17TH INTERNATIONAL CONFERENCE OF THE RESEARCH INSTITUTE OF OPHTHALMOLOGY

RIO 2025

Anterior Segment Eye Diseases
Current Status & Future Directions

Amniotic Membrane Transplantation

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The University of Nottingham

Acknowledgement

Prof. Harminder S Dua

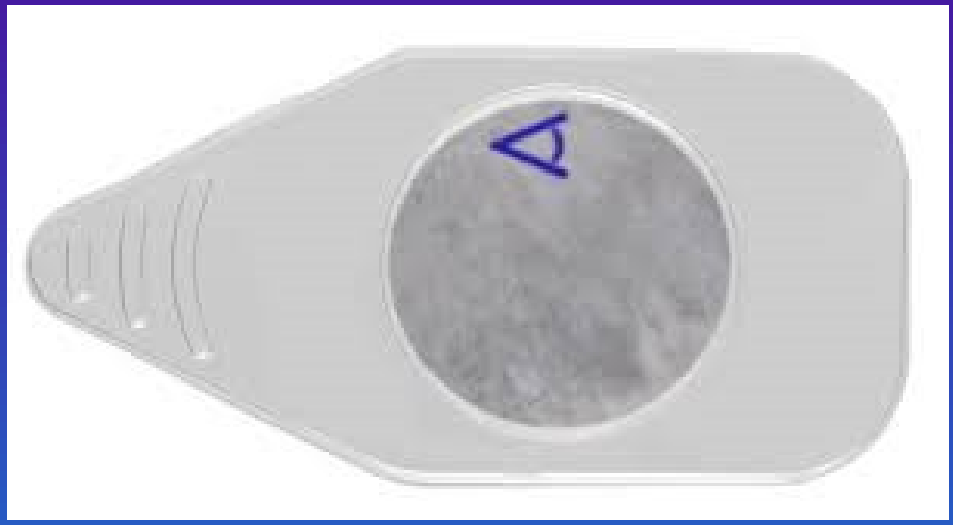
- **No financial interest to declare**

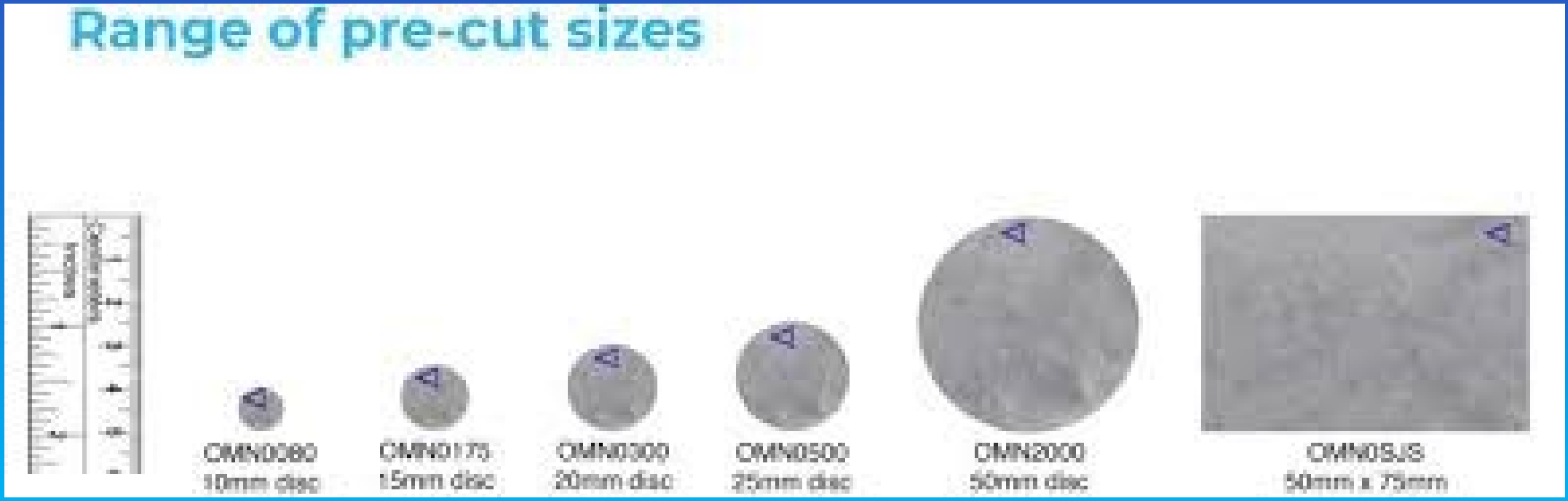
Availability

- **Fresh**
- **Frozen:**
  - **In Di Methyl Sulfoxide [DMSO] Phosphate Buffered Saline [PBS]**
  - **In Eagle's Minimum Essential Medium [MEM] with Glycerol**
- **Dried Freeze, Heat, Vacuum dried**

Availability

(Omnigen)
Vacuum dried Amnion



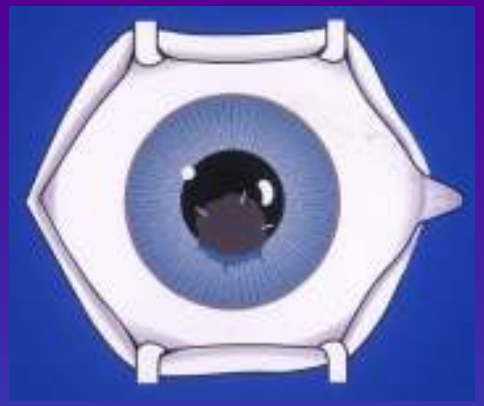


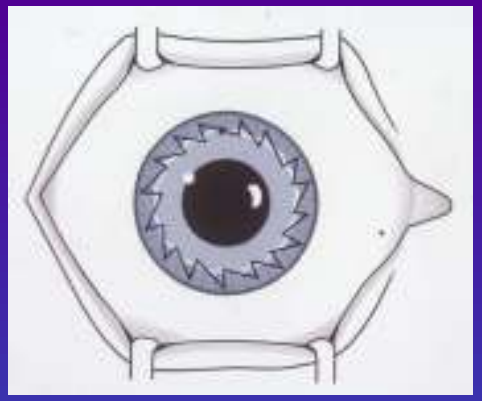
INDICATIONS AND USES

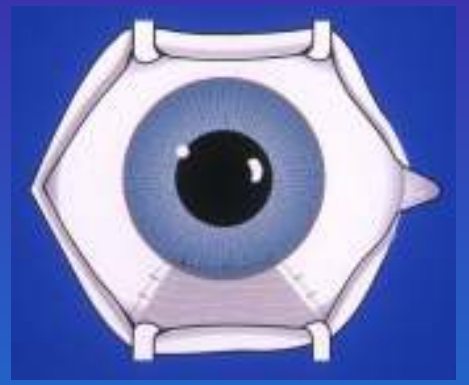
- Persistent epithelial defects
- To build tissue - corneal melts, thinning & perforation
- Bullous keratopathy
- Pterygium surgery
- Conjunctival and symblepharon surgery
- Glaucoma / Oculoplastic surgery

How is it applied ?

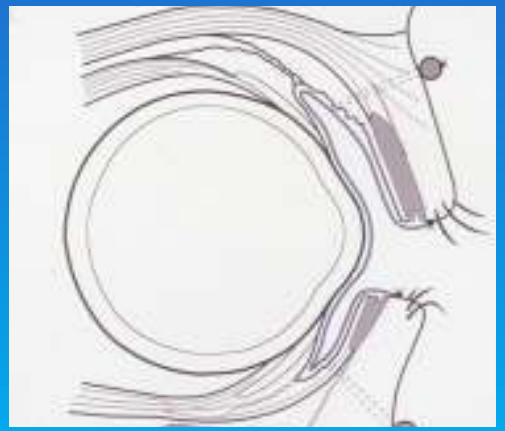
- As a patch or graft
- Partial or partial corneal cover

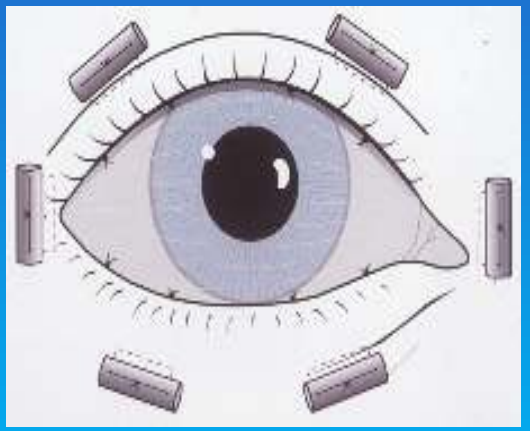






- Bulbar and fornicial cover
- Total ocular surface cover (with conformer, amnion shell)
- Ex-vivo expansion of corneal cells

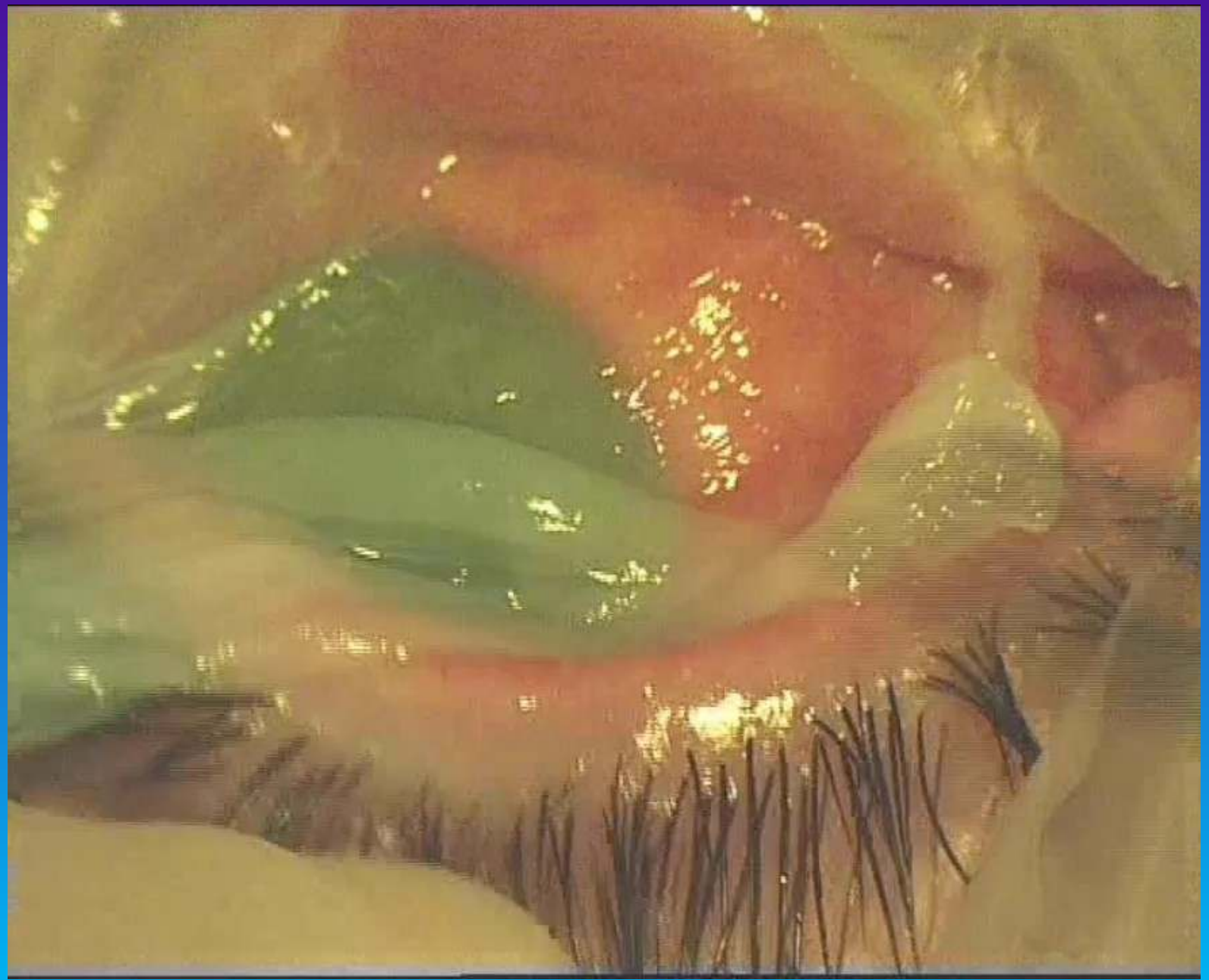




Conformer Wrapped in Amniotic Membrane

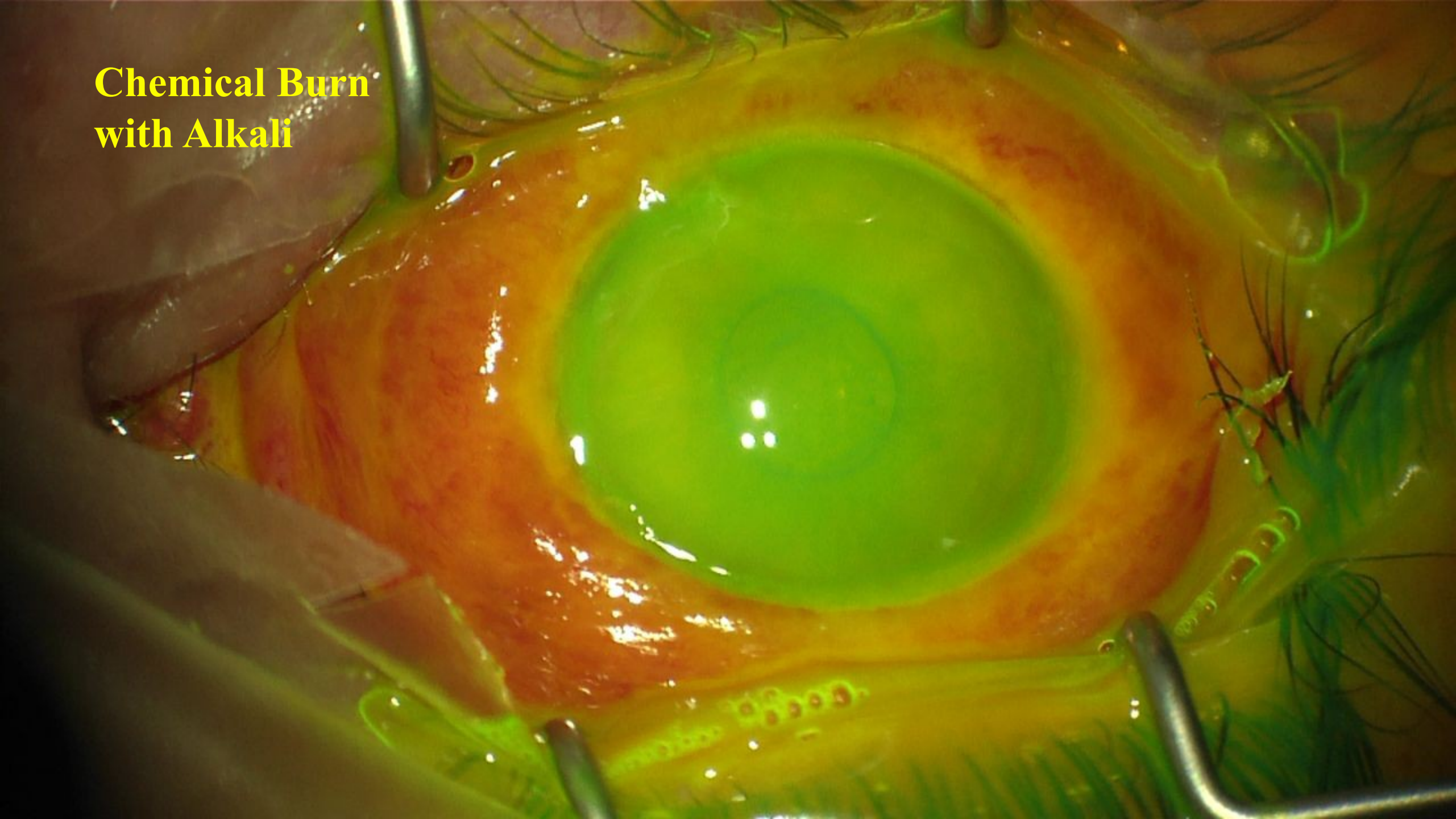
ProKera

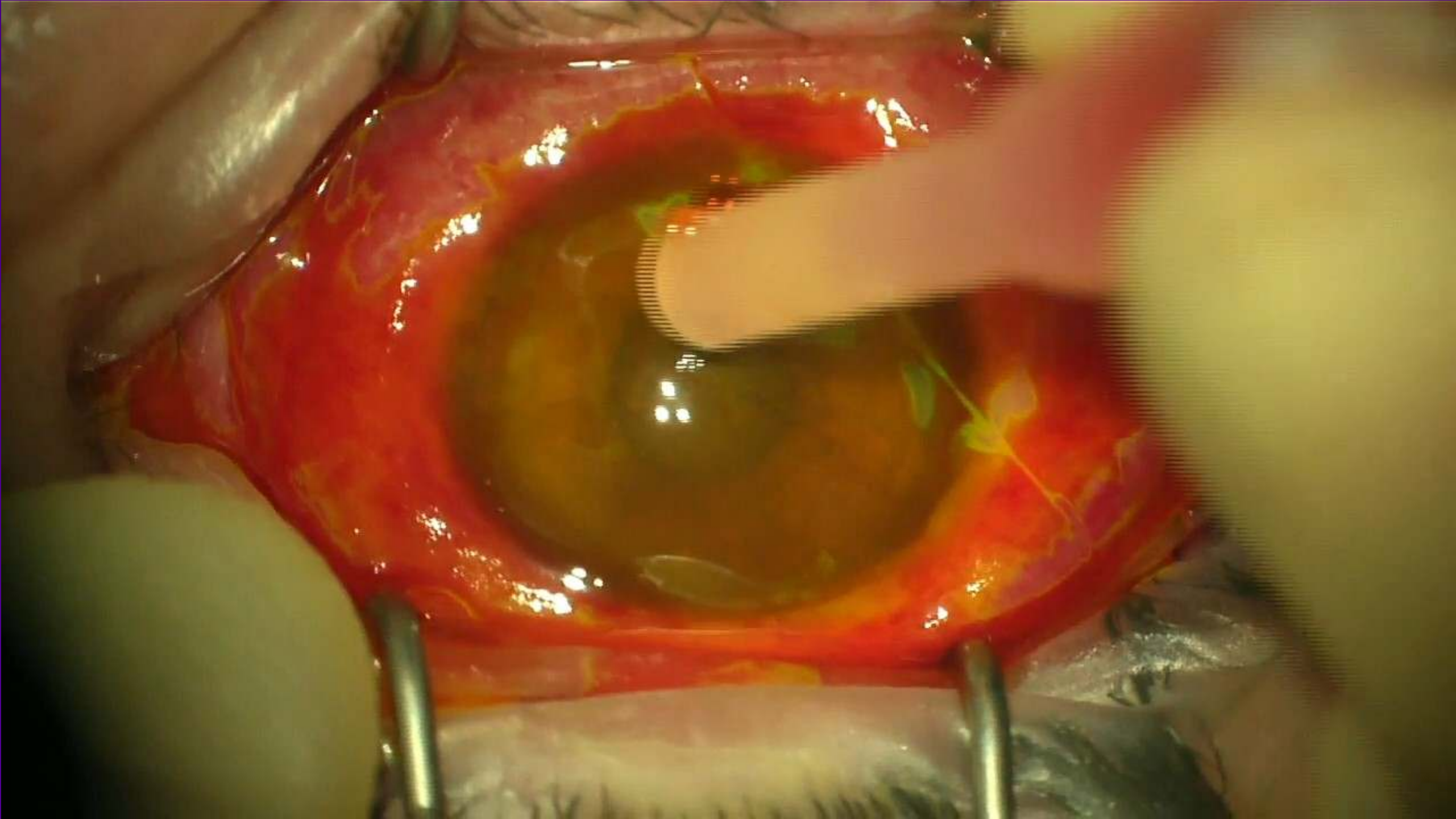
The poor man's ProKera Or Efficiency in simplicity

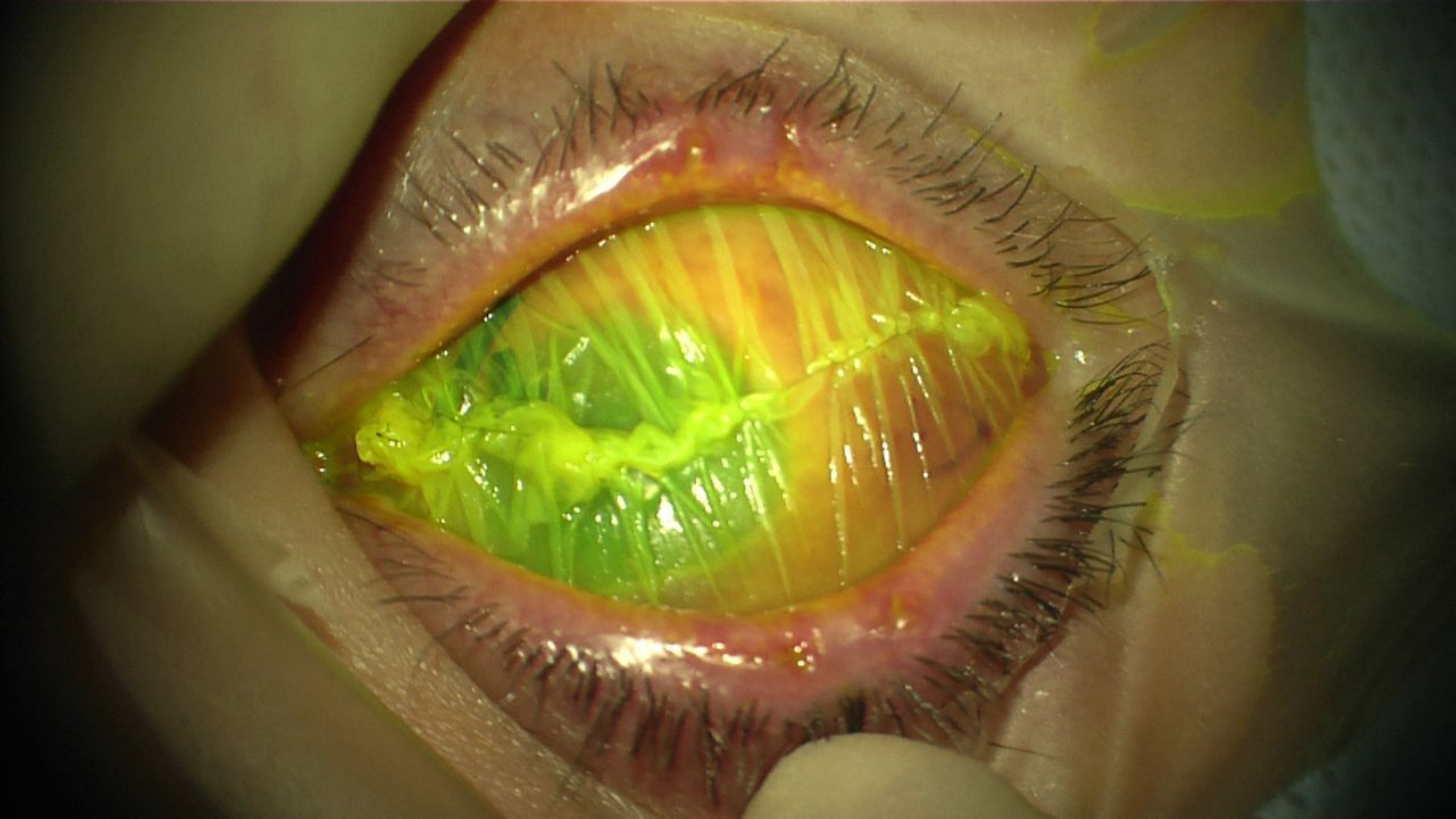


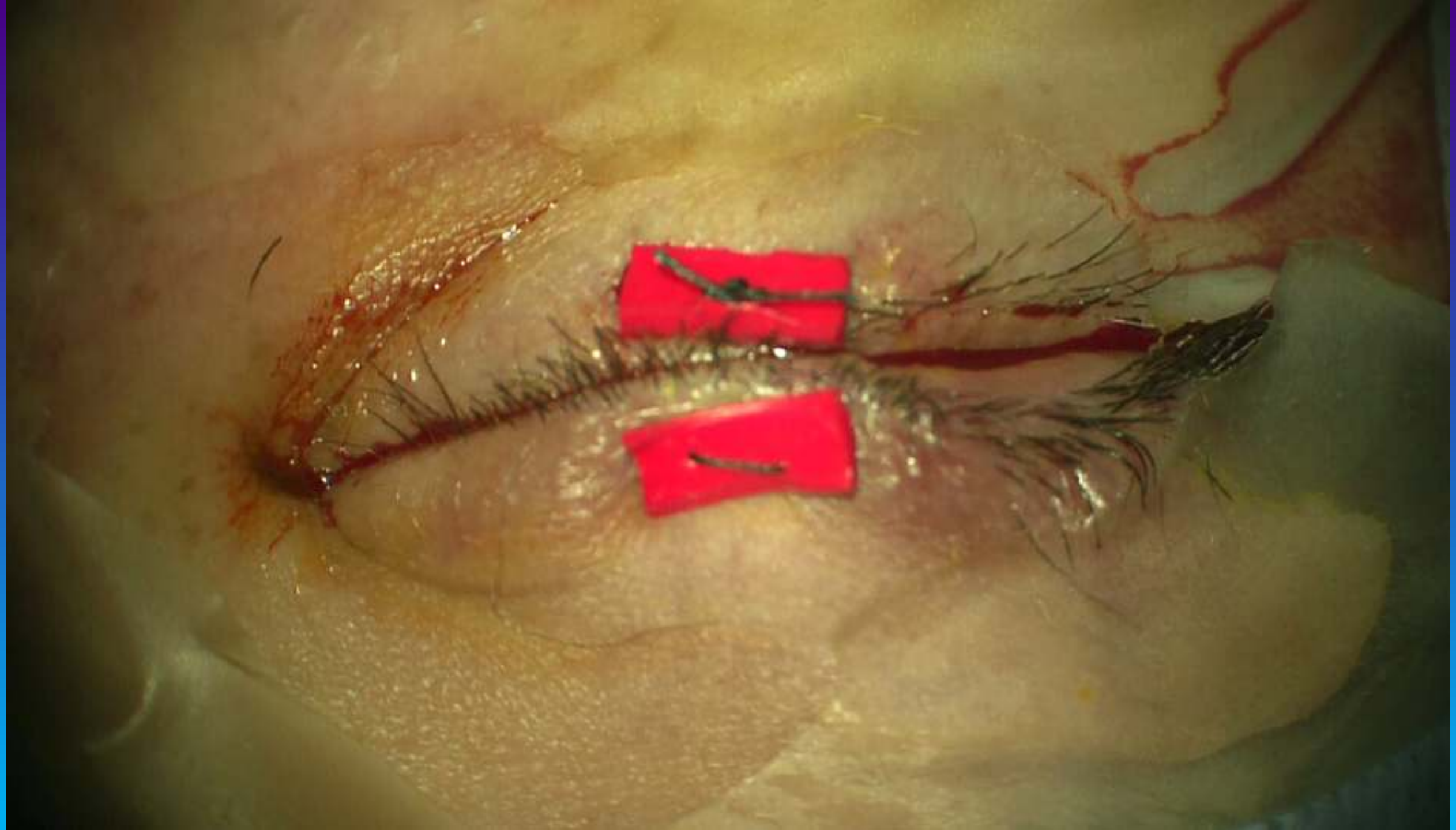
The poor man’s ProKera Or Efficiency in simplicity

Acute management of chemical burn/Steven Johnson’s Syndrom

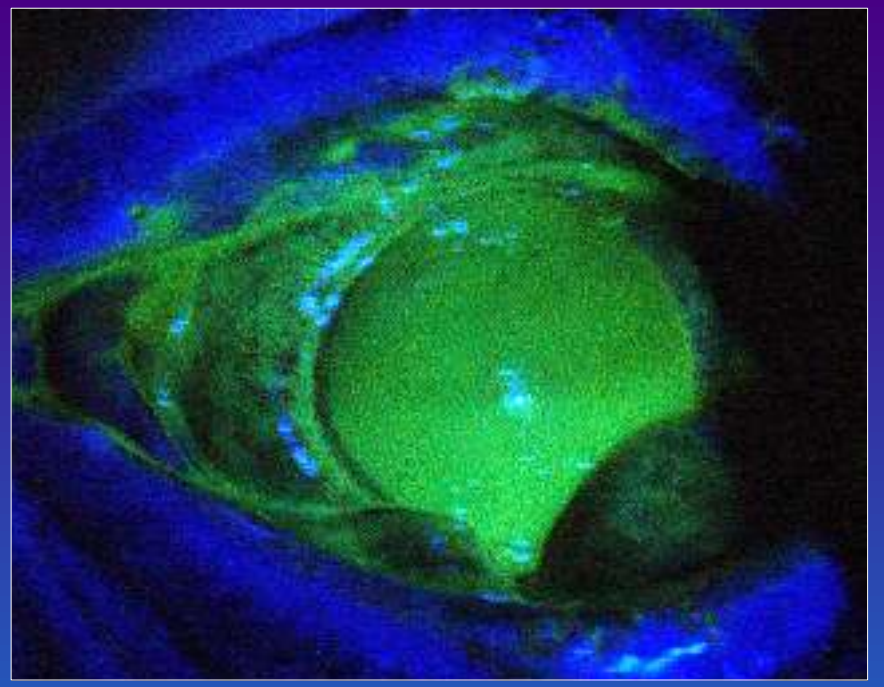

Chemical Burn
with Alkali

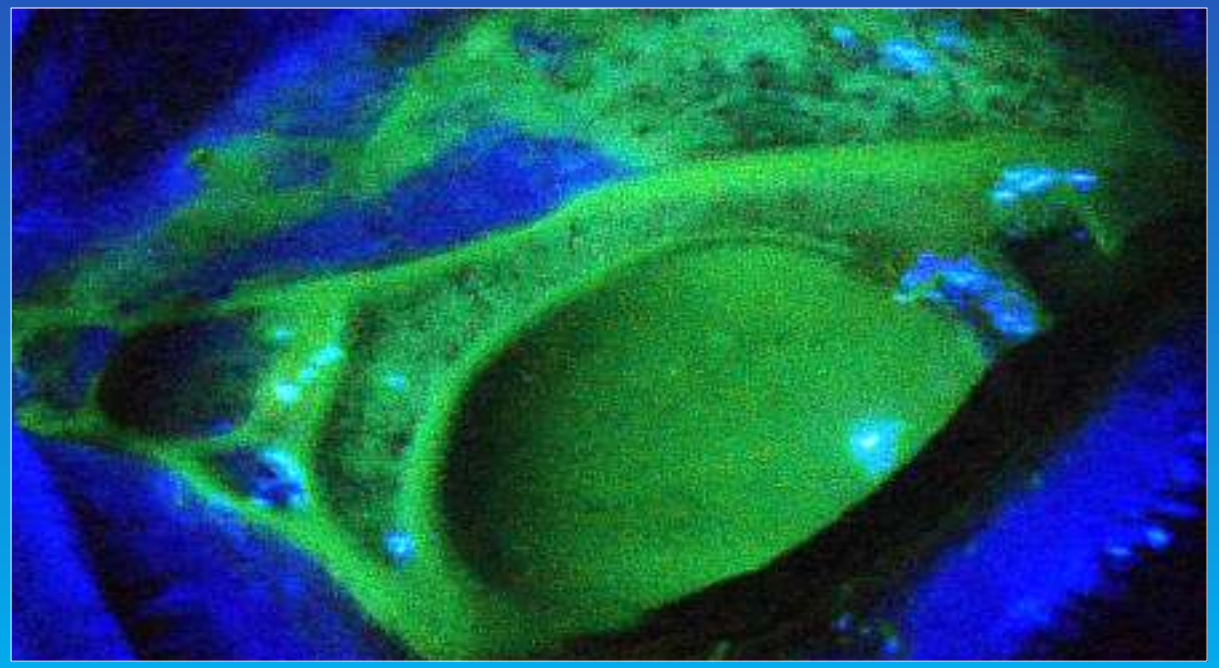


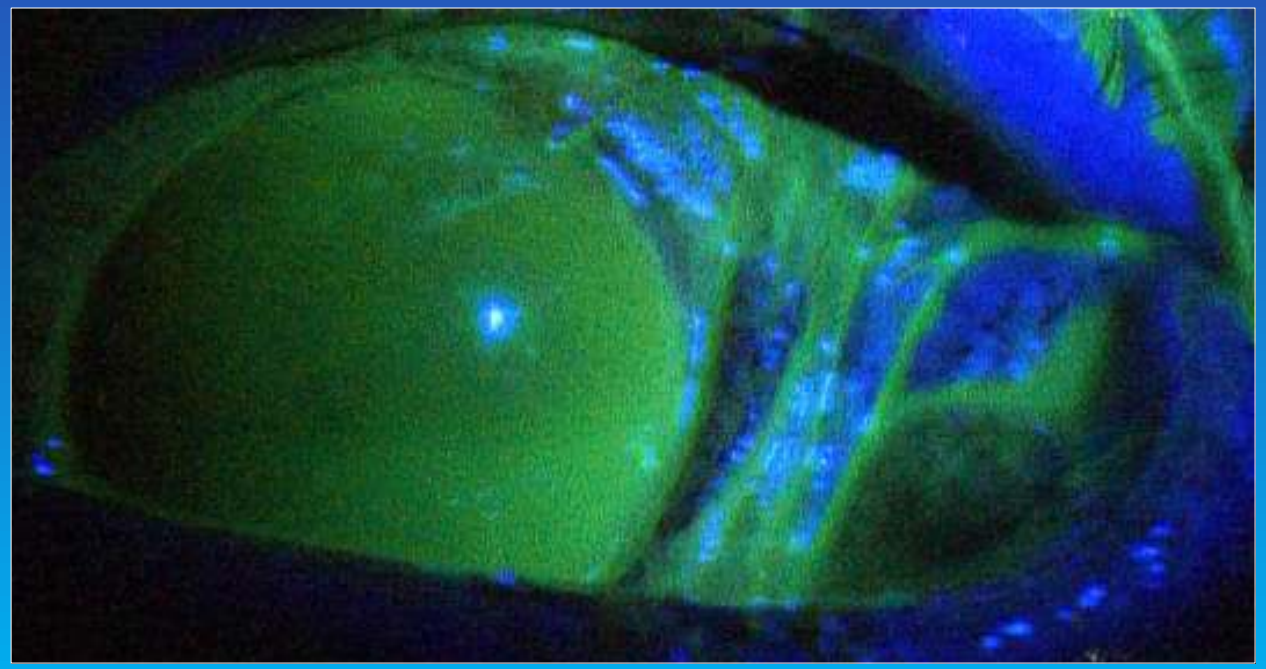


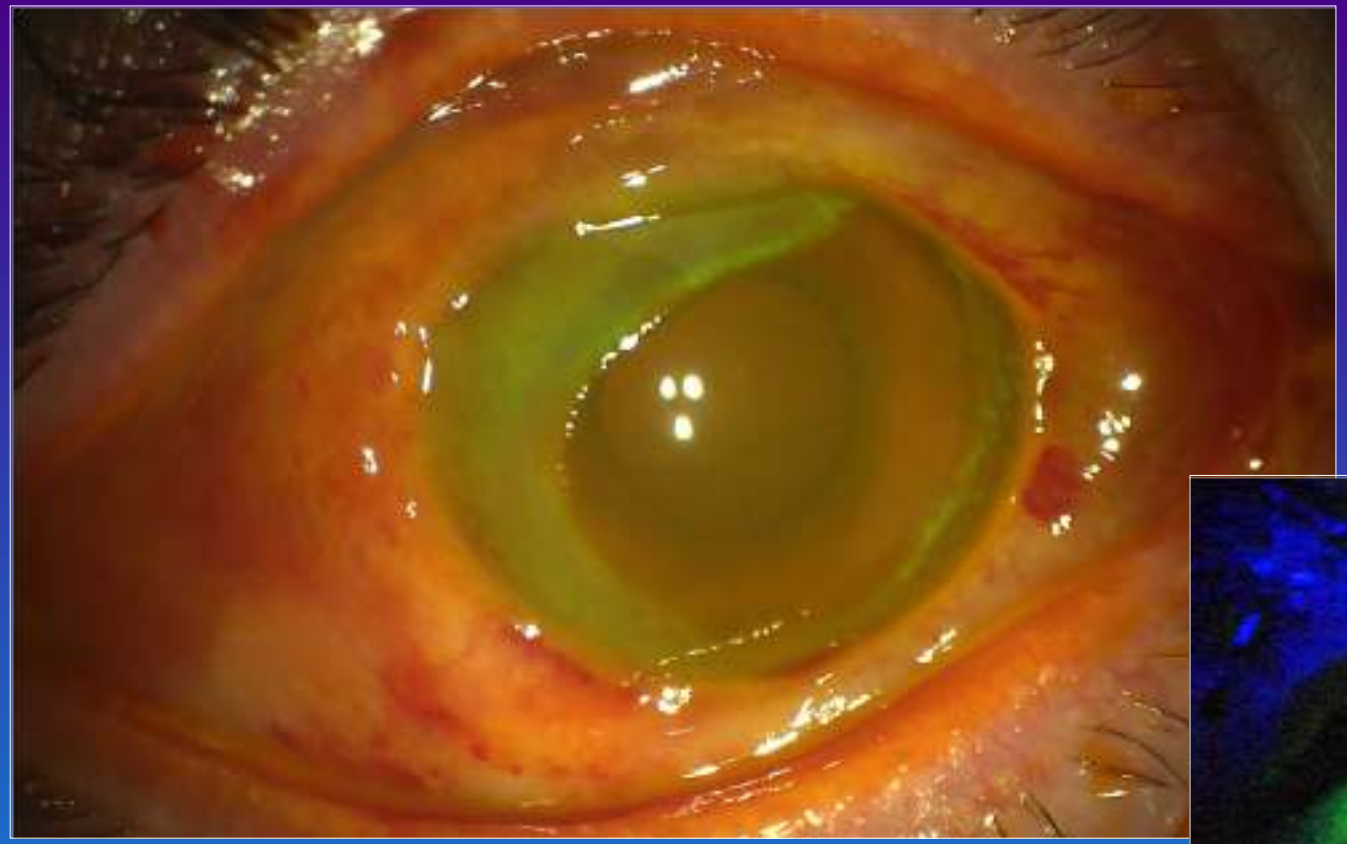


2 weeks Later

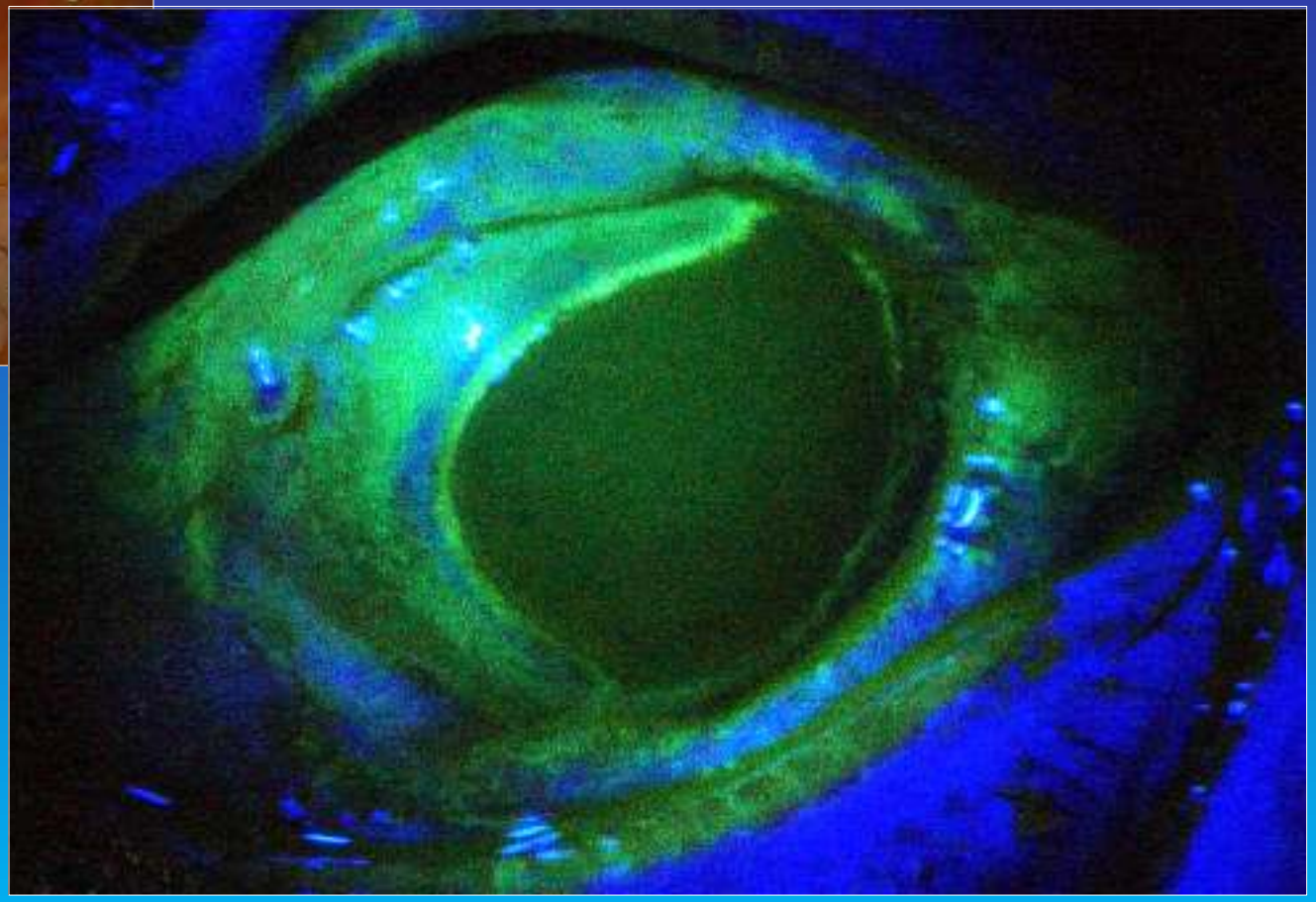


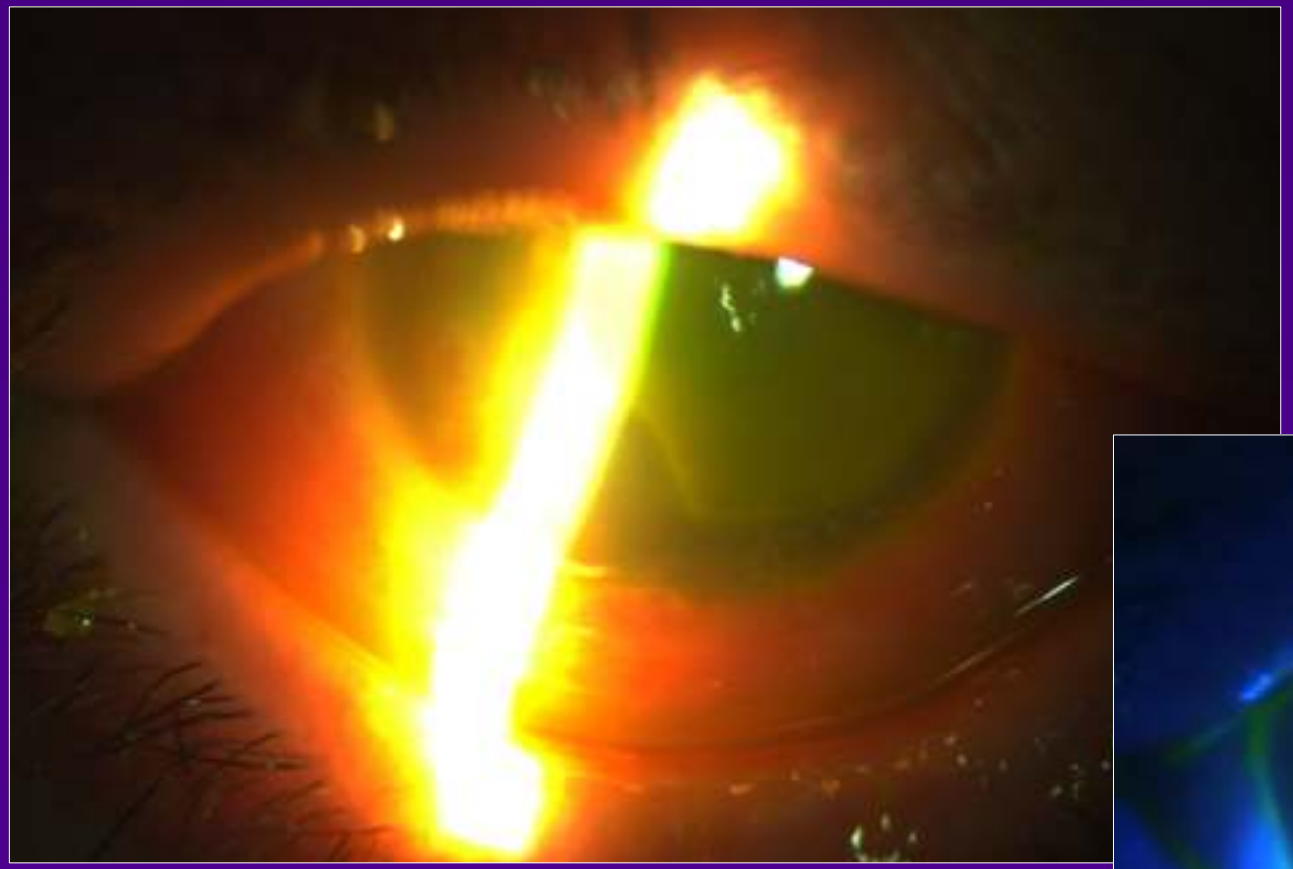


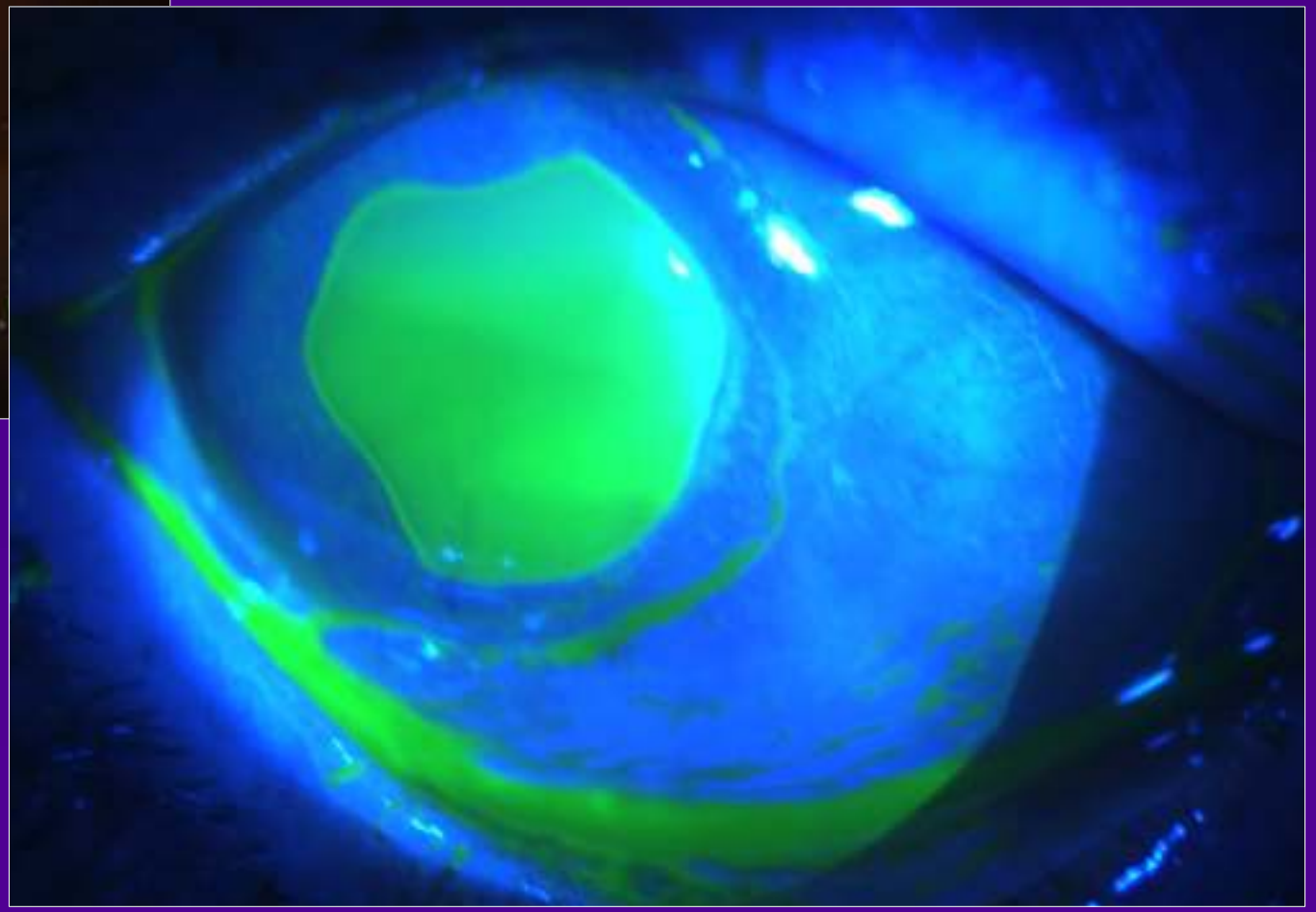




3 weeks
Later







SURGICAL OPTIONS

- **Epithelial side up**

As a substrate for migrating cells

- **Epithelial side down**

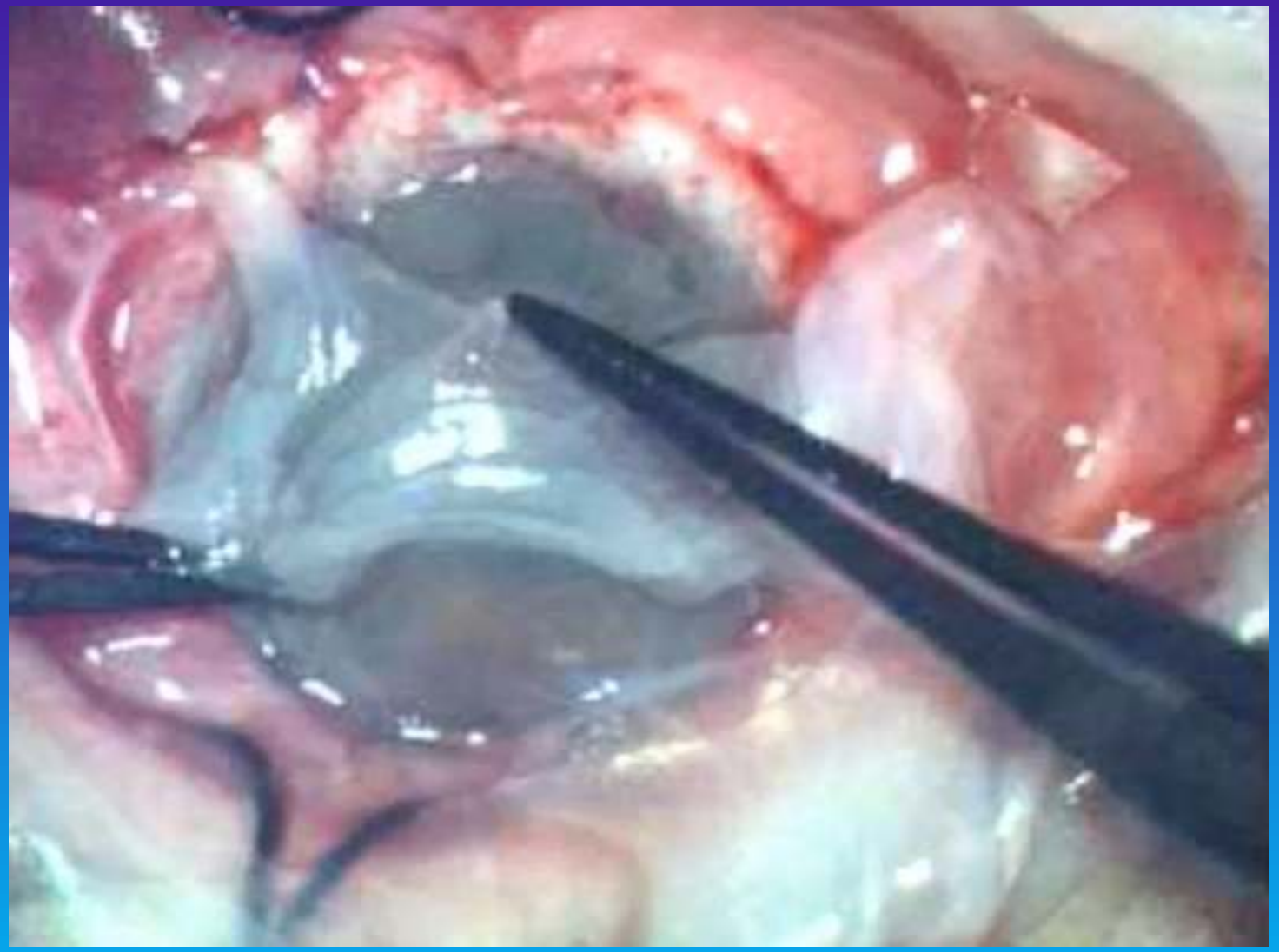
To tamponade inflammatory cells.

- **Two membranes**

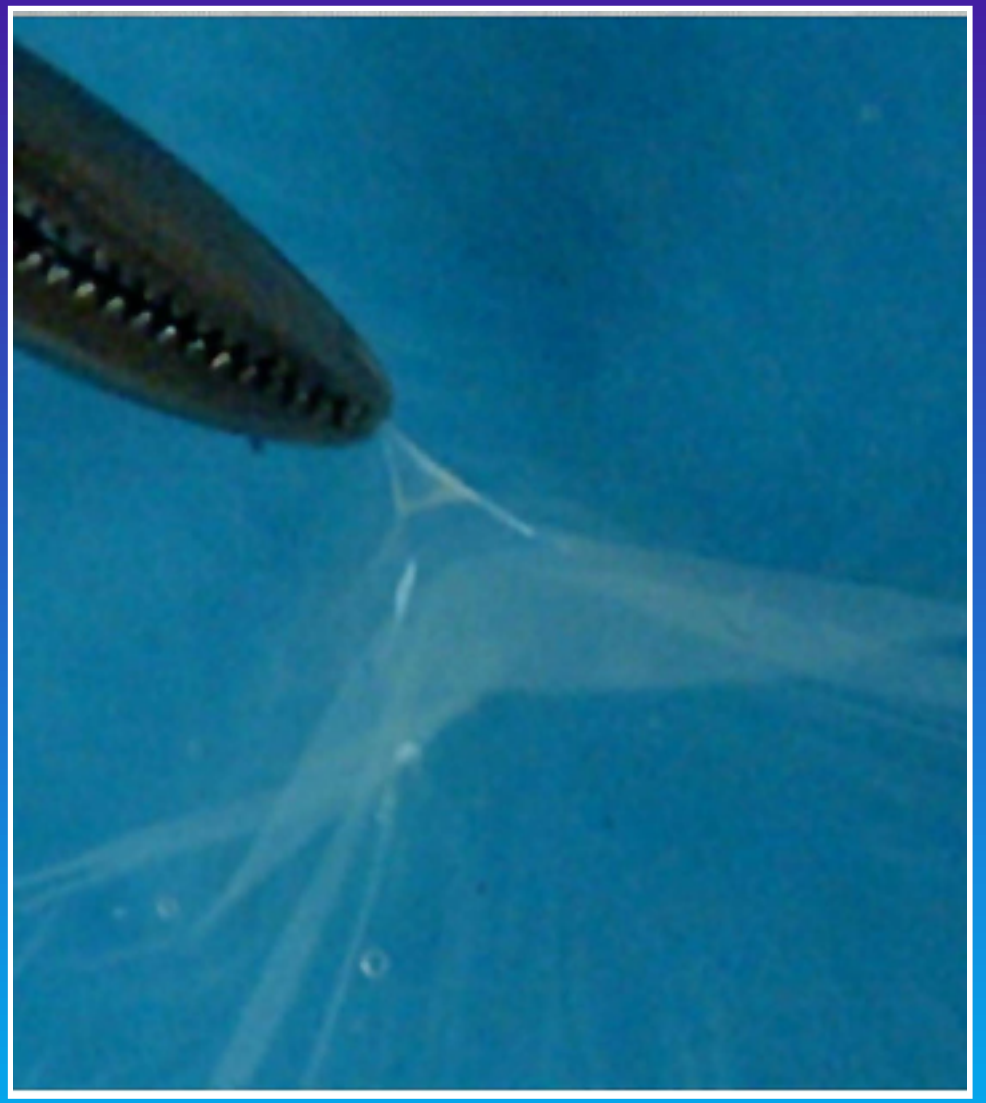
one epithelial side up and the other down.

- **Multiple layers**

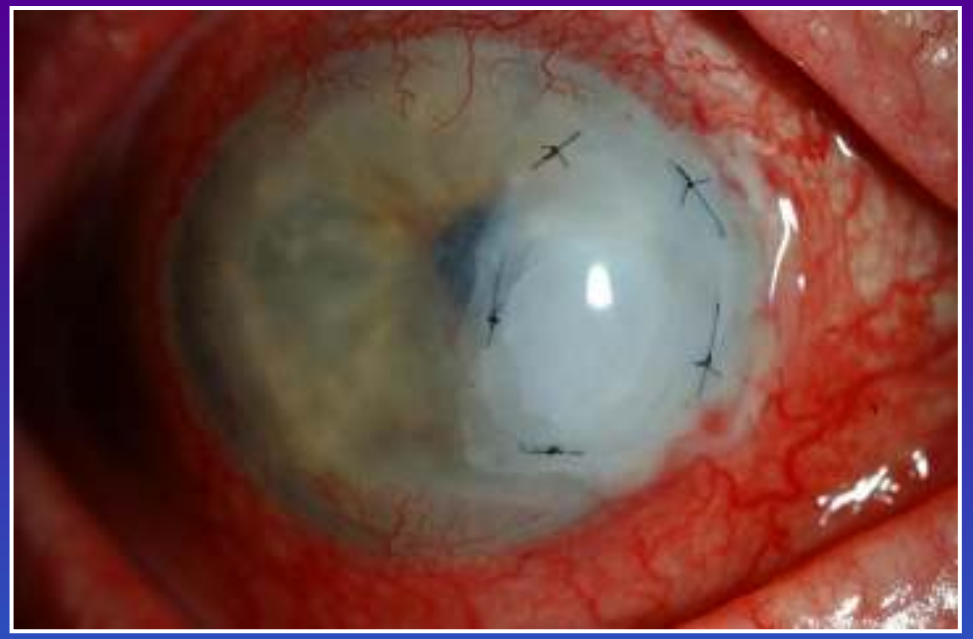
How to know which side is up?



Strands of spongy layer

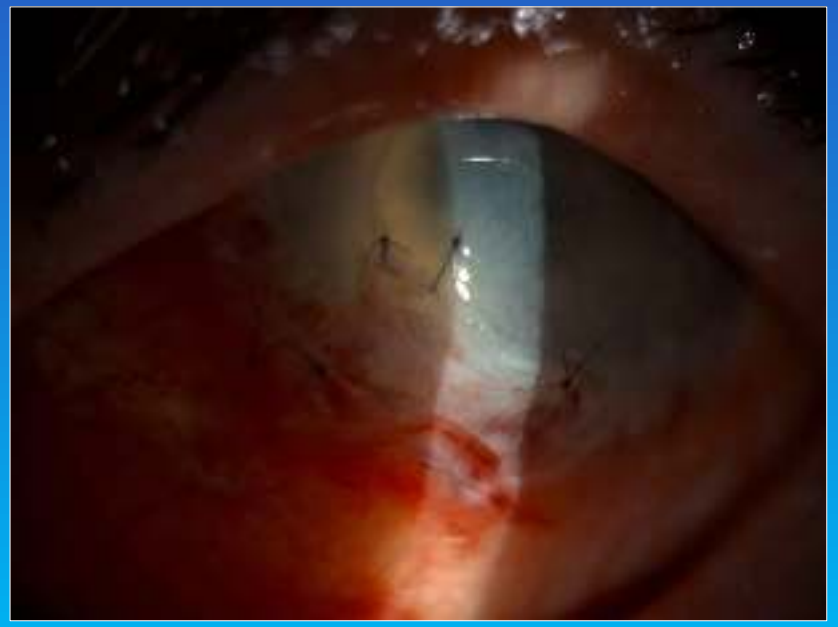


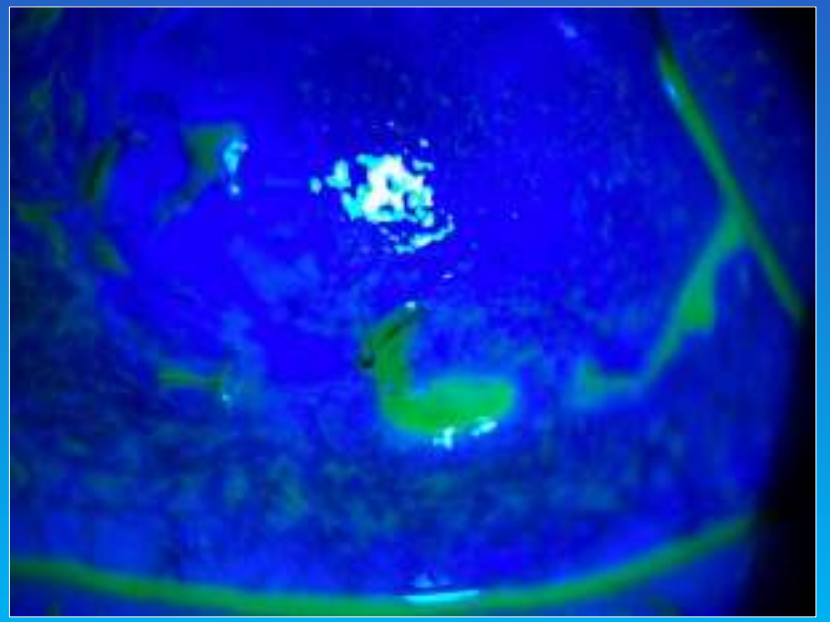
PED



Multilayer AMT with Tisseel (fibrin glue)

Persistent epithelial defect in PUK

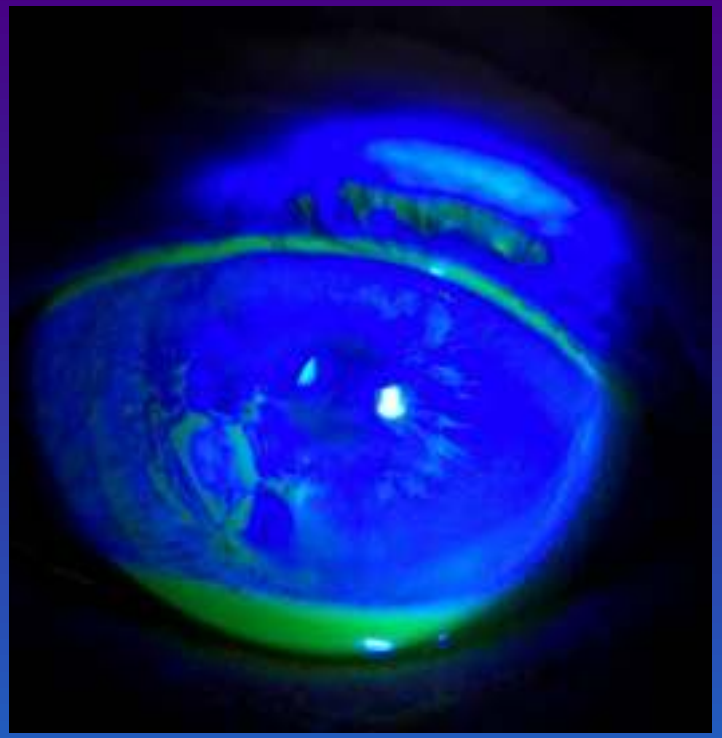


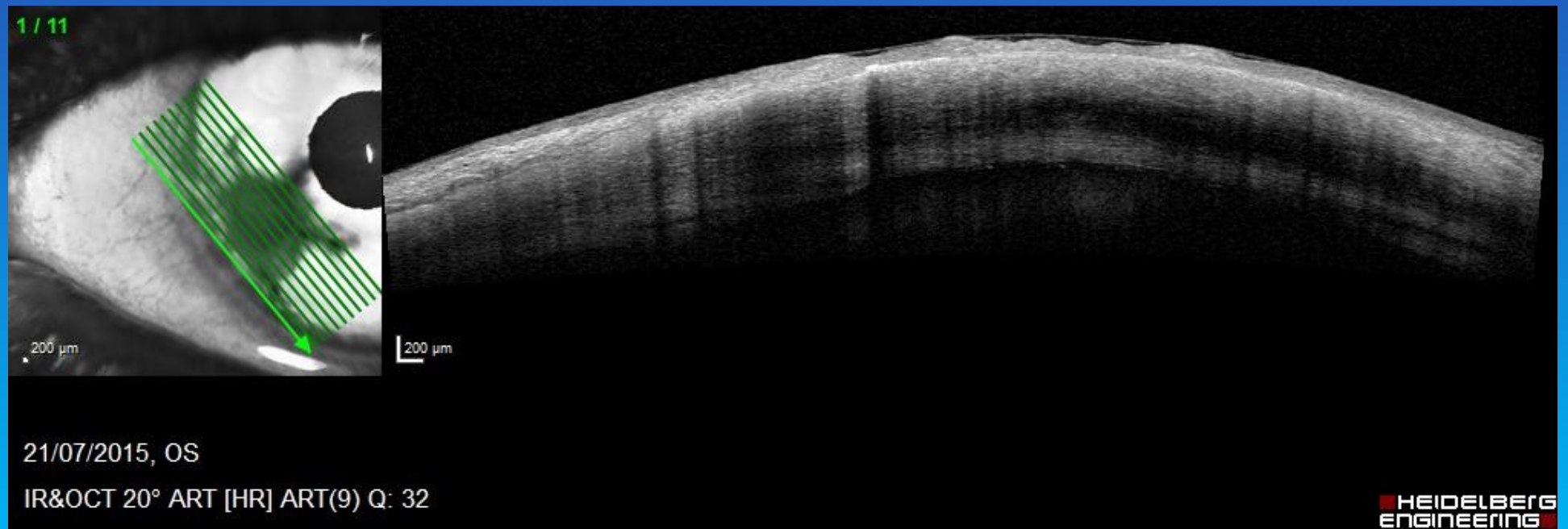



Rheumatoid melt


2 weeks later


18 / 21
200 µm
200 µm
07/07/2015, OS
IR&OCT 30° ART [HS] ART(9) Q: 28
HEIDELBERG ENGINEERING




1 / 11
200 µm
200 µm
21/07/2015, OS
IR&OCT 20° ART [HR] ART(9) Q: 32
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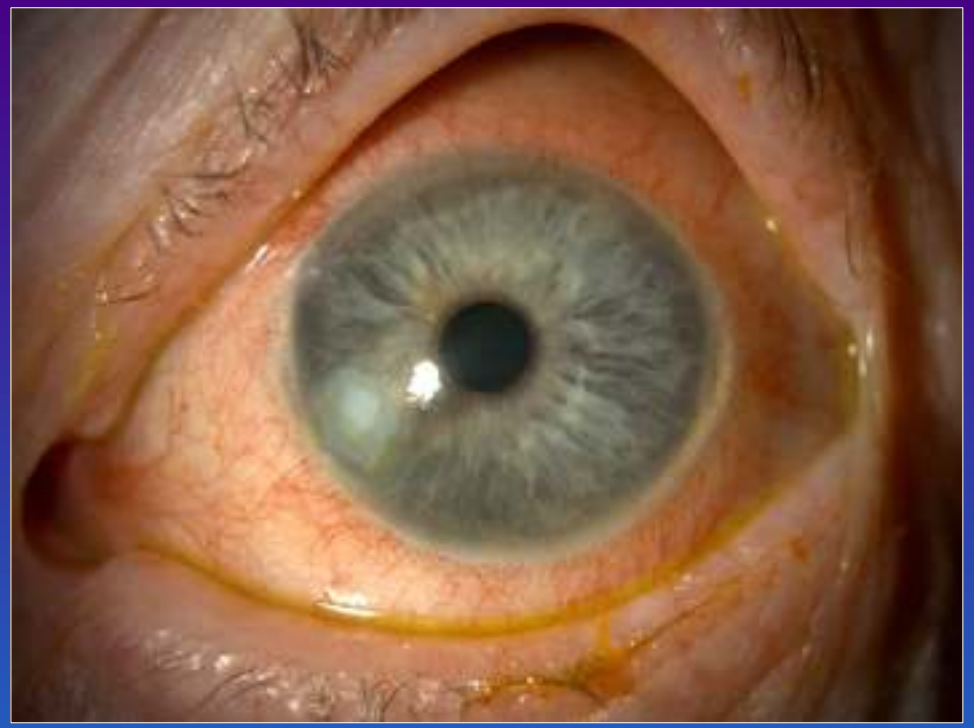

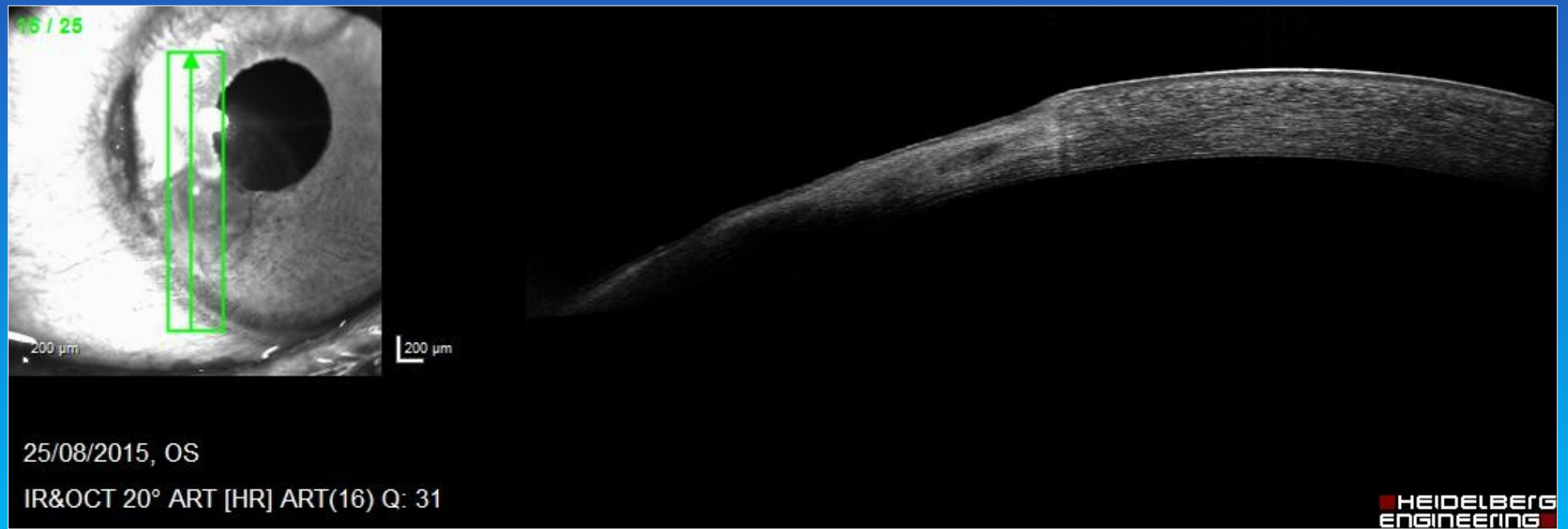
15 / 25
200 µm
200 µm
25/08/2015, OS
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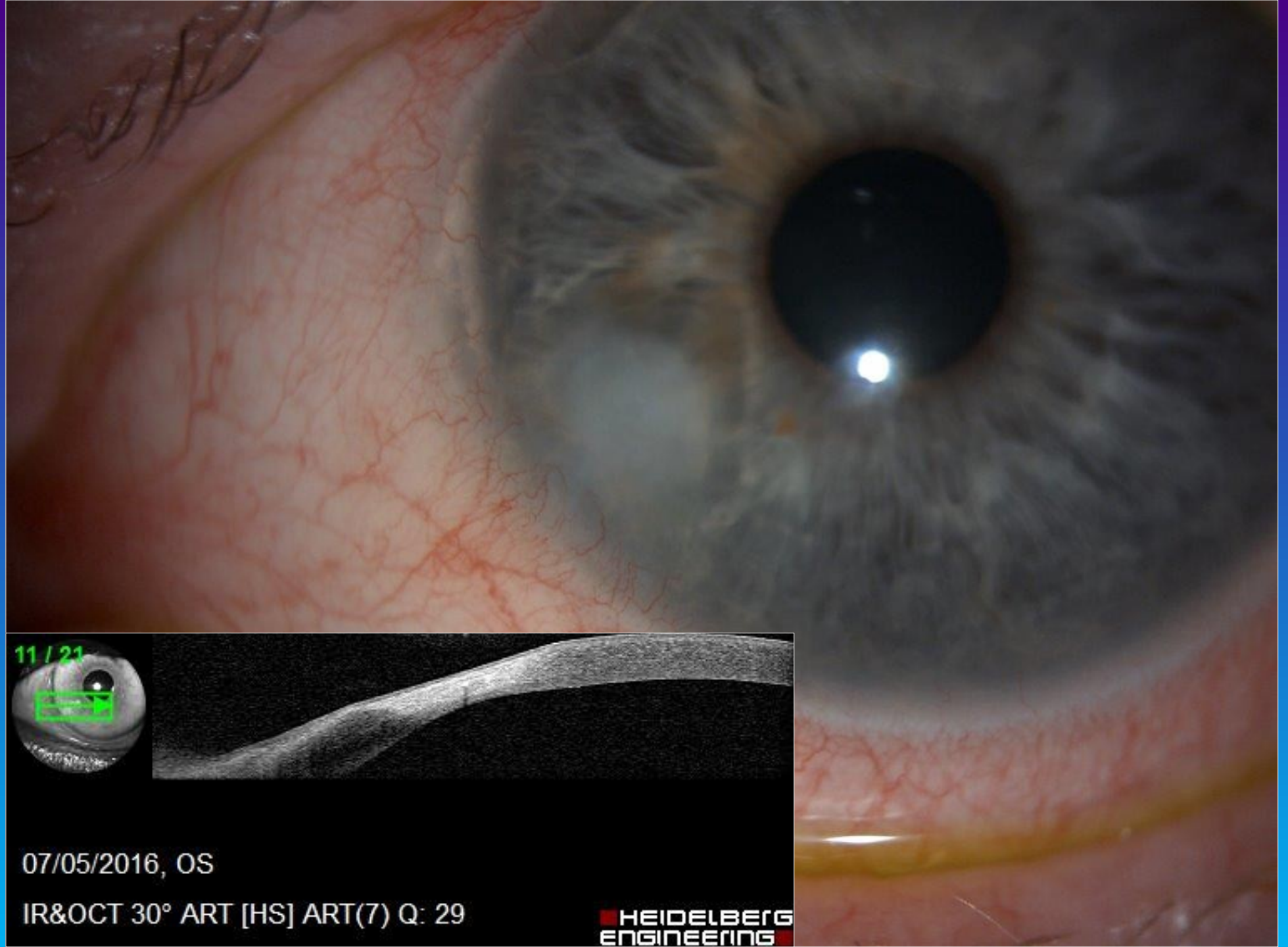
HEIDELBERG ENGINEERING

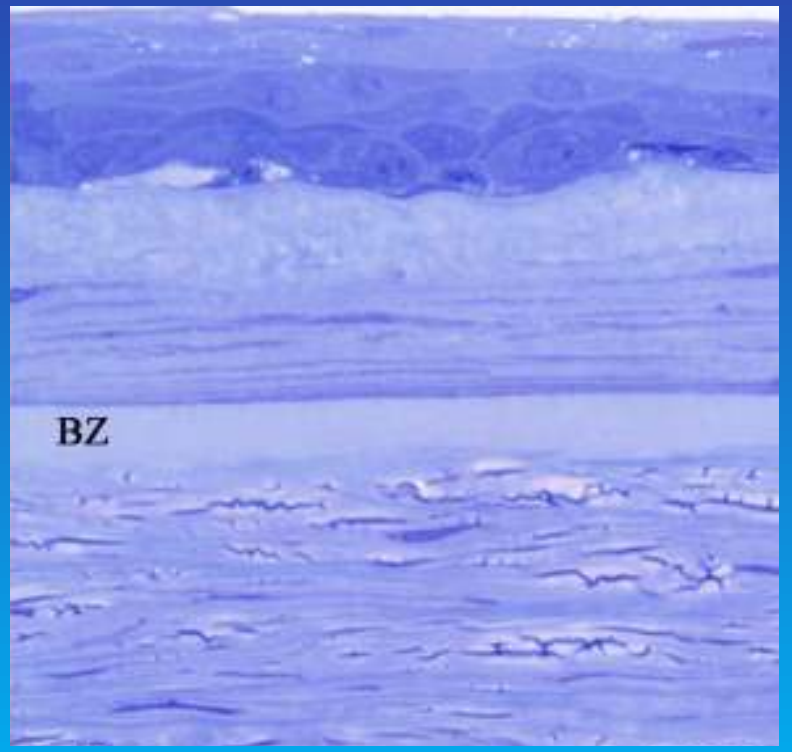

11 / 21
07/05/2016, OS
IR&OCT 30° ART [HS] ART(7) Q: 29
HEIDELBERG
ENGINEERING

Histologic Features of Transplanted Amniotic Membrane: Implications for Corneal Wound Healing

Dalia G. Said, MD,[1,2] Mario Nubile, MD,[3] Thaer Alomar, MD,[1] Andy Hopkinson, PhD,[1] Trevor Gray, FIBMS, CMLM,[4] James Lowe, FRCPath, PhD,[4] Harminder S. Dua, MD, PhD, FRCS[1]

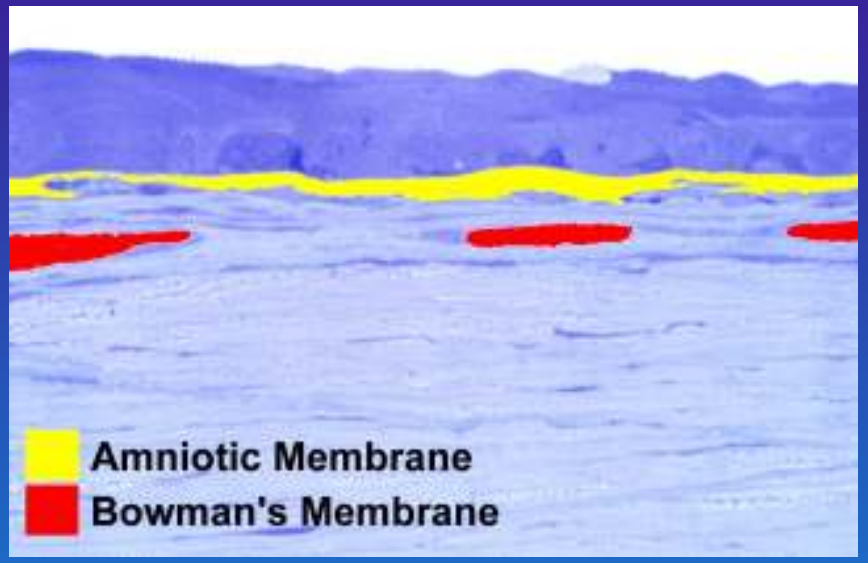
Re-population with corneal stroma derived cells.

Complete

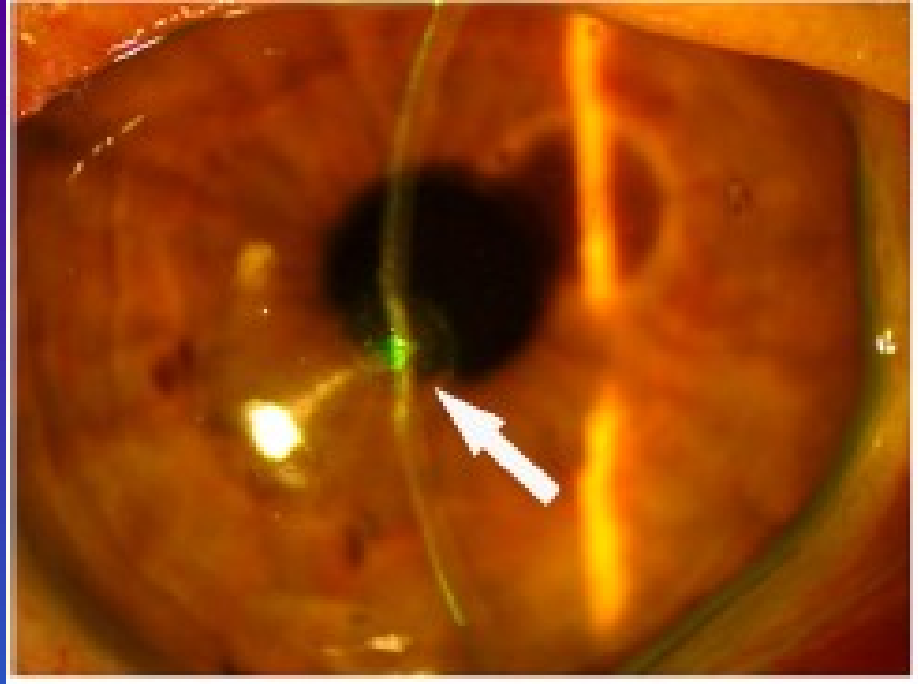


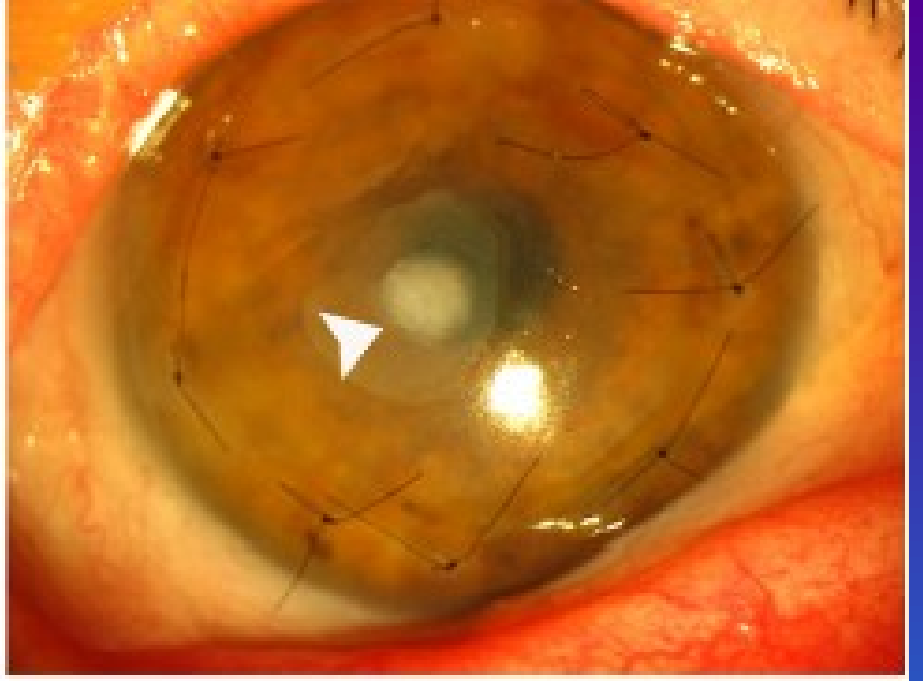
Partial

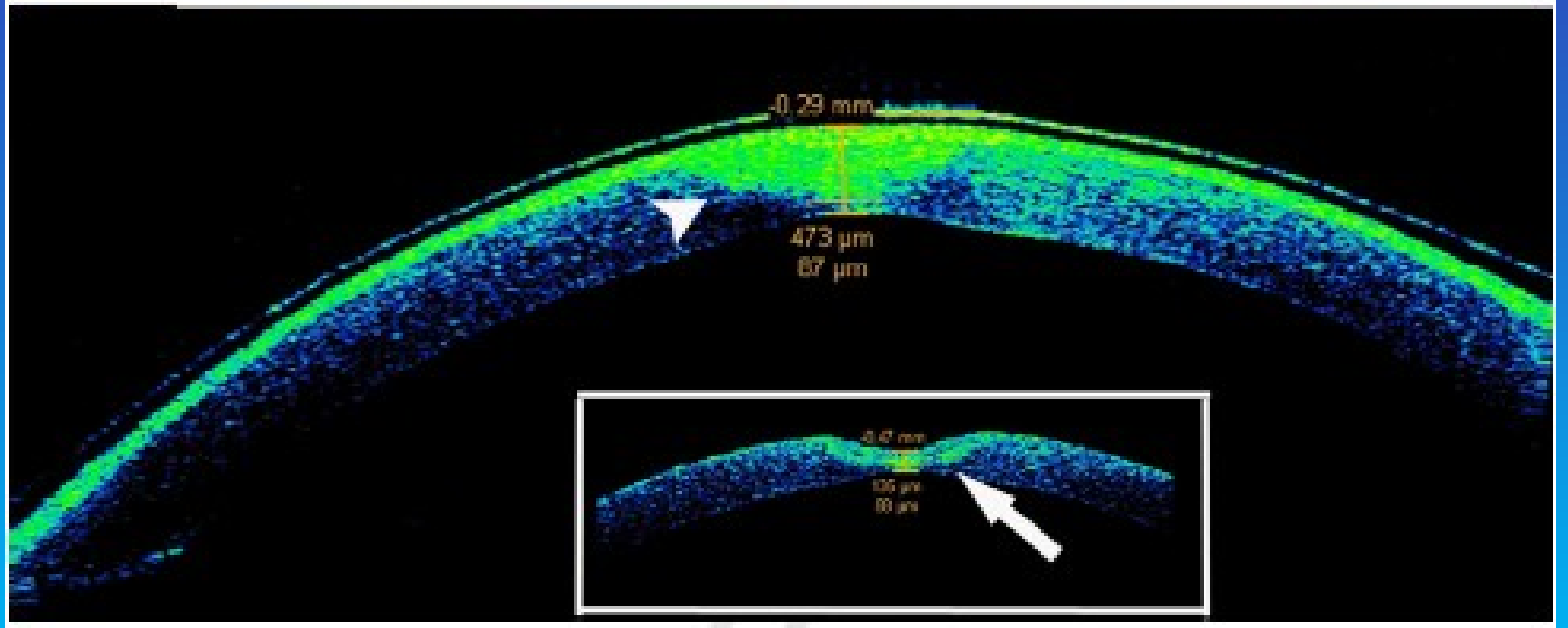
Cells populating the amniotic stroma



Herp Defect







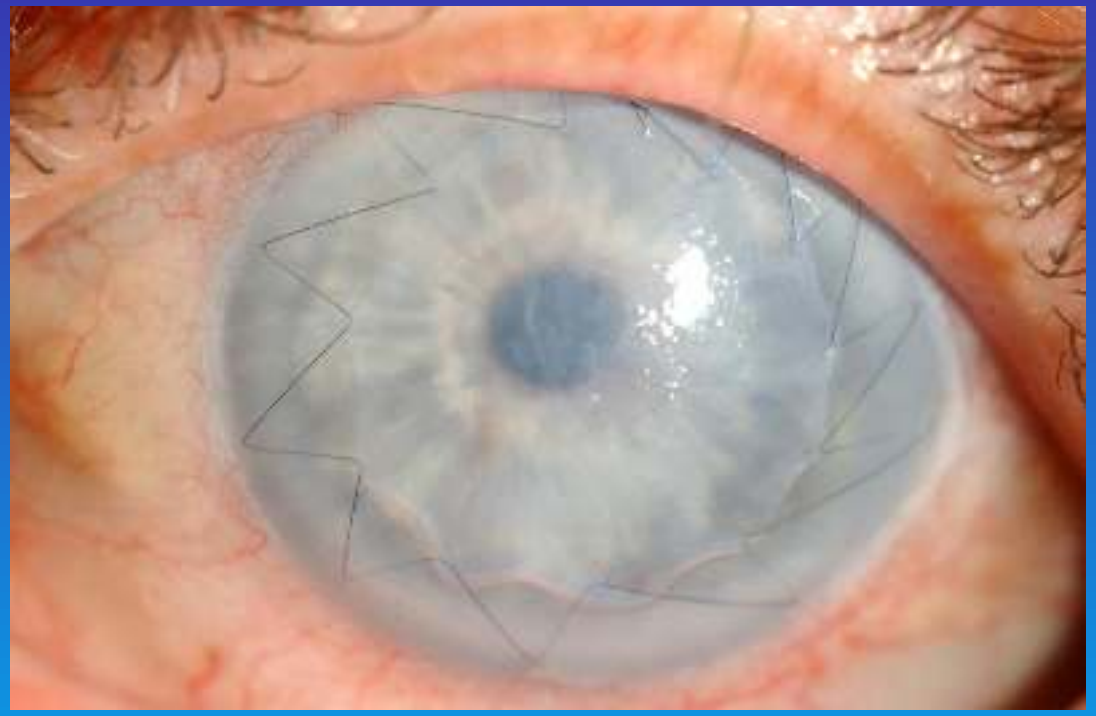
Multi layered AMT

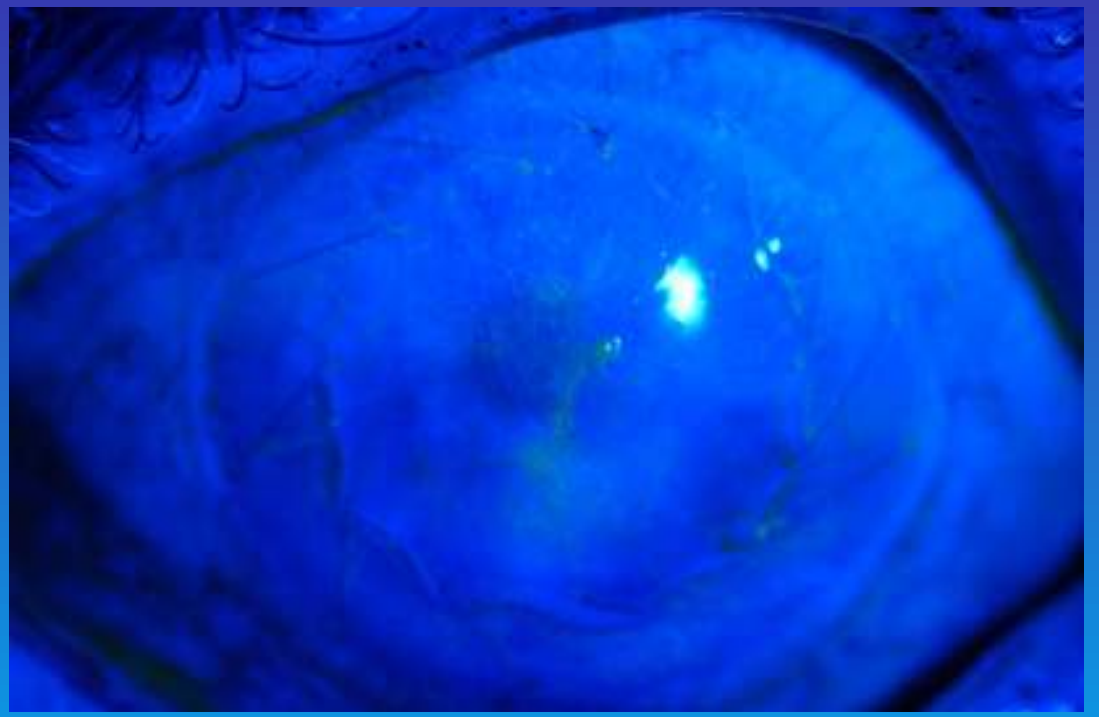
OCT

Nubile M, Dua HS et al AJO 2011

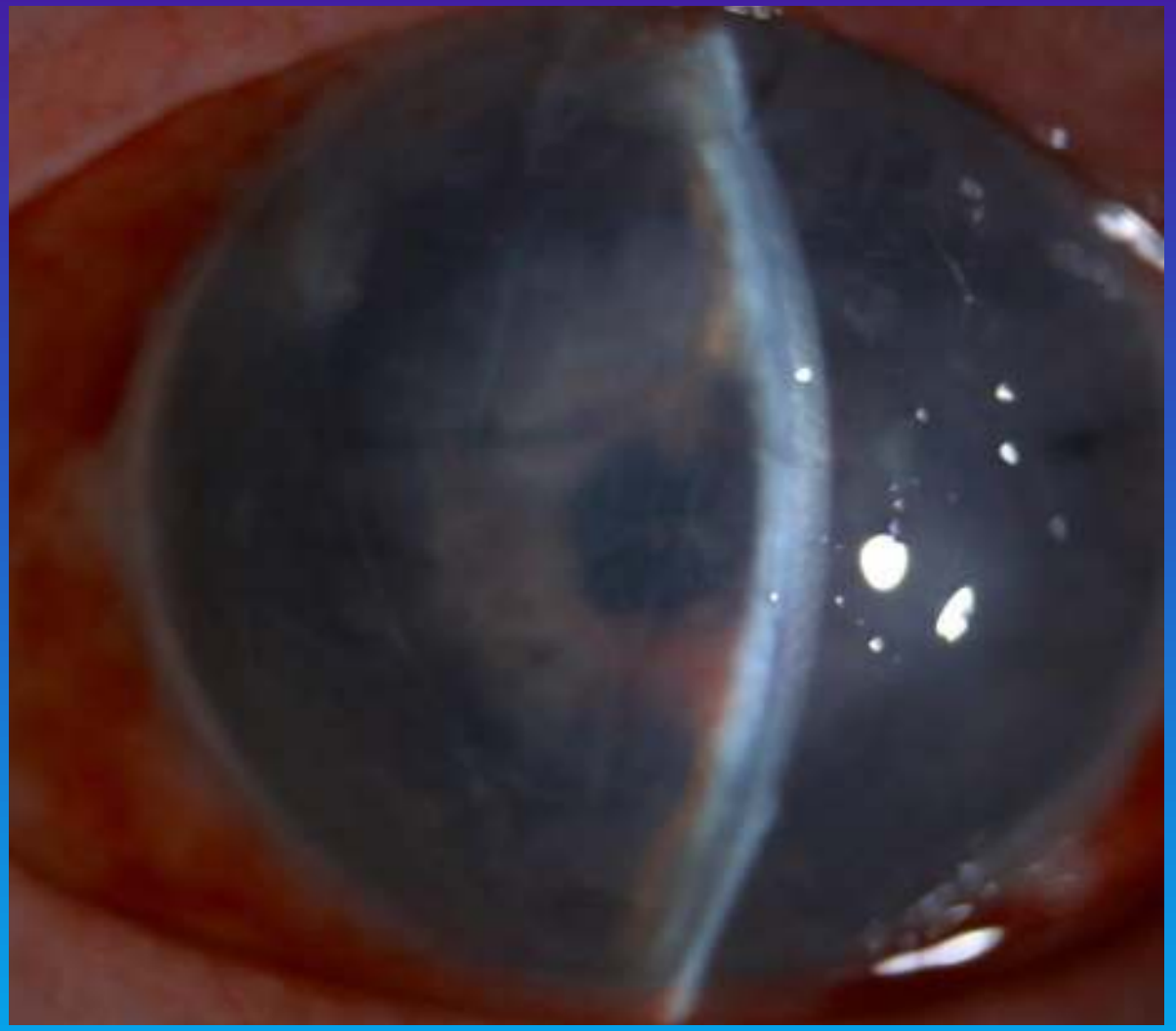
AMT for Bullous Keratopathy

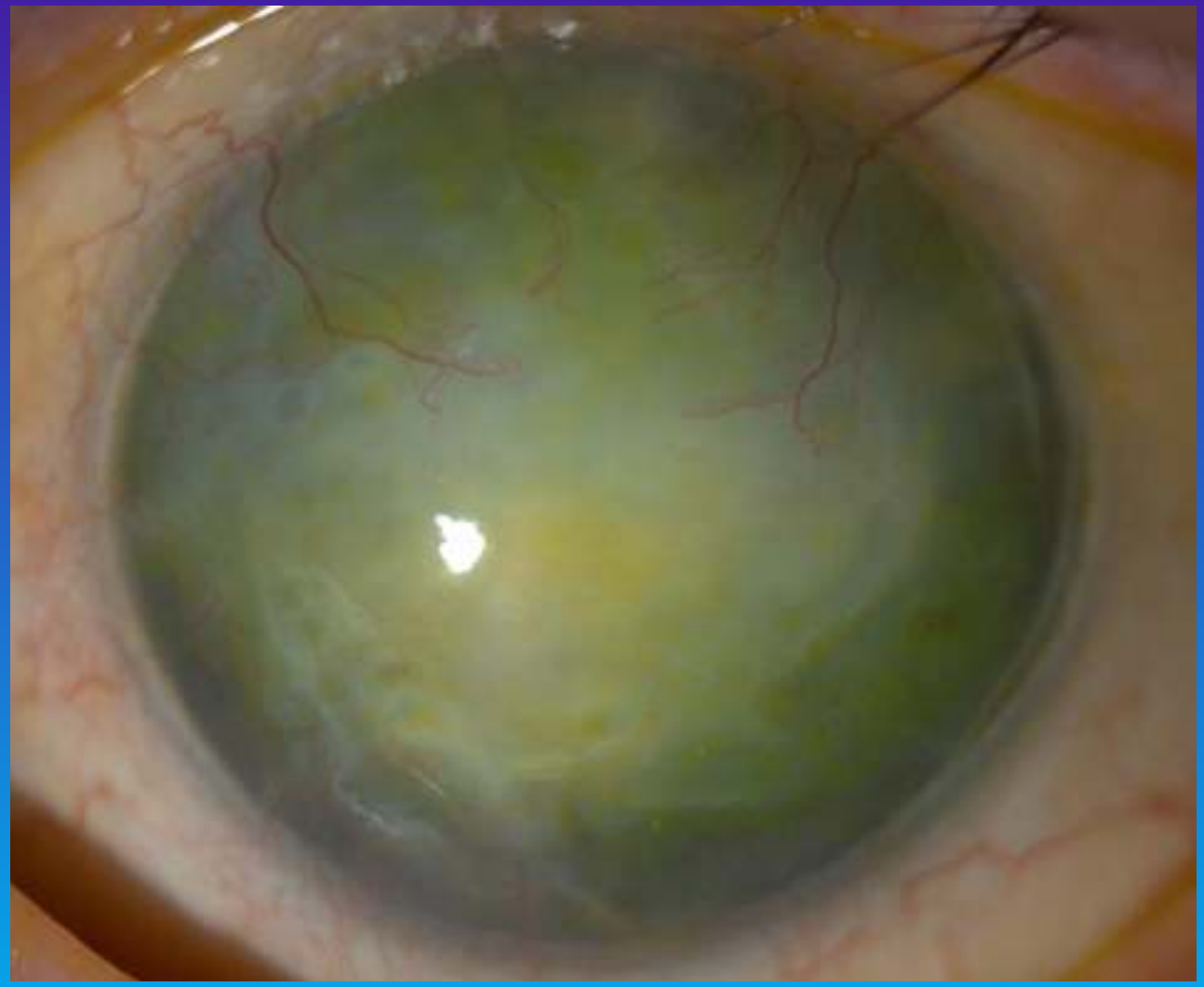
AMT in Bullous Keratopathy



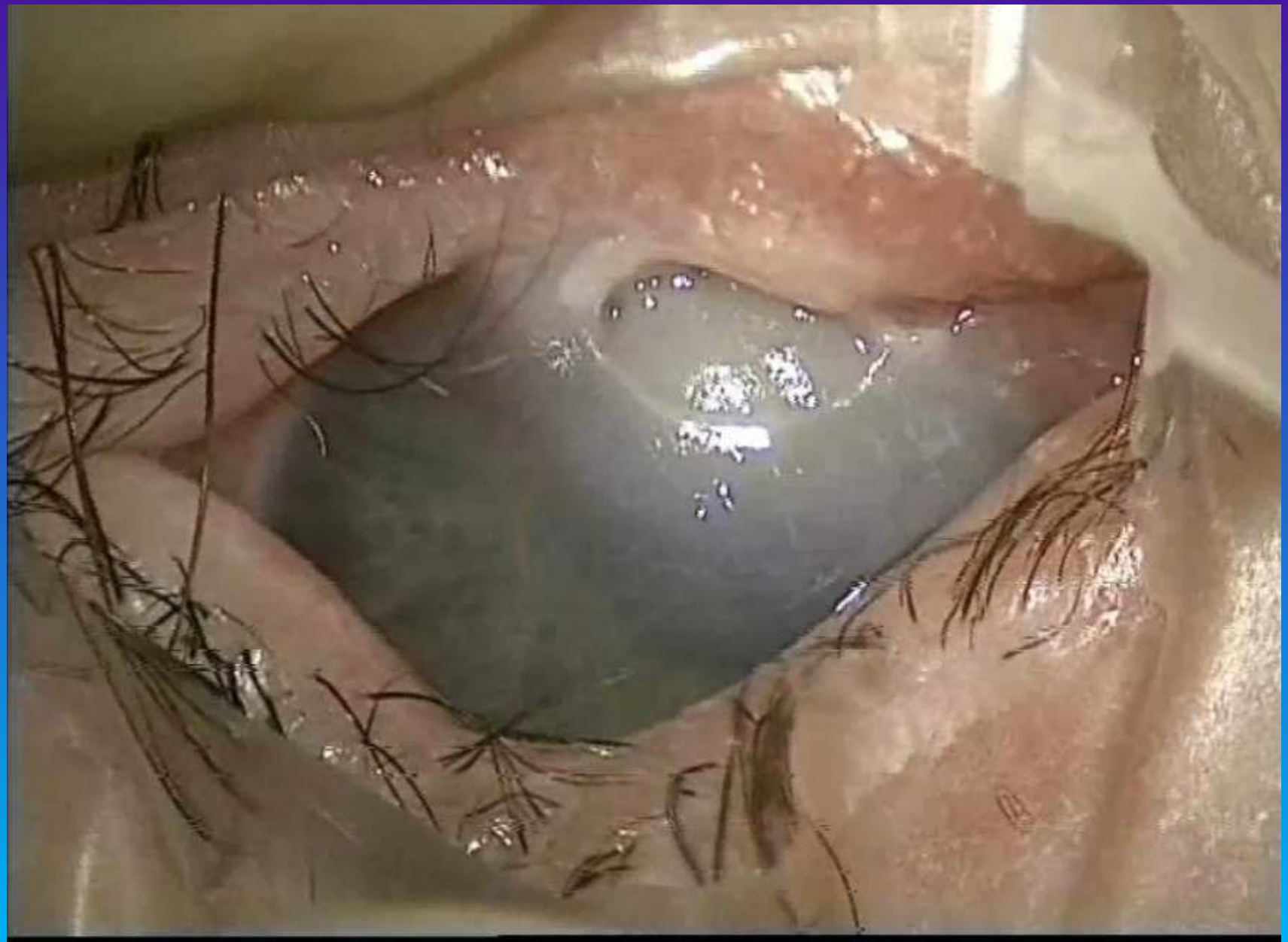


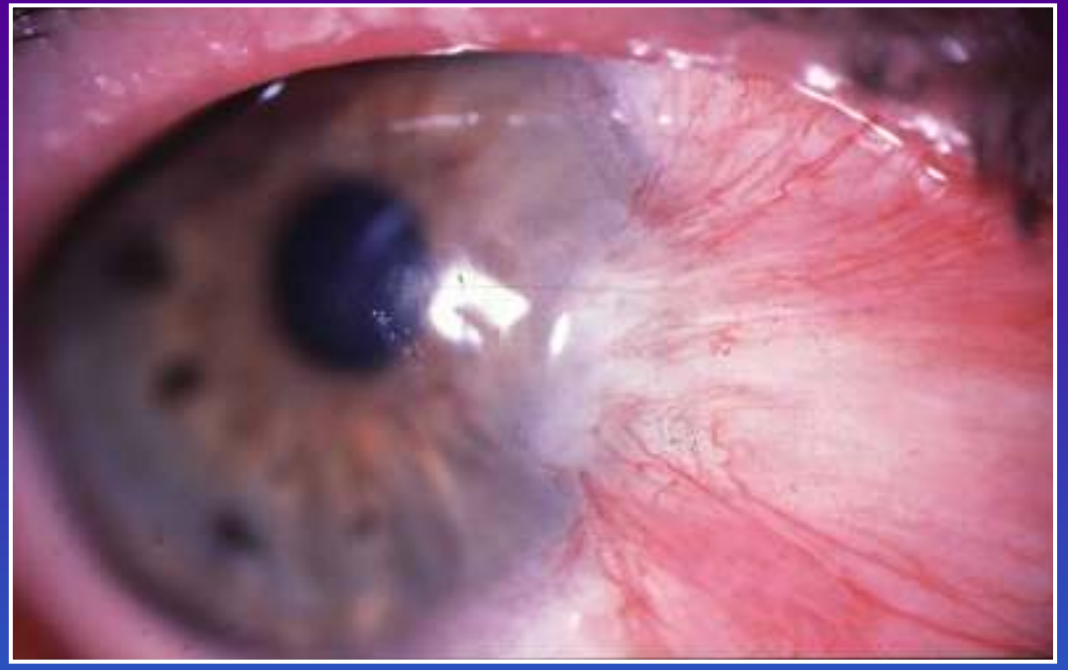
AMT in Bullous Keratopathy



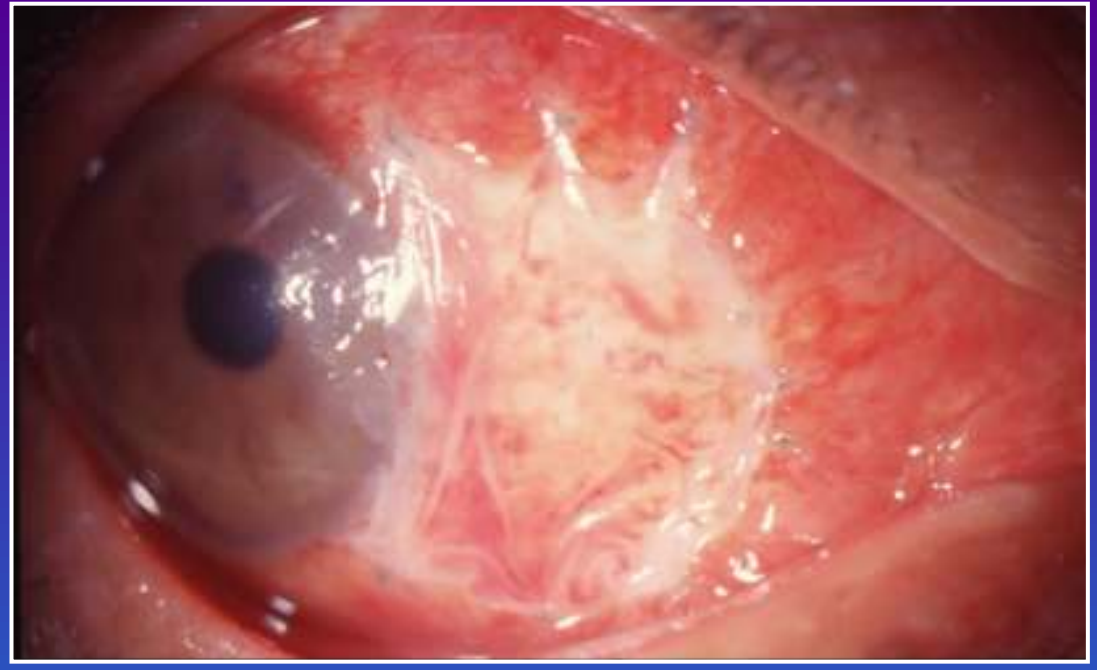


PED after severe membranous blepharo-keratoconjunctivitis

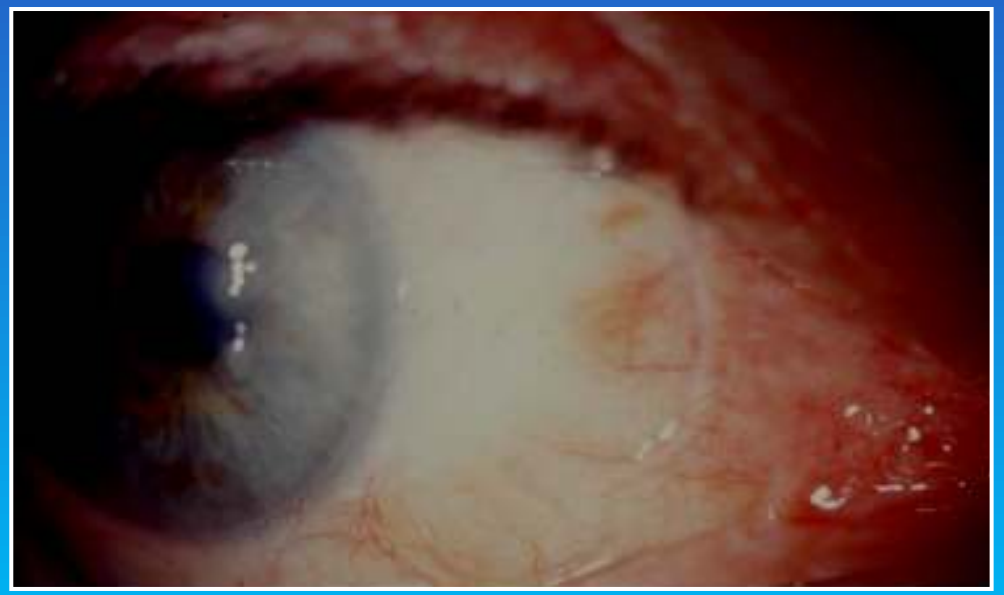




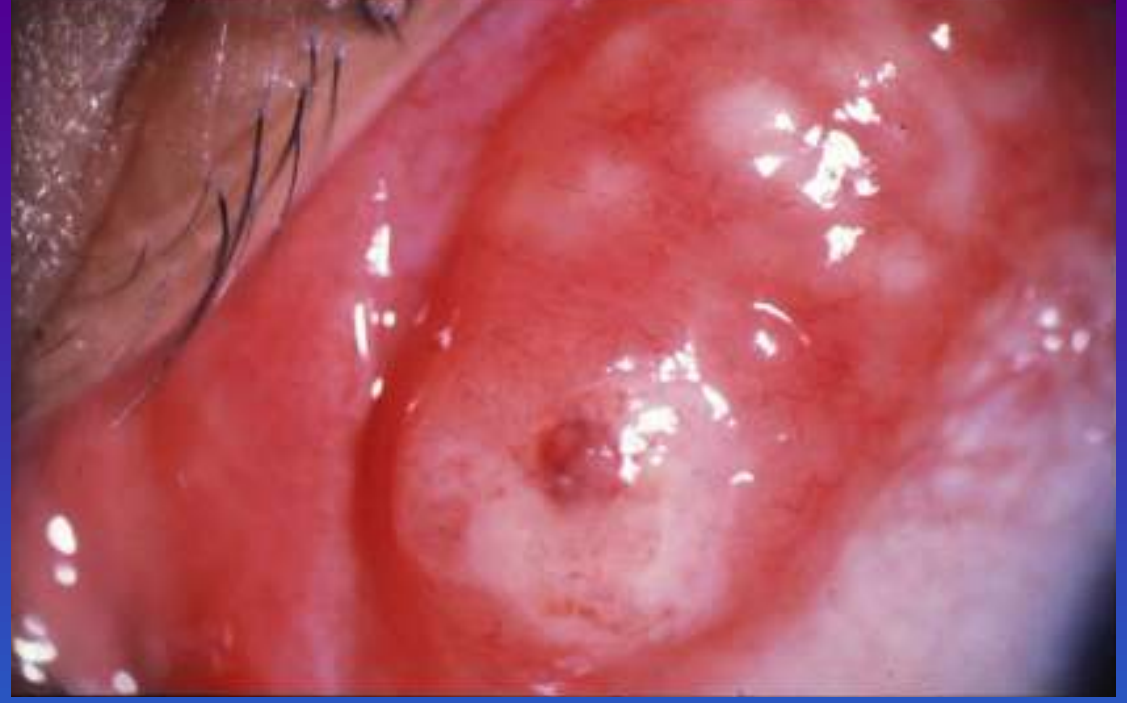
Pterygium



Immediate post-operative

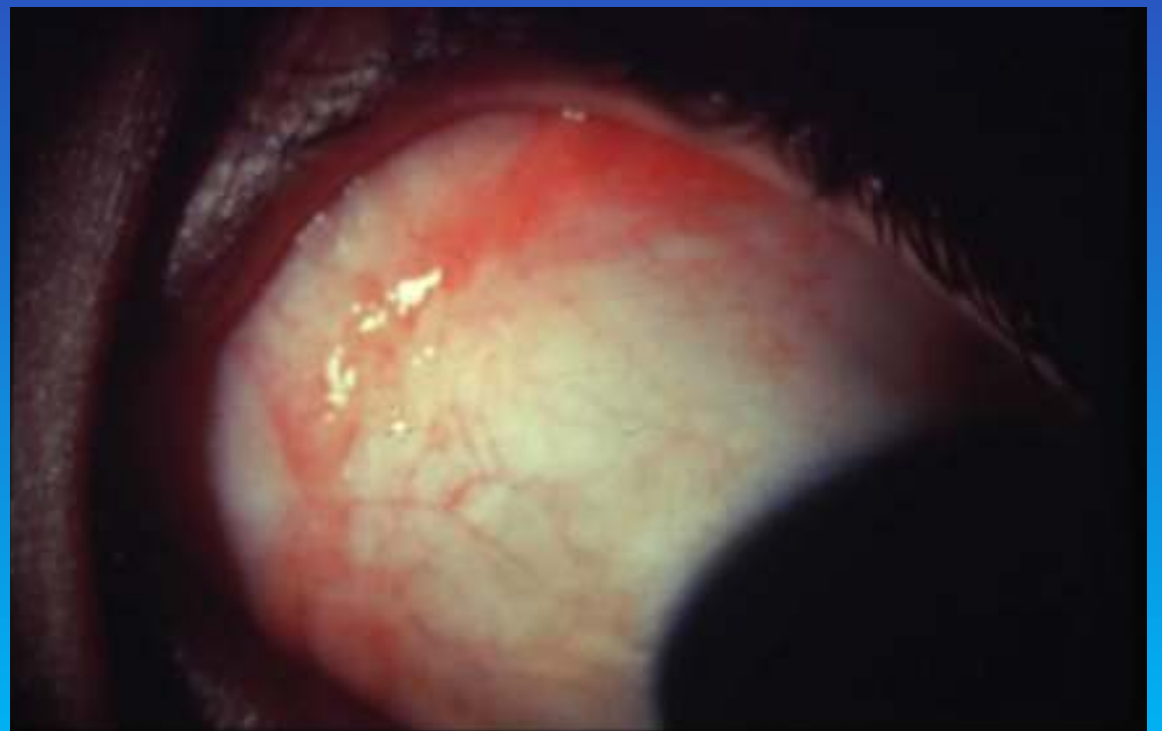


Three months post-operative

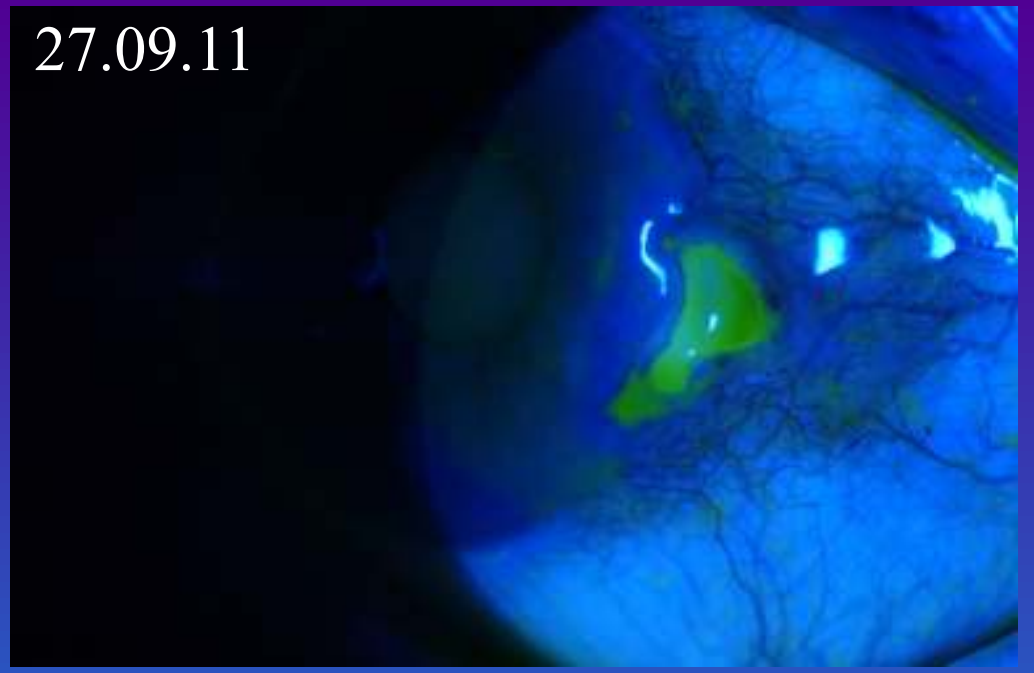


Conjunctival granuloma

Post-operative, several weeks, inflammation only at edge of AMT



Following Excision of Melanotic Lesion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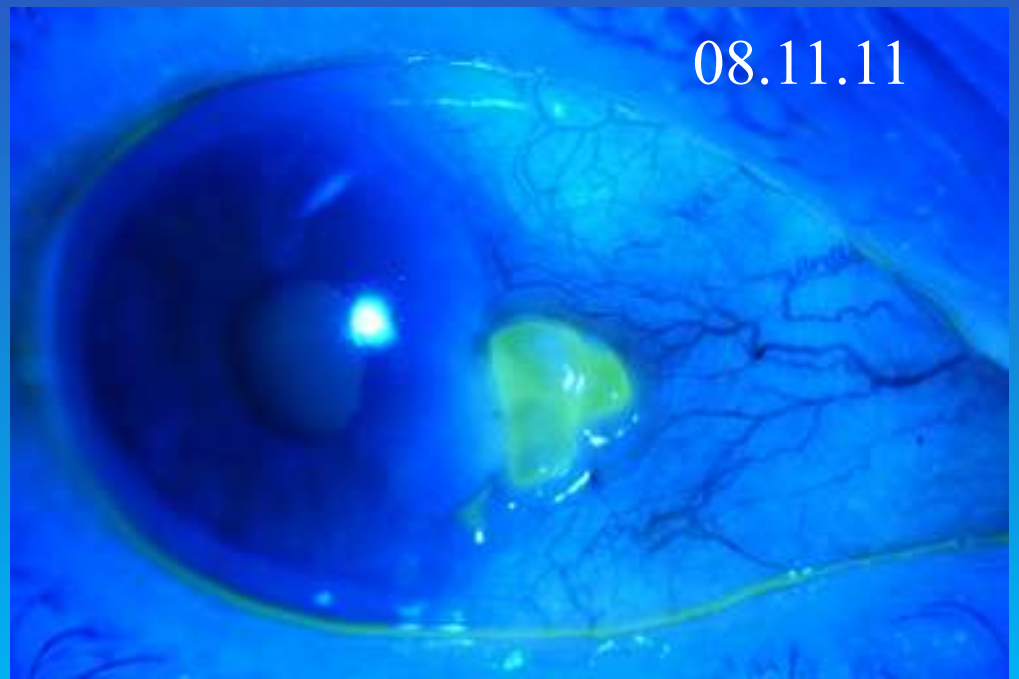
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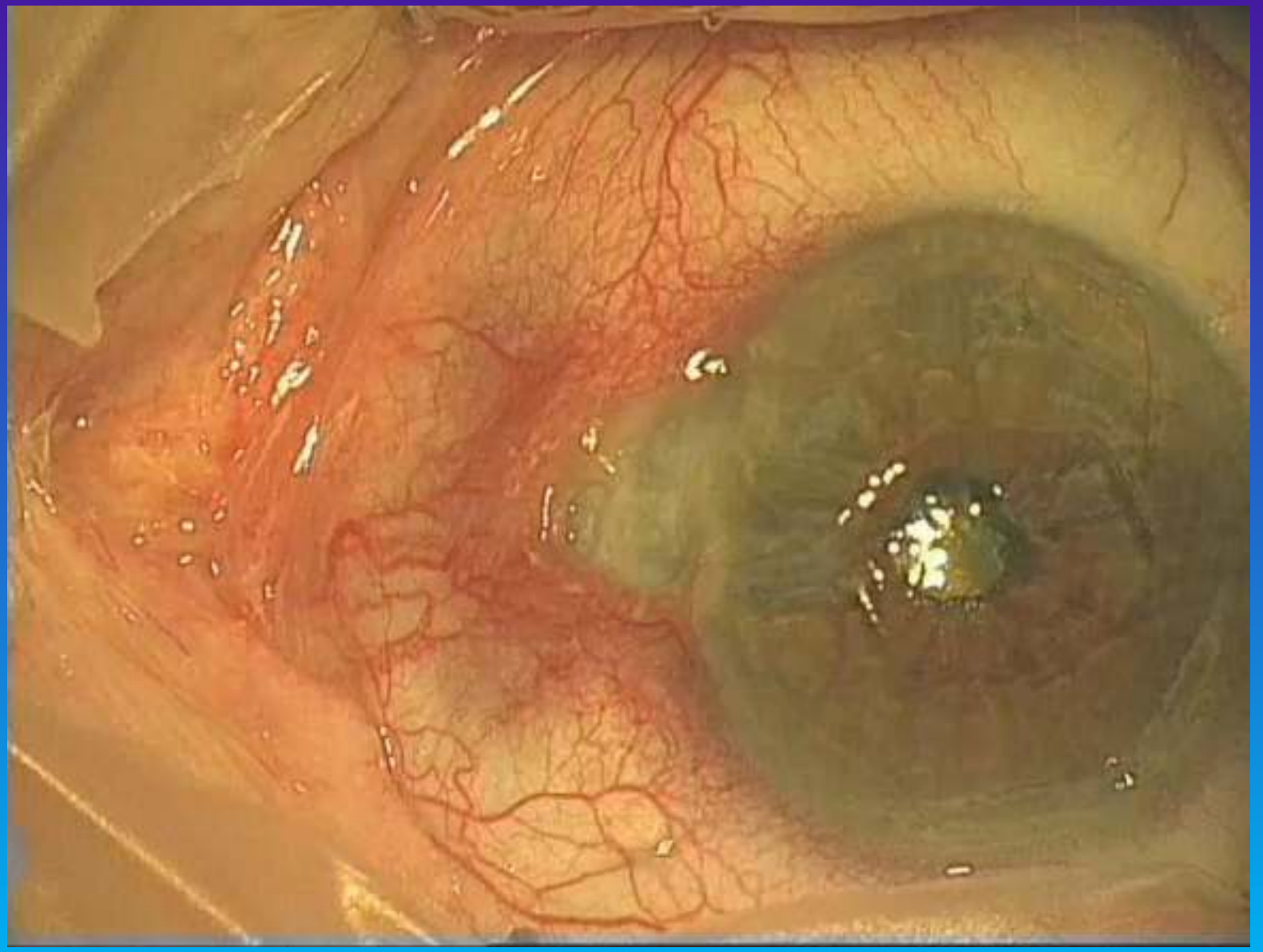
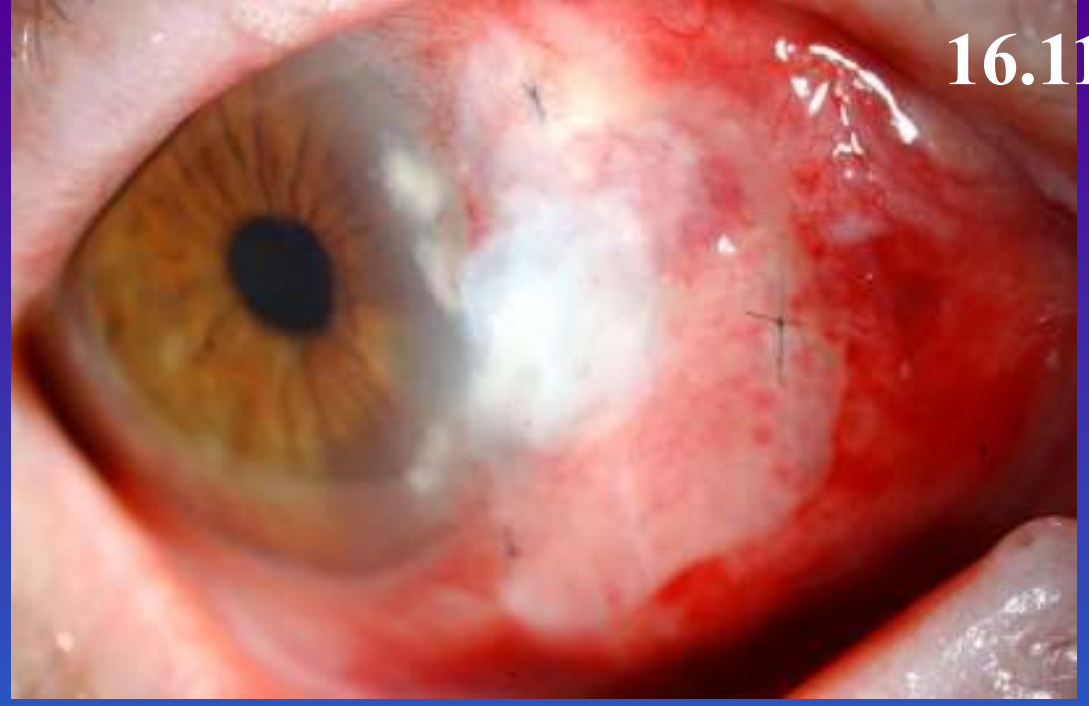
Multilayer AMT in vasculitic scleral melt

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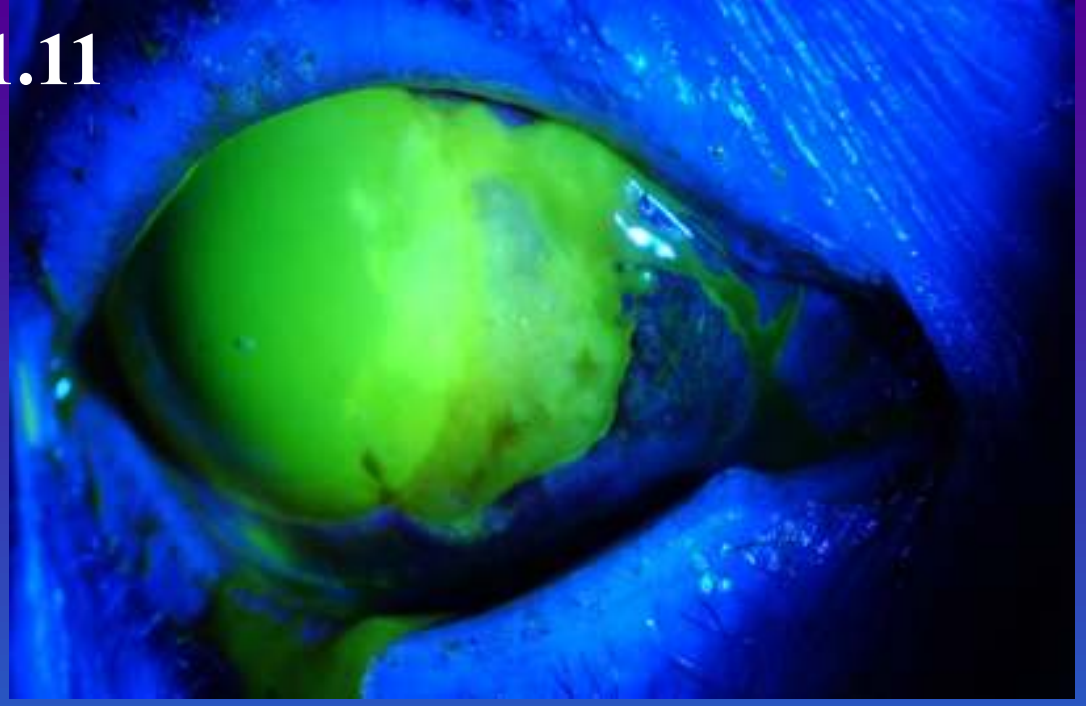
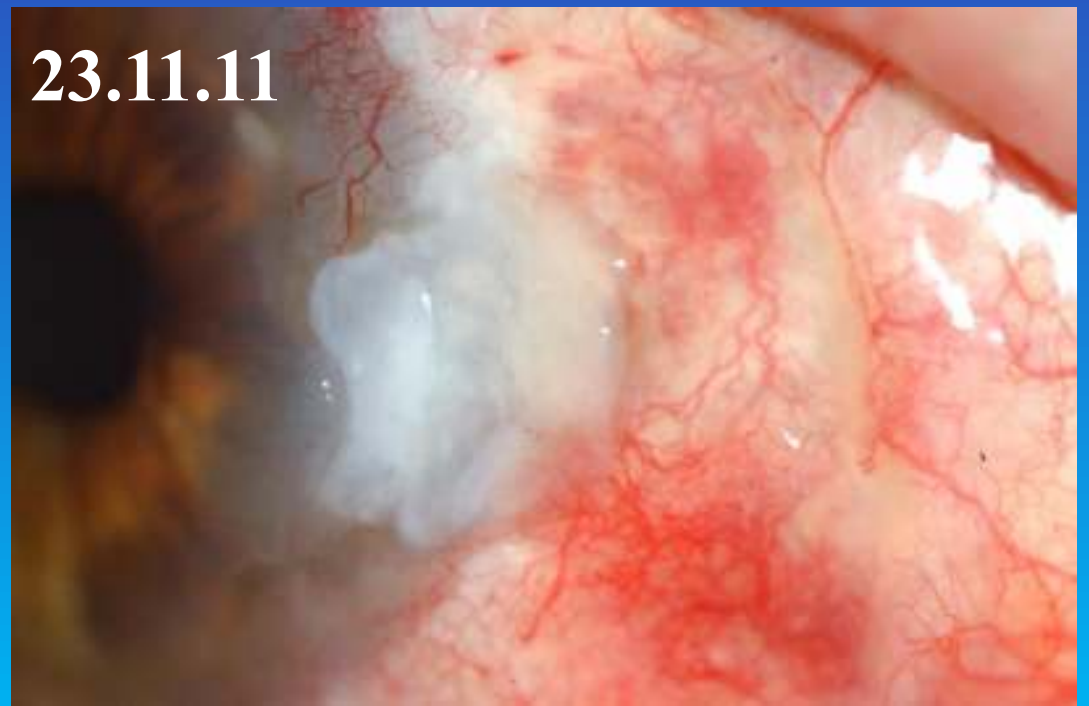


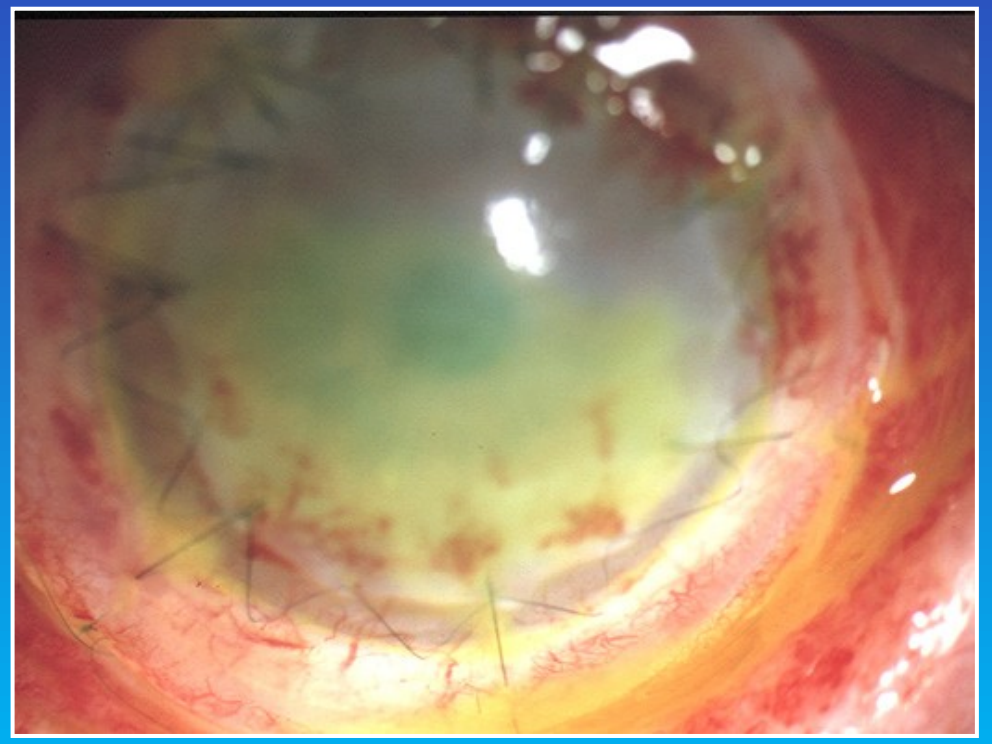

23.11.11


11.01.12

Combined Amniotic Membrane Graft and Patch

Inner 9-10 mm Disc of AM = Graft

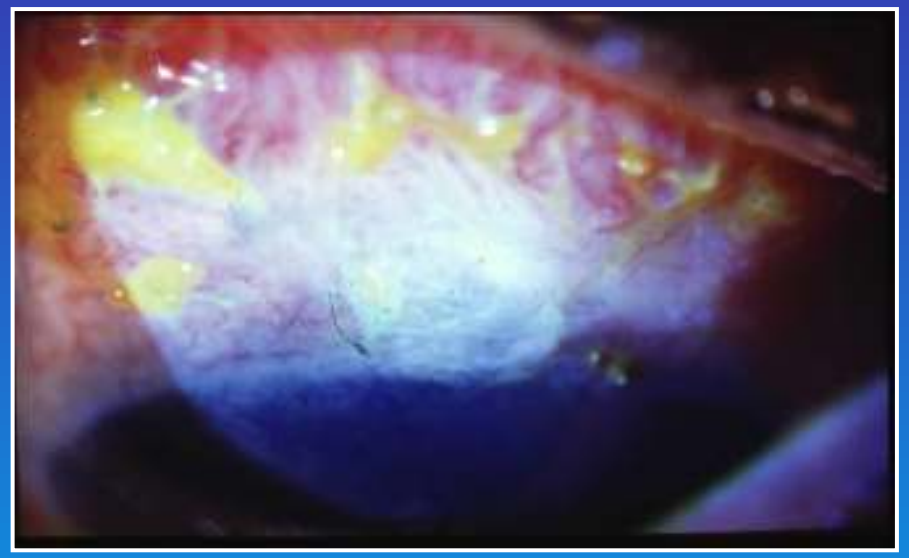
Outer Total Cover of Cornea and Limbal graft = Patch



Amniotic Membrane – In glaucoma surgery

- In filtering surgery as an adjunct to reduce scarring
- For repair of leaking blebs
- As a cover for valve implants and exposed pericardium patch

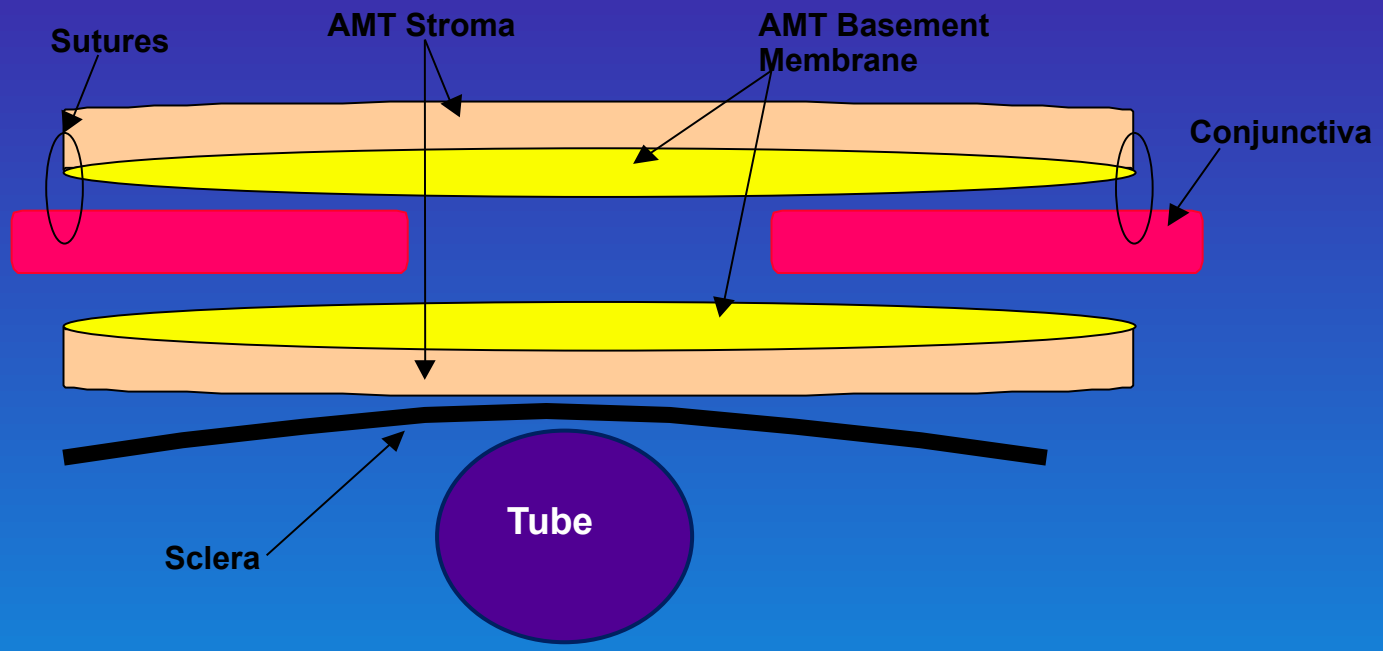
AMT in Glaucoma



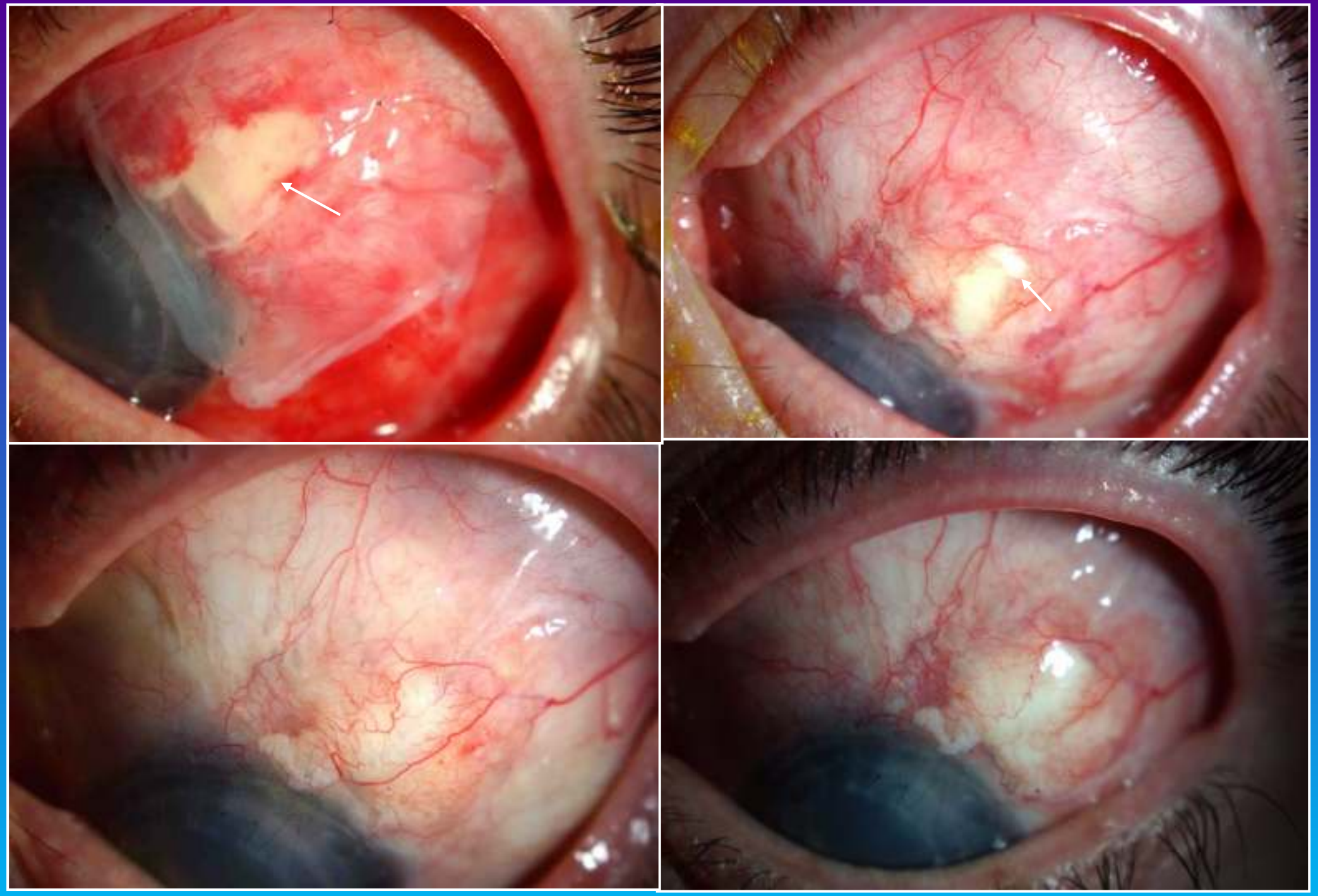
Leaking bleb, MMC Trab.

Repaired with AMT

Amniotic membrane cover for exposed tube



Ainsworth G, Rotchford A, Dua HS, King AJ. A novel use of amniotic membrane in the management of tube exposure following glaucoma tube shunt surgery. Br J Ophthalmol. 2006;90:417-9.



Amniotic membrane:
Fate and Complications

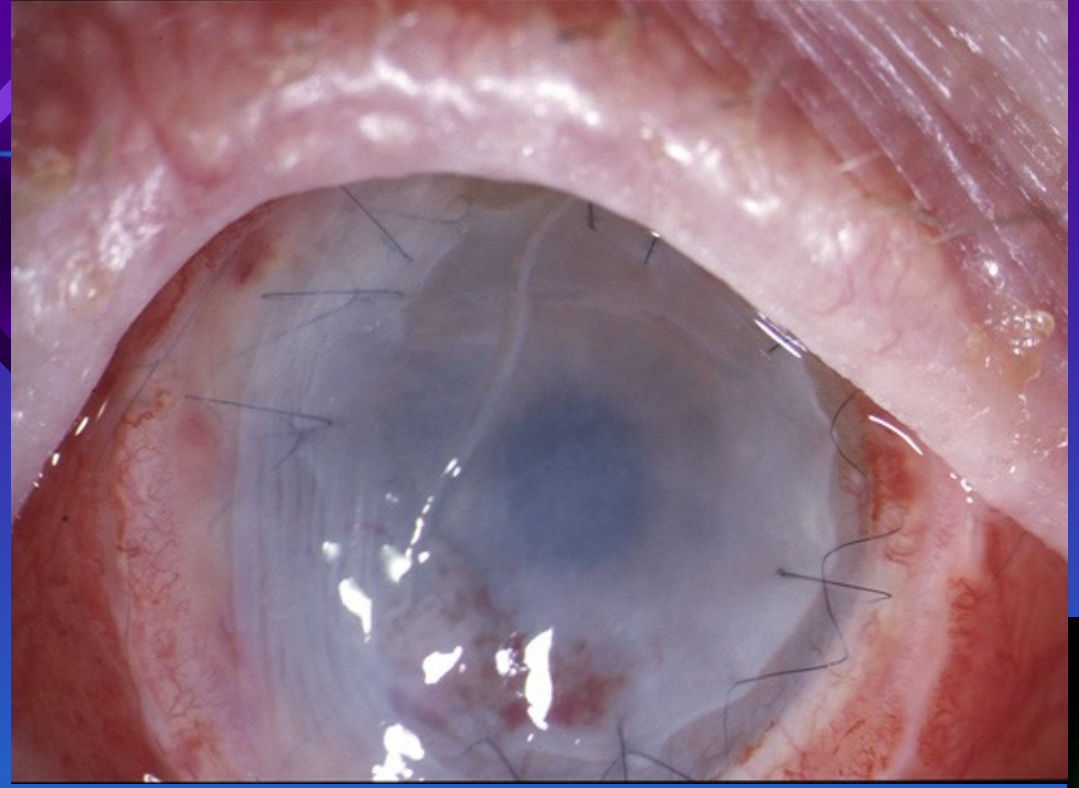
Fate of the Amniotic membrane

- **INCORPORATED** INTO SUBSTRATUM OF HOST EPITHELIUM
- **ABSORBED** FROM SUBSTRATUM WITH FEW REMANENTS
- **DISINTEGRATES** - VARIABLE, WITHIN 2 WEEKS
- UNDERGOES **NECROSIS**
- CUTS THROUGH SUTURES AND **FALLS OFF**

COMPLICATIONS OF AMT

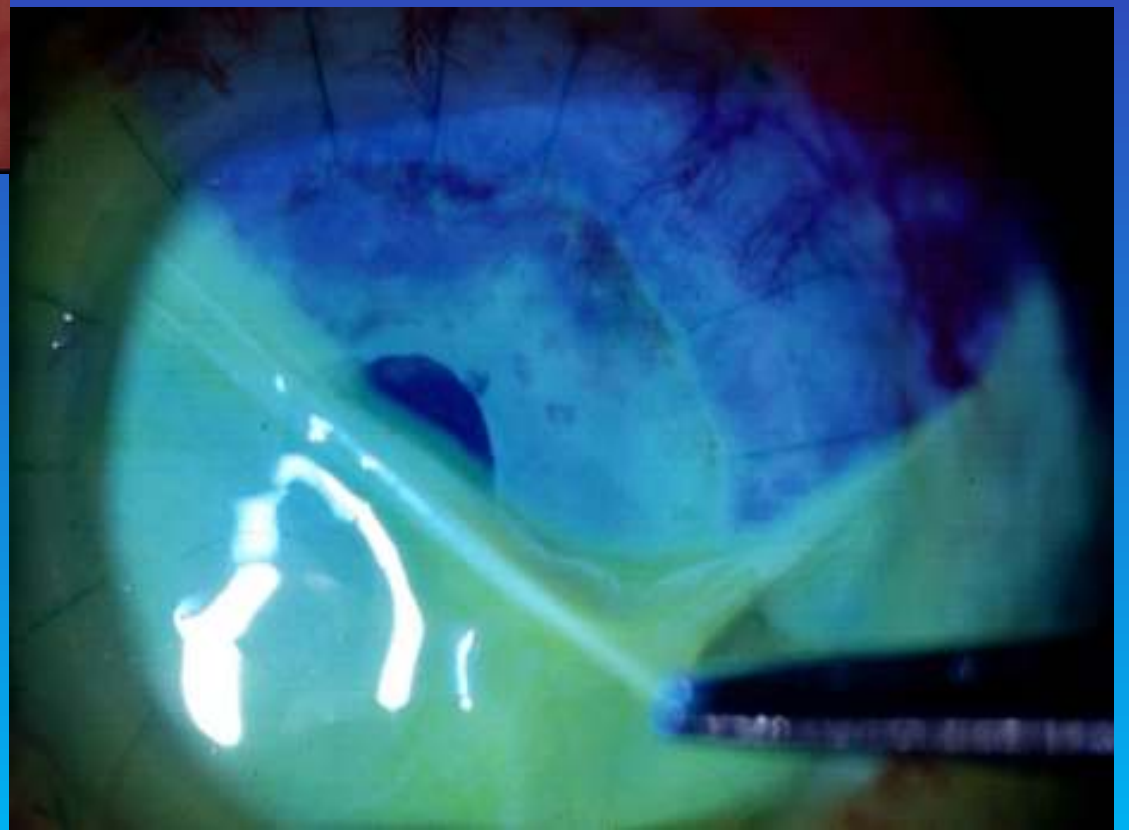
- **RESIDUAL** SUBEPITHELIAL MEMBRANE
- **PARTIAL SUCCESS OR FAILURE**
- PREMATURE **SLOUGHING OR LOSS** OF MEMBRANE
- **HYPOPYON**: REPEATED TRANSPLANTATION POSSIBLY IMMUNE RESPONSE
- **DEPOSITS**: CALCIUM, DRUGS
- **TRANSMISSION OF INFECTIONS:** HIV, HEPATITIS

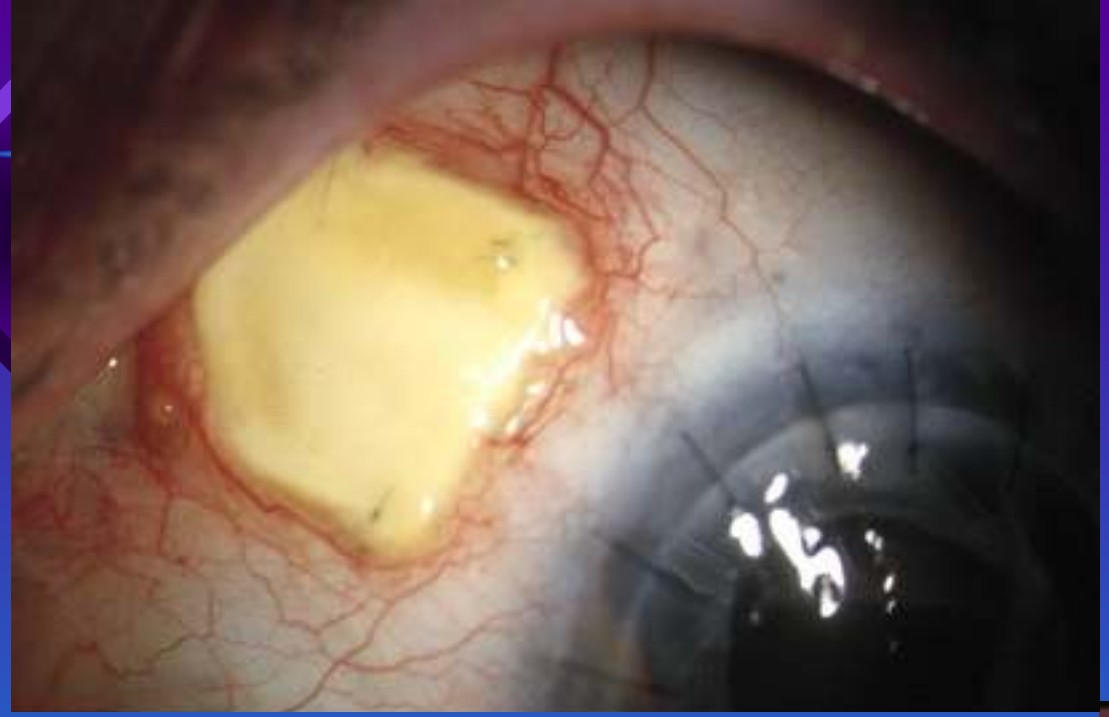
FATE OF MEMBRANE
and
COMPLICATIONS



Loosening of outer membrane

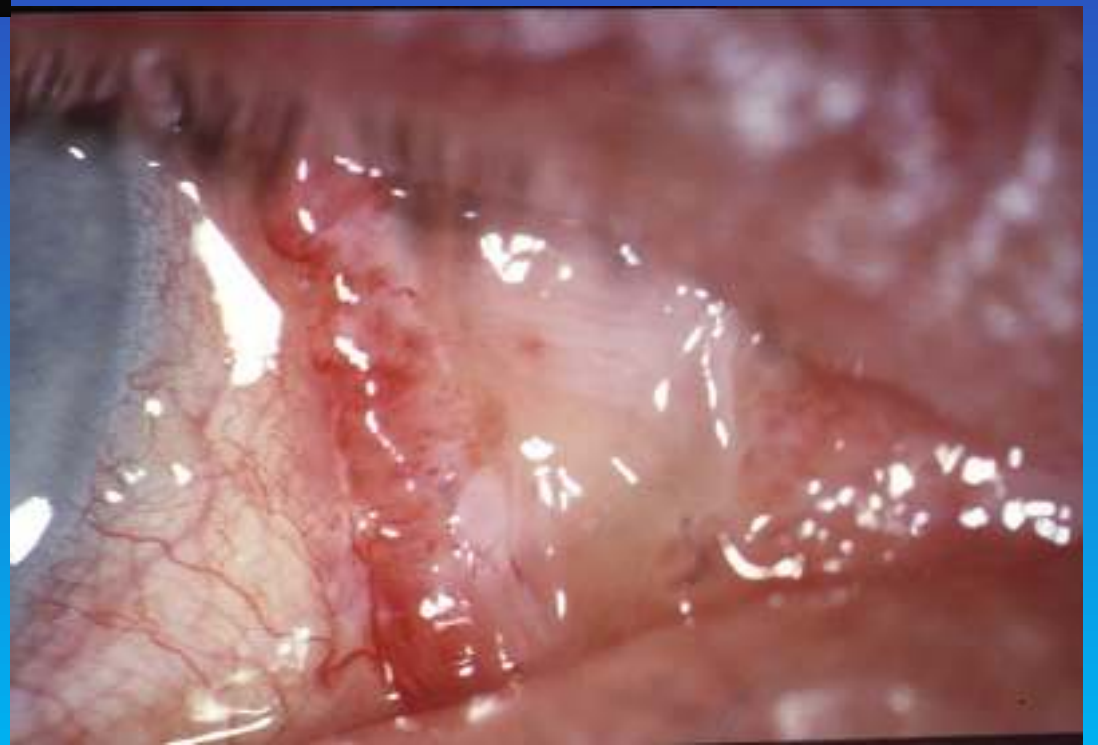
Membrane (patch) falling off

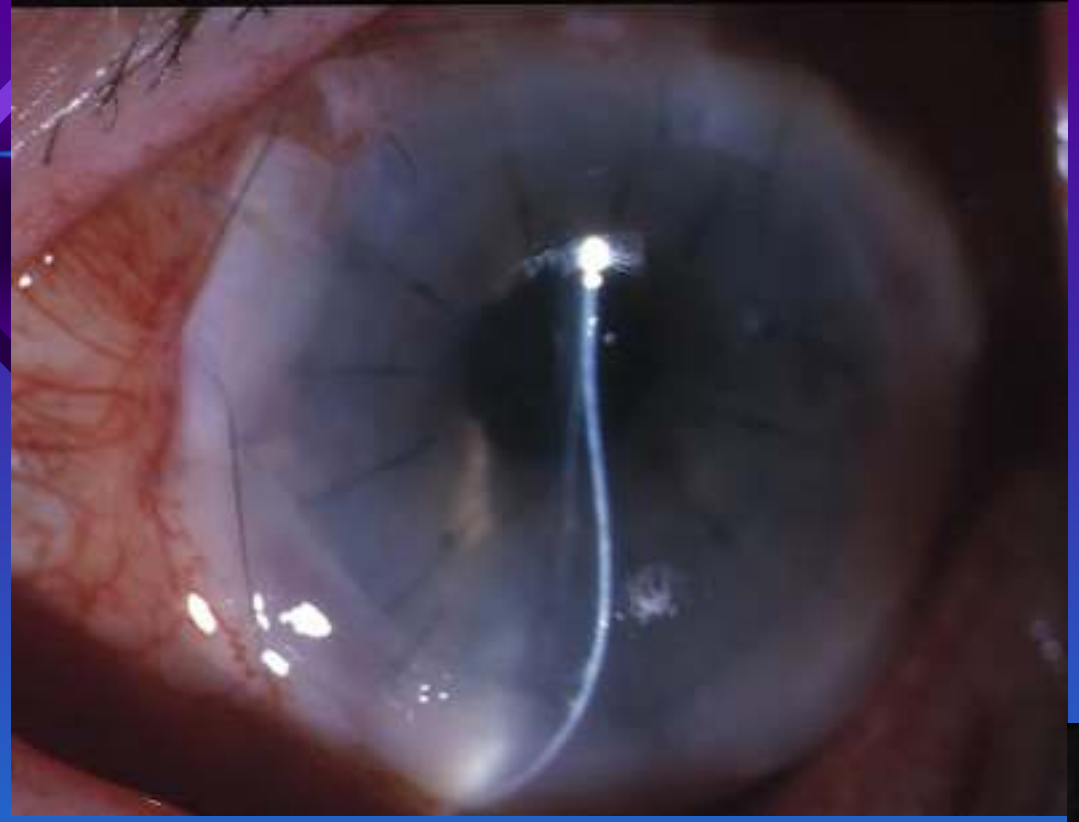




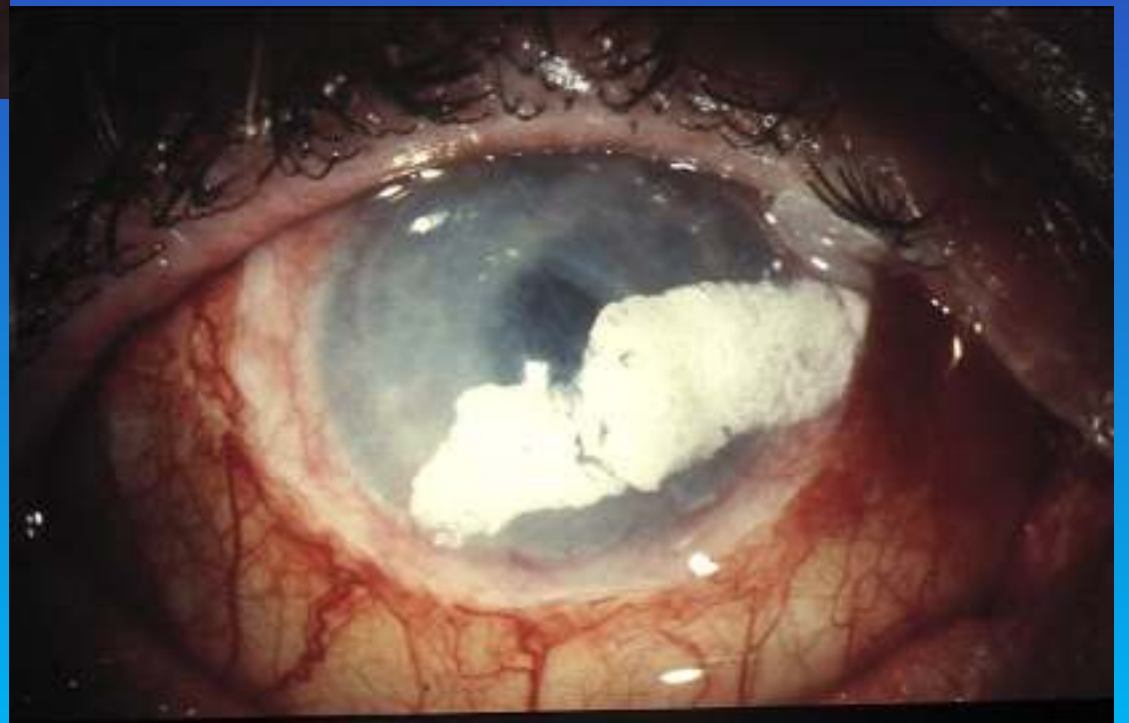
Exposed pericardial on Ahmed valve tube. AMT was unsuccessful

Amniotic membrane transplant to treat adhesions after excision of melanotic lesion (partial success)

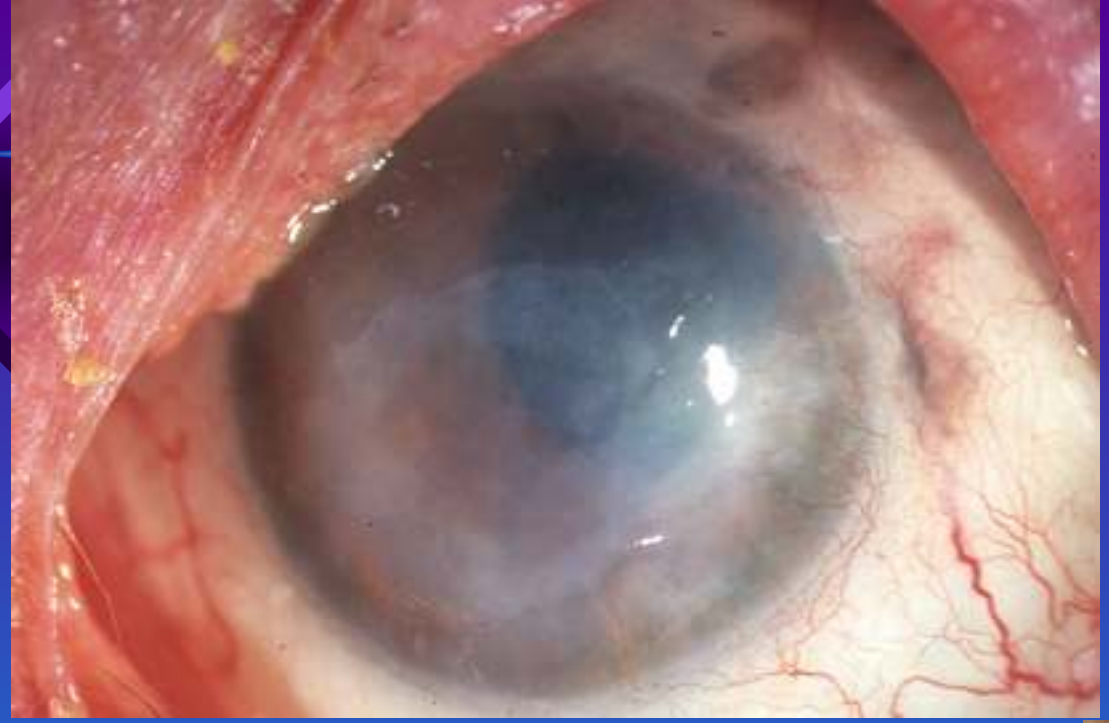




Pseudo Double Anterior Chamber

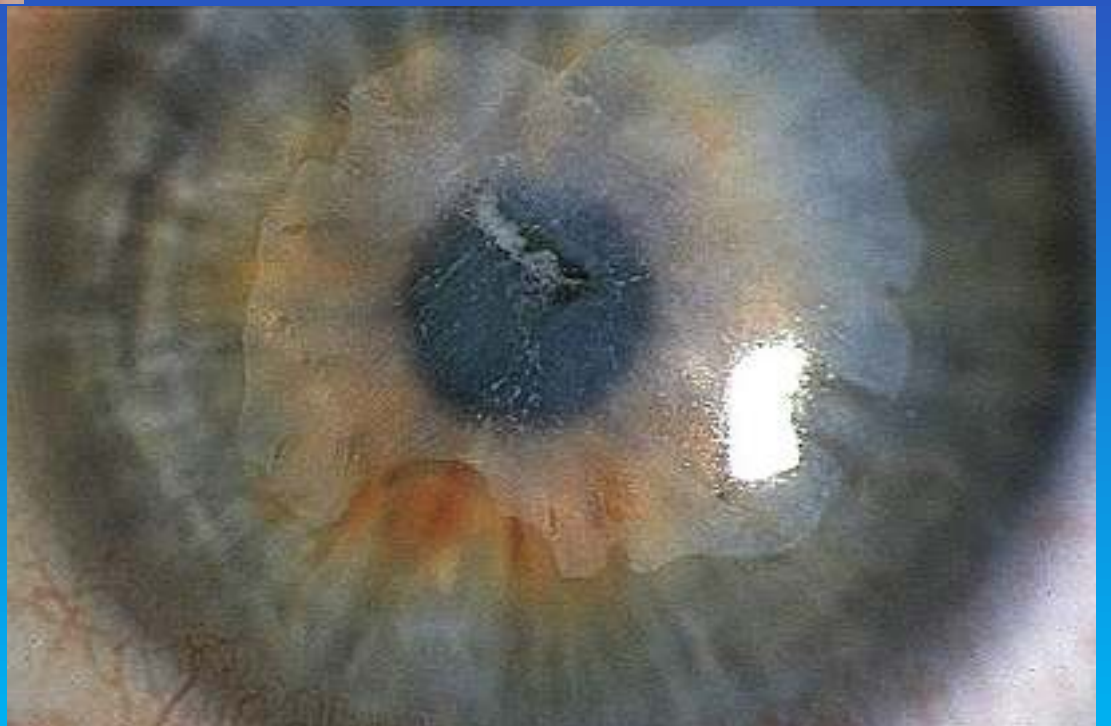


Ciproflox. Deposits

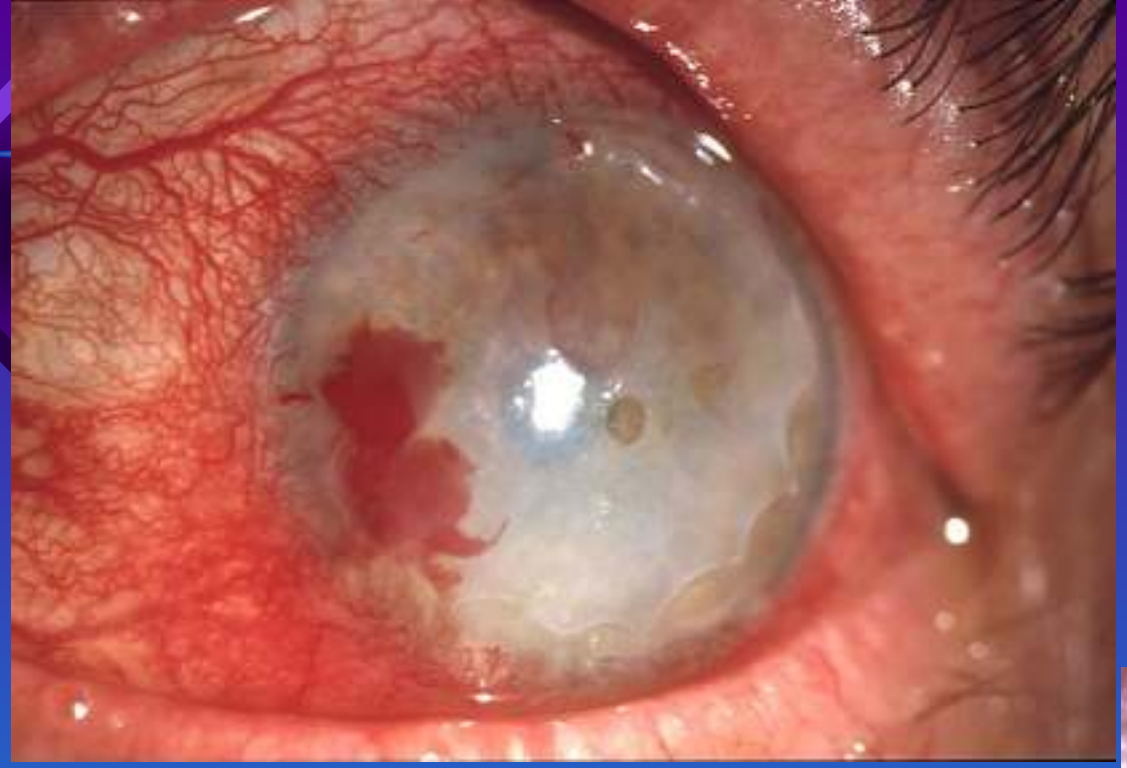


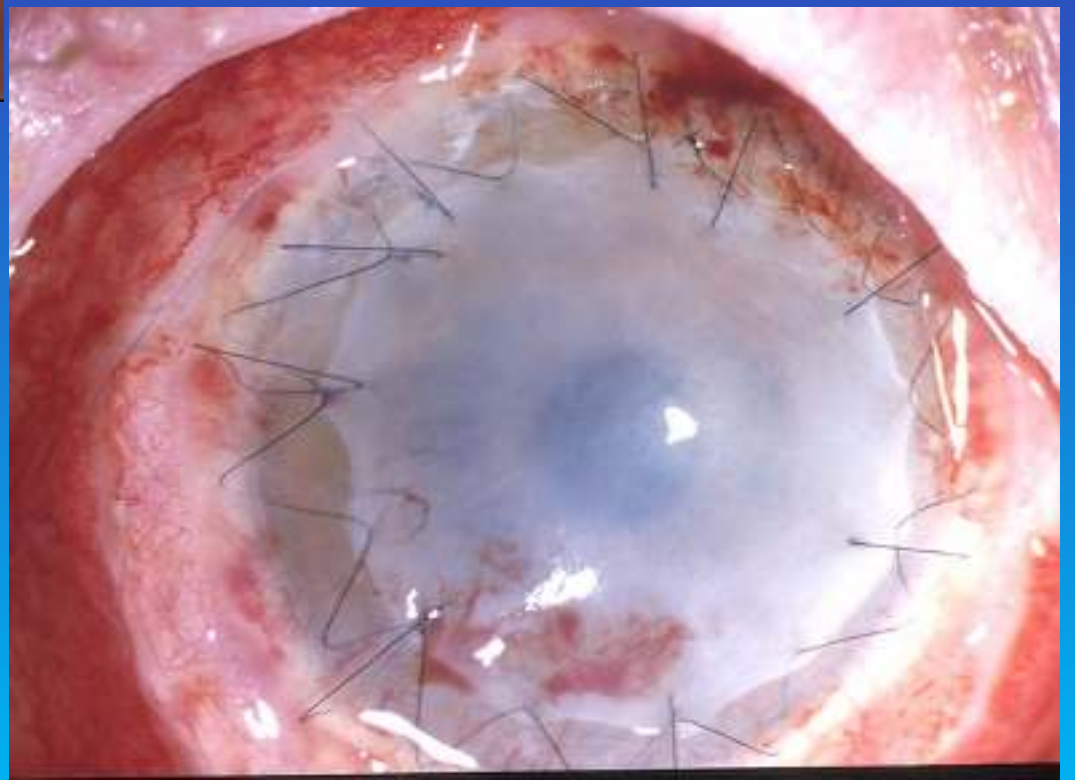
Residual Membrane after BK
With Central Cleft

Residual Membrane - opaque

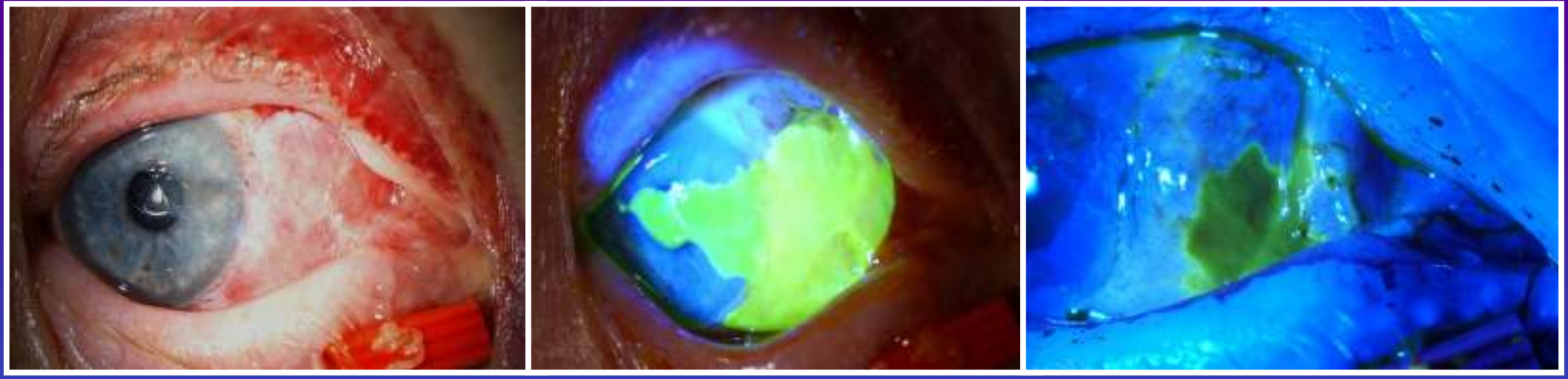


Sub Membrane Blood



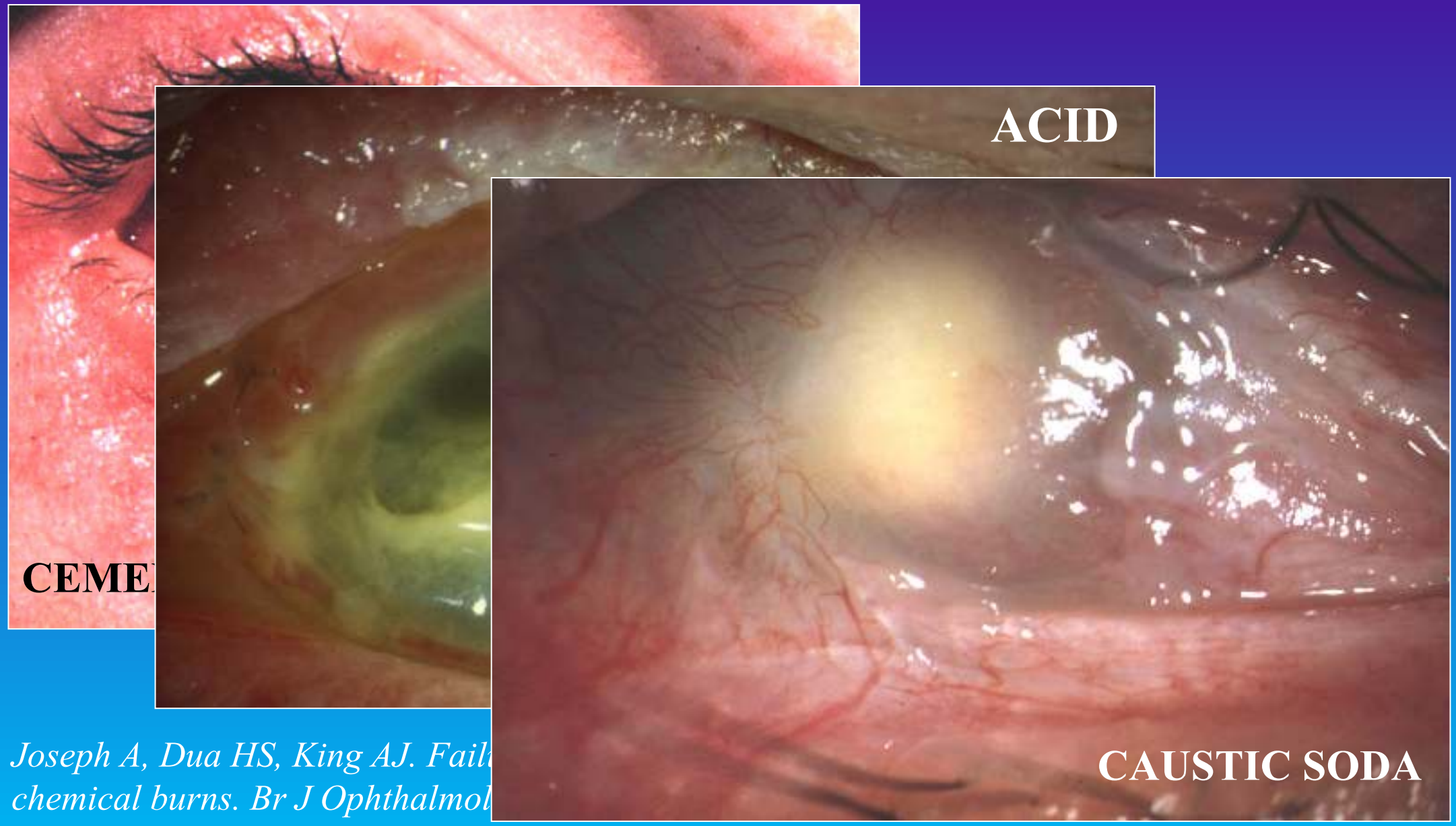


Failed AM Graft for Bullous Keratopathy – Necrosis and Ulceration

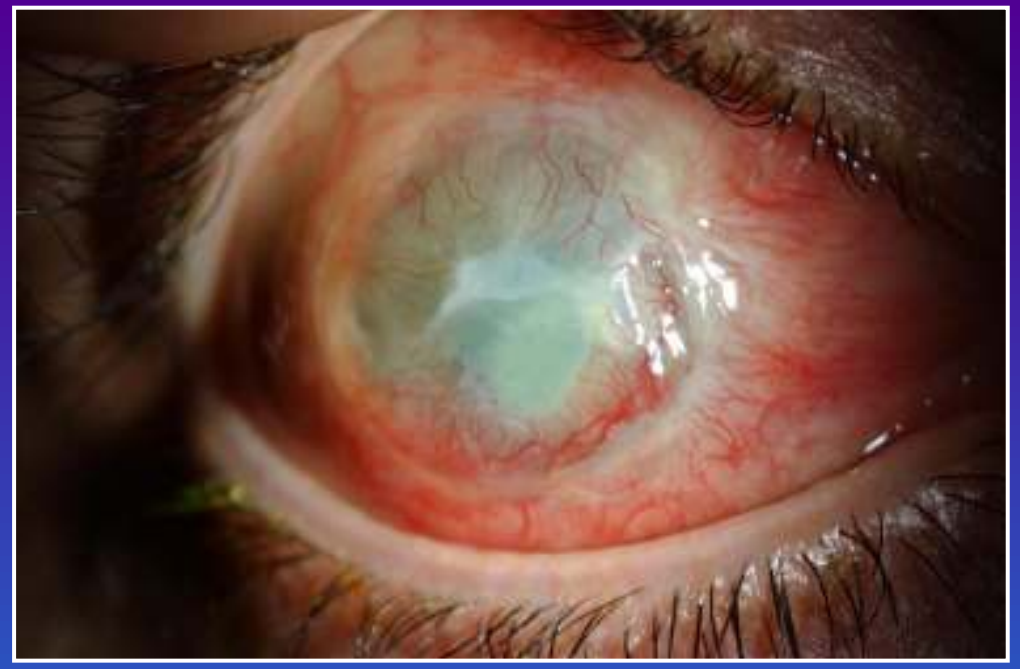


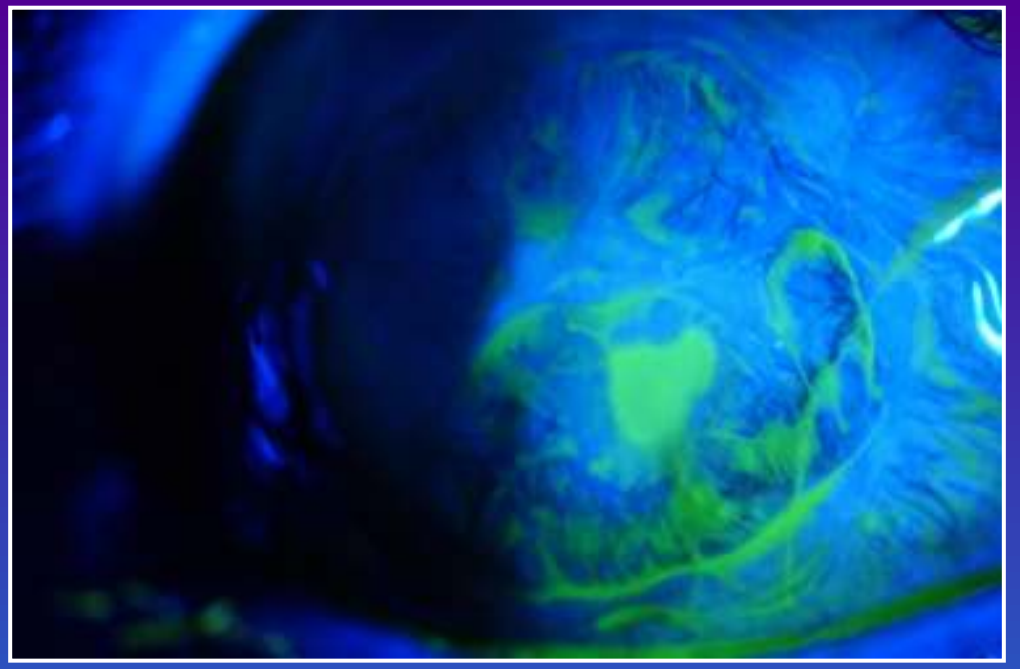
Excision of Pterygium with Amniotic membrane graft and subsequent Recurrence

Failure of Amniotic membrane transplant in acute ocular surface burns

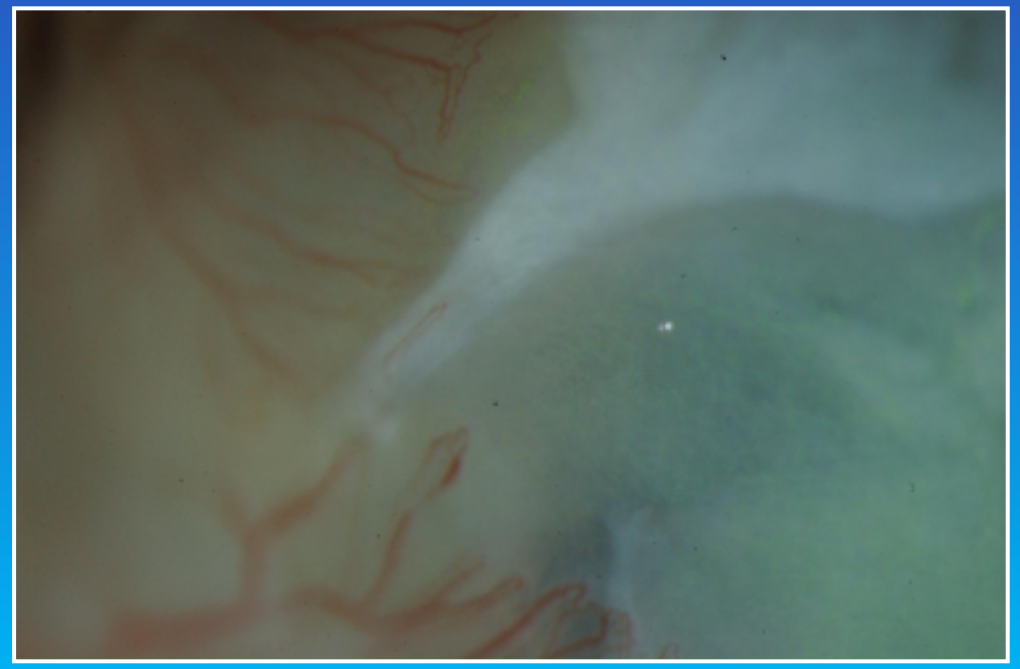


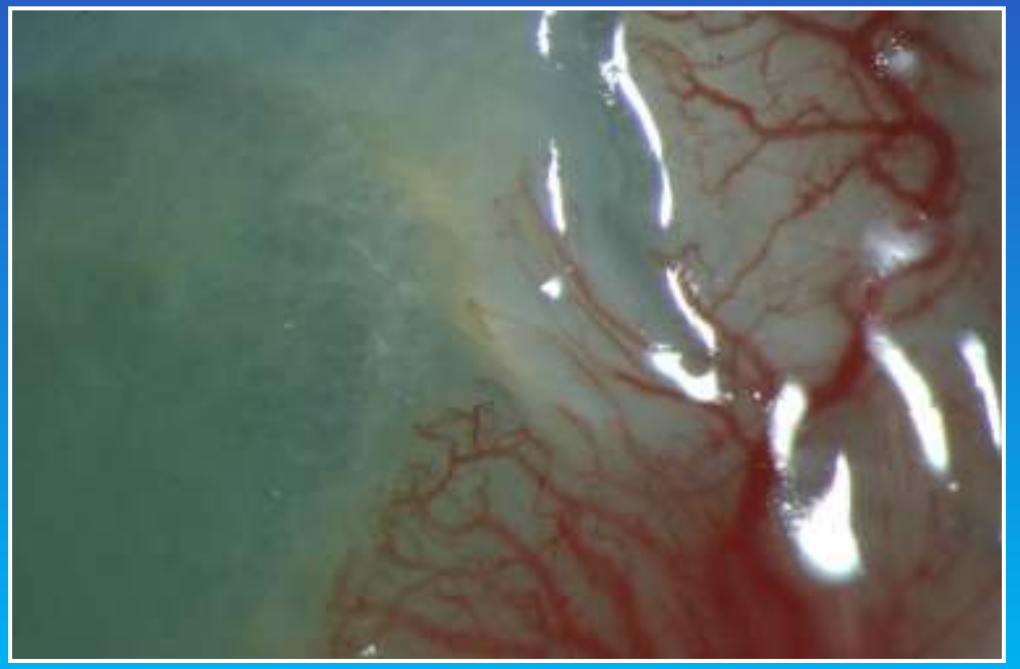
Joseph A, Dua HS, King AJ. Fail
chemical burns. Br J Ophthalmol

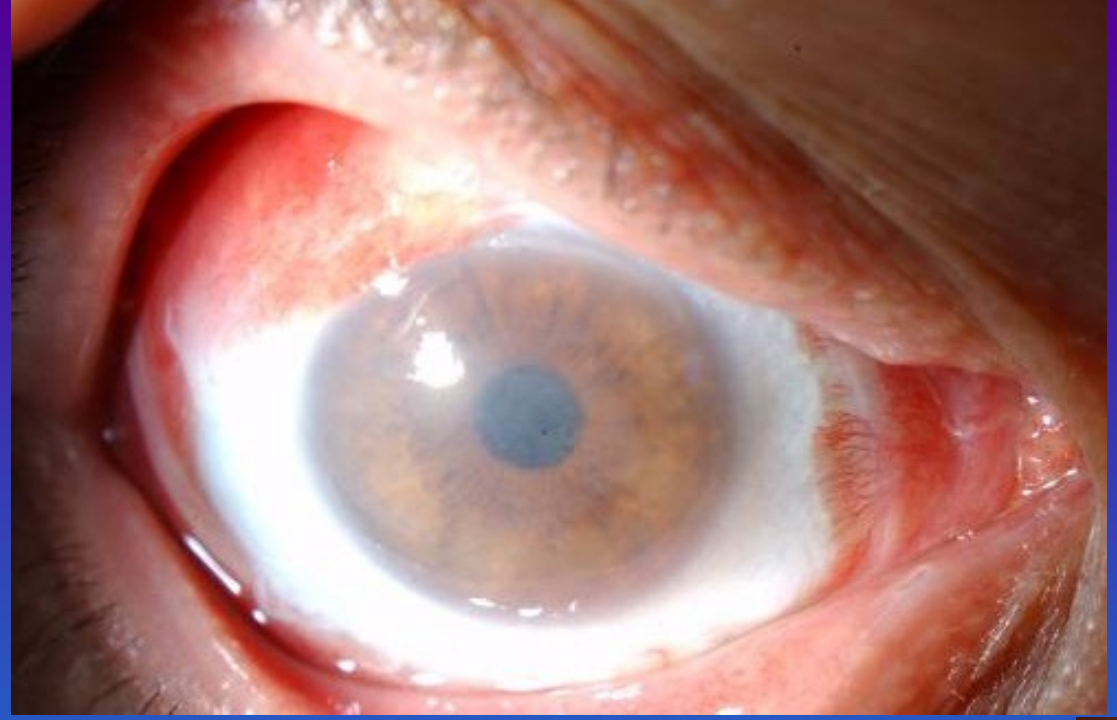




PED with LSCD: Residual PED with vessels in amnion tissue

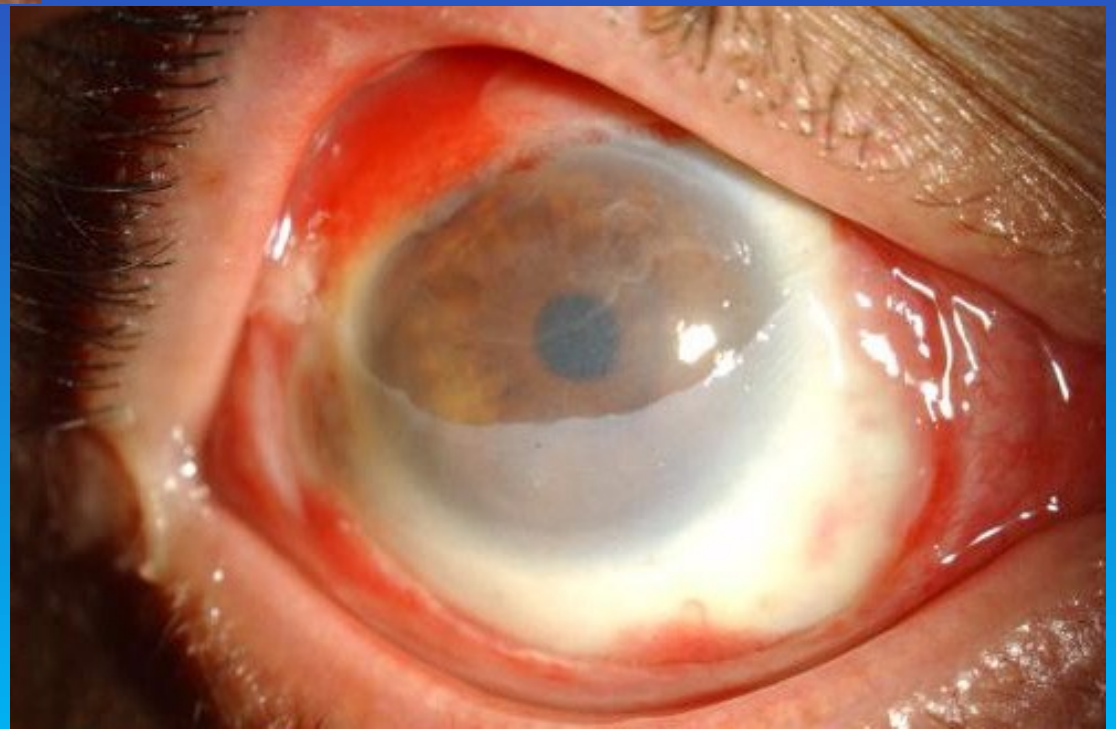






Alkali Burn

Membrane retracted and exposed surface



Take home message

- AM is versatile with multiple indications
- It is not something to do when all else fails
- Follow meticulous surgical technique to ensure success
- The variability of the membrane can lead inconsistent results

Thank you for your attention