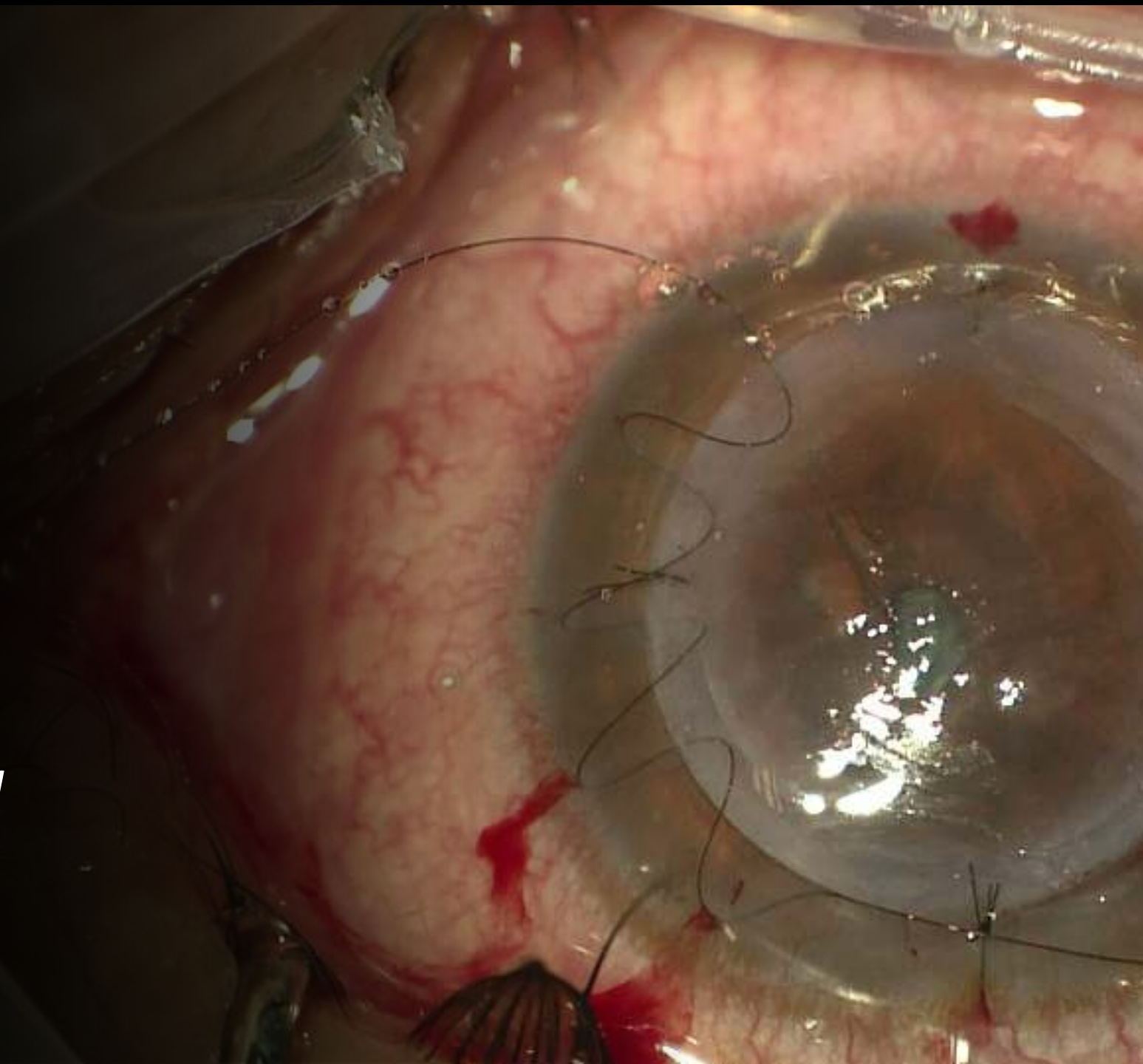




Femtosecond Laser assisted Keratoplasty Current Status....

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Disadvantages of Manual PKP

Classic vertical edge-to-edge wound requires relatively tight sutures to withstand the effect of intraocular pressure.

Healing of at least 1 year.

High Astigmatism

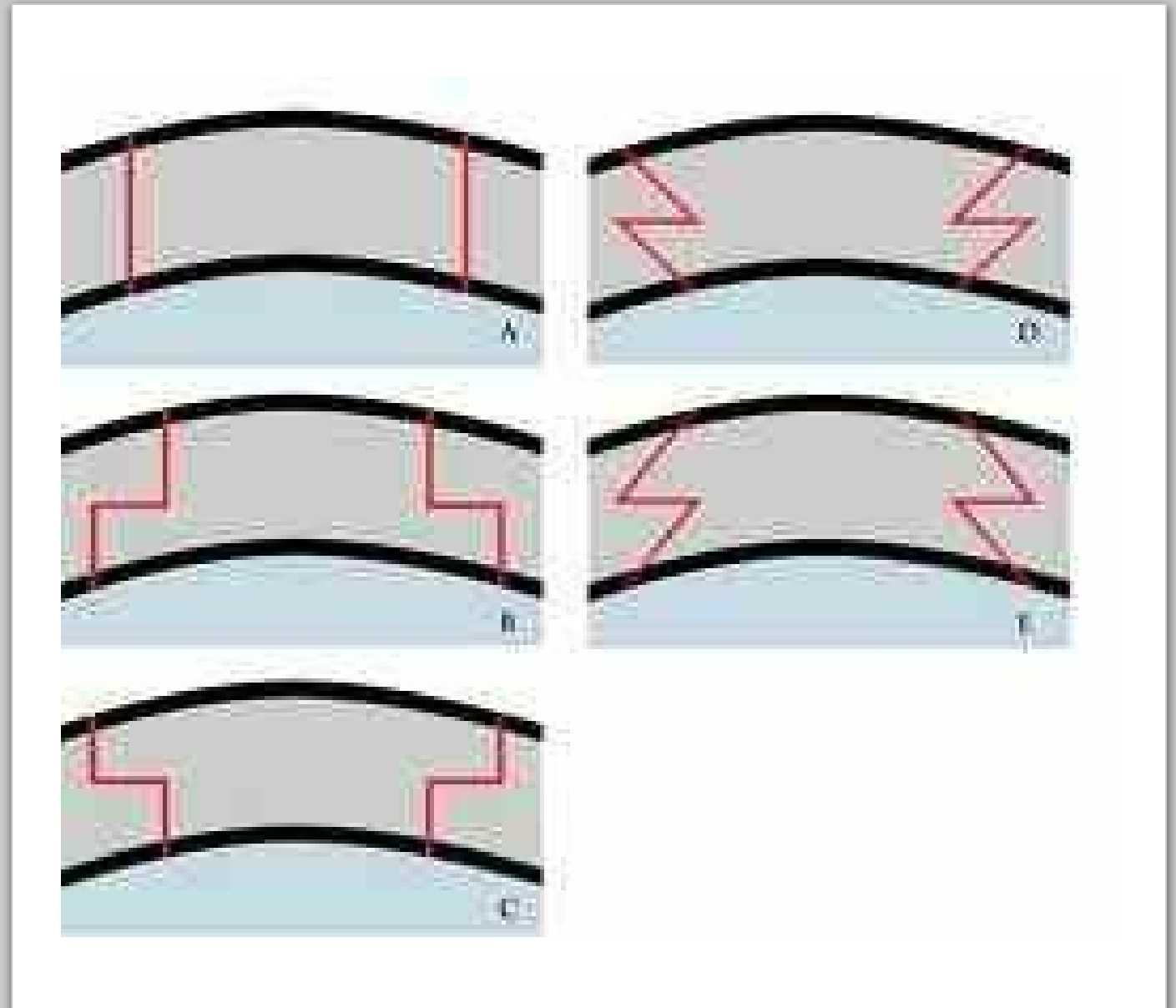
- Normally between 5-8D at 1-3 months.
- After sutural removal astigmatism between 3-5 D in the best case.

Why Femtosecond Laser

- Ultra precise cuts both for the donor and the recipient cornea.
- Complex designs with perfect “**LEGO**” like alignment hence:
 - Perfect Fit.
 - Easier Suturing.
 - Less suturing.
 - Less postoperative astigmatism.
 - Less cellular invitation and probably less rate of allograft rejection (to be tested).
 - Smoother visual rehabilitation.

Femtosecond assisted Corneal Transplantation

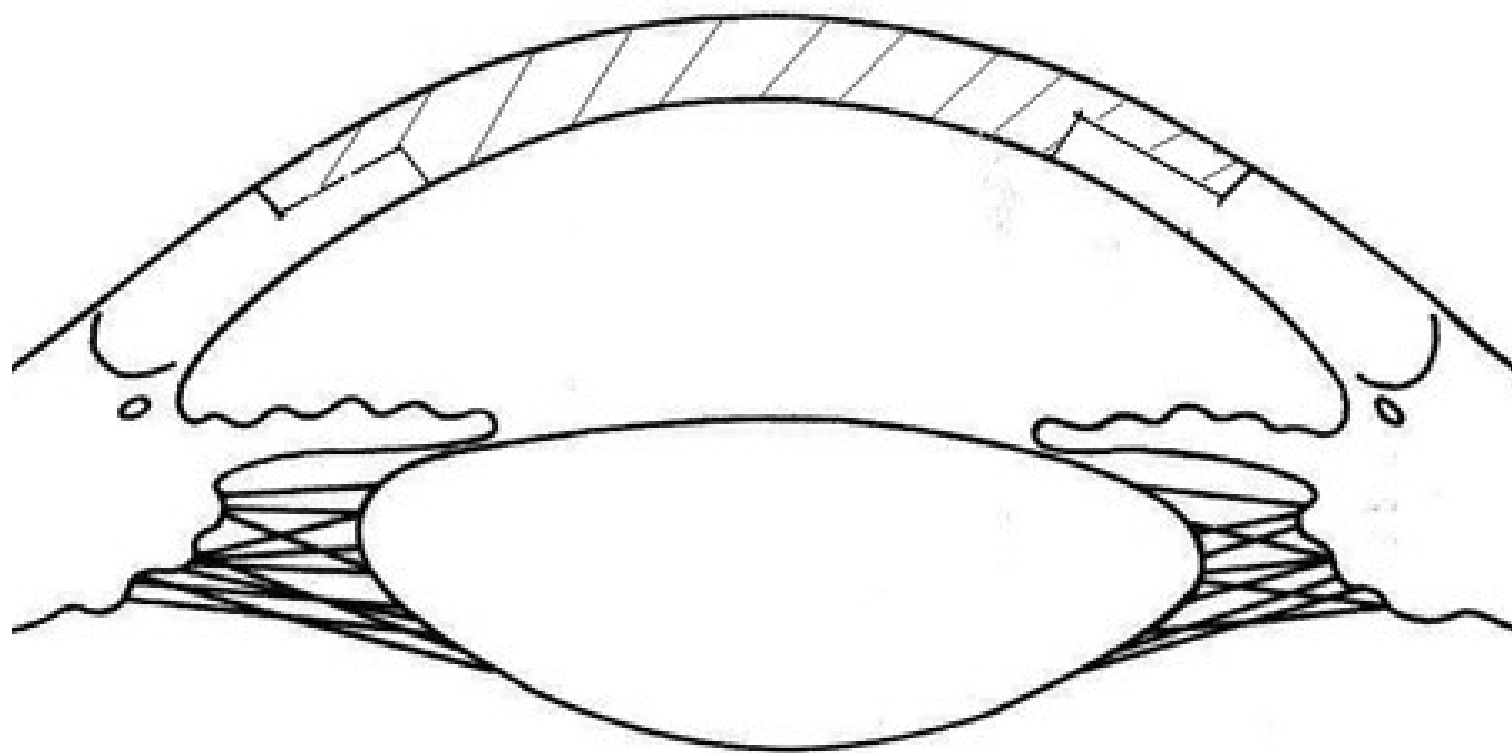
- PKP , with different designs:
 - Mushroom
 - Top hat
 - Zig Zag
 - Zig square
 - Others...
- DALK,SALK.
- DLEK and DSAEK.



Designs for FA-PKP

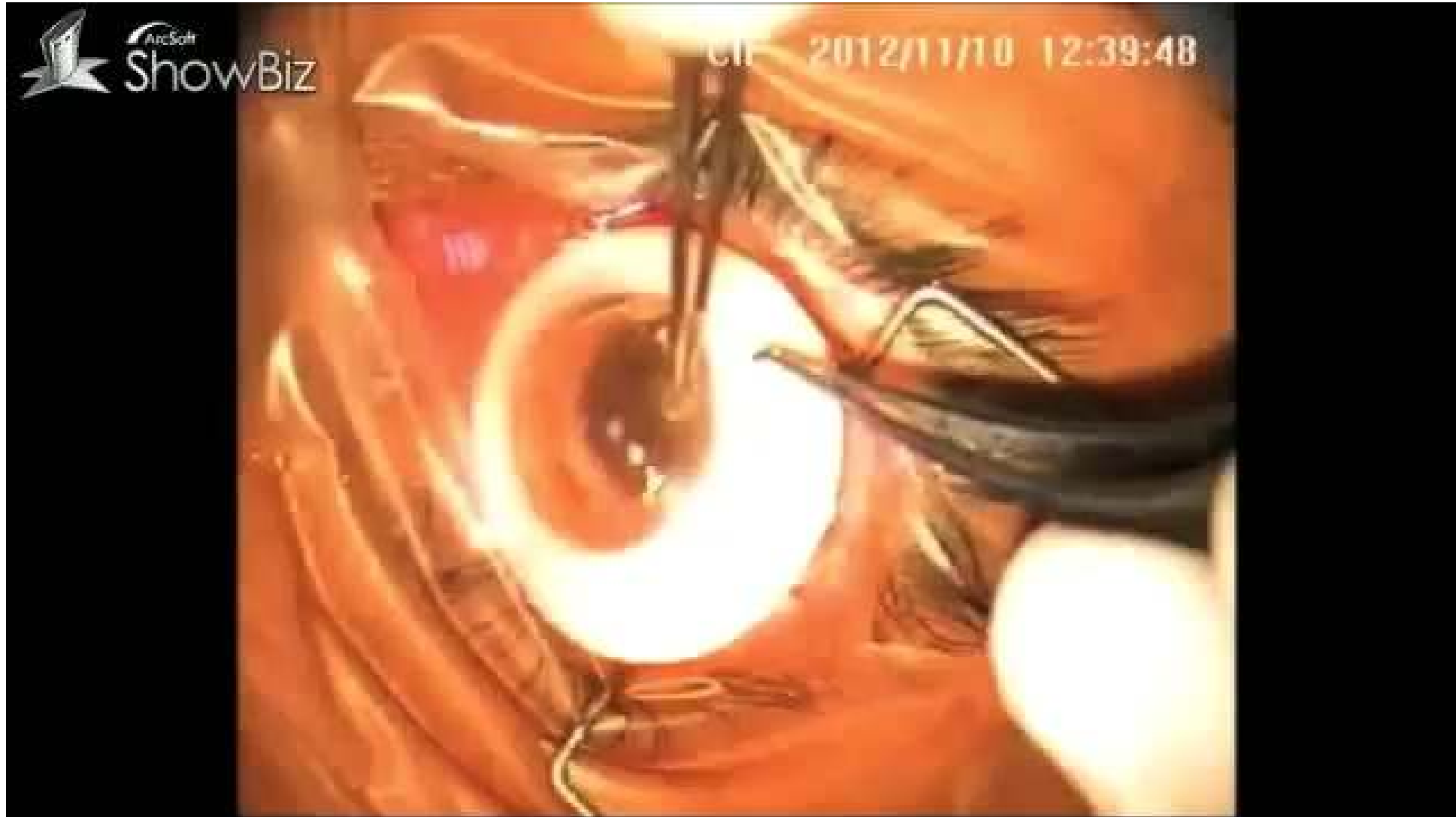
The MUSHROOM design

- Easier for Beginners.
- Lowers astigmatism significantly as the donor cornea rests on a *shelf* minimizing graft high or low riding and hence minimizing postoperative astigmatism.
- Can be used to perform DALK.

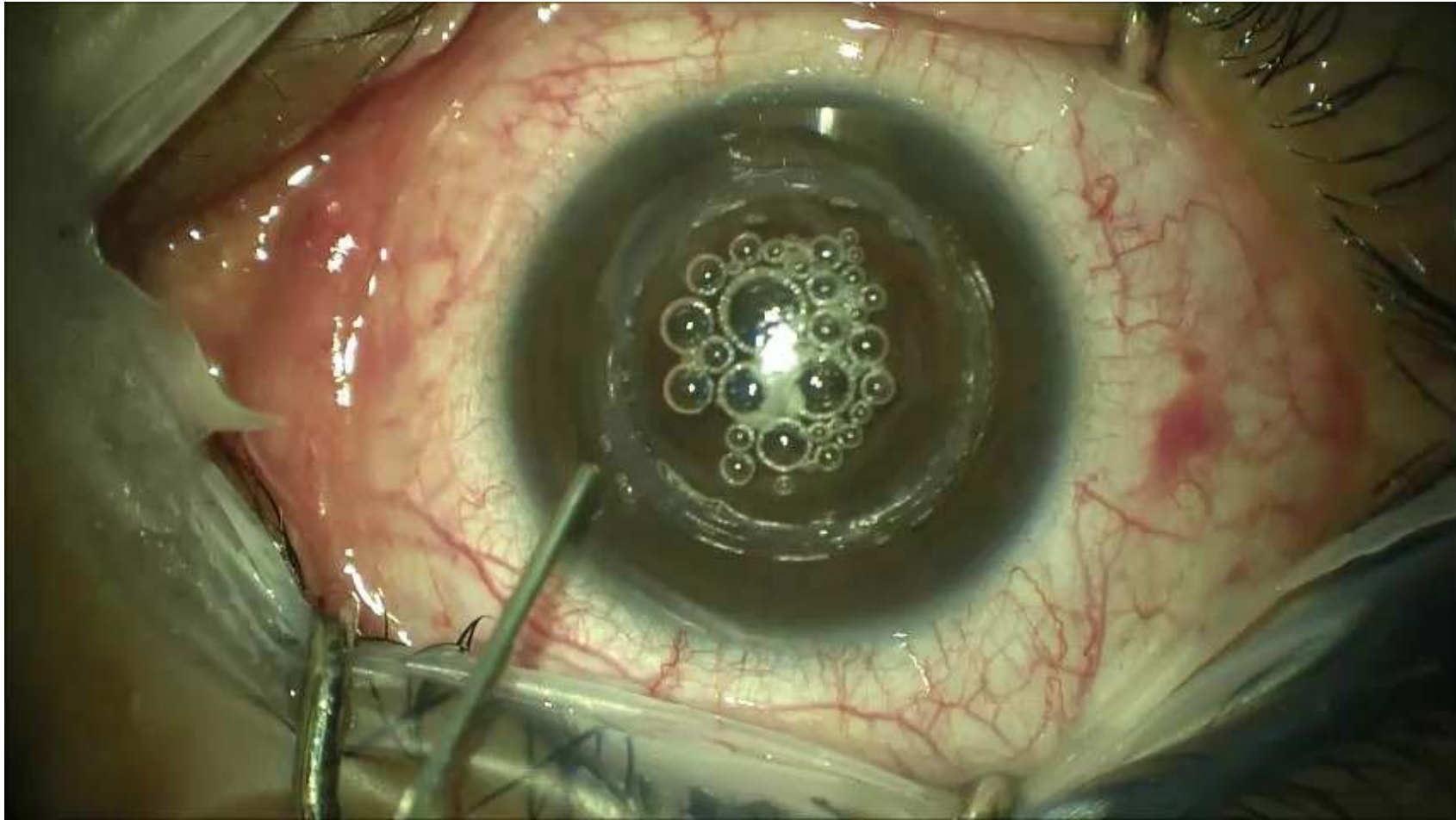


The Mushroom Design

Mushroom FS-PKP video



70 microns anterior offset

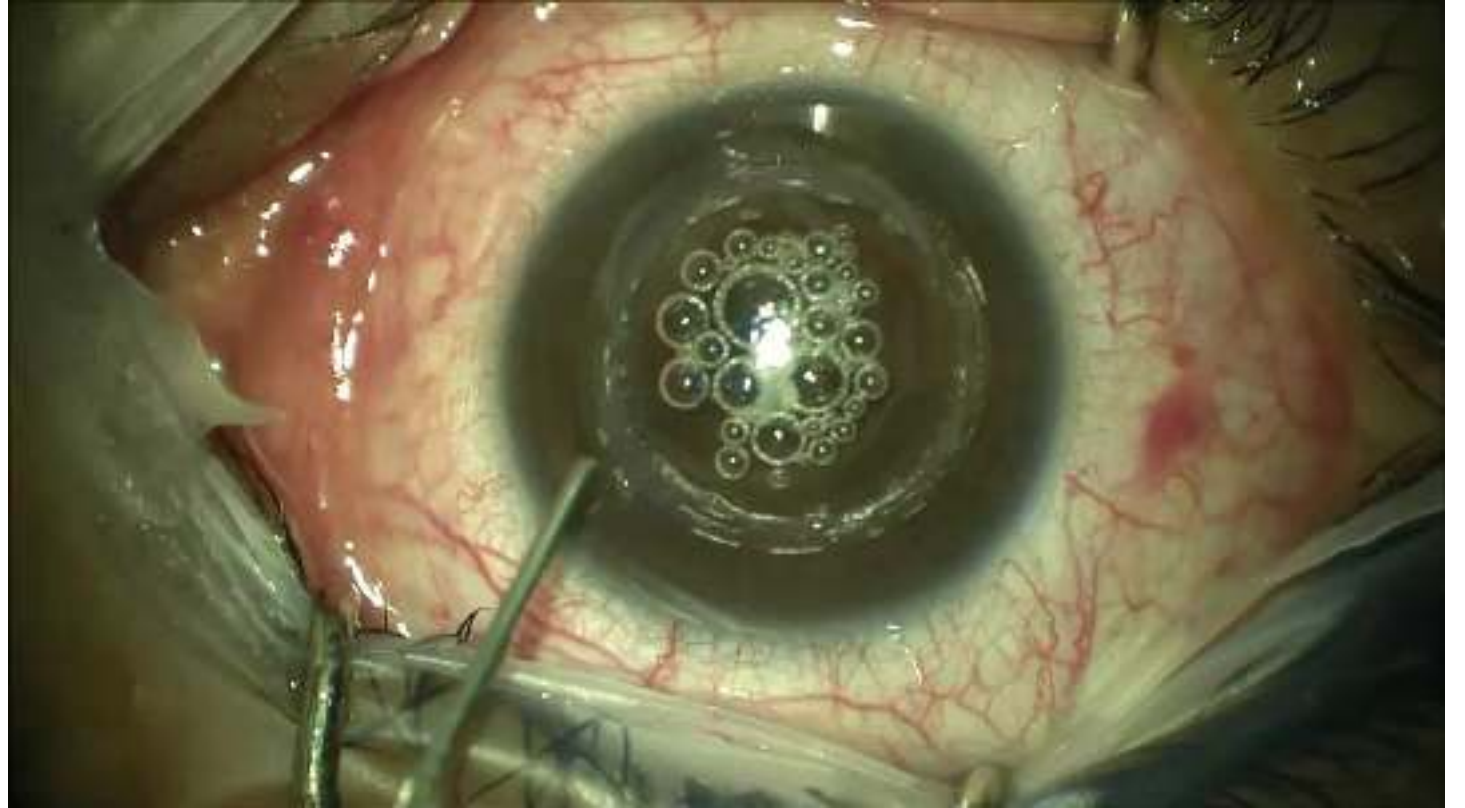


Mobile FS platforms can up your game.....

- SAME PLACE
- In FS-PKP , we take extra precautions to avoid opening the AC.
- This is because the patient is moved from one room to another (just a few meters but he has to stand up.
- In some other hospitals the FS is in a different floor, or even across the street!!!!.
- ONE scrub and TWO drapes and even if you get a leakdoesn't affect the procedure.
- For me this was a game changer...



NO NEED for the
70 microns
anterior offset



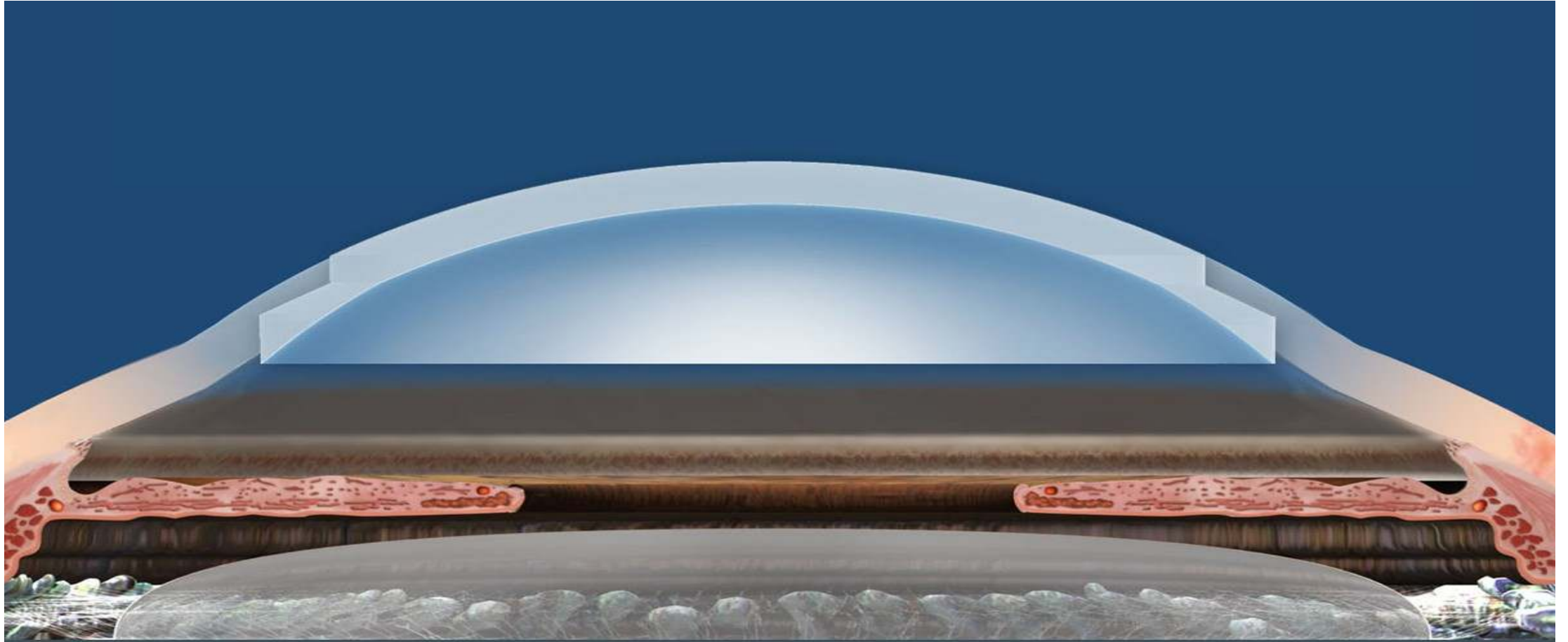
The TOP-HAT design

Naturally self sealing.

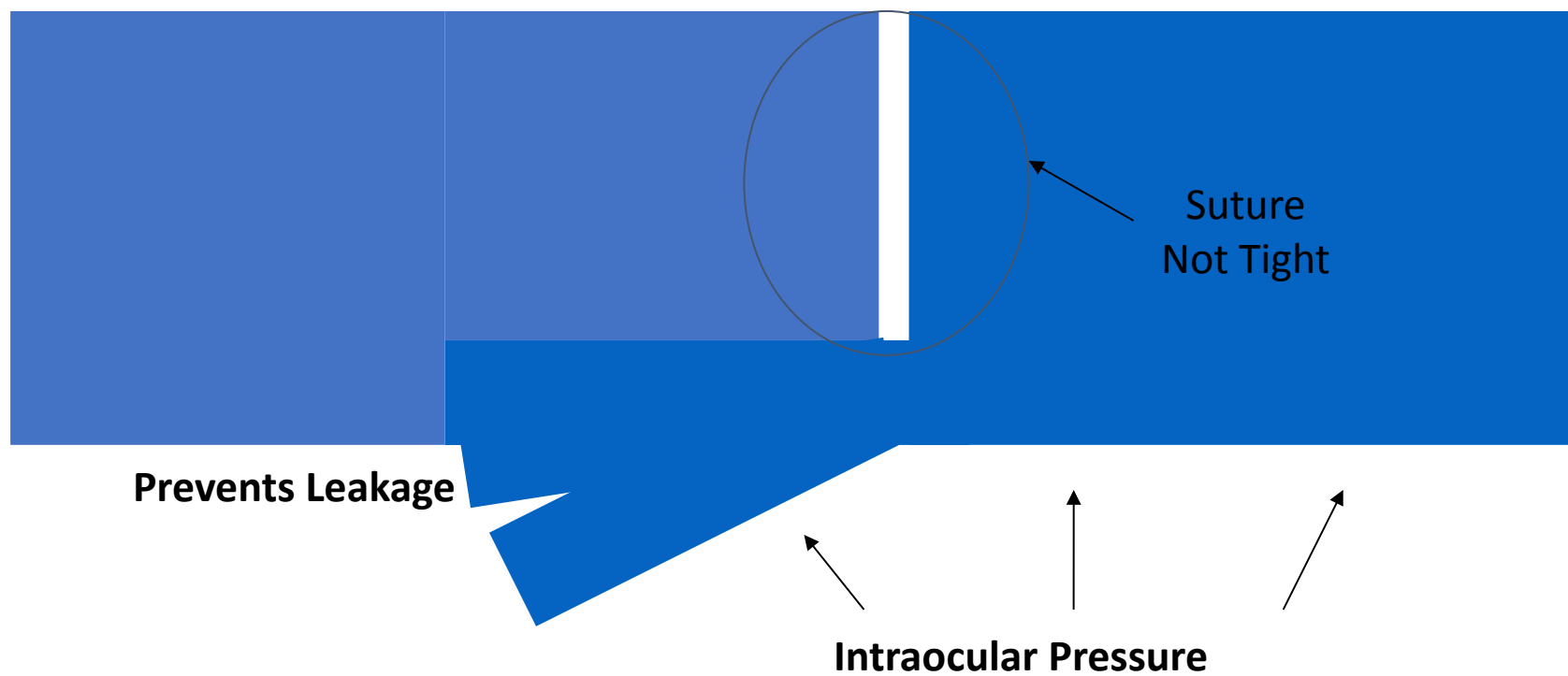
Transplants more endothelium so more suitable for low ECC pathologies (Fuchs).

IOP pushes the donor plug tight against the recipient shoulder so less suturing is needed (usually 8 interrupted!!).

The Top Hat design



Valve-Sealing Edge Design



Top Hat FS-PKP video



Special situations

FS PKP *a chaud*



CORNEA

Journal of Corneal and Contact Lens Research

Meibomian Gland Dysfunction
Cross-Linking for Infectious Keratitis
Co-Existence of CHED and FED
Review: Ocular Hypertension After
Keratoplasty

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TECHNIQUES

Femtosecond Laser-Assisted Penetrating Keratoplasty for Treating Infective Keratitis

Mohamed Monea, MD, FRCS¹, Joseph Mervin, MD, Mohamad Jaber, MD, FRCS, and
David G. Murray, MD

Purpose: To report the results of penetrating keratoplasty (PK) assisted by femtosecond laser in the treatment of penicillin-resistant keratitis.

Methods: Sixty eyes of 30 patients with diagnosed infective keratitis were included. They showed refractive error and corneal opacity. All patients had been treated with intravitreal and topical antibiotics. The eyes had been treated with femtosecond laser-assisted PK and PK assisted by femtosecond laser. All patients achieved good visual results. PK assisted by femtosecond laser was performed in 30 eyes, and PK assisted by femtosecond laser was performed in 30 eyes. The mean preoperative visual acuity was 0.12. The mean postoperative visual acuity was 0.45. The mean preoperative corneal thickness was 540 μ m. The mean postoperative corneal thickness was 540 μ m. The mean preoperative corneal curvature was 43.5 D. The mean postoperative corneal curvature was 43.5 D. The mean preoperative corneal astigmatism was 1.5 D. The mean postoperative corneal astigmatism was 1.5 D. The mean preoperative corneal irregularity was 0.5 D. The mean postoperative corneal irregularity was 0.5 D. The mean preoperative corneal haze was 0.5. The mean postoperative corneal haze was 0.5. The mean preoperative corneal endothelial cell count was 2500 cells/mm². The mean postoperative corneal endothelial cell count was 2500 cells/mm².

Results: All 30 eyes achieved good visual results. The PK assisted by femtosecond laser was performed in 30 eyes. The mean preoperative visual acuity was 0.12. The mean postoperative visual acuity was 0.45. The mean preoperative corneal thickness was 540 μ m. The mean postoperative corneal thickness was 540 μ m. The mean preoperative corneal curvature was 43.5 D. The mean postoperative corneal curvature was 43.5 D. The mean preoperative corneal astigmatism was 1.5 D. The mean postoperative corneal astigmatism was 1.5 D. The mean preoperative corneal irregularity was 0.5 D. The mean postoperative corneal irregularity was 0.5 D. The mean preoperative corneal haze was 0.5. The mean postoperative corneal haze was 0.5. The mean preoperative corneal endothelial cell count was 2500 cells/mm². The mean postoperative corneal endothelial cell count was 2500 cells/mm².

Conclusions: Femtosecond laser-assisted PK assisted by femtosecond laser was performed in 30 eyes. The mean preoperative visual acuity was 0.12. The mean postoperative visual acuity was 0.45. The mean preoperative corneal thickness was 540 μ m. The mean postoperative corneal thickness was 540 μ m. The mean preoperative corneal curvature was 43.5 D. The mean postoperative corneal curvature was 43.5 D. The mean preoperative corneal astigmatism was 1.5 D. The mean postoperative corneal astigmatism was 1.5 D. The mean preoperative corneal irregularity was 0.5 D. The mean postoperative corneal irregularity was 0.5 D. The mean preoperative corneal haze was 0.5. The mean postoperative corneal haze was 0.5. The mean preoperative corneal endothelial cell count was 2500 cells/mm². The mean postoperative corneal endothelial cell count was 2500 cells/mm².

Key Words: femtosecond laser, penetrating keratoplasty, infectious keratitis, corneal opacity, corneal thickness, corneal curvature, corneal astigmatism, corneal irregularity, corneal haze, corneal endothelial cell count.

(Cornea 2020;39:382-385)

Introduction: Penetrating keratoplasty (PK) is a surgical procedure used to treat corneal diseases. It involves the replacement of the diseased cornea with a healthy donor cornea.

Methods: The study was approved by the local ethics committee. All patients gave informed consent. The study was conducted in a tertiary care hospital.

Results: All 30 eyes achieved good visual results. The PK assisted by femtosecond laser was performed in 30 eyes. The mean preoperative visual acuity was 0.12. The mean postoperative visual acuity was 0.45. The mean preoperative corneal thickness was 540 μ m. The mean postoperative corneal thickness was 540 μ m. The mean preoperative corneal curvature was 43.5 D. The mean postoperative corneal curvature was 43.5 D. The mean preoperative corneal astigmatism was 1.5 D. The mean postoperative corneal astigmatism was 1.5 D. The mean preoperative corneal irregularity was 0.5 D. The mean postoperative corneal irregularity was 0.5 D. The mean preoperative corneal haze was 0.5. The mean postoperative corneal haze was 0.5. The mean preoperative corneal endothelial cell count was 2500 cells/mm². The mean postoperative corneal endothelial cell count was 2500 cells/mm².

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infective keratitis is difficult to treat, which can be avoided by a laser-assisted PK.

Many eyes have been treated with femtosecond laser-assisted PK. The results have been good. The mean preoperative visual acuity was 0.12. The mean postoperative visual acuity was 0.45. The mean preoperative corneal thickness was 540 μ m. The mean postoperative corneal thickness was 540 μ m. The mean preoperative corneal curvature was 43.5 D. The mean postoperative corneal curvature was 43.5 D. The mean preoperative corneal astigmatism was 1.5 D. The mean postoperative corneal astigmatism was 1.5 D. The mean preoperative corneal irregularity was 0.5 D. The mean postoperative corneal irregularity was 0.5 D. The mean preoperative corneal haze was 0.5. The mean postoperative corneal haze was 0.5. The mean preoperative corneal endothelial cell count was 2500 cells/mm². The mean postoperative corneal endothelial cell count was 2500 cells/mm².

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METHODS

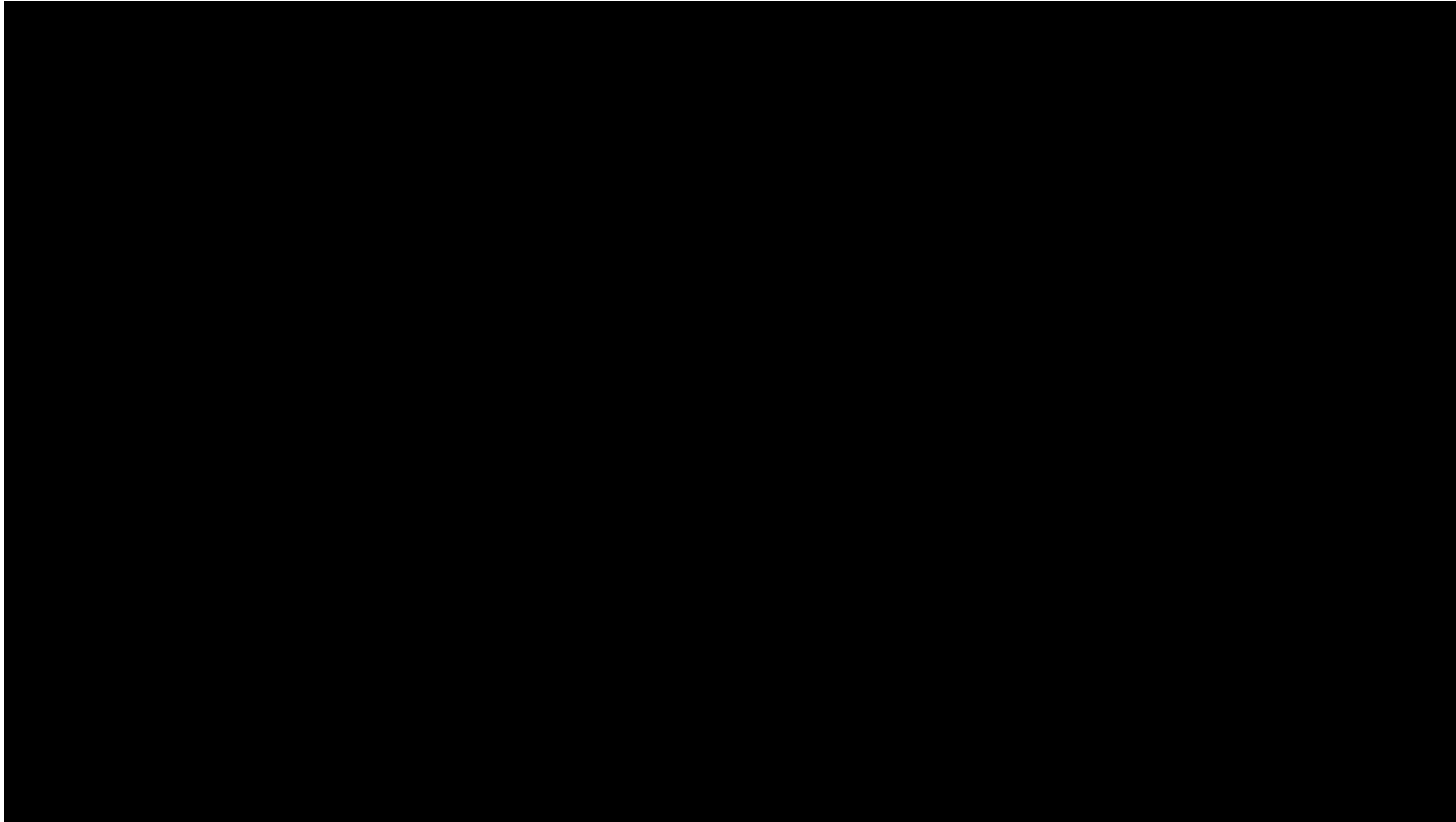
Patients' Data

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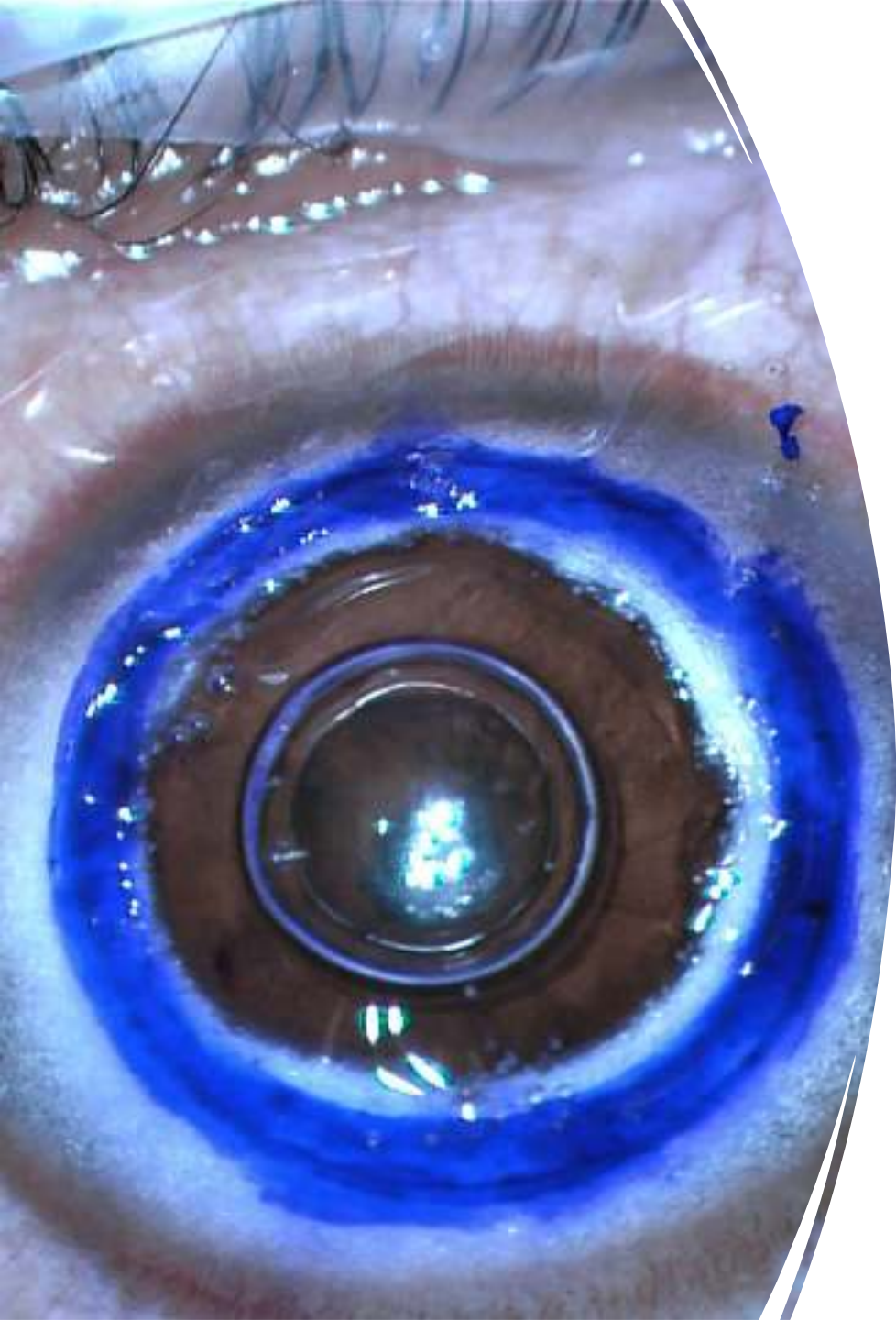
Cornea • Volume 39, Number 3, March 2020

Common misconception....
“femto will not cut an opacified cornea”



Special situations;
REDO Mushroom PKP
post allograft
rejection...





Advantages of FS in DALK

- Produces a deep , well designed and controlled ASC with an accurate predetermined clearance from the DM.
- In contrast with the usual expected depth of trephination for every 90 degree suction trephine rotation (which varies according to the corneal biomechanics and the suction pressure).
- This guarantees the posterior placement of the air canula ensuring an adequate air bubble.

A perspective view of a tunnel with tracks and glowing lights. The tunnel is illuminated by a series of warm, golden-yellow lights that create a strong sense of depth and perspective. The tracks run straight down the center of the tunnel, leading the eye towards a dark, circular opening at the far end. The walls of the tunnel are composed of many small, curved segments, each reflecting the light. The overall atmosphere is one of mystery and anticipation.

The Tunnel

FS Tunnel creation

Some Femtolasers have the software capability of creating a narrow tunnel that stops short of DM.

The idea is to avoid sharp instruments that can cause perforations.

And guarantee deep enough access to the pre-Descemet layer.

A blunt canula is inserted in the tunnel after stromal debulking and air is injected.

In our experience , not always practical due to air escape from tunnel roof.

Femto- DALK



Conclusion

FS assisted keratoplasty has been around for some time , is growing steadily and is not going anywhere.

I believe this is the immediate future of corneal transplantation.

It is a definite improvement to our manual techniques, both in the rehabilitation and the final visual outcomes.

