Neovascular glaucoma: A retinal perspective

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Neovascular glaucoma: the cascade of events

- **Retinal ischemia** (severe DR; CRVO)
- **Iris neovascularization**
- Extension of iris neovascular complex onto internal aspect of angle → **open-angle glaucoma**
- Fibrosis of neovascular complex → PAS → **angle-closure glaucoma**
- **Hemorrhage** → further IOP elevation
- **Corneal edema**

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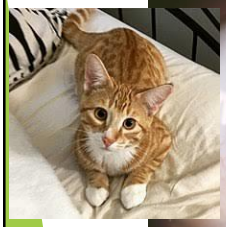
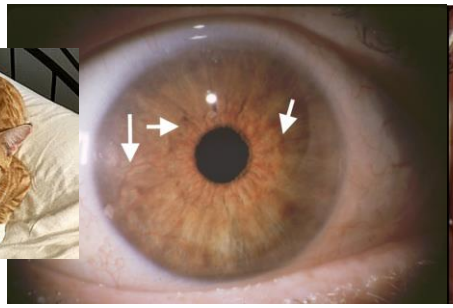
The spectrum of NVG

- Mild rubeosis
- Mild retinal ischemia
- Mild IOP elevation
- Clear media
- Better visual prognosis

- Severe rubeosis
- Severe retinal ischemia
- Severe IOP elevation
- Corneal edema, hyphema
- Guarded visual prognosis

Who should treat NVG?

- NVG lies in a no-man's-land between retina and glaucoma
- Retina guys: "There's nothing we can do: we can't even see the retina"
- Glaucoma guys: "How can we treat the IOP if the eye is so inflamed"

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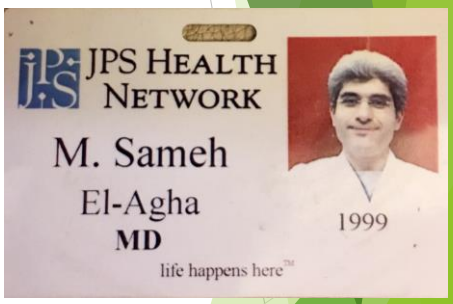
Classical teaching (what I learned during fellowship)

- Two components of the treatment solution:-
  1. Retinal ablation to abolish rubeosis
     a) Pan-retinal photocoagulation (clear media)
     b) "Pan-retinal" cryotherapy (blind procedure)
  2. Reduction of IOP
     a) "Good vision potential"
        i. Trabeculectomy/MMC (very low success)
        ii. Tube shunts
     b) "Poor vision potential"
        - Cyclocryotherapy



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What where the problems of this algorithm

- Extremely rare to have clear media permitting PRP
- Pan- retinal cryo:-
  - Extremely "subjective"
  - Undertreatment: no effect
  - Overtreatment: severe inflammation, further complicating the situation
- Time lost in treating retina → persistence of IOP elevation compromising optic nerve
- Huge psychological burden: feeling of futility

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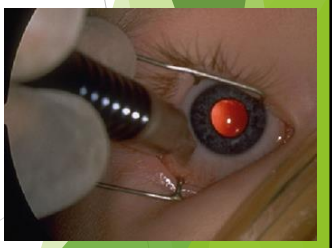
What has changed since then

- ANTI VEGFs
  - Can control rubeosis even if media are not clear
  - May repeat injections until media permit PRP

- DIODE LASER CYCLOPHOTOCOAGULATION
  - Induces less inflammation
  - Feasible in sighted eyes (avoid problems associated with fistulizing/tube procedures)
  - Minimal zonular damage (phaco still possible later)



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What is the ideal algorithm

- Different presentations
- Different degrees of pathology
- Individual physician experiences/preferences
- In this presentation: “how I do it”
- Main concept: IOP first, rubeosis second

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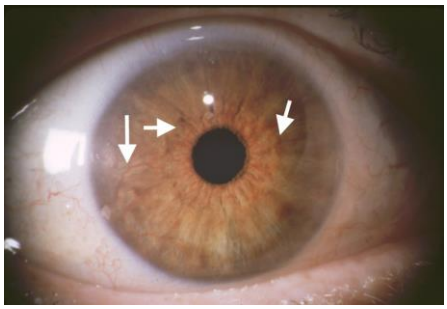
The first question: what is the level of IOP ?

- The IOP is normal
- Or IOP drops below 35 mmHg with treatment
  - Immediate anti-VEGF injection
  - PRP within one month of anti-VEGF
  - If media compromised:
    - Cataract: phaco followed by PRP
    - Vitreous hge: PPV with endolaser
  - If media remain unclear → repeat anti-VEGF until PRP become feasible



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Notes on anti-VEGF injections

- Does not make sense to inject anti-VEGFs into AC
- Need to make use of the vitreous as a sustained-delivery device
- The root of the problem is the retina, not the iris
- If the rubeosis is mild, a limited paracentesis may be done before injection to prevent an IOP spike
- 0.05ml of either of the three anti-VEGFs is enough:-
  - Bevacizumab (Avastin) 1.2 mg
  - Ranibizumab (Lucentis) 0.5 mg
  - Aflibercept (Eylea) 2 mg

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Tips for PRP after cataract extraction

- Precautions during phaco:-
  - Large rhexis
  - Place suture in main wound
- PRP within 3-4 weeks
- Earlier is better to ensure
  - Cover by anti-VEGF
  - Clear lens capsule (i.e. before phimosis or PCO)
- Later is better to ensure:-
  - Clearing of any corneal edema
  - Wound stability
- Avoid excessive pressure with contact lens (to avoid opening wound)

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The IOP is persistently above 35mmHg

- Cannot inject anti-VEGF
  - Pressure increase may induce CRAO
  - Paracentesis to relieve IOP spike may induce hyphema
- Diode laser CPC (first)
  - In itself may relieve rubeosis
  - If rubeosis persists: anti-VEGF can be done safely (after IOP drops)
- After relieving IOP and controlling rubeosis, then we can think about retinal ablation

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How about TAE/MMC and tube shunt procedures

- Can be done in patients with good vision in the following situations:-
  - A patient who initially had controlled IOP, then develops persistent IOP elevation after resolution of rubeosis
  - A patient who has undergone cycloablation but still has residual IOP elevation (provided rubeosis is controlled)

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Wrap-up

- The priority is controlling IOP (to save the optic nerve)
- Intravitreal anti-VEGFs have generally solved the problem of controlling NVI in preparation for glaucoma surgery
- Anti-VEGFs are a TEMPORARY SOLUTION: PRP should be done as soon as possible to prevent recurrence of rubeosis
- Clearing the media with phaco and/or PPV may be necessary to clear the media for PRP (either after phaco or during PPV)
- If PRP is deferred for any reason, repeated anti-VEGF injections can buy us more time until PRP becomes feasible
- Establishing a healthy collaboration between a glaucoma and retina specialist is mandatory to save these eyes

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THANK YOU VERY MUCH FOR YOUR KIND ATTENTION

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