypotony of the anterior chamber
- Results in subtle expansion of the choroid, which reduces the posterior segment volume

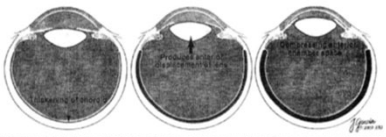


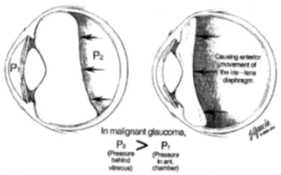
FIG. 5. Schematic illustration shows the substantial effect of choroidal expansion on the eye. The example presumes that an increase in choroidal volume is accommodated by immediate exit of aqueous humor from the anterior chamber (as in the situation during surgery when a corneal track incision is made). With a 20% increase in choroidal thickness, there is 100 µL in volume displacement—equal to the volume of the anterior chamber in a typical PAC eye. If there is no anterior wound, the pressure–volume relationship of the human eye suggests that IOP would rise to 60 mm Hg with a similar expansion.[12]

An Ounce of Prevention

Maintain anterior chamber pressurization during instrument exchanges in at-risk eyes

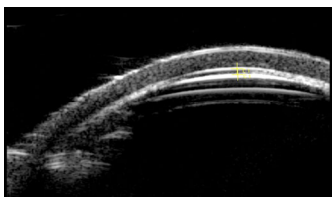
Step 2: Posterior Pressure

- Posterior segment pressure increases, and there's no way to equalize that pressure across the lens/iris diaphragm
  - Anterior movement of the lens/iris diaphragm
  - Vitreous compaction -> less able to transduce pressure so more of a gradient



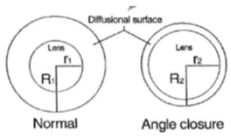
Step 3: Angle Closure

- The anterior chamber will continue to shallow until either
  - The chamber is flat, or
  - Angle closure develops (no outflow, so IOP goes up)



Who's at Risk?

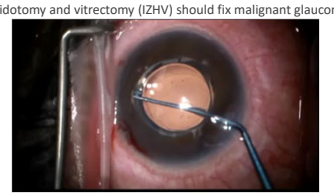
- Small anterior chamber volume *and* small channel between lens equator and ciliary body
  - Less able to transduce pressure gradient



How to Fix It

If a peripheral iridotomy fixes pupillary block by making the anterior *segment* one chamber…

…an iridozonulohyaloidotomy and vitrectomy (IZHV) should fix malignant glaucoma by making the *eye* one chamber



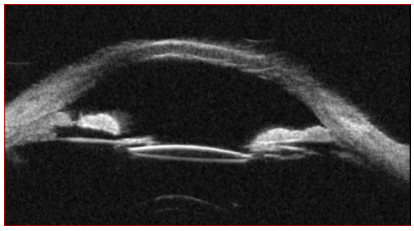
IridozonulohyaloidoWHAT?

Anterior approach versus posterior approach

- Anterior: usually easier for the anterior segment surgeon
  1. Vitrector port facing against iris to create a moderate iridectomy
  2. Advance the vitrector posteriorly along the inner surface of the sclera about 2-3mm, cutting as you go
  3. Aspirate and cut once posterior to remove some vitreous around the channel you are creating
  4. Withdraw the vitrector while cutting (not aspirating)
  5. Inject some dispersive OVD into the IZHV to mitigate vitreous prolapse

- Posterior approach: need to ideally open a trochar for added safety
  1. Remove some vitreous posterior to the IOL centrally and in the area of planned IZHV
  2. Advance the cutter anteriorly with port facing up as you move through the peripheral zonules and toward the iris
  3. Stop when the cutter is in the AC

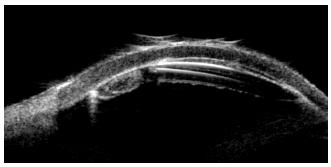
Fixed!



Case 2

88 year old female presents urgently with an IOP of 57 OS

- Past ocular history: former hyperope s/p CE/IOL; Pseudoexfoliation glaucoma (unknown severity)
- Past medical history: recently discharged from ICU after developing a pneumothorax after recent pacemaker placement



What to do?

Since there is no AC, would need to go pars plana

- Given recent cardiopulmonary issues, patient deemed *"high risk of intraoperative mortality"* by anesthesiology

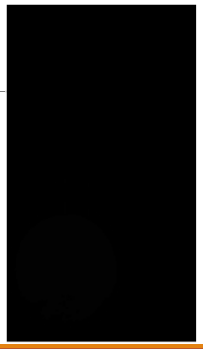
YAG IZHV had already been attempted, but since there was broad I-K touch, this wasn't working

How can we create a unicameral eye nonsurgically?

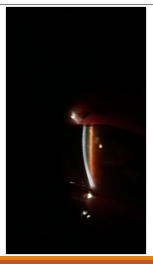
Slit lamp IZH (or HZI)

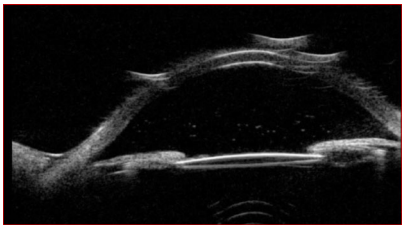
With very limited options, we opted to create a unicameral eye at the slit lamp

- 25g needle entry at the pars plana
- Brought around IOL/capsule and into the iridotomy from the back
- Small vitreous tap to further disrupt the vitreous and hyaloid



Disaster Averted!





Summary

Malignant glaucoma is simply a whole eye version of pupillary block

- Root cause: transient hypotony and choroidal expansion

Know signs of intraoperative and postoperative MG

- Positive pressure and inability to fill AC
- Myopic shift and axially shallow AC

Treat MG like you would treat pupillary block

- Create a unicameral eye with an IZHV