Post operative Endophthalmitis

Endophthalmitis

- Endophthalmitis is the clinical term used to describe the inflammatory response of the eye to ocular infection.

Classification

Endophthalmitis can be classified according to the

- Mode of entry
- Type of etiological agent

According to mode of entry

Exogenous	Endogenous
•Micro-org directly introduced from environment	•Haematogenous spread of organisms as a metastatic infection
•Usually occurs following surgery: i.e. post-operative endophthalmitis or trauma i.e. post-traumatic or keratitis	•Structural defect of eye is not necessary
•Mainly bacterial	•Common predisposing factors are immunocompromised status, septicemia or IV drug abuse
	•Mainly fungal

Infective –

- Bacterial /fungal/ parasitic

Non-infective (Sterile uveitis) –

- Left over lens fragments / glove powder
- Toxic reaction to drugs/irrigating solutions.
- Operative trauma
- Exacerbation of preexisting uveitis
- Phacolytic glaucoma/phacoanaphylaxis

- **Panophthalmitis** ⟹

  Inflammation of all coats of the eye including intraocular structures

Endophthalmitis

- Post operative

- Bleb associted

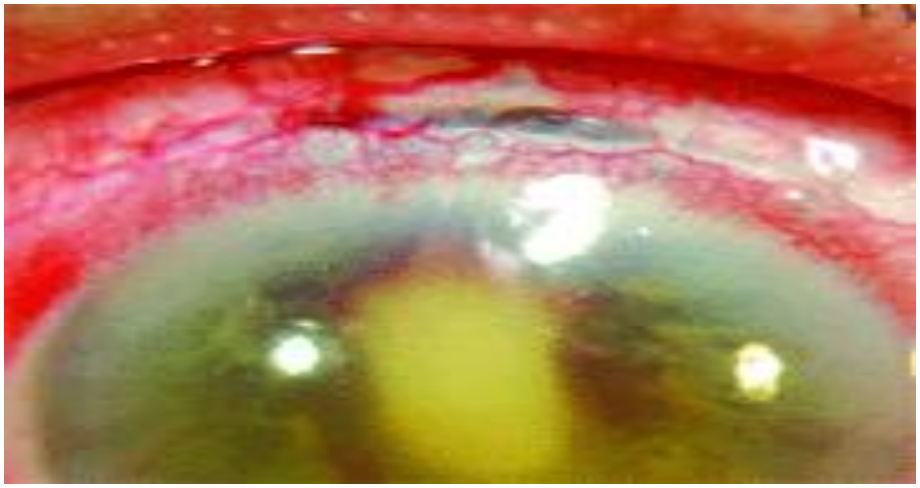
Post operative endophthalmitis

Severe inflammation of the eye involving both posterior and anterior segment of the eye secondary to an infectious agent

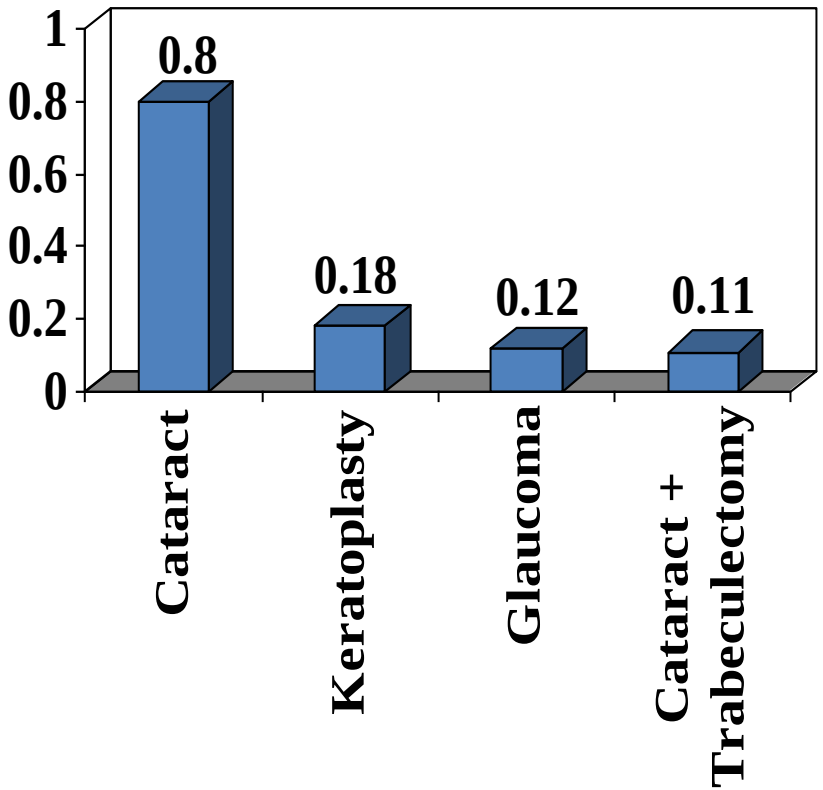
- May occur after any surgical procedure.

- **All unexpected inflammatory response following I/O surgery be considered endophthalmitis unless proved otherwise**

- Possibility must be considered after any surgical procedure that breaches the integrity of the corneo-scleral wall of the eye, no matter how ‘minor’ the breach may be



Incidence after various ocular surgeries (%)



Incidence of Endophthalmitis

- Worldwide, the reported incidence of

Post-op endophthalmitis is 0.04-4%.

Post cataract surgery 0.265% (more with clear corneal incision)

Post keratoplasty 0.382%

Post Vitrectomy 0.05%.

Bleb associated 0.2%-9.6%

Post traumatic 2.4%- 8%, retained IOFB 30%

Cataract surgery : most frequently performed intraocular surgery

Constitutes 90% of postoperative endophthalmitis

Recent estimates : 0.08% to 0.68 %

0.087% in the 1990s and 0.265% after 2000. Rates high due to CCI (three to fourfold risk)

Risk factors:

- Incision – site, size, suture
- Application of 2% lidnocaine before povidine –iodine preparation
- IOL type, prolene haptics – additional risk
- Hydrophilic materials and arcylic are better compared to silicone and PMMA

Keratoplasty and Keratoprosthesis

Period	cataract	PK	RR for cataract vs PK
1964-2003	0.128	0.382	0.34
1964-1999	0.109	0.392	0.28
2000-2003	0.265	0.200	1.33

Mehran Taban et al Arch Ophthalmol. 2005;123:605-609

- 1992 breakpoint year: introduction of CCI
- Widespread use of povidone-iodine
- The evolution of eye-banking techniques

Endophthalmitis secondary to retina surgery

- Incidence : 0.039% -0.05 %

(Eifrig CW et. al Am J Ophthalmol. 2004 Nov;138(5):799-802.

MF Shuler et. al Wills eye institute Invest Ophthalmol Vis Sci 2002;43.)

- Streptococcus and staphylococcus: MC cause
- Incidence: low but the visual acuity outcomes generally poor
- 20 v/s 23G : which predisposes more??

  Francesca Menchini et.al : *Meta-analysis* (*Invest Ophthalmol Vis Sci* 2011;52

  - Microincisional straight approach 2.5 times > incidence
  - Beveled approach same as 20G

  Tae Gon Lee et.al : no significant difference (*Invest Ophthalmol Vis Sci* 2011;52:

Endophthalmitis in eyes following vitrectomy

- Flat A.C. in gas filled eyes phakic eyes along with severe orbital inflammatory reaction in immediate P.O. period should be an ominous sign of infective endophthalmitis.

- Post vitrectomy endophthalmitis more common in diabetics than in non diabetics.

- *Dr TARUN SHARMA ,DR LINGAM GOPAL, Lily Therese (Ophthalmic surgery & lasers OCT 98 vol 29 No 10 857-859)*

POE: A potentially blinding condition

- Though rare, it is potentially the most devastating complication of intraocular procedures and can lead to a permanent, complete loss of vision.

- **Endophthalmitis has been associated with severe visual loss in 20% of patients.**

Surv Ophthalmol 2004, 49(2), S53-S54)

POE: Aetiological Agents

- Most common potential source of infection is the **periocular flora** of the patient
- 75% of conjunctive cultures from normal eyes harbour ***Staph. epidermidis, Staph. aureus*** and various *streptococci*
- Similar pattern has been found in eyes with post-operative endophthalmitis
- Role of external ocular bacterial flora in the pathogenesis of post-op endophthalmitis has been proven by DNA studies

Post-op Endophthalmitis: Etiology

- Periocular flora gain access into eye during surgery
- Organisms may be carried into the eye as surface fluid refluxes through the wound during surgery
- IOL contamination if it touches the ocular surface or with the air of the operating room
- Contaminated irrigation solutions

Risk Factors

Bacterial

- Defects in sterilization of instruments.
- Contamination of fluids and drugs
- Complicated surgery (rupture of posterior capsule),tissue damage
- Lacrimal drainage obstruction

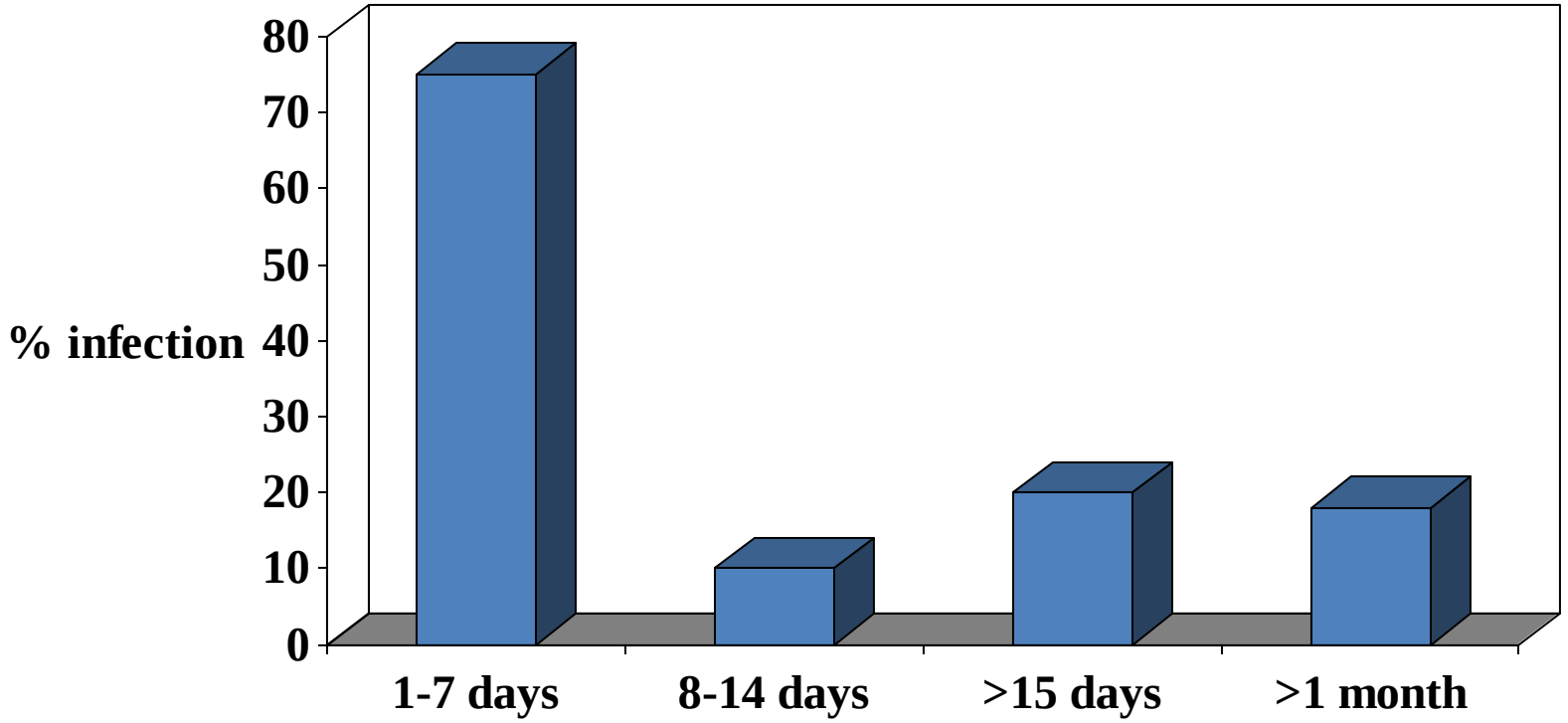
Fungal

- Contaminated irrigating solutions.
- Contaminated IOLs, viscoelastics, poor OT hygiene, hospital construction activity.

POE: Clinical Aspects

- Three forms of clinical presentation can be distinguished
  - **Acute form**, usually fulminant, occurs **2-4 days** post-op, most commonly due to *S.aureus* or streptococci or Gram negative bacilli
  - **Delayed form**, moderately severe, occurs **5-7 days** post-op, due to *S.epidermidis*, rarely fungal.
  - **Chronic form**, occurs as early as **1 month post-op**, due to *Propionibacterium acnes*, *S.epidermidis* or fungal.

Day of presentation of infection



In most cases, infection occurs in immediate post-op period,

Most common organisms responsible for endophthalmitis

Gram positive bacteria 75%-85%	*Gram negative bacteria 10%-15%*
***Staphylococcus epidemidis* 43%**	***Pseudomonas* 8%**
***Streptococcus spp* 20%**	***Proteus* 5%**
***Staphylococcus aureus* 15%**	***Haemophilus influenzae* 0-1%**
Propionibacterium acnes 5%	***Klebsiella 0-1%***
***Bacillus cereus* 1%**	***Coliform spp 0-1%***
Fungi (rare)	
Candida parapsilosis	
Aspergillus	
Cephalosporium spp.	

Endophthalmitis: Microbiology

Post Operative-

Acute onset

- Staph. epi.
- Staph. aureus
- Gram negative
- Streptococcus
- Fusarium (Filamentous Fungi)

Late onset

- P. acne
- Fungus (Candida)
- Staph. epidermidis
- Anaerobic streptococci
- Actenomyces
- Nocardia asteroids

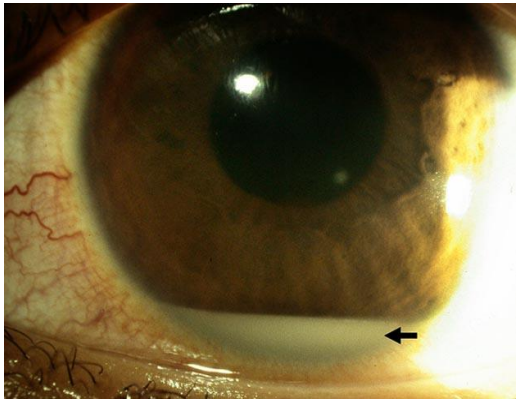
Patient presents with symptoms most commonly on the **second day** after surgery

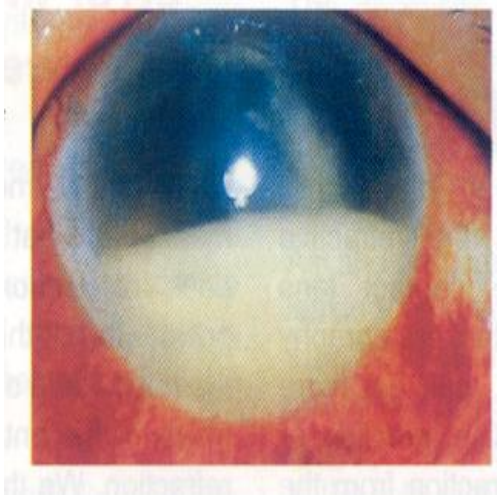
Symptoms:

- Pain : absent in 25% (EVS group)
- Diminished vision

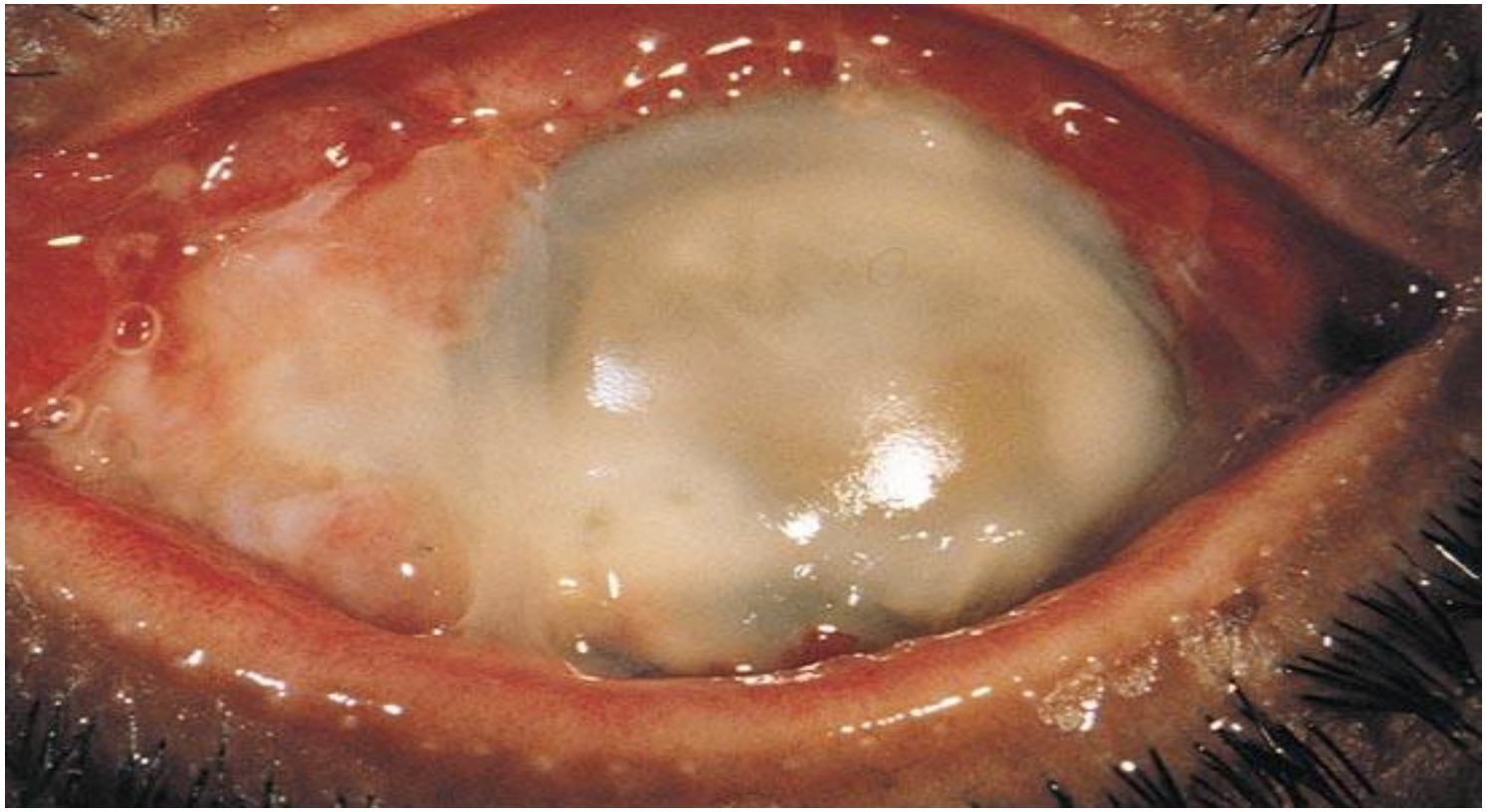
Signs:

- Upper lid edema
- Conjunctival hyeremia
- Intense chemosis
- Corneal edema
- Anterior chamber inflammation & Hypopyon
- Endothelial precipitates





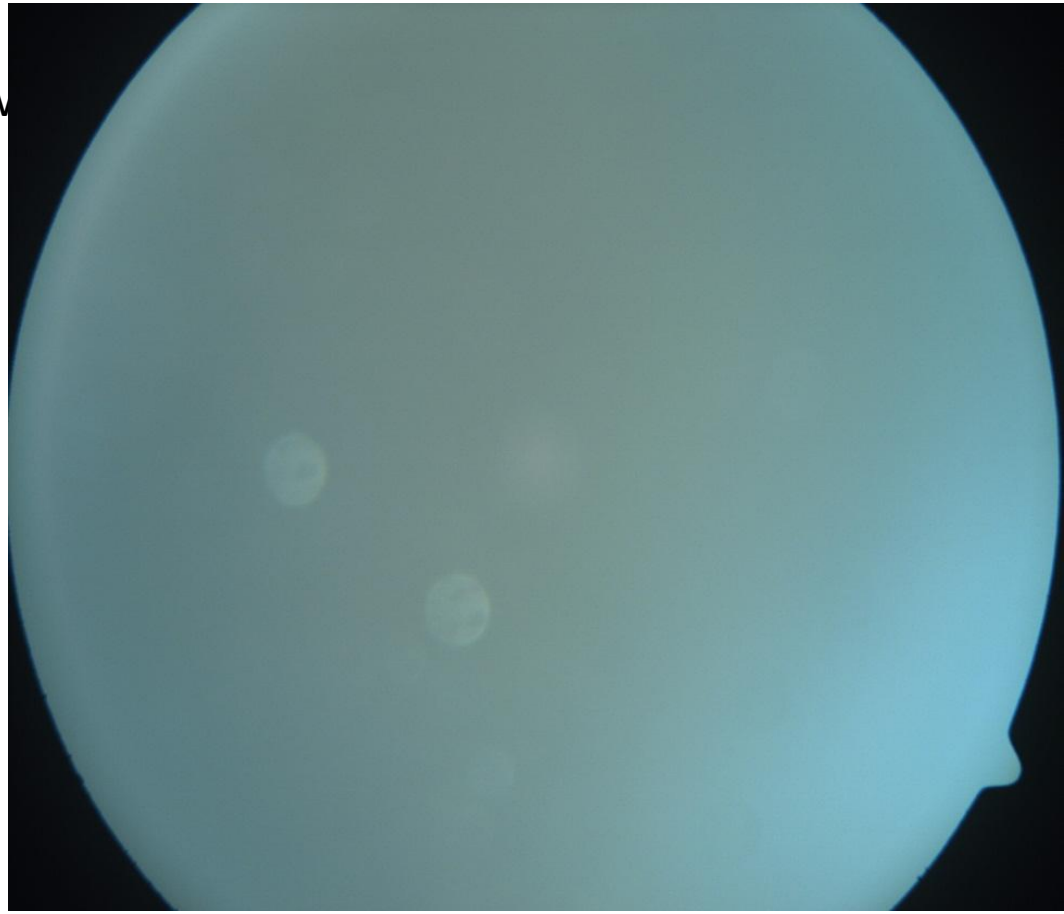
Acute Bacterial Endophthalmitis



BACTERIAL ENDOPHTHALMITIS

Fundus-

- Decreased/ yellowish/ absent glow
- Vitreous debri/fluffy exudates
- Retinitis/ retinal periphlebitis
- Retina may/may not be visible



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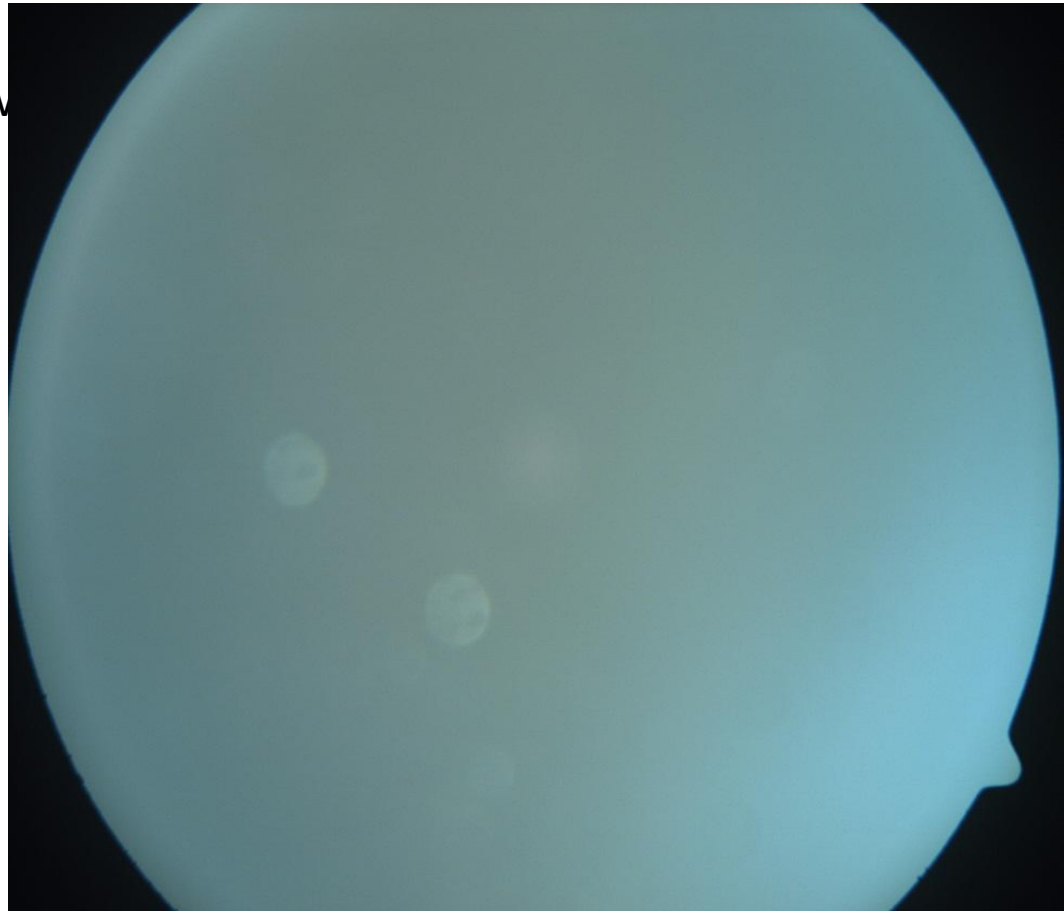
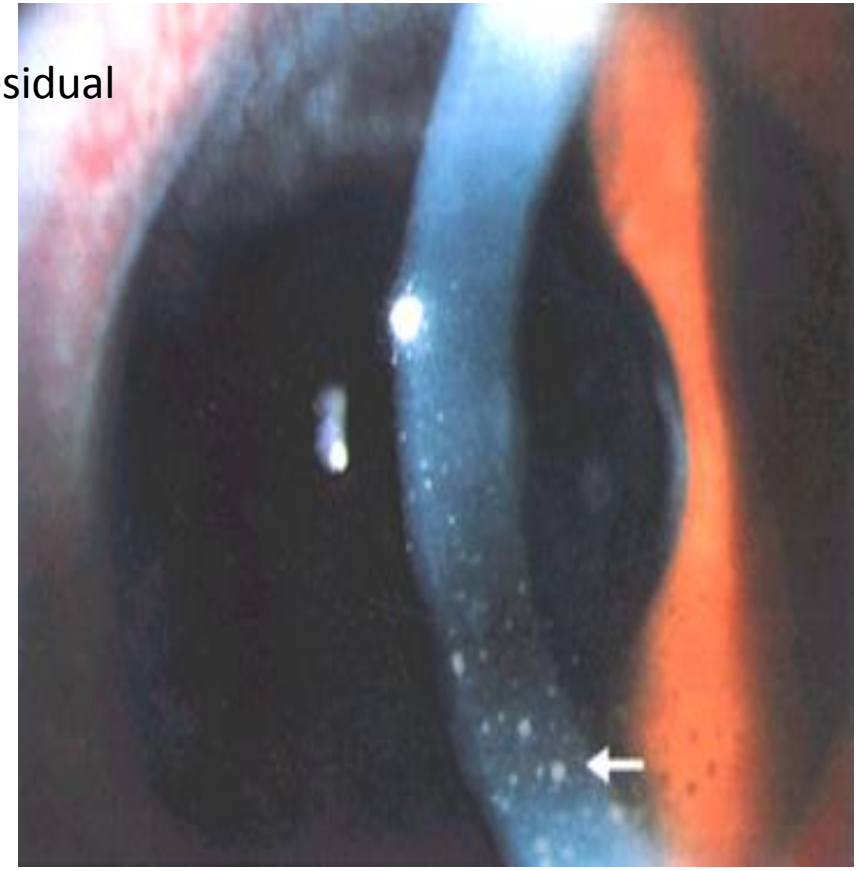


P. Acne Endophthalmitis

- Anaerobic, pleomorphic, Gram

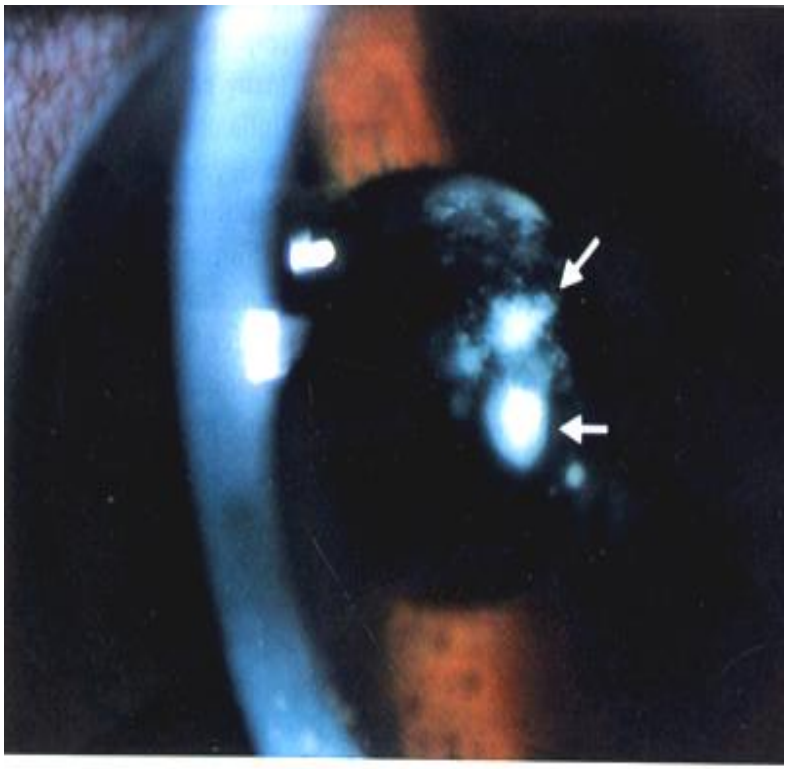
+ve bacilli normally found in conj. sac

- Stimulate/provoke immune response with residual lens matter
- May follow retained lens matter/ Nd-YAG capsulotomy

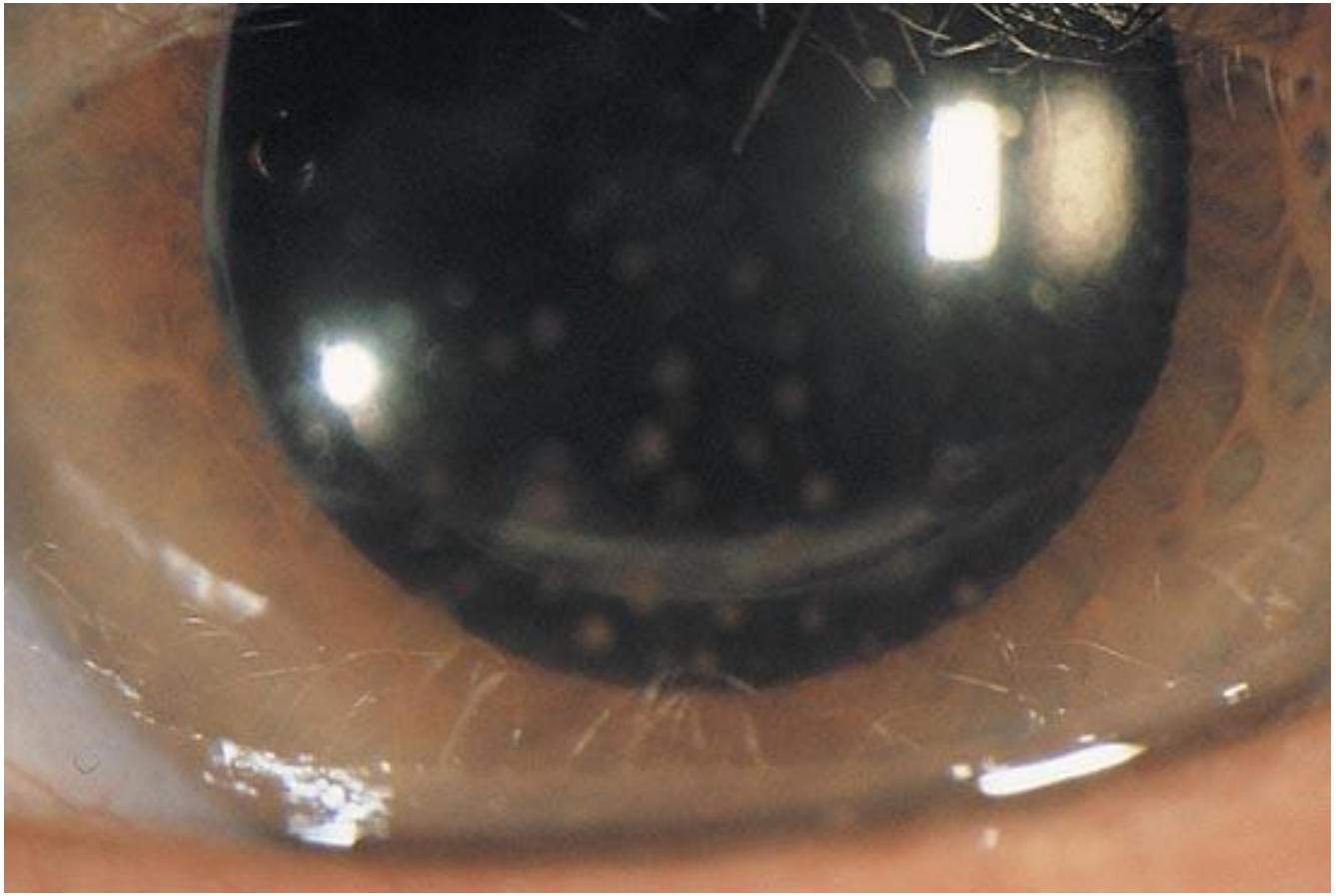


P. Acne Endophthalmitis

- Mutton fat KPs on - endothelium / IOL
- Beaded fibrin strands in AC/ minimal hypopyon
- PCO/ sequestrated plaques within the capsular bag/ post. Cap / IOL
- Vitritis but usually healthy retina
- Optic disc edema/Visual field loss

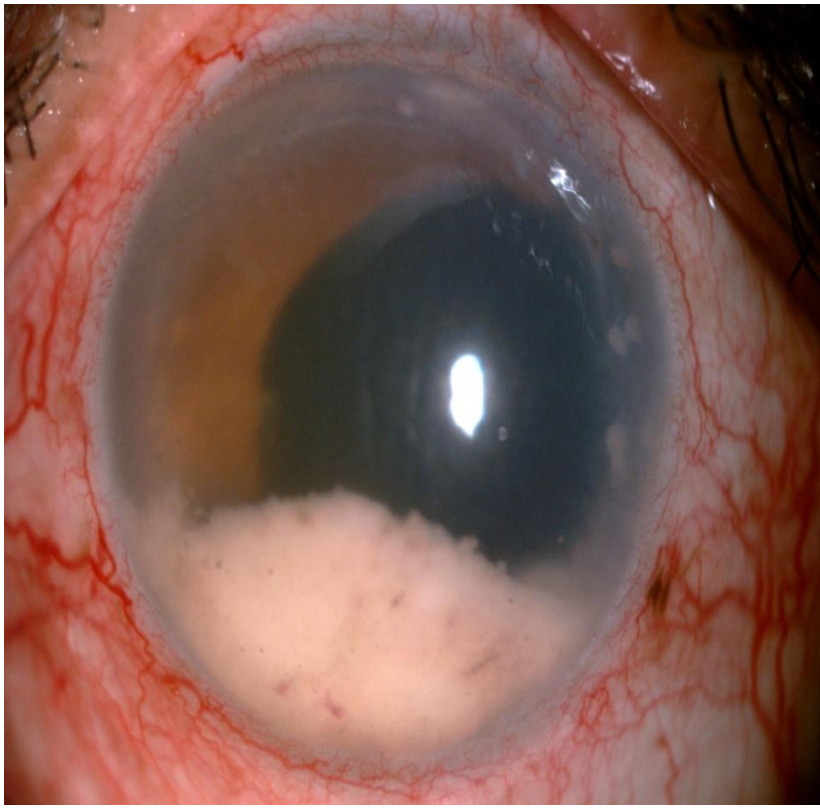


P. Acnes Endophthalmitis



FUNGAL ENDOPHTHALMITIS

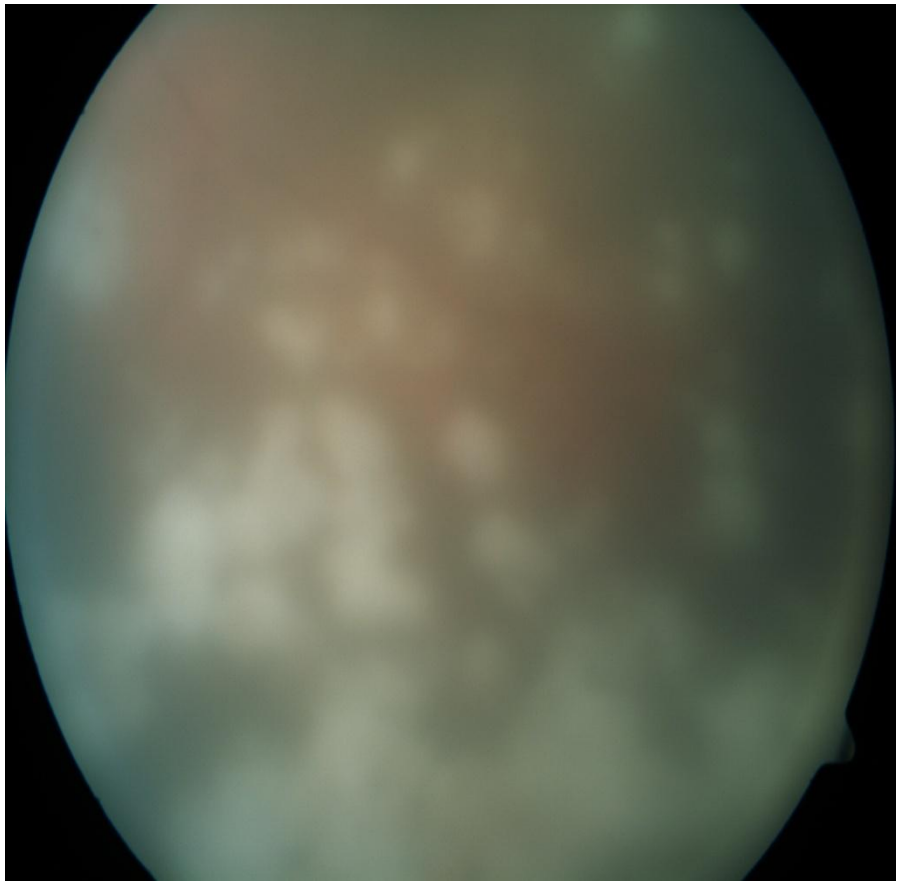
- Onset: days / weeks (can be rapid onset)
- Diminution of vision/Mild pain
- Waxing/waning course
- Ant. Seg.: Corneal abscess/section infiltration
  Hypopyon, iridocyclitis



FUNGAL ENDOPHTHALMITIS

- Fundus: Localized vitreous opacity (snow ball) white string of pearls appearance

Vitreous exudation / diffuse haze

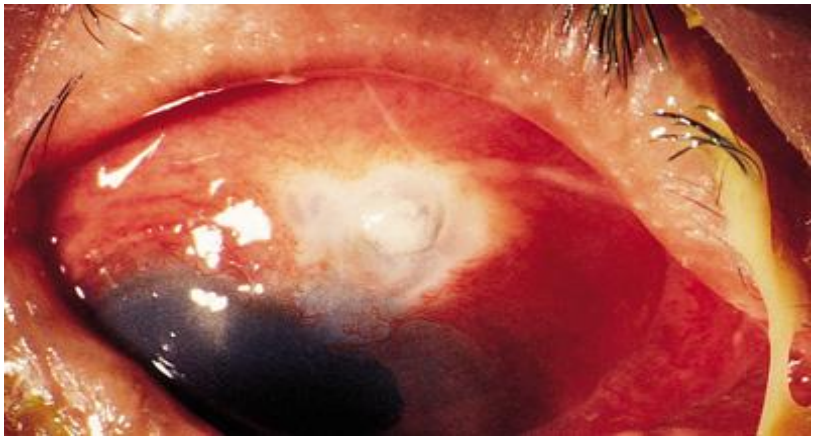


Candida endophthalmitis

BLEB RELATED

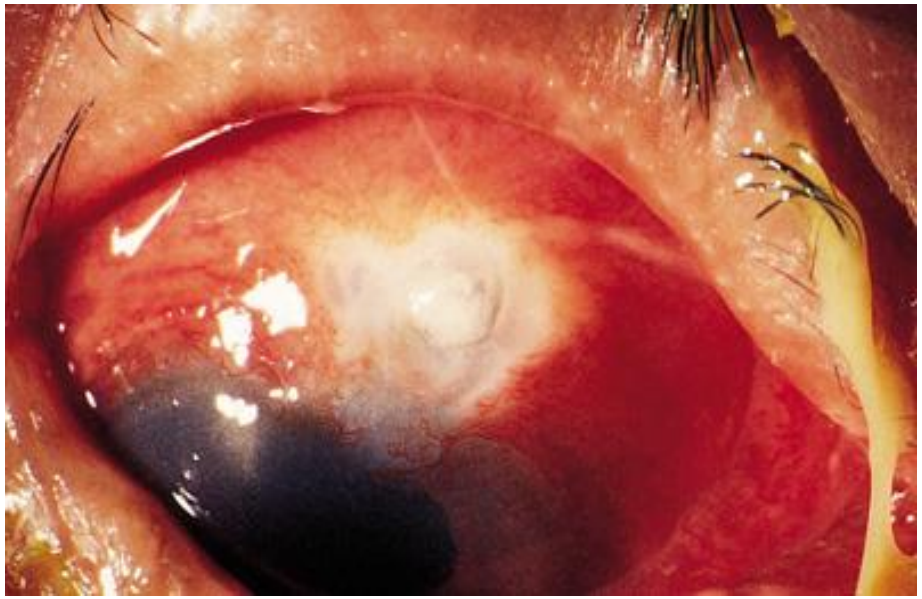
- Blebitis- A microbial bacterial infection of the bleb without vitreous involvement, may complicate the postoperative course months to years after filtering surgery

- R - redness (conjunctival injection or ciliary flush),
- S- sensitivity to light (photophobia)
- V- vision change (decreased central visual acuity); or
- P- pain (ciliary body spasm)

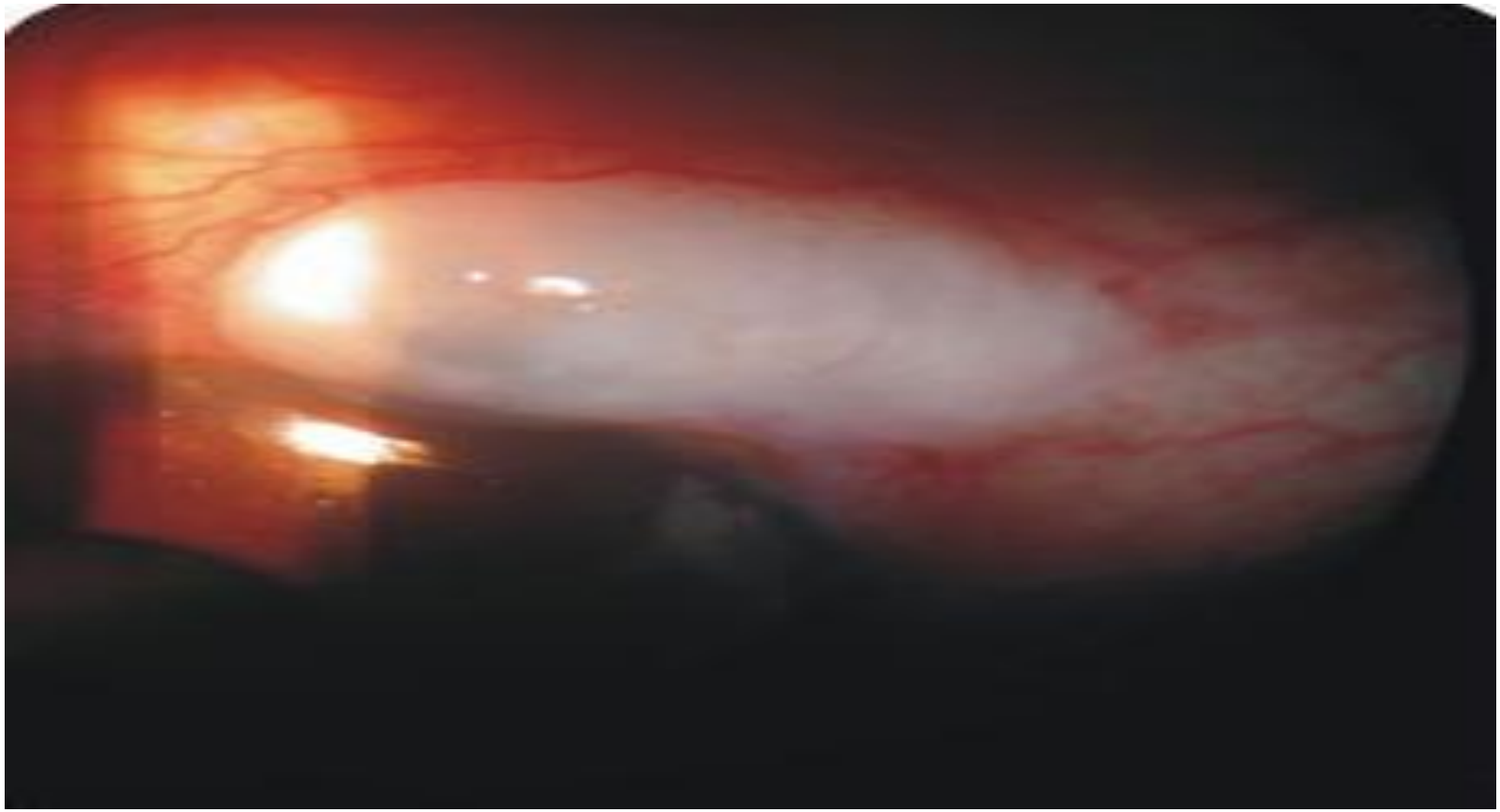


Presenting features:

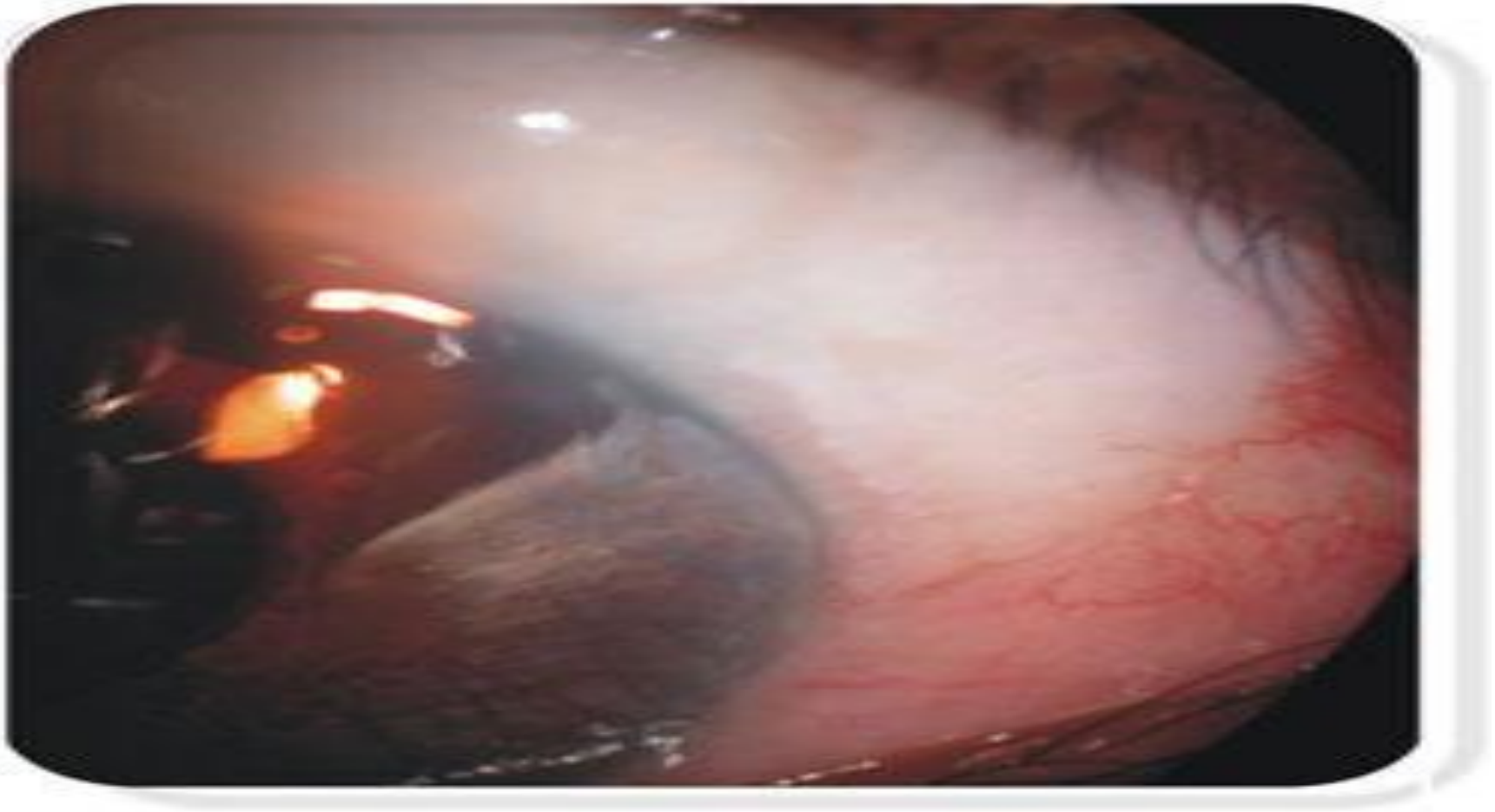
–Abrupt onset pain & redness
–Thin, avascular & leaky bleb
–"white on red" appearance



Thin wall of the bleb



There is a chronic exposure of intraocular contents to the tear film, and in some cases, endophthalmitis can develop years after the original surgery.



- Significant high morbidity
  - 5-year probability with mitomycin :

    (*Peter W. DeBry et. al Arch Ophthalmol. 2002;120:297-300*)
    - Bleb leak – 17.9%
    - Blebitis – 6.3%
    - Endophthalmitis – 7.5%
  - Its higher with 5 FU: more bleb leak

- Concluded that: incidence of endophthalmitis is approximately 1.3% per year

Organisms:

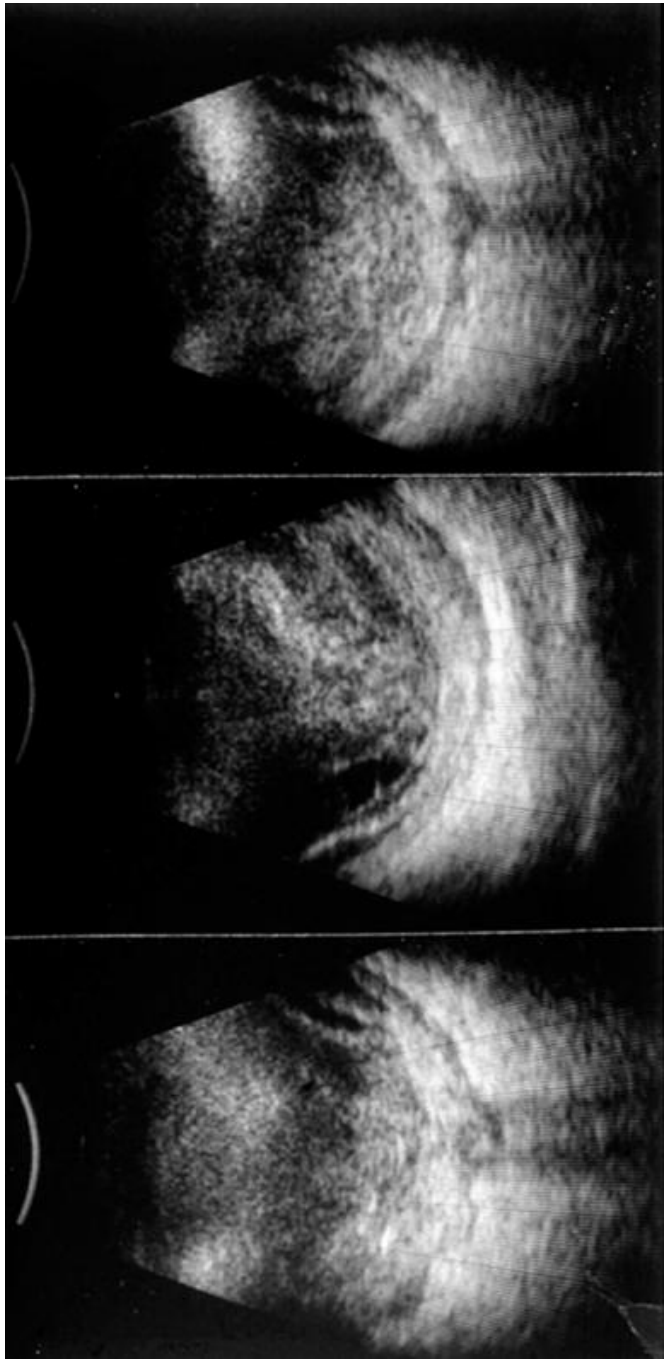
- MC : *Staphylococcus and more so* Coagulase - ve
- Streptococcus
- *Enterococcus* species
- *Moraxella* species
- *Pseudomonas aeruginosa*

Treatment : most Gram +ve responded to Vancomycin

Outcome : Poor prognosis

Role of Real time USG

- Ultrasound evaluation :
  - Significant media opacification
  - Dispersed vitreous opacities associated vitritis and
  - Advanced cases, chorioretinal thickening
  - R/O associated retinal or choroidal detachment, dislocated lens material, or retained foreign bodies, which may influence management
  - Also to know the response of the treatment.



- *Top:* *S*evere intravitreal infiltrates and thickening of the choroid.“T-sign” due to increased fluid in the sub-Tenon space, which indicates beginning of panophthalmitis

- *Middle:* *1 day later* the situation has worsened in spite of intravitreal antibiotics, beginning of retinal detachment

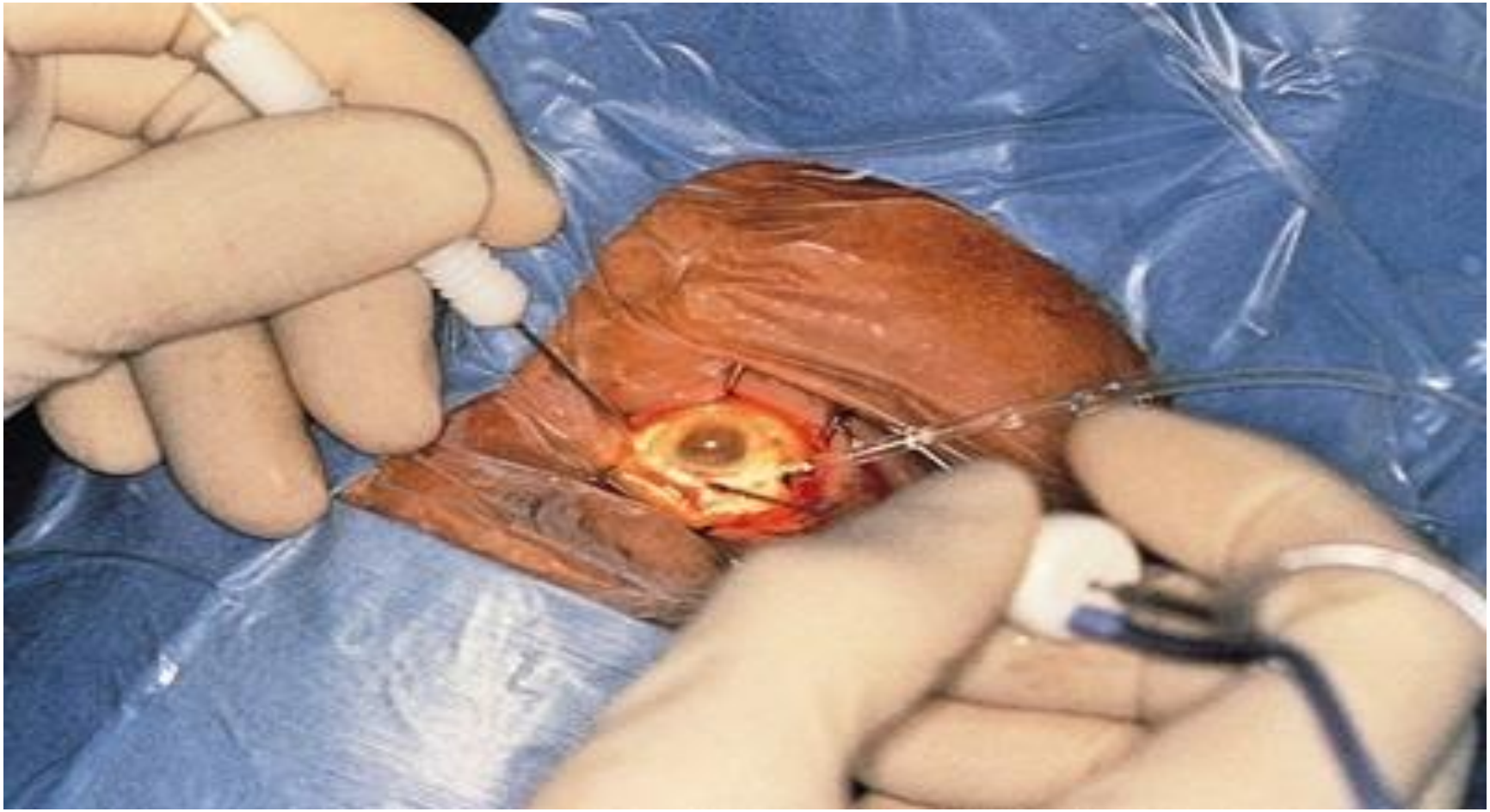
- *Bottom:* *5days* later diffuse panophthalmic infiltration is present

Diagnosis

- Clinical picture can be confirmed by smear and culture of the organisms
- The most important samples to culture are **aspirates from the aqueous and vitreous cavity**
- Possibility of isolating an organism from vitreous 56-70% while from aqueous 36-40%

www.aios.org

Obtaining intraocular specimens



Obtaining aqueous samples

- Aqueous fluid is obtained by paracentesis
- About 0.1 ml fluid is aspirated
- Innoculated on culture media

Obtaining vitreous samples

- Sample of vitreous is a very important source to know the causative organisms
- Aspiration may not provide adequate sample as vitreous is denser and contain inflammatory membranes in endophthalmitis
- There is also chance of retinal detachment.
- Safest method is vitreous biopsy (0.2-0.3 ml)
- Lost volume of vitreous replaced by saline

www.aios.com

EVS:

- Vitreous samples > aqueous samples in isolating organism
- Aqueous samples sole source : 4.2% of eyes
- No significant difference in yield : needle tap = vitreous biopsy = PPV techniques

Technique…

- Eye is surgically prepped : povidone-iodine 5% solution
- A/C tap: A 30-gauge needle attached to a tuberculin syringe is inserted through the limbus. 0.1 mL of aspirate.

- Vitreous specimen: vitreous needle tap / vitreous biopsy with a cutter
  - vitrectomy probe attached to a 5 ml syringe through sclerotomy incision
  - Approximately 0.1– 0.3 mL of vitreous (slow, manual aspiration)
  - Alternative : vitreous needle tap with 27- to 22-gauge
  - No fluid vitreous: vitreous biopsy better choice
  - Intravitreal antibiotics mandated

A/C tap as good as Vitreous Tap???

- **Anterior Chamber and Vitreous Concordance in Endophthalmitis -**
  - The AC lacks concordance with vitreous
  - AC culture : did not aid in predicting vitreous findings
  - Topical therapy achieving therapeutic levels in the AC may not prevent or treat **endophthalmitis**

David R. P. Almeida et.al Arch Ophthalmol. 2010;128(9):1136-1139

Culture media for evaluation of endophthalmitis	
Media Types	**Organisms Suspected**
Chocolate agar	**Bacteria (H. influenzae)**
Blood agar	**Bacteria (Streptococci)**
Sabouraud's agar	**Fungi**
Thioglycolate Broth	**Bacteria (Aerobic & Anaerobic)**
Anaerobic media	***Propionibacterium acnes* and other anaerobes**

Quantitative PCR

- Quantitative broad-range PCR of bacterial 16S rDNA

- Advantages of PCR:
  - Early diagnosis: recognition and susceptability
  - Identifying atypical organism
  - High sensitivity but low specificity

- **Gustavo B. Melo et.al** *Invest Ophthalmol Vis Sci* 2011;52:
- PCR better than conventional
  - Conventional : (Gram + culture) identify 68% of vitreous samples, 50% of aqueous samples (50%) and 61% of the patients with infectious **endophthalmitis**

  - Real time PCR assays was positive in 82% of the vitreous samples and in 100% of the aqueous samples. **endophthalmitis** in 86%

  - Specificity was 100% for the vitreous and 96% for the aqueous samples

Differential Diagnosis

Marked postoperative inflammation:-

Hypopyon uveitis - Behcet's disease or rifabutin toxicity

Pre-existing Uveitis

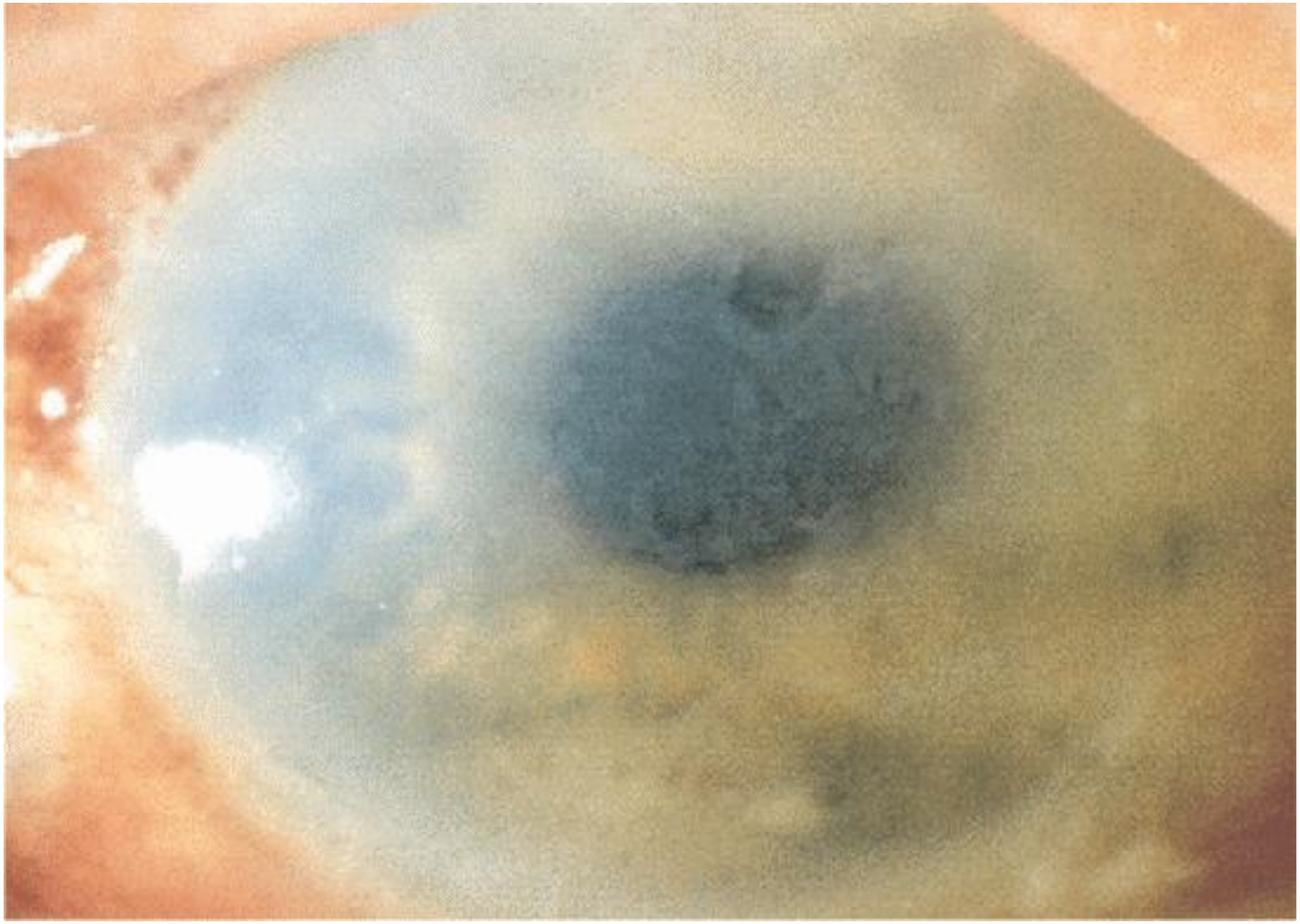
Blebitis Or Keratitis - Anterior segment infection of contiguous structures

Pseudohypopyon may be simulated by RBC, Debries, Pigments, Tumor cells

Retained lens material cause sterile post op inflammation

Toxic anterior segment syndrome (TASS): causes hypopyon without infection

Differential diagnosis - TASS



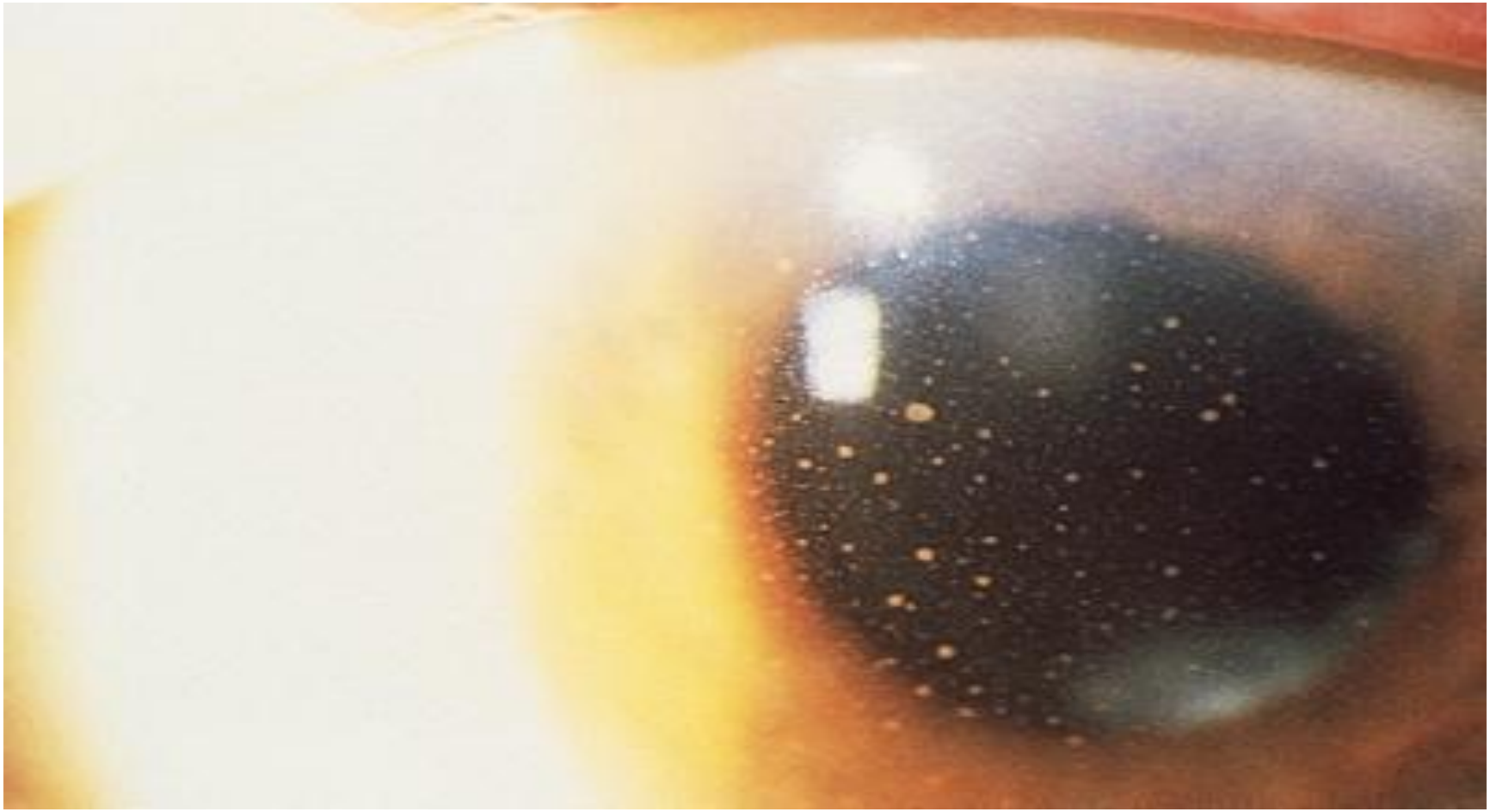
Etiology

- TASS : marked sterile inflammation
  - Noninfectious, toxic substances : gain access in A/C
  - Bacterial toxins,
  - preservatives,
  - detergents, or
  - cleaning compounds as well as intraocular solutions
  - Early postoperative migration of externally applied ointment

Differentiating the Two

Features	TASS	Endophthalmitis
Time	1 day or even earlier	2 to 5 day (EVS – with exceptions)
Pain	Rare (< 25%)	Common (75% - EVS)
Conjunctiva & Lid	Uneventfull	Chemosis & Congestion
Corneal edema	Limbal to Limbal	Very very rare
Iris	Dilated pupil	Constricted
IOP	Extremely high	Low, Normal or High
Therapeutic response	Very good to topical steroid	Worsening
Tap	Negative	Usually Positive (65 to 70% - EVS)

Phacoanaphylactic glaucoma



Progressive vitritis out of proportion to other anterior segment findings = Endophthalmitis

When doubt manage as infection

DISCUSSION CONTINUES…….

- Management – EVS & ESCRS guidelines
- Controversies in Management
- Recent Advances in Management

THANK YOU .