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Fluid is withdrawn from EC Space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)

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.

- 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 sensivity 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
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 Vitreo 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
CME with V.M.T.S

Vitreo-Foveal Traction

Cystoid Spaces

Subretinal Fluid
Treatment Option For “Irvine Gass Syndrome”

- **Mild**
  - Wait and Watch
  - **No Improvement**

- **Moderate**
  - Topical NSAID'S
    - **No Improvement**
      - Intravitreal Injection Triamcinolone
      - Posterior Subtenon Triamcinolone
Treatment For Secondary CME

Topical or Oral medication
- Topical NSAID's
- Topical Steroid's
- Systemic C.A.I's

Intravitreal Injections
- Anti-VEGF
  - Bevacizumab (Avastin)
  - Ranibizumab (Lucentis)
  - Pegaptanib (Macugen)
- Triamcinolone

Surgical Management
- Pars Plana Vitrectomy
- Memb. Peeling
- Double Peeling

LASER photocoagulation
- Grid
- Focal
- Sectoral
- PRP
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 um.
  - 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 particles 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 IV Steroid.

- 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 um 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 were treated with IVTA.
- Mostly the drops were 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