

# Cystoid Macular Edema

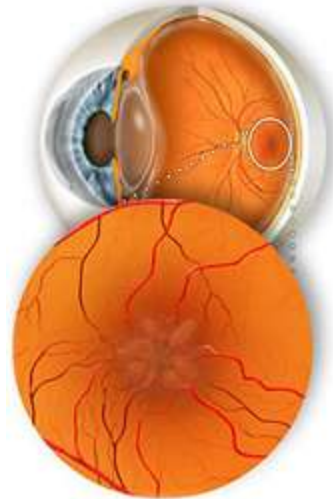
Post cataract surgery non resolving C.M.E.



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# Definition

- Accumulation of Fluid in the Outer Plexiform and the Inner Nuclear layer of the retina.
- There is formation of Fluid filled cyst like spaces in the central macula.
- Usually associated with breach in the Inner Blood Retinal Barrier.



# Basic Pathology

**Etiological Factors**



**Instability of Vascular endothelium**



**Breakdown of Blood retinal Barrier**



**Extracellular and intracellular accumulation of FLUID.**



**Muller cell Breakdown**



**Collection of Fluid  
in Outer Plexiform and Inner Nuclear Layer**



**CYSTOID MACULAR EDEMA**

# “Progression”

**With Treatment**

**Spontaneously**

**Etiological Cause Settles**

**RPE Functions with Muller cells**

**Fluid is withdrawn  
from EC Space**

**Normal Morphology  
Restored**

**Regain of  
Lost Function and vision  
(MOST COMMON)**

**Chronic CME  
(Non Resolving )**

**OR**

**Coalescence of Cystic Space**

**Larger Cavities Formation**

**Lamellar Hole at Fovea**

**Irreversible Visual loss**

**Etiological Causes**

**Primary (Idiopathic)**

**Associated Disease conditions**

**Irvine Gass Syndrome**  
**Post Cataract Surgery CME**

**Retinal Vascular Ds.**

**Diabetic retinopathy**  
**R.V.O.**  
**Hypertensive Retinopathy**  
**Telangiectasis**  
**Macroaneurysm**  
**Radiation retinopathy**

**Inflammatory Conditions**

**Pars Planitis**  
**Choroiditis**  
**Toxoplasmosis**  
**Scleritis**

**Traction Syndromes**

**V.M.T.S**  
**E.R.M**  
**Taut Hyaloid**

# Miscellaneous Causes

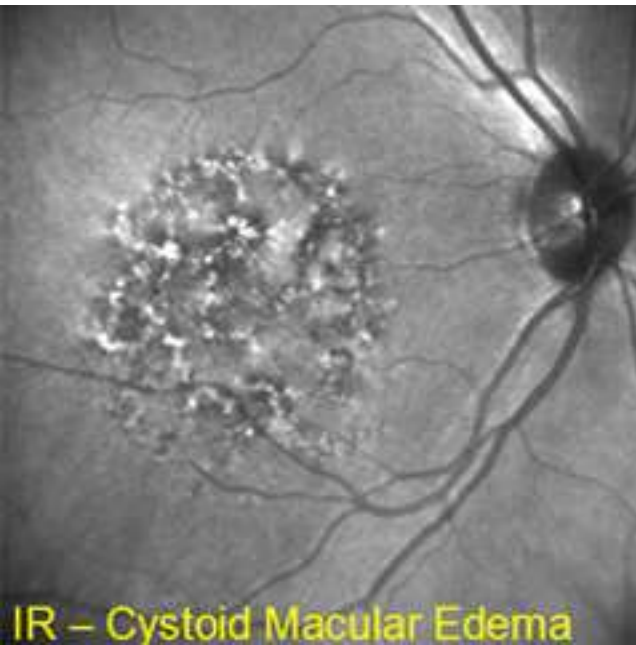
- Retinal Dystrophies:
  - Retinitis pigmentosa
  - Gyrate Atrophy
  - Hereditary CME
- SRNVM
- Retinal And Choroid Tumors
- Drug Induced
  - Topical Adrenaline
  - Topical Prostaglandin analogs
  - Systemic Nicotinic acid

# IRVINE-GASS SYNDROME

- In 1955 Prof. Irvine described “ Macular changes occurring in patients after cataract surgery with loss of Best corrected visual acuity”
- In 1966 Dr. Gass and Norton described “ These changes are Cystic spaces in macula” and termed “Irvine- Gass Syndrome”.
- Later through studies it was described as the most common cause of Visual loss after an uneventful cataract surgery.

# Post Operative C.M.E

- Event following an Uncomplicated Cataract Surgery.
- Spontaneous resolution does occur.
- Peak incidence are at 5-10 weeks postop.





# RISK FACTOR ASSOCIATED WITH IRVINE GASS SYNDROME

- P.C.R. (With more chances with Vitreous loss).
- Vitreous in A/C.
- Aphakia.
- Unstable diabetic maculopathy.
- H/O CME in contra lateral eye.
- Secondary IOL's
- Early YAG ( < 6 Months Post op).
- Topical Prostaglandin Analogs

# Clinical Presentation

- **Blurring of Vision. ( Watery Vision)**
- **Usually after 5-10 Weeks post operative.**

# Clinical Presentation Irvine Gass

**Cataract Surgery**



**Good Vision  
2-4 week**

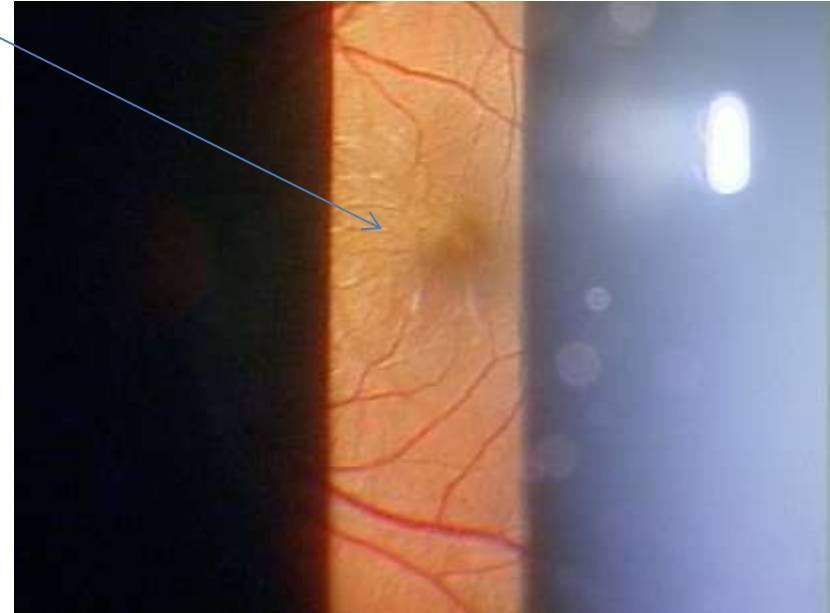
**5 - 10 Weeks**



**Blurring of Vision**

# Fundus Examination (90D or Fundus Photo)

- Loss of Foveal reflex in an otherwise normal looking macula.
- Retinal Thickening
- Yellow Spot at fovea
- “Cystic spaces seen at macula”



# Extra macula Finding in Chronic Severe Irvine Gass

- Some Degree of Optic nerve head swelling with mild congestion reduced cup size.
- Changes are best appreciated when compared with the other eye disc findings.
- Media Haze with Vitritis like picture

# Diagnostic test for C.M.E.

```
graph TD; A[Diagnostic test for C.M.E.] --> B[Test to Find Integrity of Blood Retinal Barrier]; A --> C[Test done to determine Retinal morphological Alterations]; A --> D[Test assessing the retinal Function]; B --> E[F.F.A]; C --> F[O.C.T]; D --> G[Macular Function test]; D --> H[Contrast sensitivity Test]; D --> I[Electroretinogram];
```

**Test to Find Integrity  
of Blood Retinal Barrier**

**F.F.A**

**Test done to determine  
Retinal morphological Alterations**

**O.C.T**

**Test assessing  
the retinal Function**

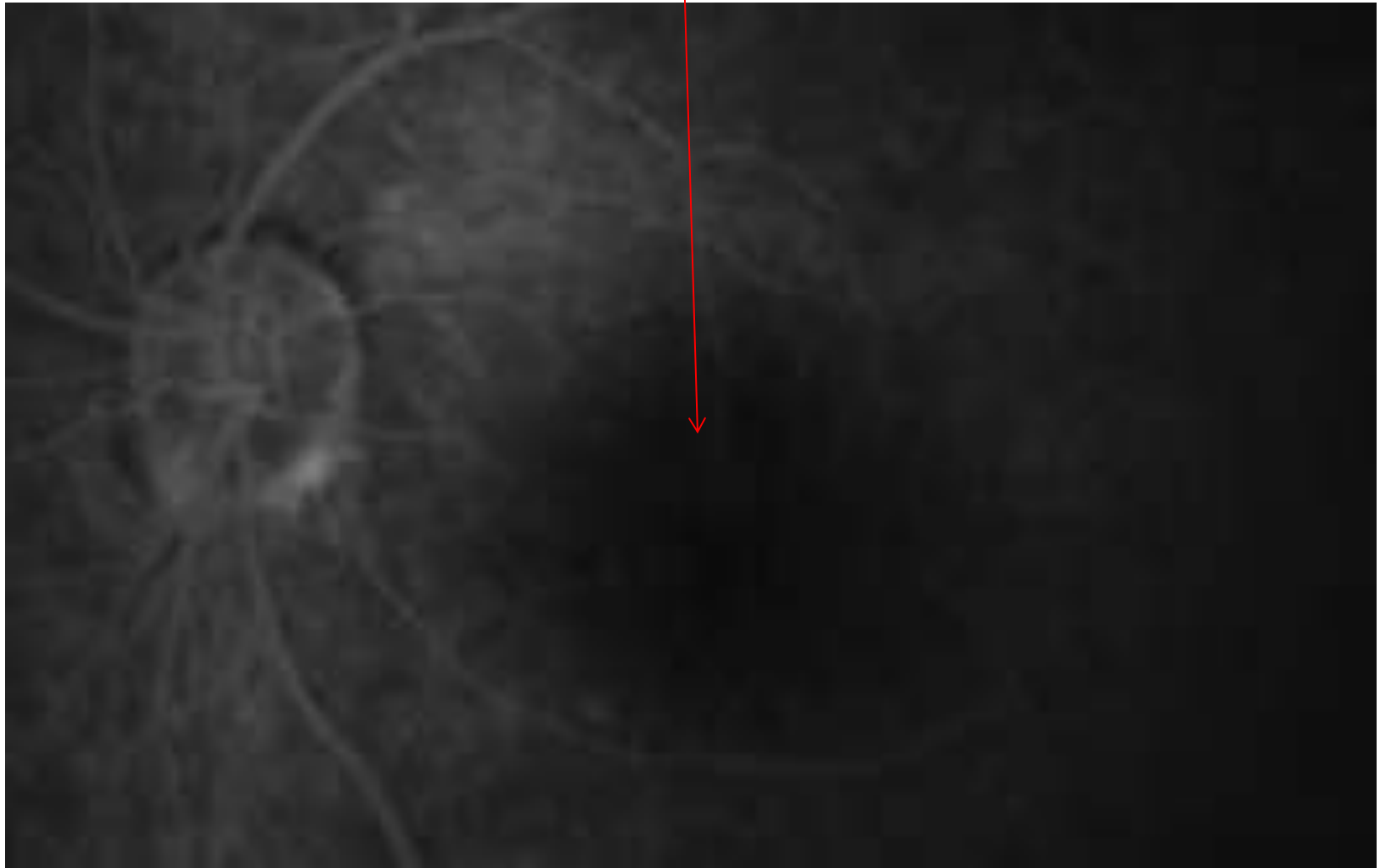
**Macular Function test  
Contrast sensitivity Test  
Electroretinogram**

# Fundus Fluorescein Angiography

- Pre-OCT era: Test of choice in cases post op. with reduced visual acuity and no clear Fundus findings.
- Also helped in finding any other etiological cause associated with C.M.E
- “Angiographic macular edema”, macular edema visible only angiographically.

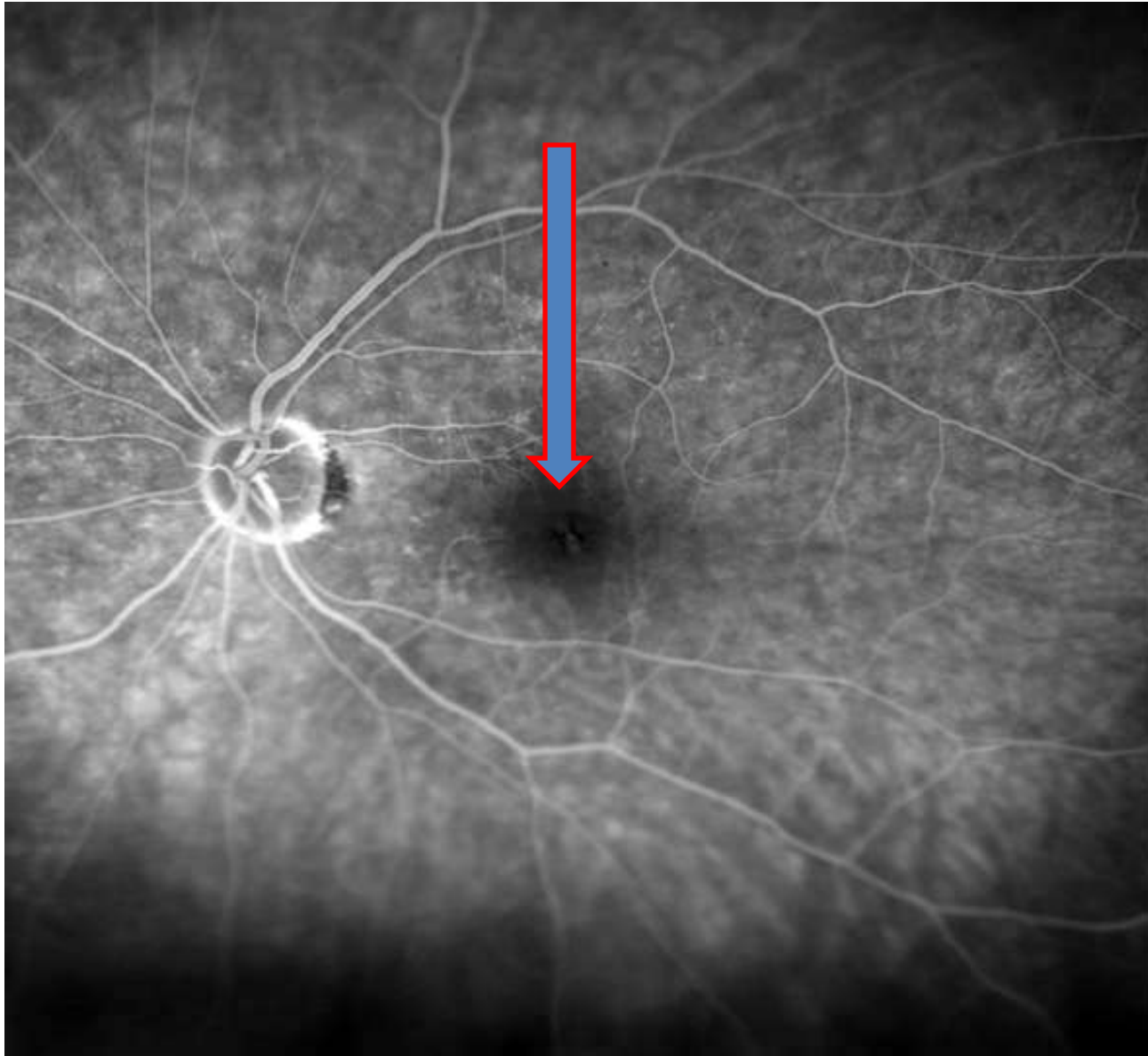
# Fundus Fluorescein Angiography

**Early Phase with  
No apparent leak**

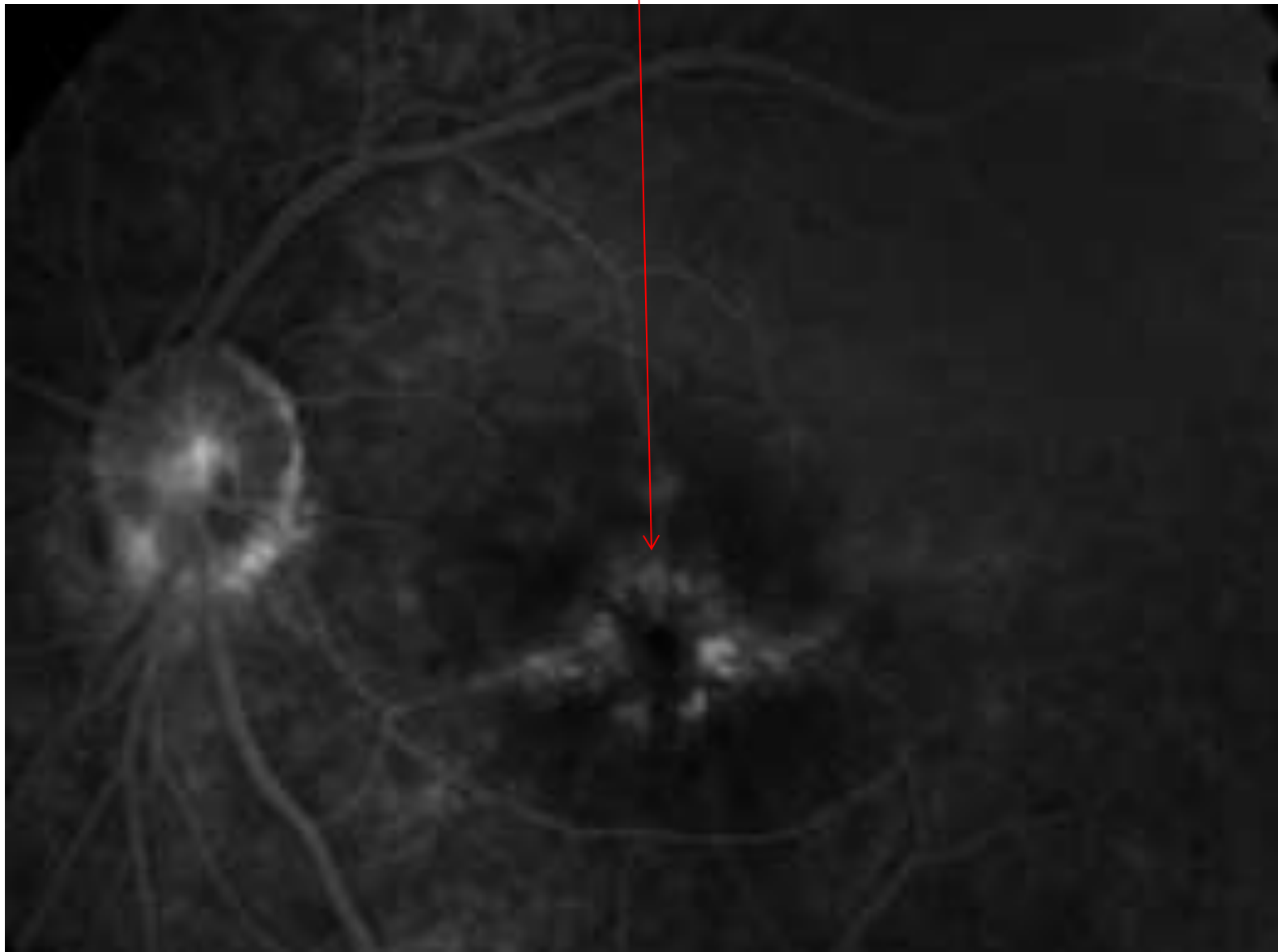




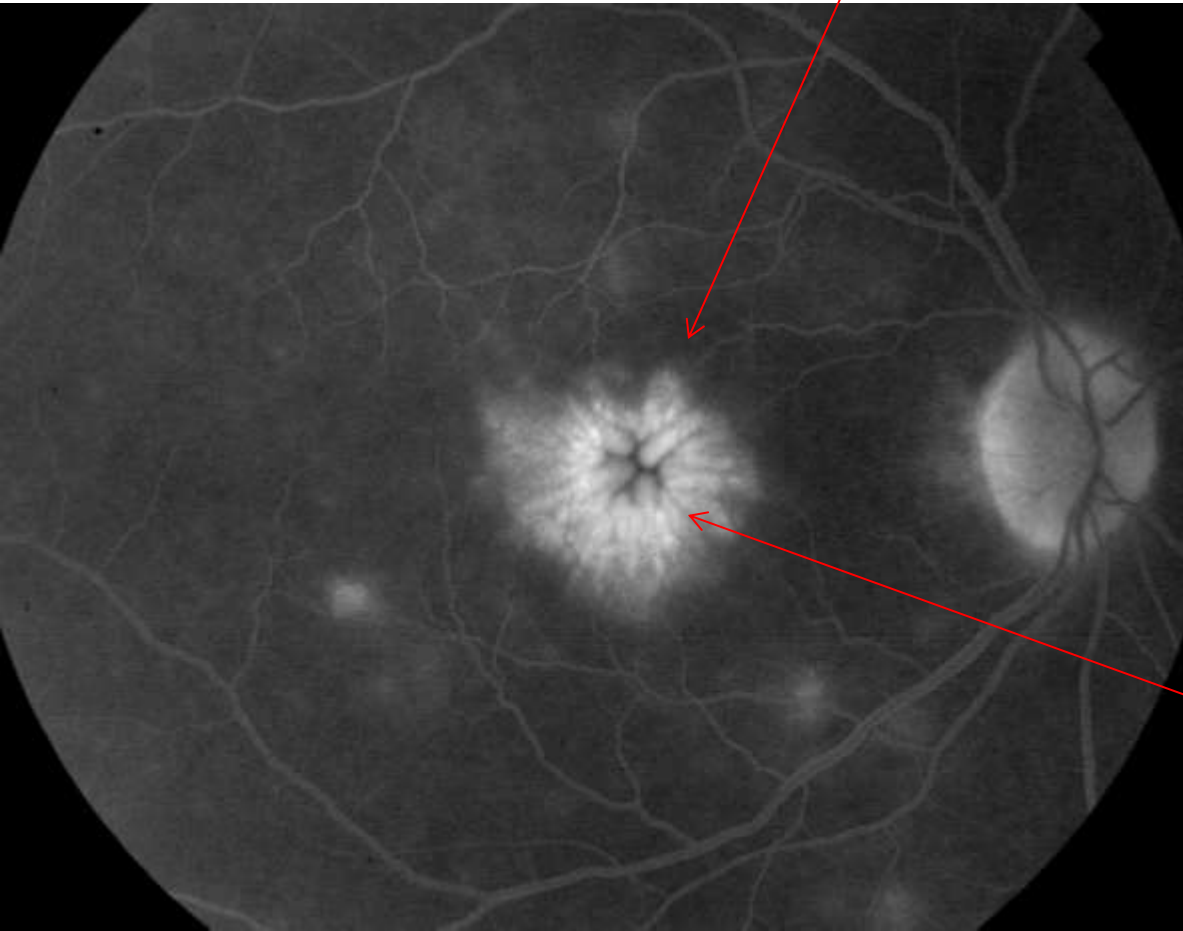
# Minimal C.M.E



# Moderate Angiographic C.M.E.

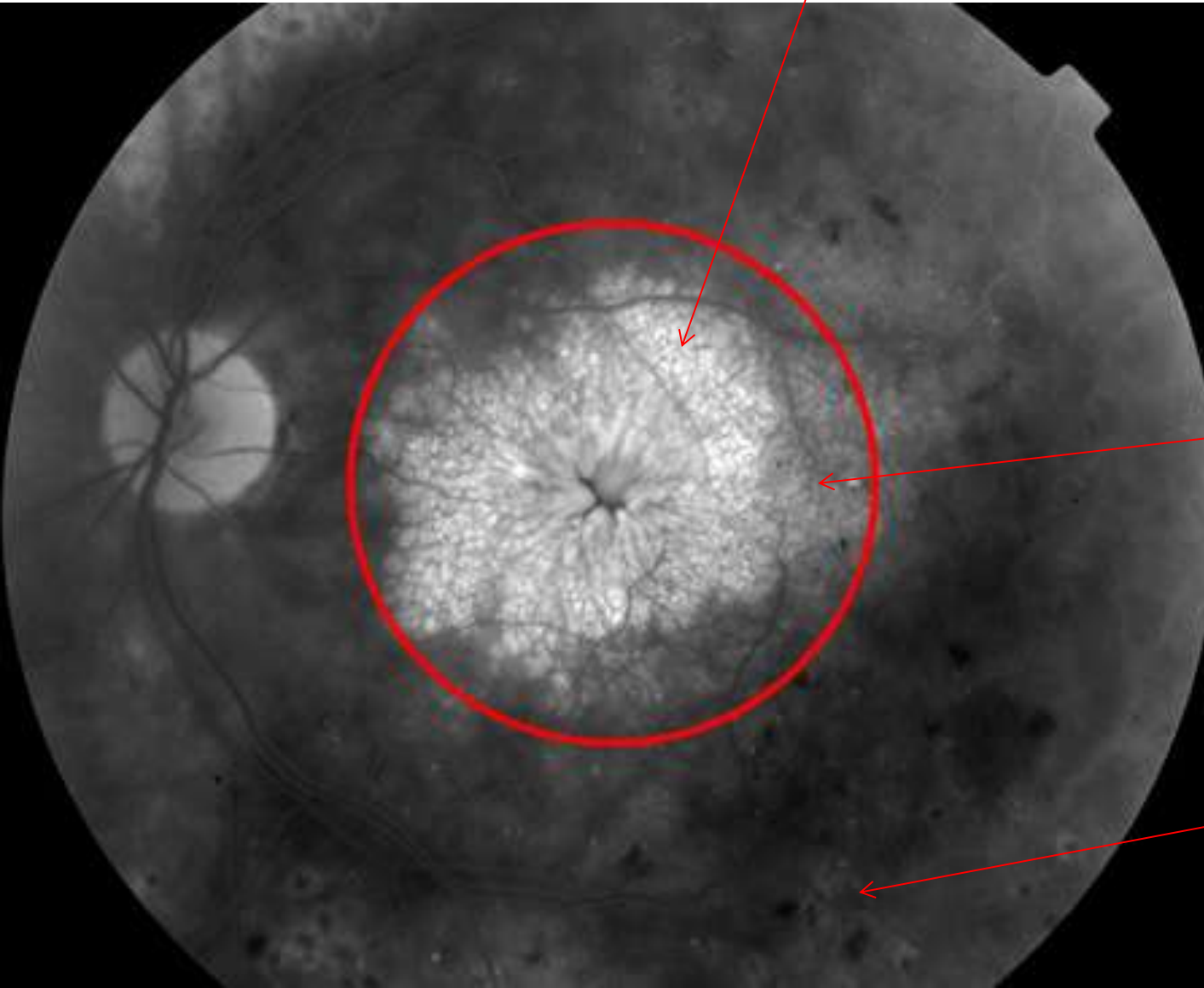


# Typical “Flower Petal Appearance”



**Dye in  
Cystoid spaces**

# Massive C.M.E. with Associated pathologies



**Diabetic  
Maculopathy**

**Laser  
Mark**

# Points Regarding FFA

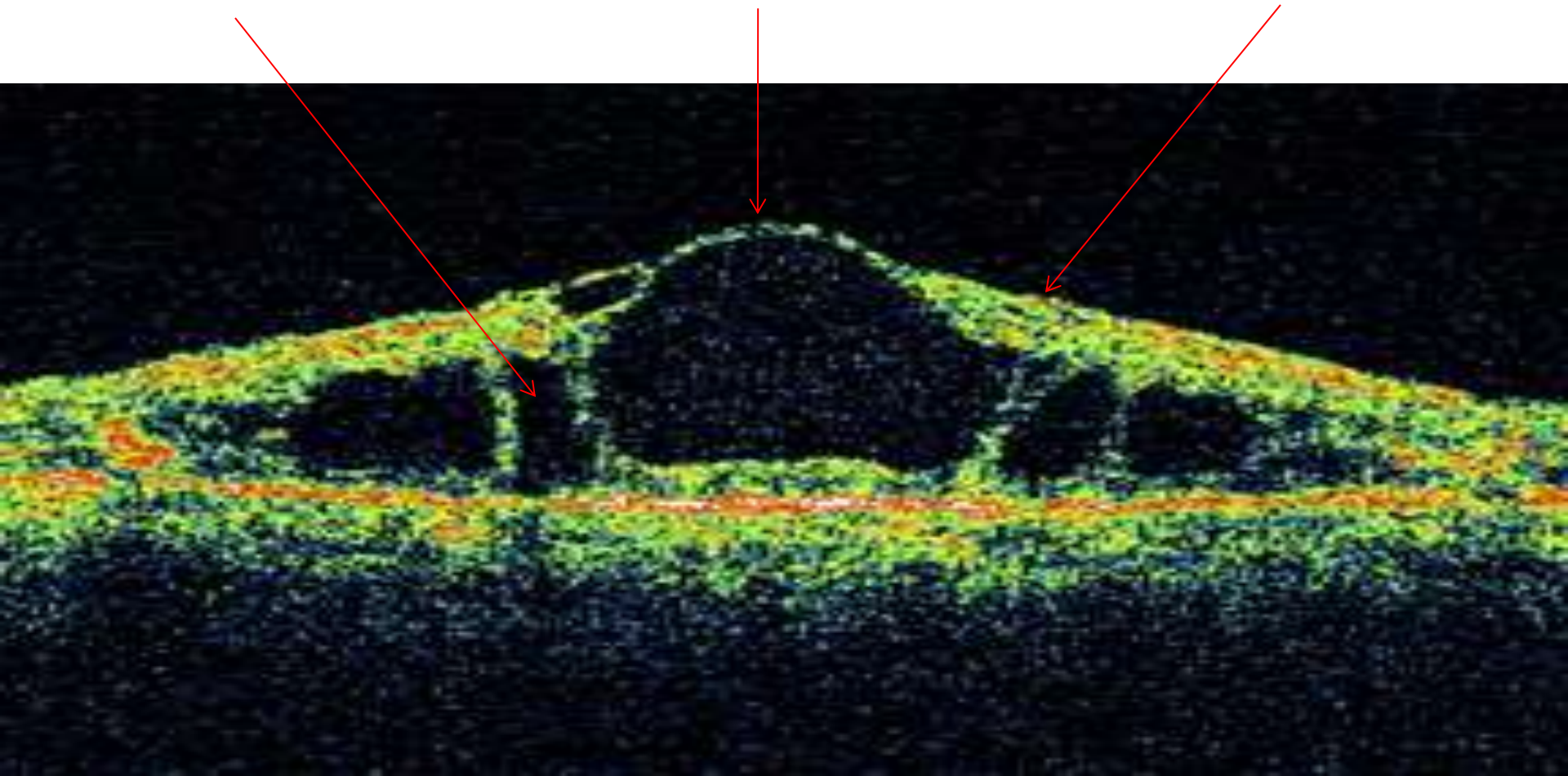
- According to “Gass . Et al”
  - There is significant correlation between visual acuity and area found with Cystoid changes.
  - There is no correlation between V/A and distance the cyst from FAZ.

# Optical Coherence Tomography

**Hypo-reflective Cyst  
with clear fluid**

**Loss of Normal  
Foveal contour**

**Relation at  
Vitreous retinal interface**

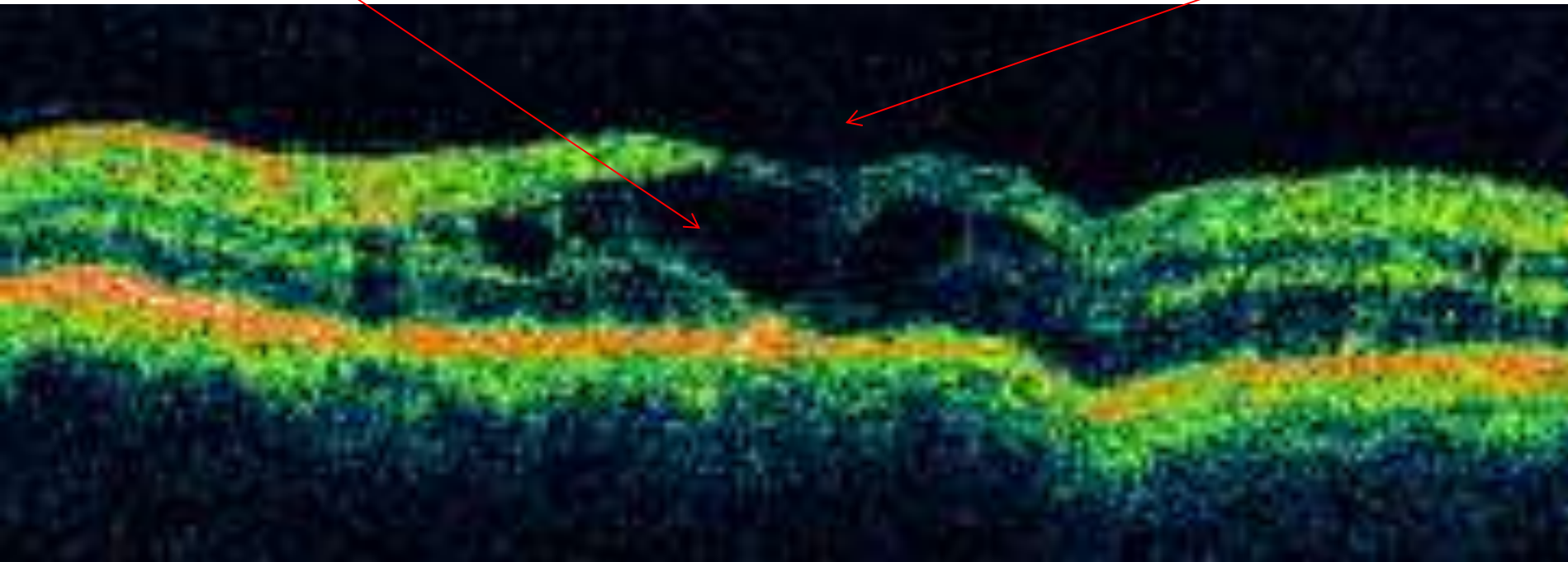




# Mild Irvine Gass Syndrome

**Few Cystic Spaces**

**Relatively Preserved  
Foveal Contour**

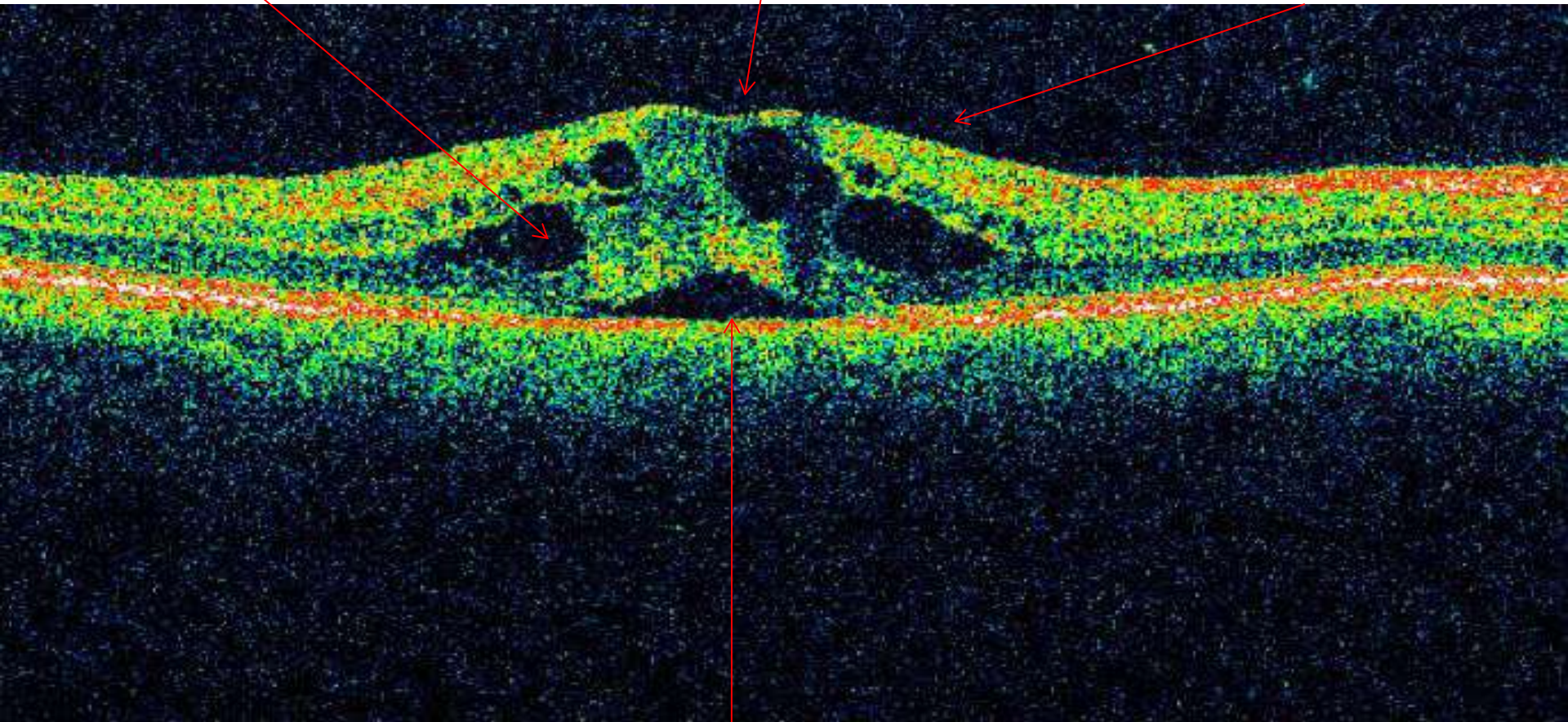


# Moderate Irvine Gass Finding

**Hypo-reflective Cyst  
with clear fluid**

**Altered Foveal  
Contour**

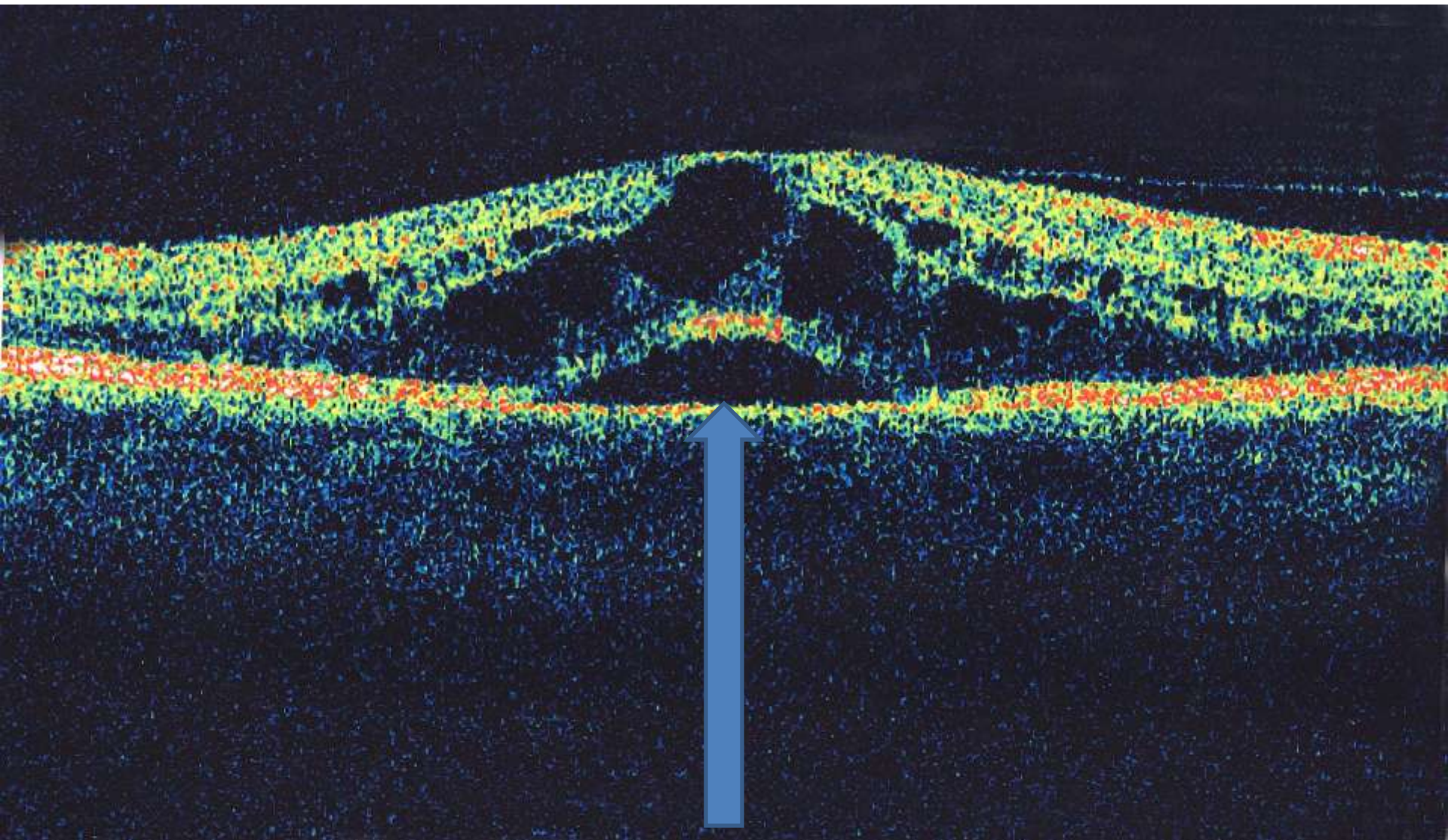
**Normal Vitreo foveal  
interface**



**Subretinal Clear Fluid**

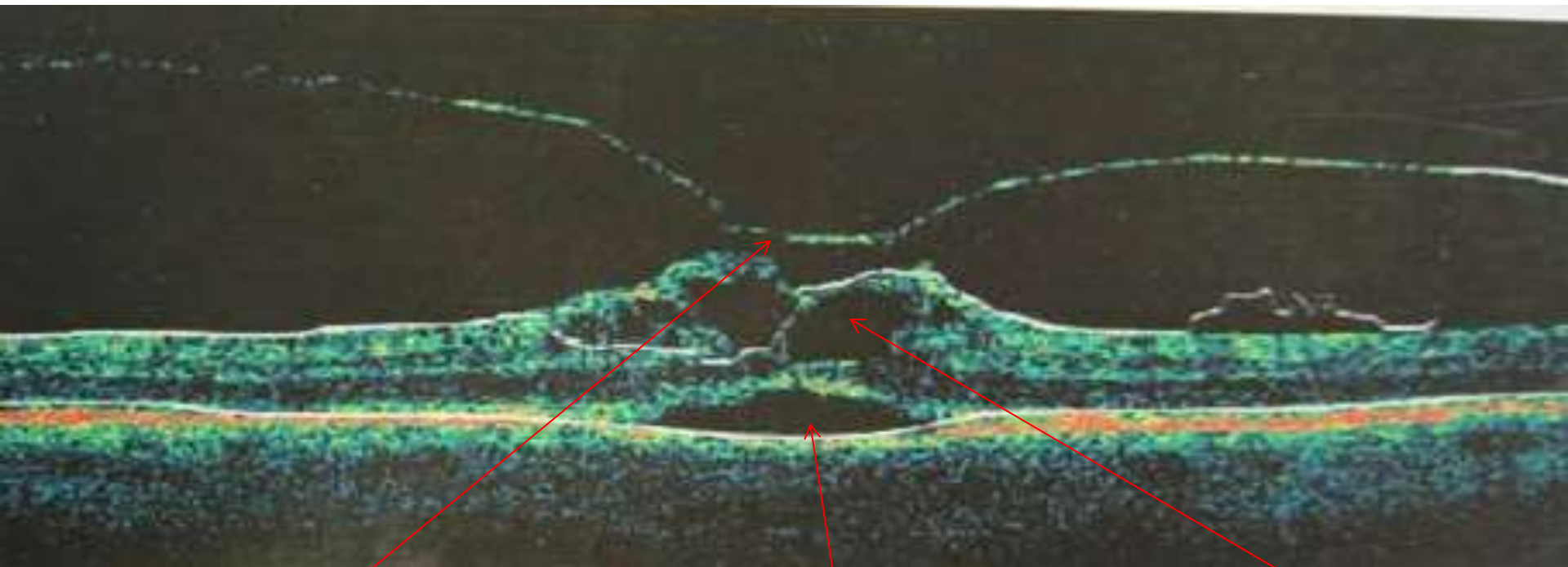


# OCT in Severe Irvine Gass Syndrome



**Subretinal Clear Fluid**

# CME with V.M.T.S

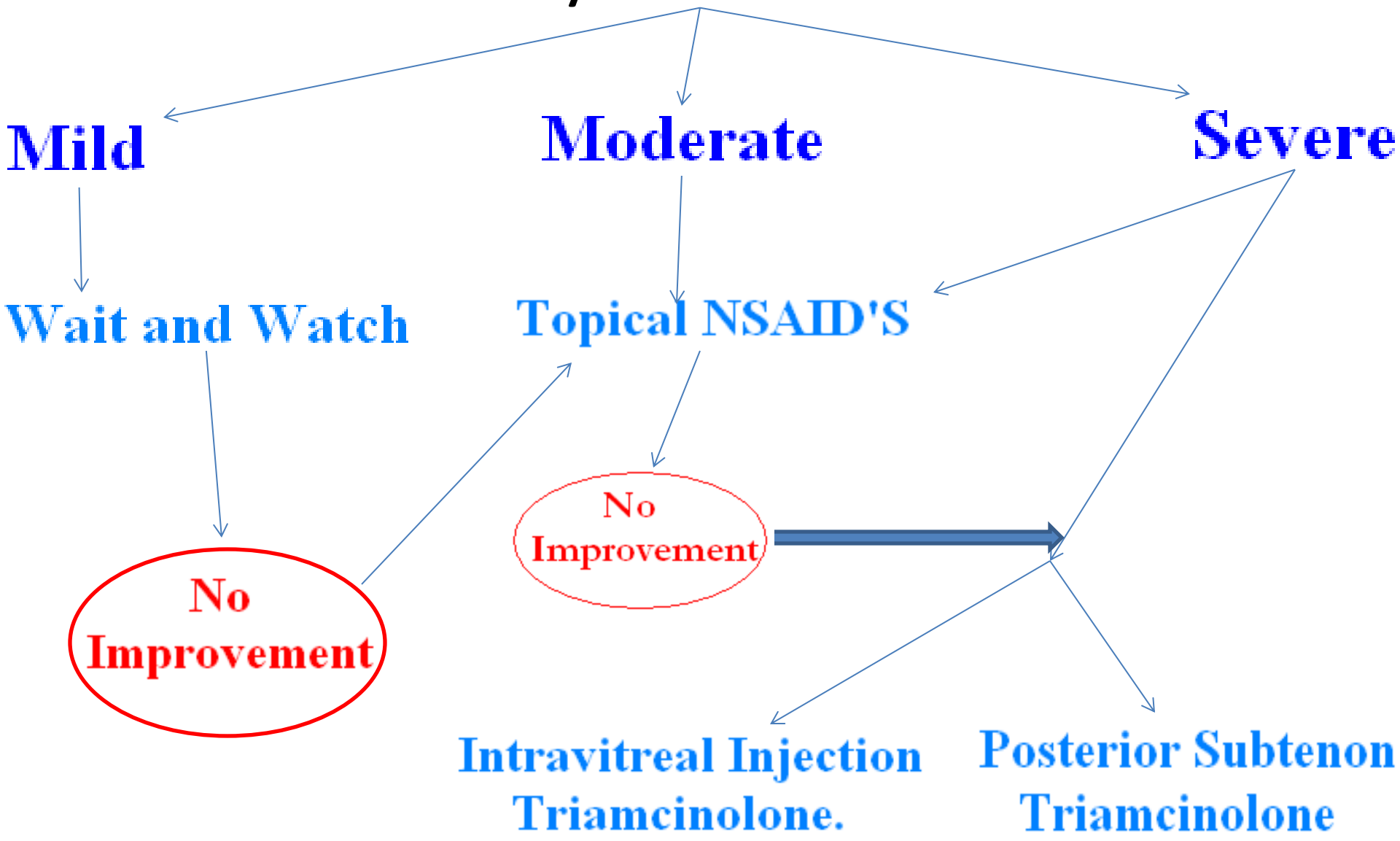


**Vitreous-Foveal Traction**

**Cystoid Spaces**

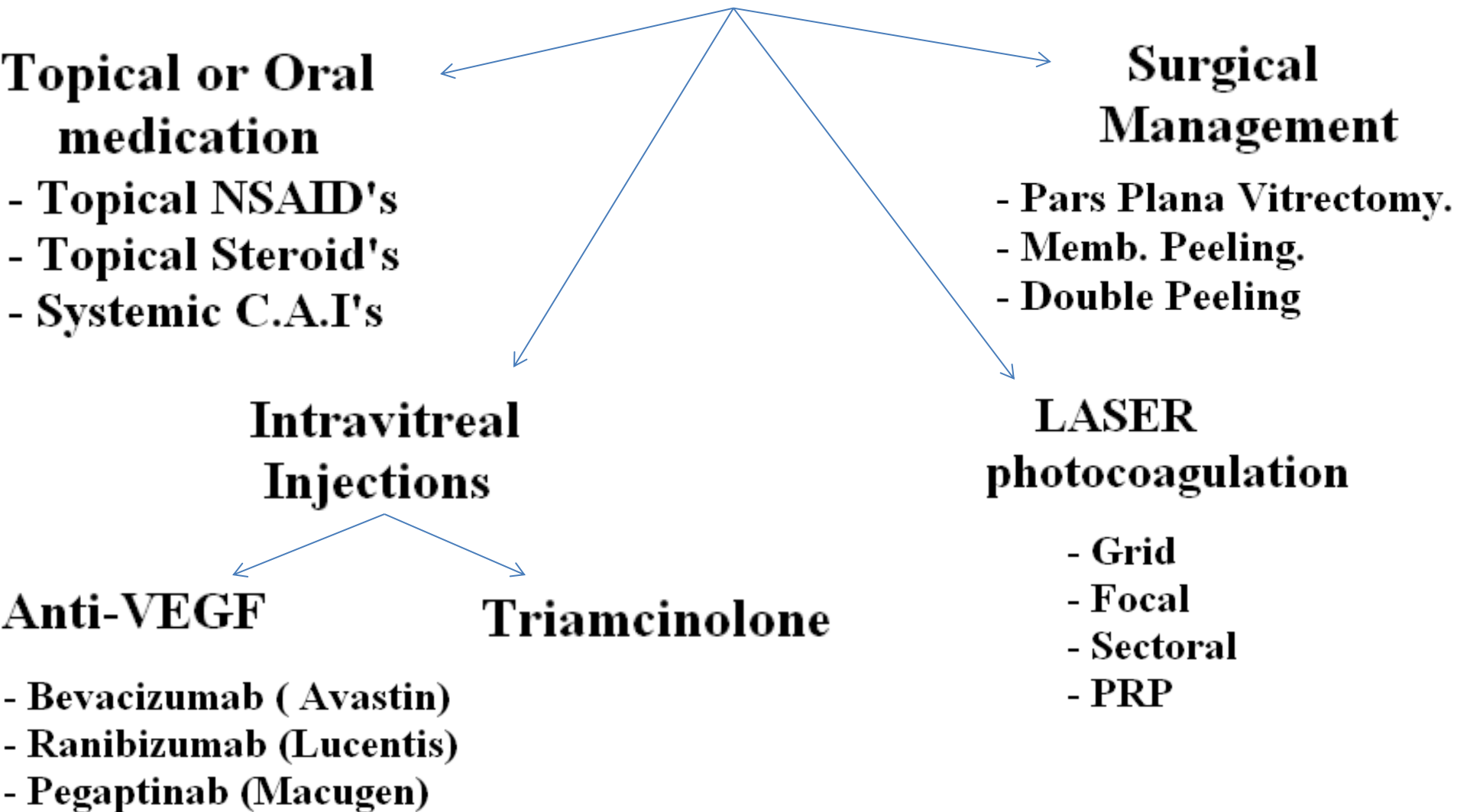
**Subretinal Fluid**

# Treatment Option For "Irvine Gass Syndrome"





# Treatment For Secondary CME



# Moderate C.M.E

## Available Topical NSAID's

- Ketorolac 0.5%
- Ketorolac 0.4% (with Antibiotic combination)
- Diclofenac 0.1%
- Nepafenac 0.1%
- Bromfenac 0.09%(with Antibiotic combination)

# Points Regarding Ketorolac

- Prophylactic use of Ketorolac 0.5% after cataract surgery reduces chances of Pseudophakic CME.
- Most of the Multicenter R.C.C.T. are on 0.5% Ketorolac.
- Although it has been shown that 0.4% is as effective as 0.5% drug in Q.I.D dosage schedule.

# Topical KETOROLAC

- Many Pilot studies and Multicentre studies show Ketorolac to be:
  - Effective in reducing post operative CME.
  - Probable Synergistic with Topical Steroids.
  - Also working Effectively in combination with antibiotic.
  - More effective in Acute CME than in Chronic once.

# Nepafenac and Bromfenac

- Prophylactic use of Nepafenac 0.1% TDS reduces chances of Clinical Pseudophakic CME.
- Still, Nepafenac and Bromfenac are FDA approved for Postoperative Inflammation control but not Prophylactically for Pseudophakic CME.
- Effective in Secondary CME's in venous occlusions and DME.



# Nepafenac and Bromfenac

- There is no current R.C.C.T to show Superiority of any one over the other.
- The advantage of the above Quoted drugs:
  - lesser dosage schedule
  - Comparatively better patients response

# Severe Pseudophakic CME



- Blurred Vision.
- OCT:
  - C.F.T > 400  $\mu\text{m}$ .
  - Gross Cystic Spaces.
  - Subretinal Fluid

# *Severe OR* Refractive Pseudophakic CME & Intravitreal Triamcinolone

- IVTA leads to visual improvement in these patients.
- The improvement is usually:
  - Visual improvement with BCVA > 2 ETDRS lines
  - OCT : reduced CFT and normal Contour
  - Resolved Angiographic CME
- Dosage:
  - 4mg in 0.1ml.
  - Currently used: 2mg in 0.05 ml
- Rarely these patients require repeat injection after 6-8 months.

# Intravitreal Triamcinolone Technique

- Aseptic precautions.
- 2mg in 0.05 ml taken in 1ml syringe.
- 26/30 Gauge needle.
- Carefully stabilize globe
- Injected 3.5 to 4 mm from limbus.
- Needle is withdrawn
- Area pressed with cotton bud.



# Literature Reported Complication of Intravitreal Triamcinolone

- Raised IOP. ( seen more with high dose).
- Floater ( since particle are appreciated)
- Lens Touch.
- Cataract Formation (Not to worry in Pseudophakic).
- Pain after injection
- Endophthalmitis
- Vitreous Hemorrhage
- Retinal detachment

# Severe or Refractive CME and PST

- Their have been reports that:
  - Posterior Subtenon injection of Triamcinolone improves vision and reduces CFT in patient with Chronic non resolving Pseudophakic CME.
  - Most of the studies now take into consideration Intravitreal injection of steroids for treatment of Chronic Non resolving CME.
- Complication:
  - Globe perforation.
  - Raised IOP.
  - Improper injection module.
  - Concern for dosage.



# Ozurdex Implant

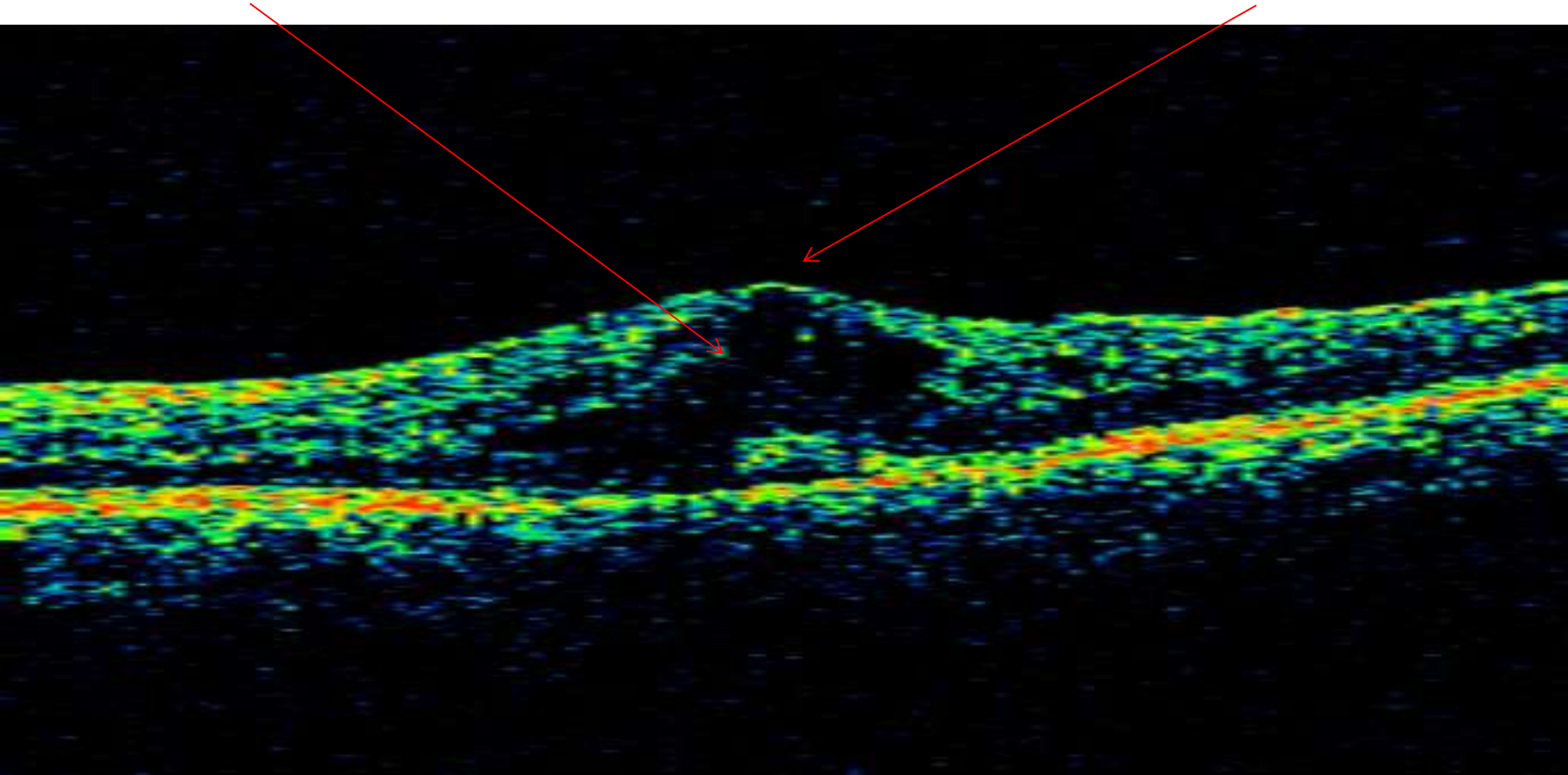
- Long acting
- Dexamethasone 0.7mg.
- Good for conditions requiring repeated IVSteroid.
- Effect need to be proven



# Patient Day 1 OCT with 20/100.

**Non Resolving  
CME**

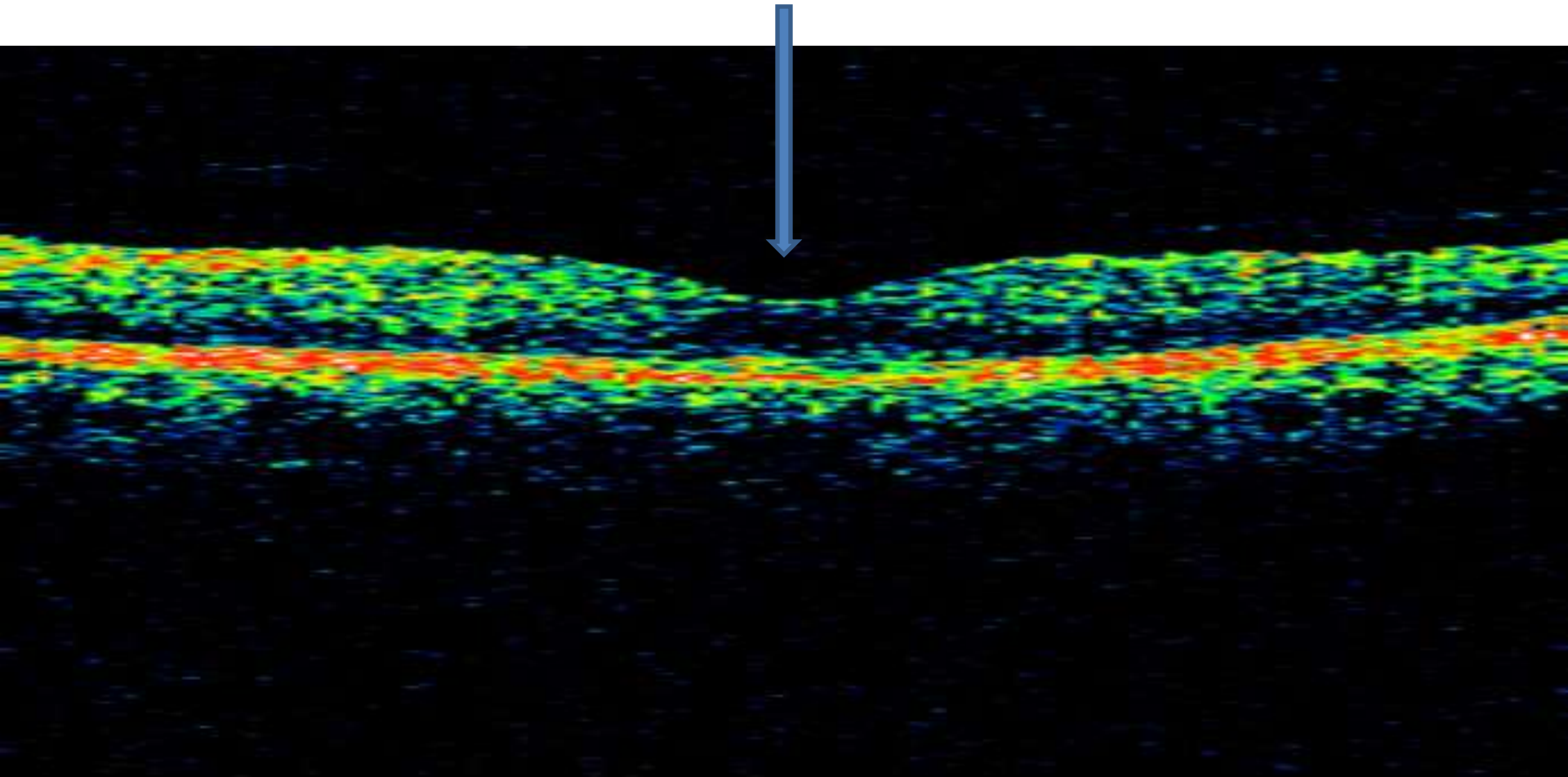
**Vitreo-retinal  
interface**





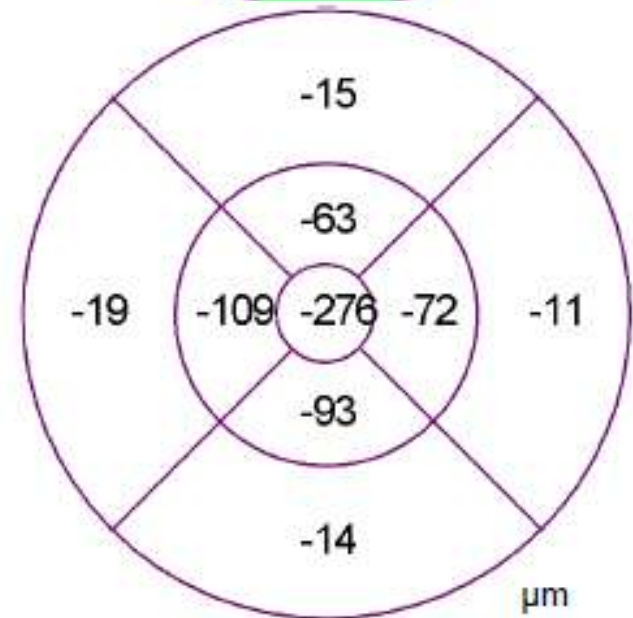
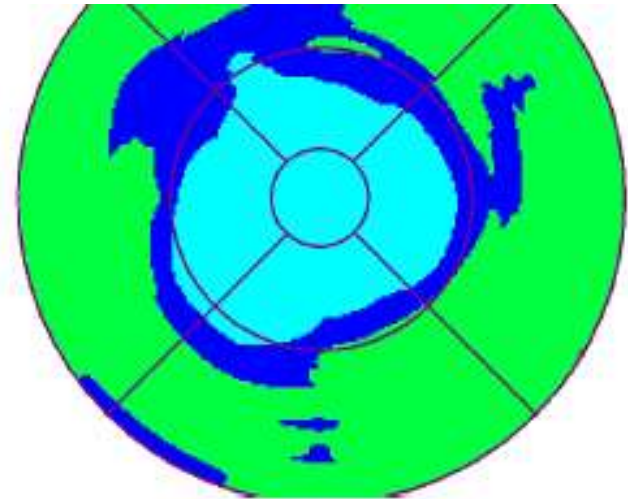
# Day 30 After Intravitreal Triamcinolone

**Normal Foveal Contour**



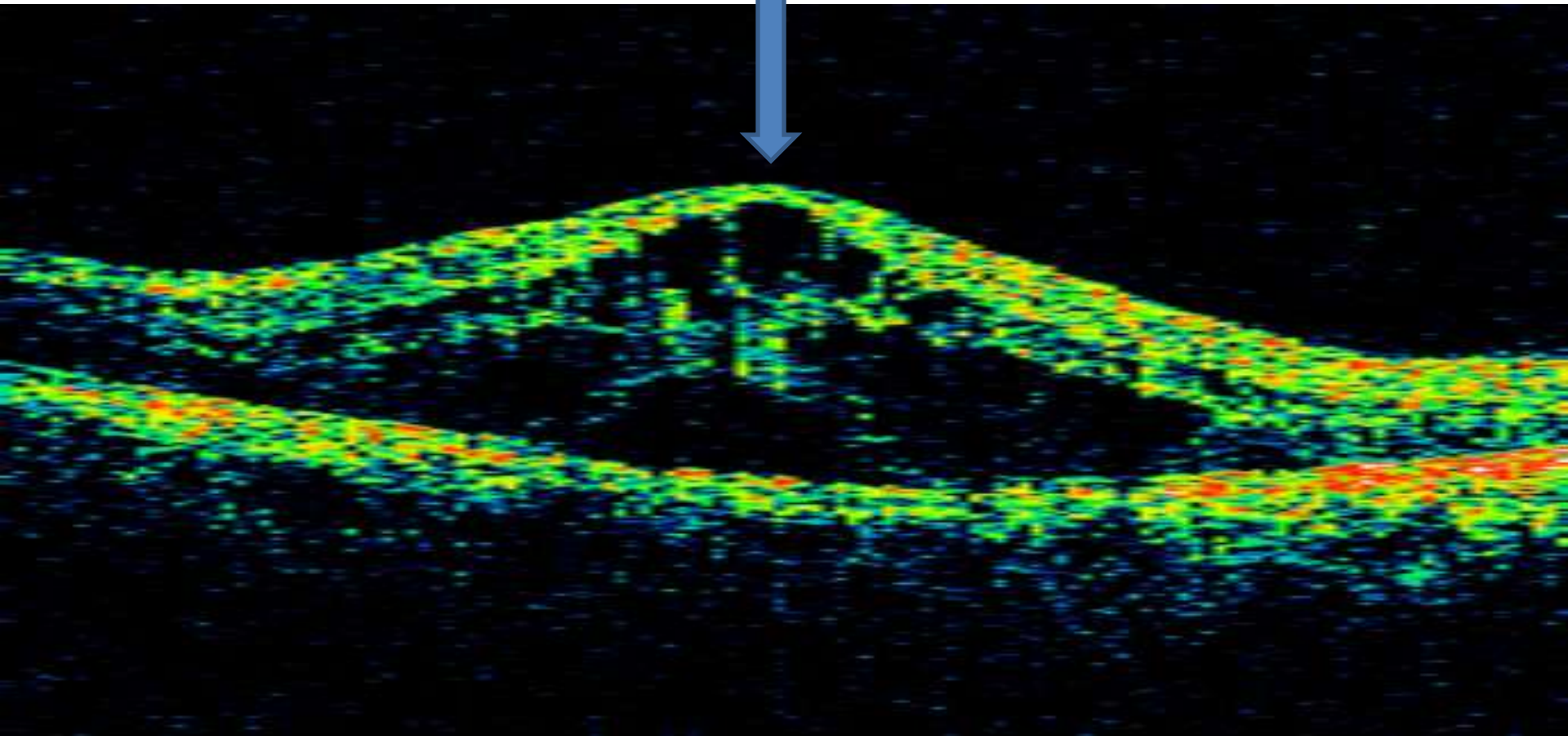
# Improvement Seen

- Increase in BCVA from 20/100 to 20/20.
- Reduced C.F.T.
- -276  $\mu\text{m}$  reduction in C.F.T.

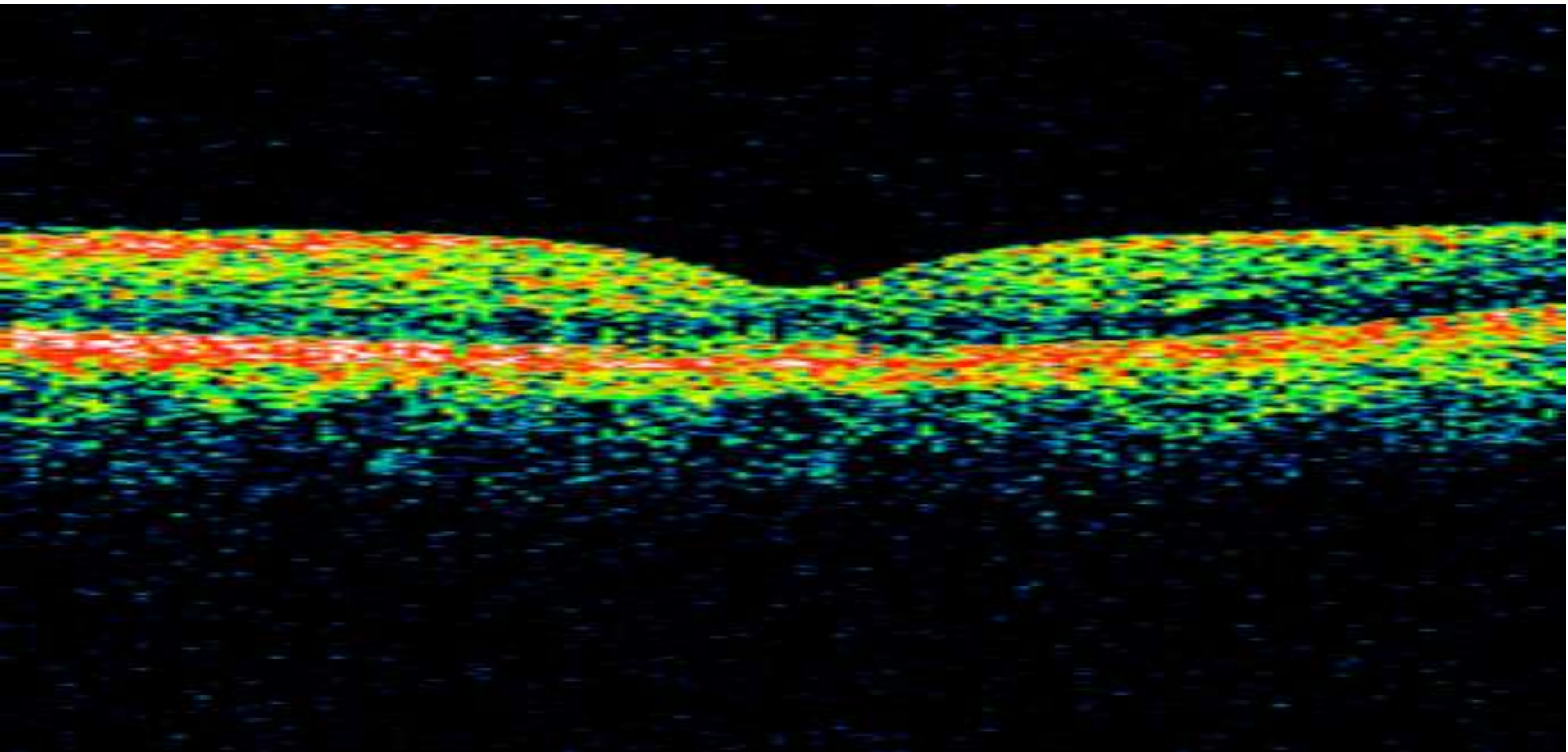


# Second Report of Refractory Pseudophakic CME

**Severe CME**



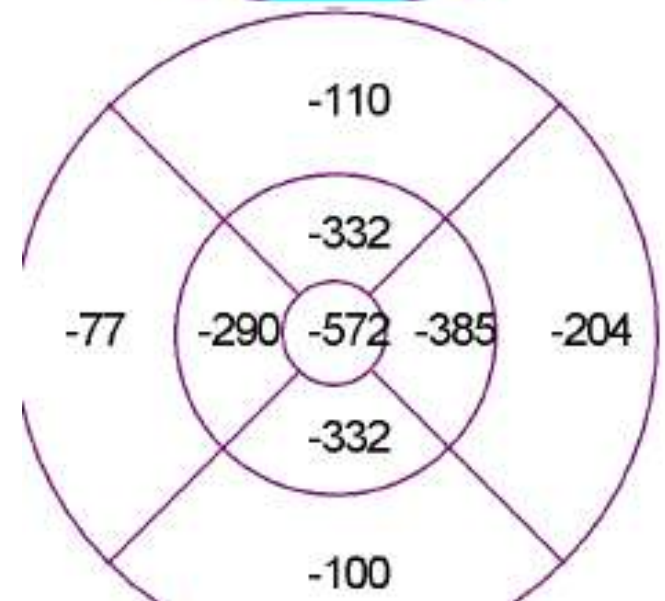
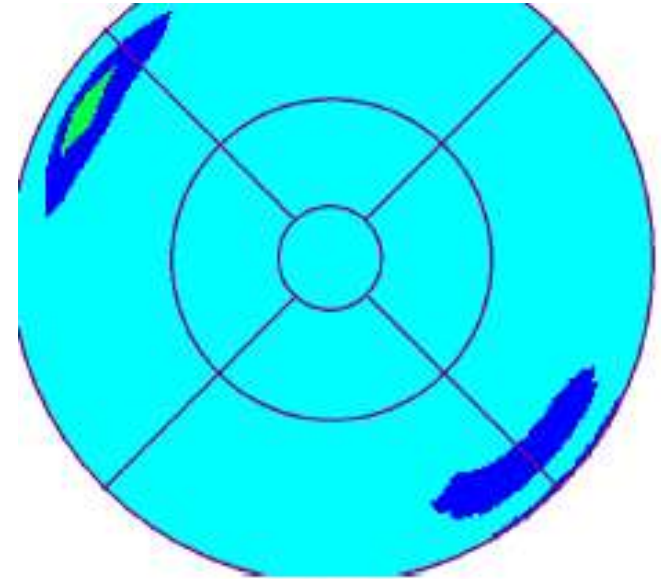
# Day 26 post IVTA





# Improved

- **BCVA 20/100 on day 1 improved to 20/30 day 26.**
- **CFT decreased by 572um.**
- **Normal Foveal Morphology achieved.**



# Topical Medication post injection

- We continued either Combination drops with Ketorolac 0.4% OR Bromfenac 0.09% OR Nepafenac 0.1% in all cases of Refractive CME who where treated with IVTA.
- Mostly the drops where preferred based on what medication patient already had with him.
- Most cases showed improvement on serial OCT and visual recovery. The former occurring before in time.

# Pars Plana Vitrectomy for Refractory Pseudophakic CME

- Improvement occurs in selected cases.
- Indications:
  - Taut posterior Hyaloid.
  - E.R.M.
  - Complicated Pseudophakic.

# Other Treatment Tried

- Oral Acetazolamide:
  - Risk of adverse effect are more.
  - Non of the trails show their benefit
- Oral Steroid:
  - Effective in Uveitis CME's.
  - Primary Pseudophakic CME: No role
- Intravitreal Bevacizumab (Avastin):
  - Few R.C.C.T show their benefit in Refractory CME.
  - Not Proven



# Summary

- Pseudophakic CME occur even in uneventful Cataract surgery. Although incidence increase with intraoperative complication.
- Usually these occur **5-10 weeks** postop. Thus the patient has good vision immediate postoperatively followed by reduced vision later.
- Most of these cases respond to **topical NSAID's**. The choice of drugs are multiple and NO superiority has been proven of any available drug type.
- Cases should be investigated and treated depending upon their pathological status.

- **Intravitreal injection of Triamcinolone** does improve visual acuity and anatomic recovery is seen even in chronic cases. Rarely, repeat injections 6-8 months later.
- **Intravitreal injection of Anti VEGF** : May be useful in co-existing pathologies or refractory CME.
- **Pars Plana Vitrectomy** with or without Membrane peeling, in indicated case.

Thank You