

Alternatives à la greffe : cornée artificielle et endothélium synthétique

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Service du Pr Isabelle Cochereau

Hôpital Bichat - Fondation A. de Rothschild



Guillaume Pellier de Quengsy 1789

Ophtalmologiste célèbre de Montpellier.



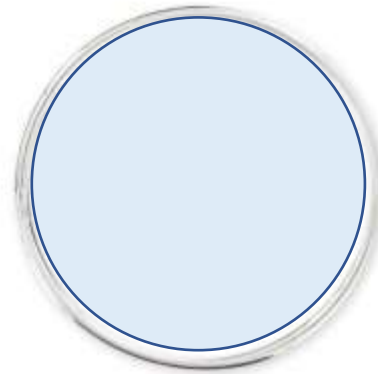
Johann Nepomuk von Nußbaum. 1853

Chirurgien allemand originaire de Munich.



1789

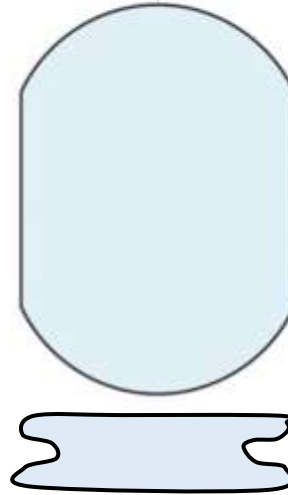
Guillaume
Pellier de Quengsy



Verre convexe
Anneau
périphérique
en Argent

1853

J Nepomuk Von Nussbaum



Verre

Expérimentation
Animale et premiers
patients

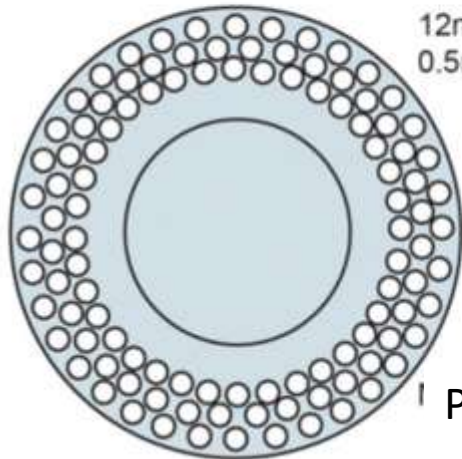
1860

Heusser Creates
a quartz keratoprosthesis

Quartz

1953

William Stone Jr.

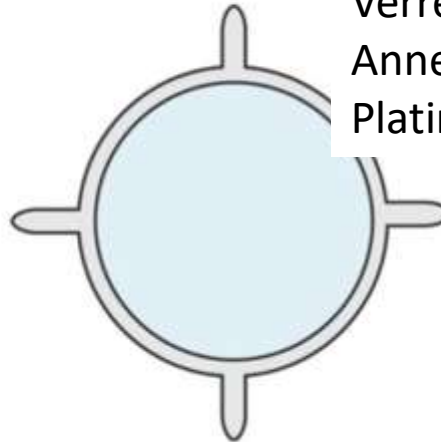


12mm Overall Diameter
0.5mm Thick

PMMA

1900

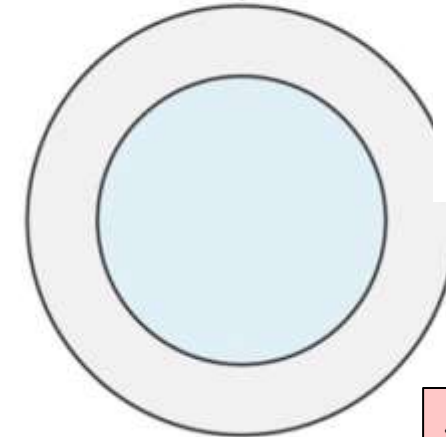
Salzer*



Verre convexe
Anneau de
Platine

1862

Abbate*



Verre
Jupe
périphérique
Latex-Caséine

«



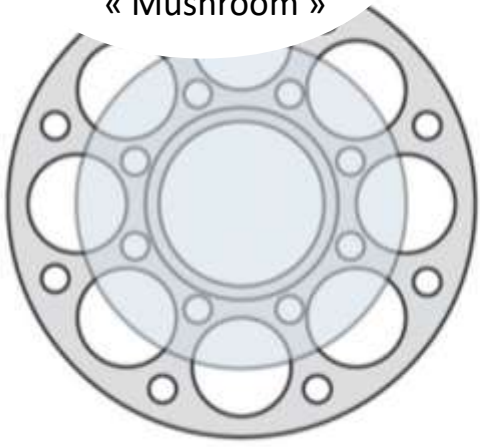
1969

Hernando Cardona

PMMA-Teflon
« Mushroom »

6mm Optic Diameter
8.5mm Teflon Backplate Diameter
1.8mm Larger Fenestration Diameter
0.5mm Smaller Fenestration Diameter

PMMA Optic
Teflon Skirt

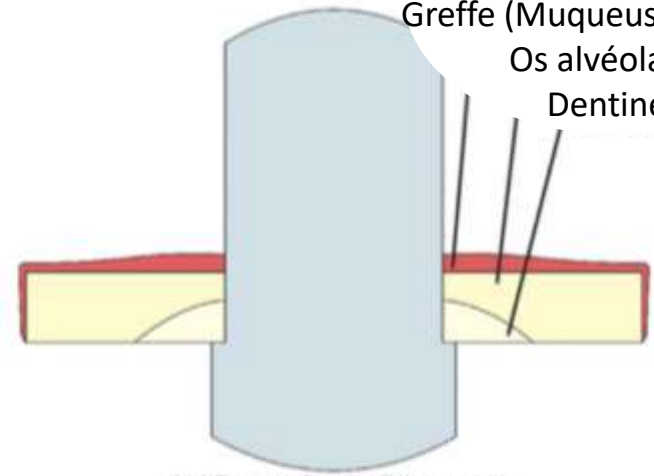


Optique PMMA
Jupe Teflon
« Mushroom design »

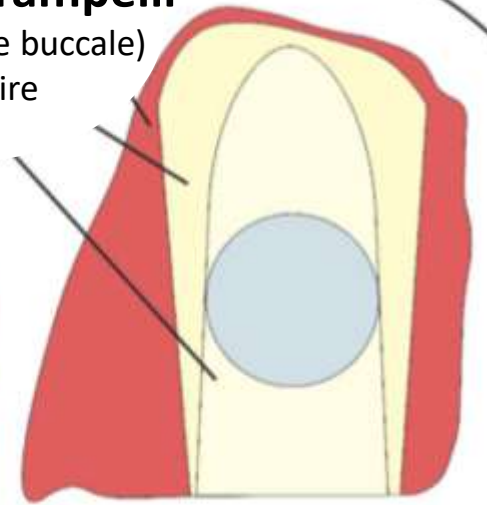
1963

Benedetto Strampelli

Greffe (Muqueuse buccale)
Os alvéolaire
Dentine



3.65mm Optic Diameter
7.75mm Optic Length

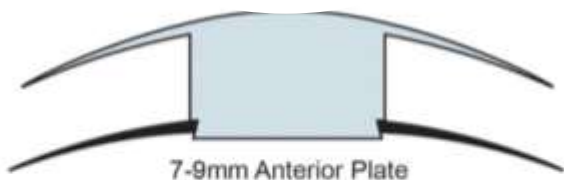


« OOKpro »

1974

Claes Dohlman

PMMA



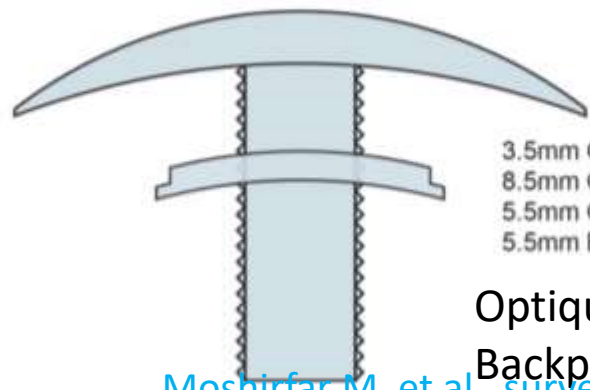
7-9mm Anterior Plate
7-9mm Posterior Plate

Optique PMMA
Backplate PMMA
« Bouton de manchette »

1983

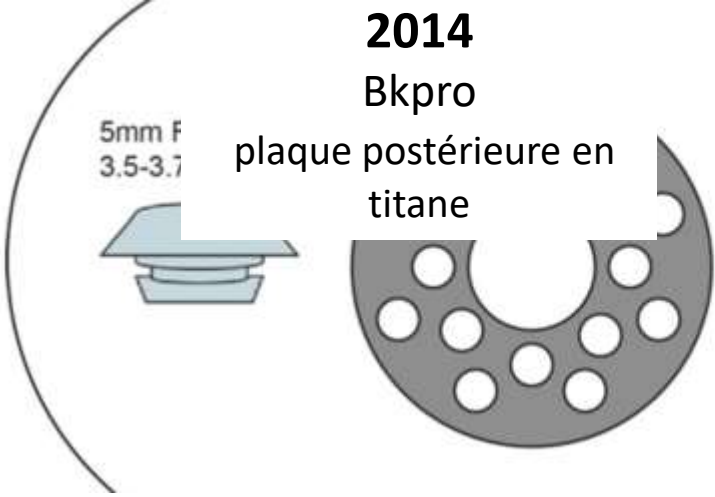
Hernando Cardona

PMMA



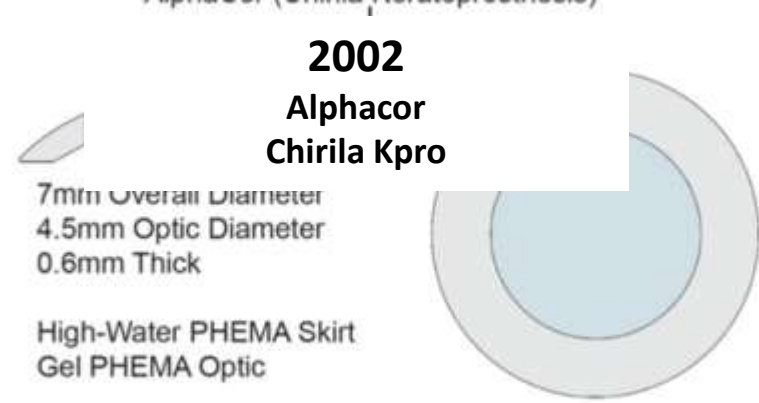
3.5mm Optic Diameter
8.5mm Overall Diameter
5.5mm Overall Length
5.5mm Backplate Diameter

Optique PMMA
Backplate PMMA

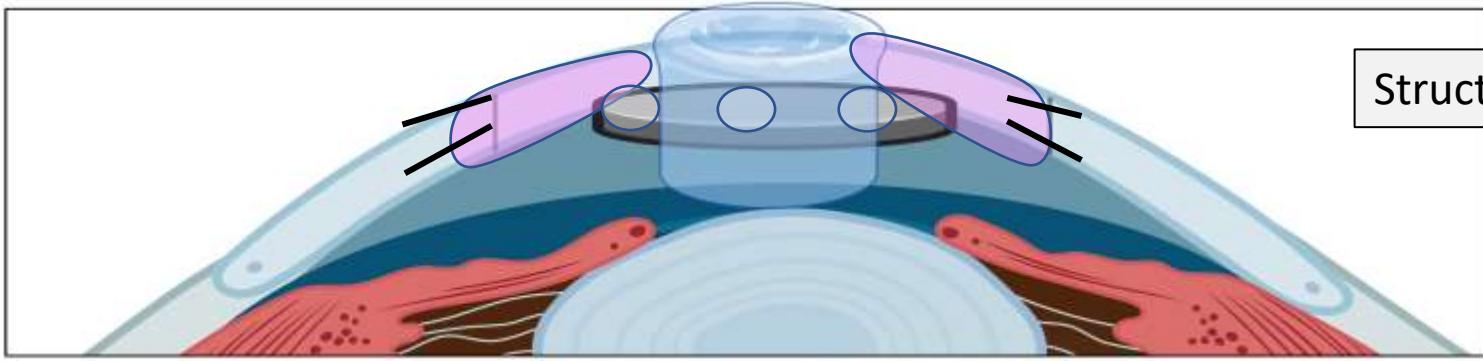


first used as an
alternative to OOKP

introduced for use
in Hyderabad, India



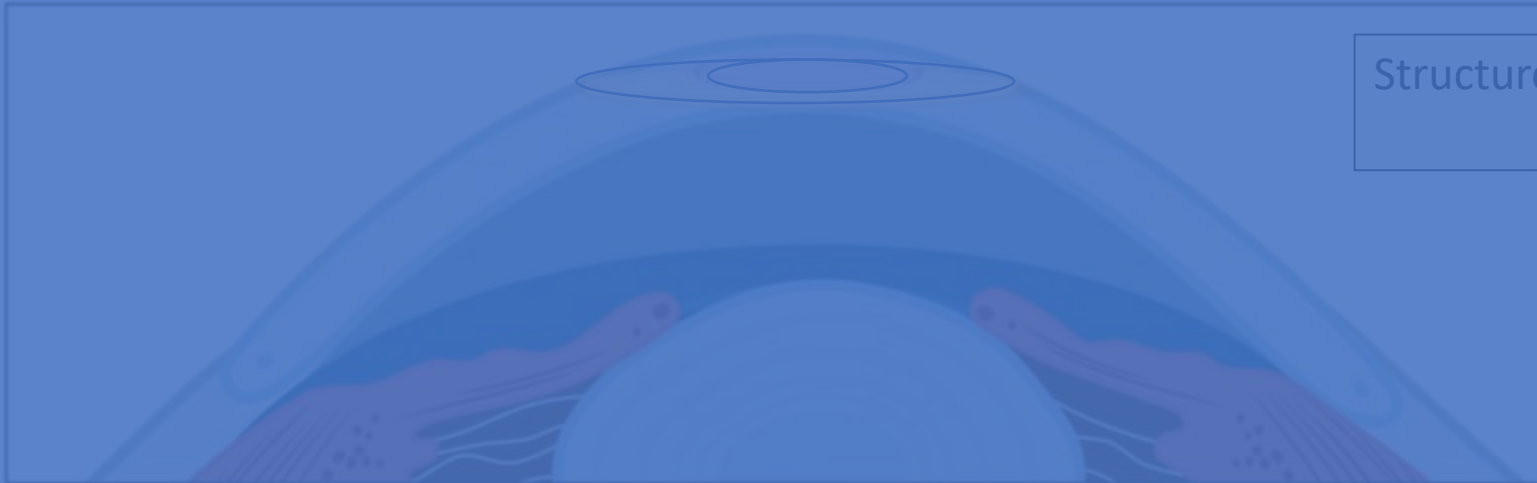
Moshirfar M. et al. survey of ophthalmology 67 (2022) 1175–1199



Structure en bouton de manchette

- Optique
- Plaque postérieure

Bio intégration : Cornée allogénique



Structure insérée dans la cornée
« Intrastromal »

- Optique
- Jupe périphérique

Bio intégration : Cornée du patient



Structure insérée à travers
et positionnée par dessus la cornée

- Optique
- Jupe périphérique

Bio intégration : Tissu Autologue

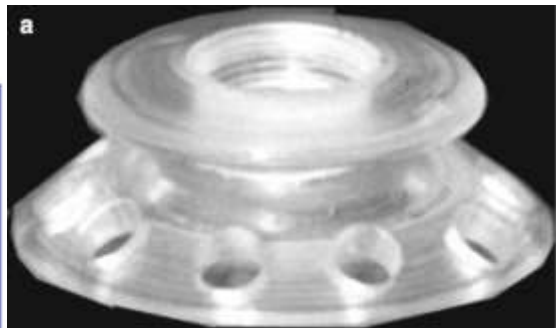
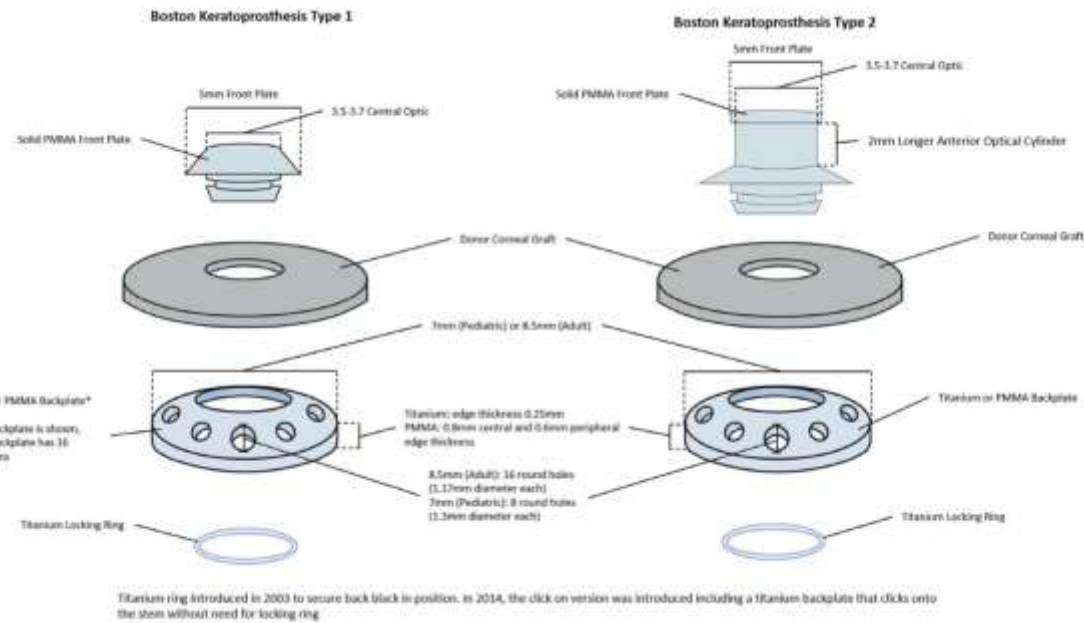
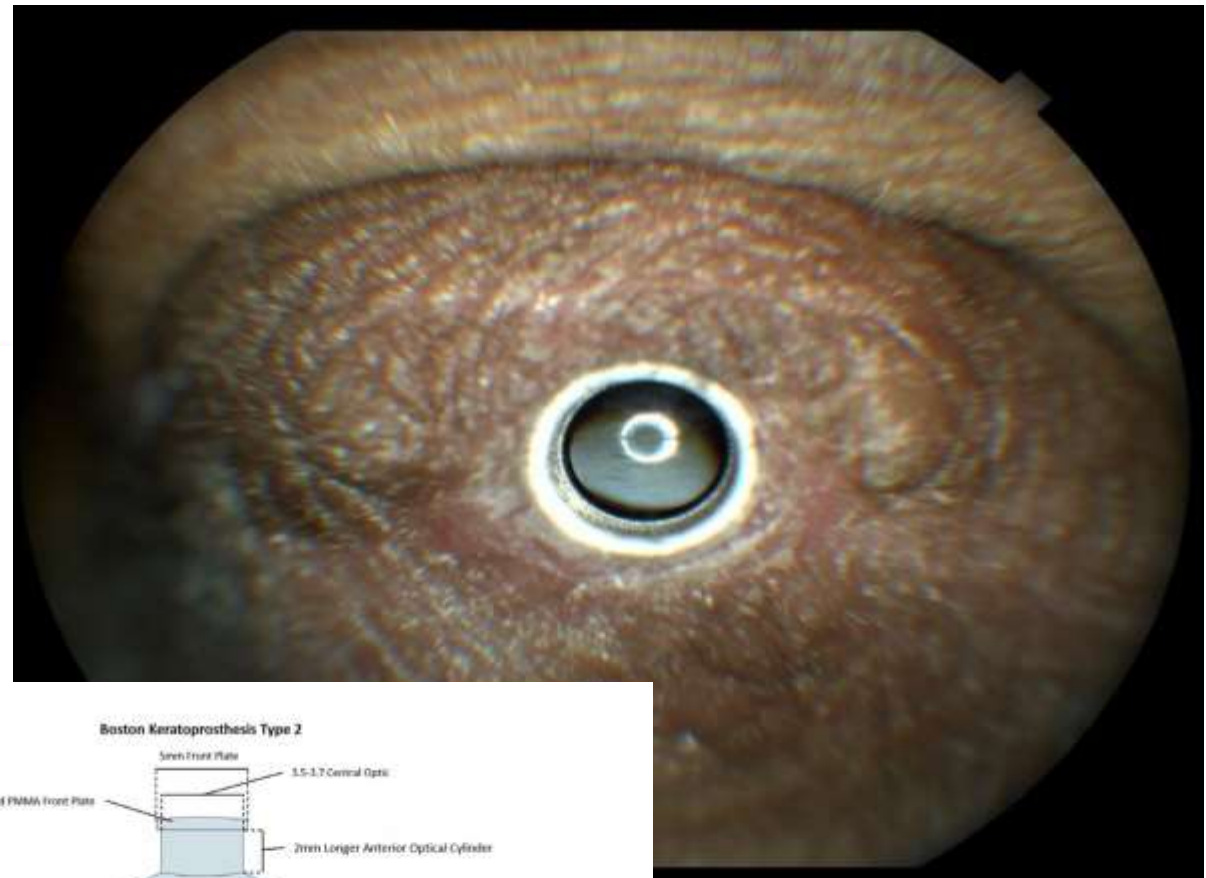
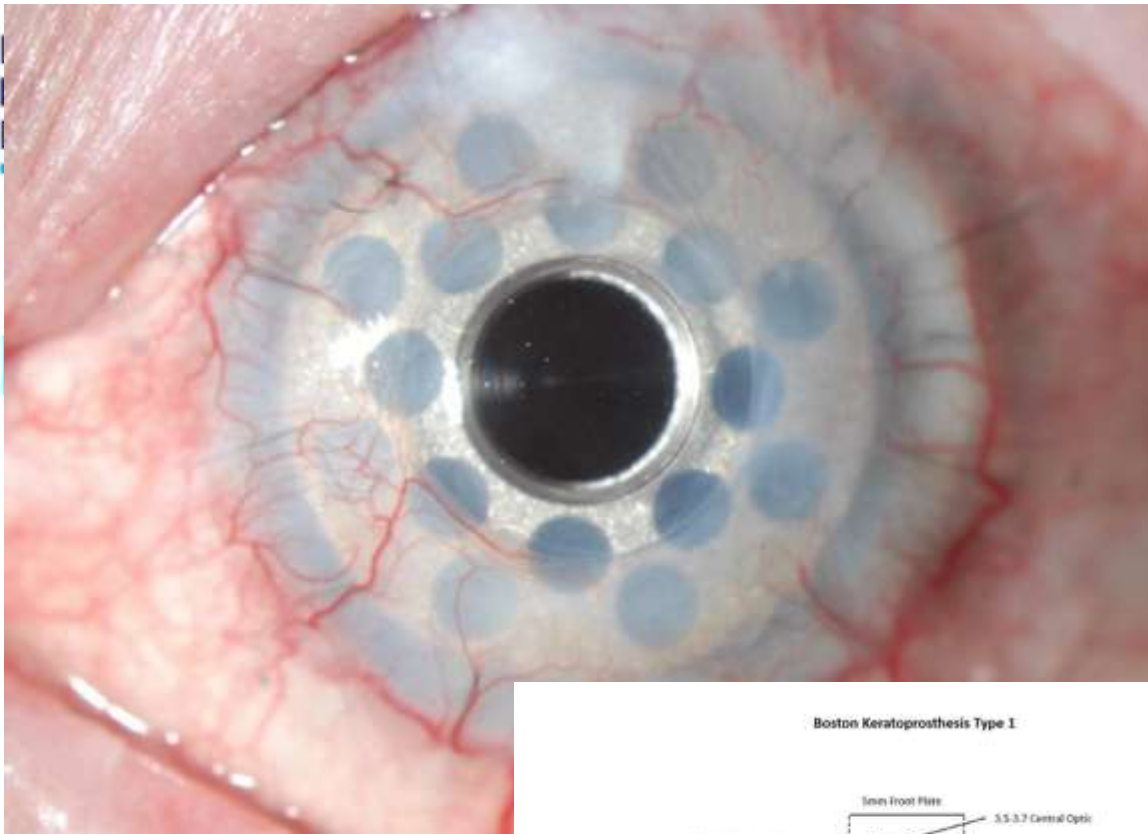
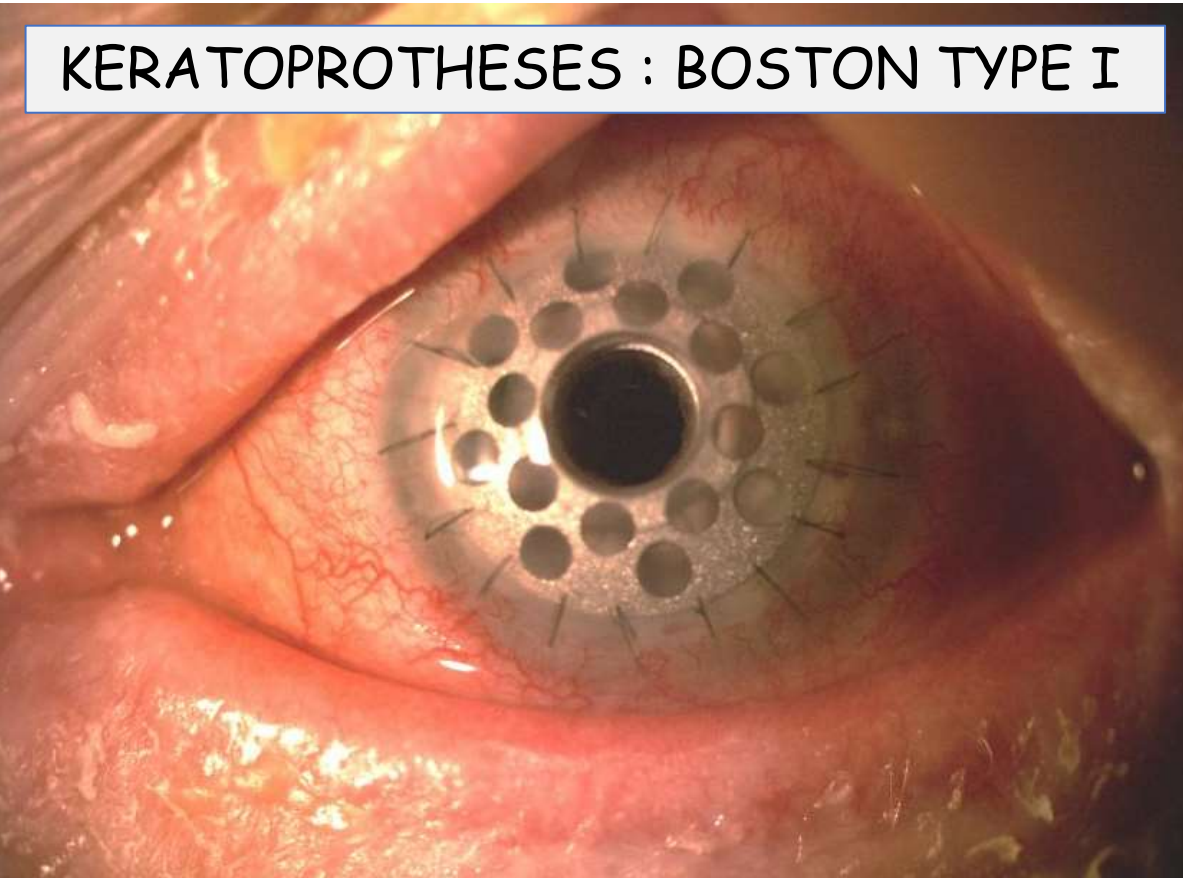


Fig. 3 – Boston Type 1 and Boston Type 2 keratoprostheses.

KERATOPROTHESES : BOSTON TYPE I

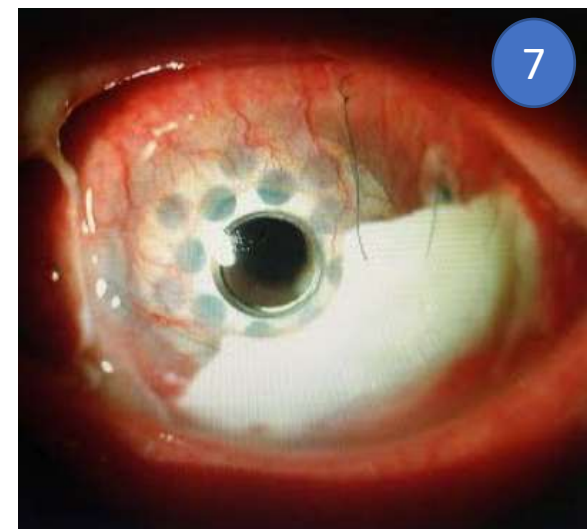
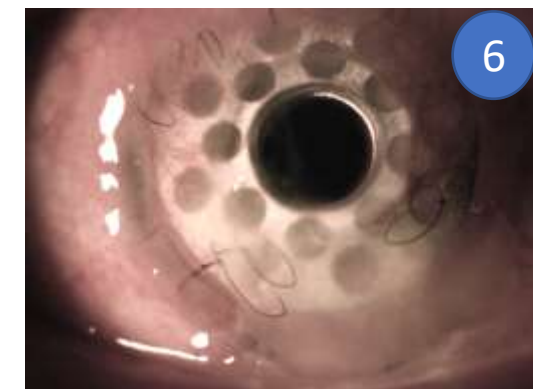
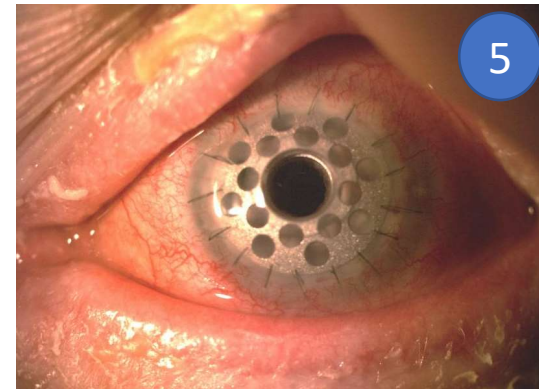
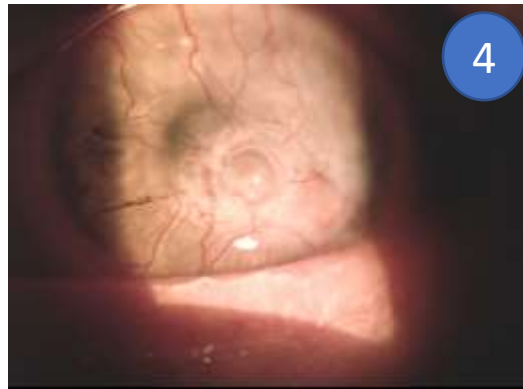
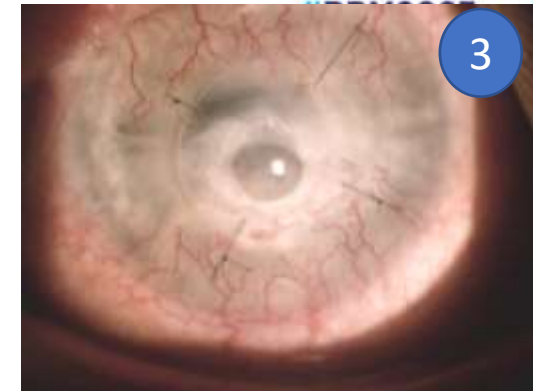


Complications

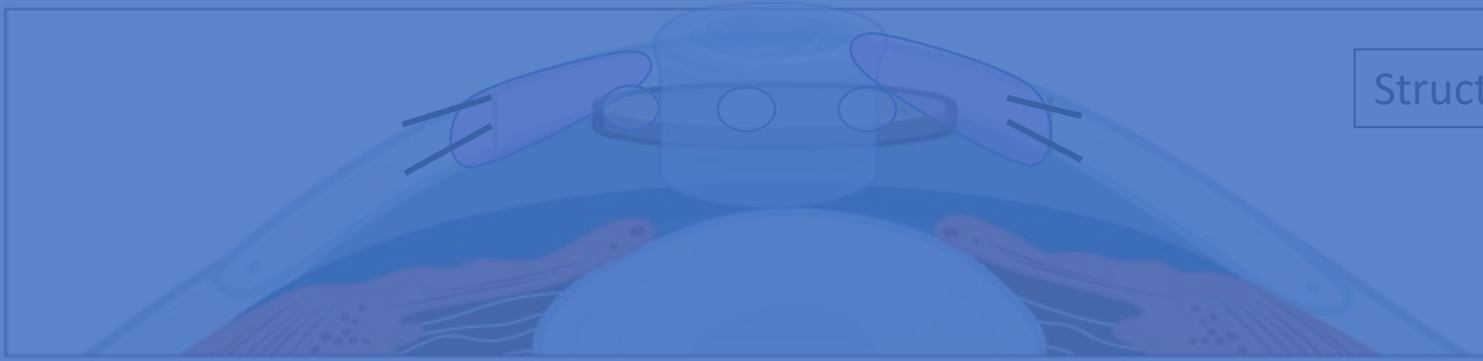
- Fonte Stromale
- Glaucome
- Fibrose du segment antérieur
- Infection
- Membrane retro-prothétique

Kang KB et al. PLoS One. 2018 Feb6;13(2)

Shah KJ et al. Cornea. 2018 Jan;37(1):11-14.



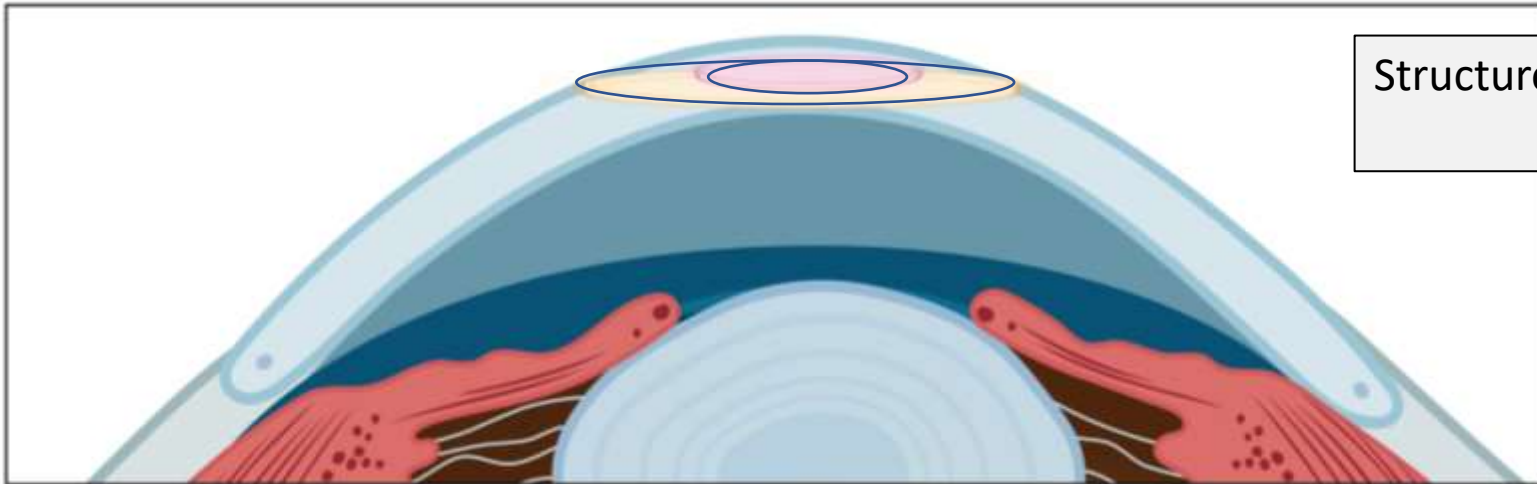
- Plusieurs chirurgies > 40 interventions : AMG a ensuite répété ALTK
- Lyse autour de la prothèse
- Infection fongique
- Acuité visuelle 4/20



Structure en bouton de manchette

- Optique
- Plaque postérieure

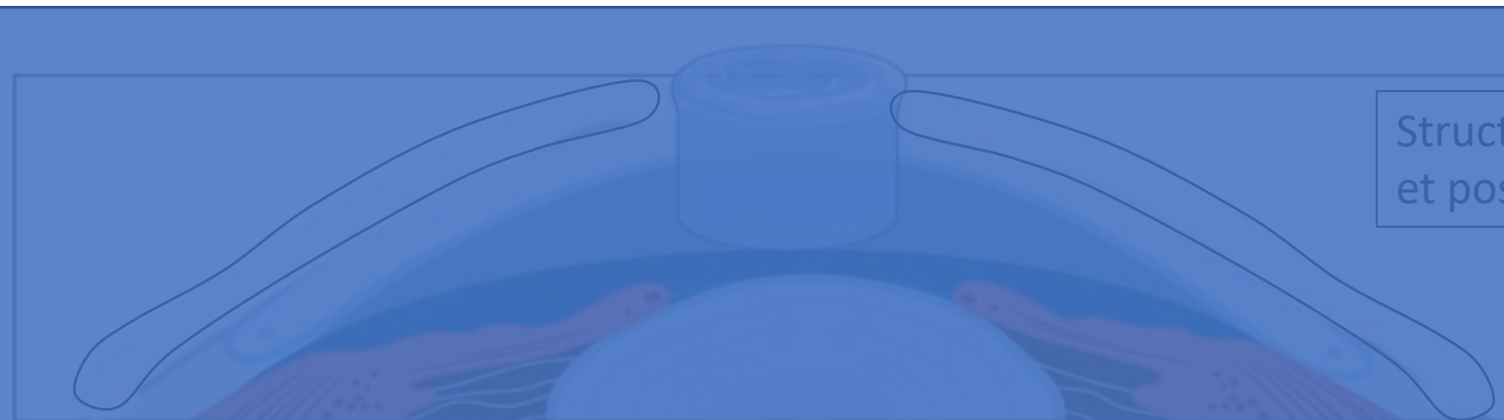
Bio intégration : Cornée allogénique



Structure insérée **dans la cornée**
« Intrastromal »

- Optique
- Jupe périphérique

Bio intégration : Cornée du patient



Structure insérée à travers
et positionnée **par dessus** la cornée

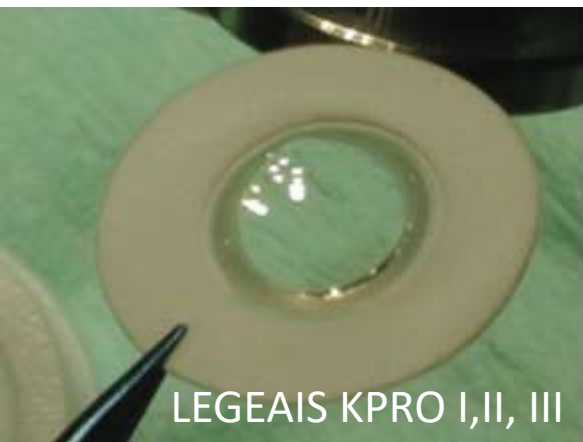
- Optique
- Jupe périphérique

Bio intégration : Tissu Autologue

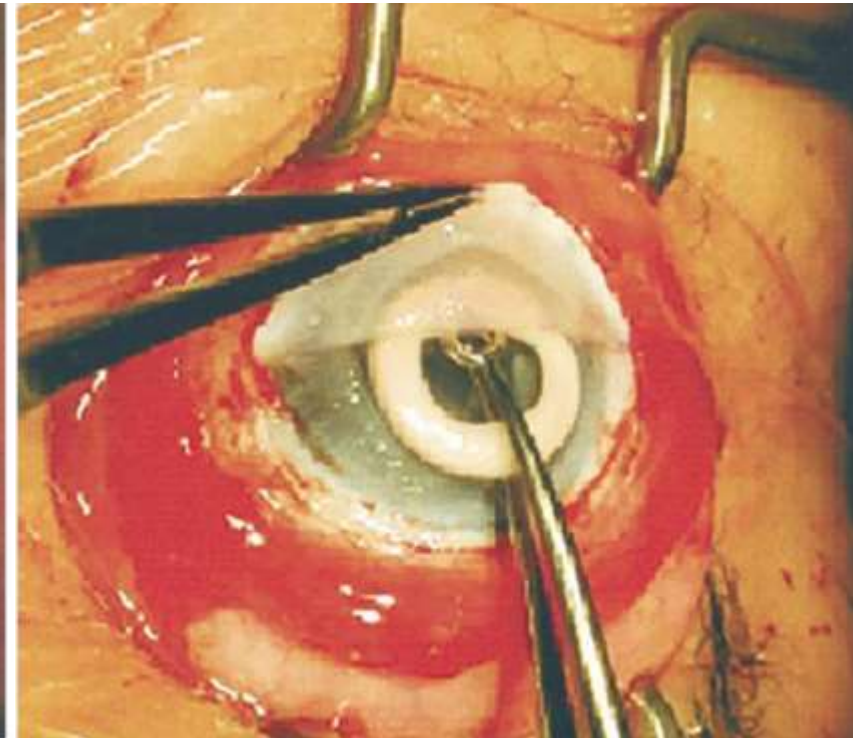
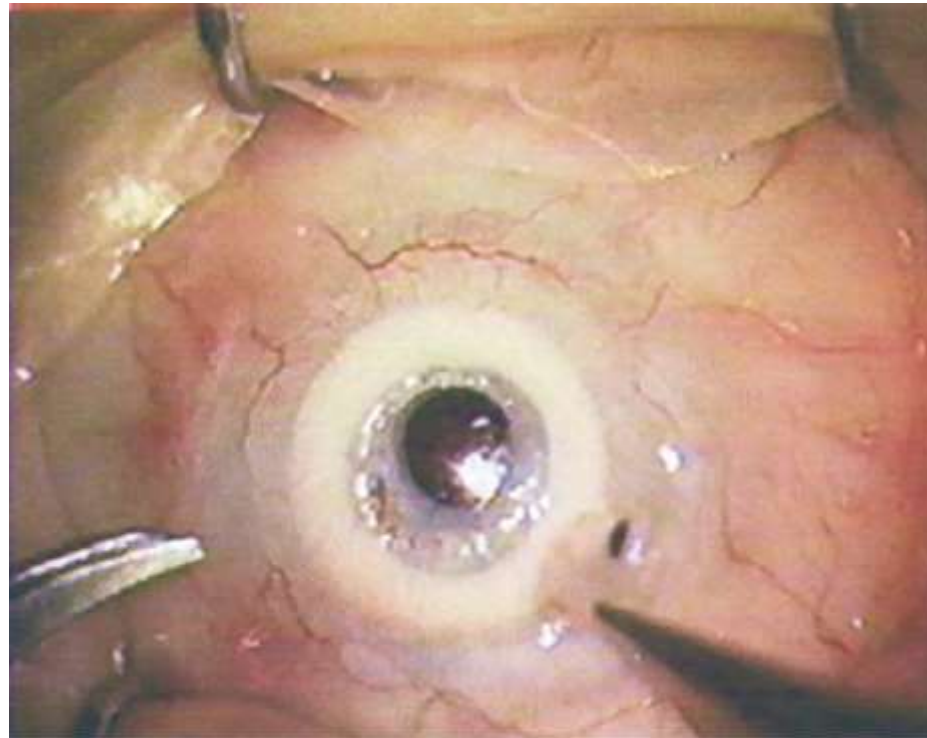


ALPHACOR

Polyhydroxyethylmethacrylate
(PHEMA)

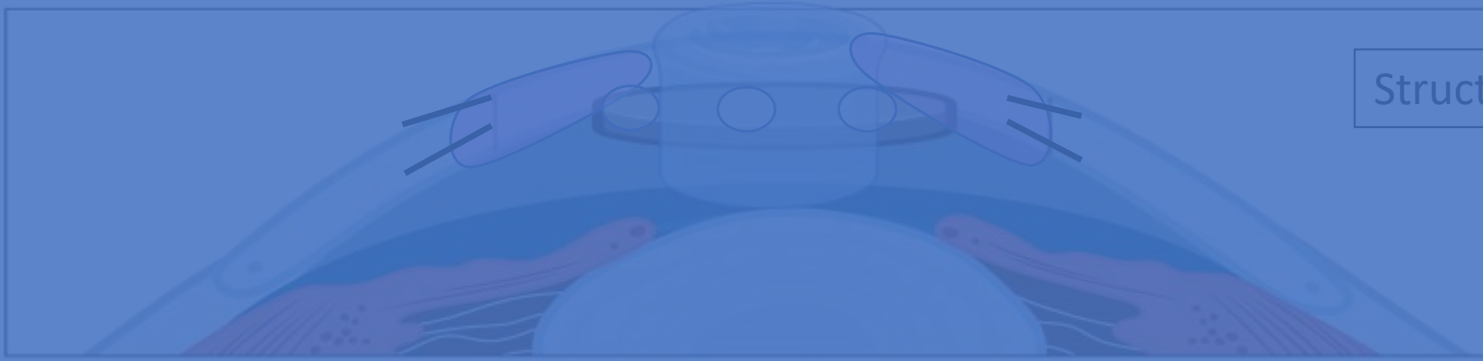


LEGEAIS KPRO I,II, III



PTFE - PMMA

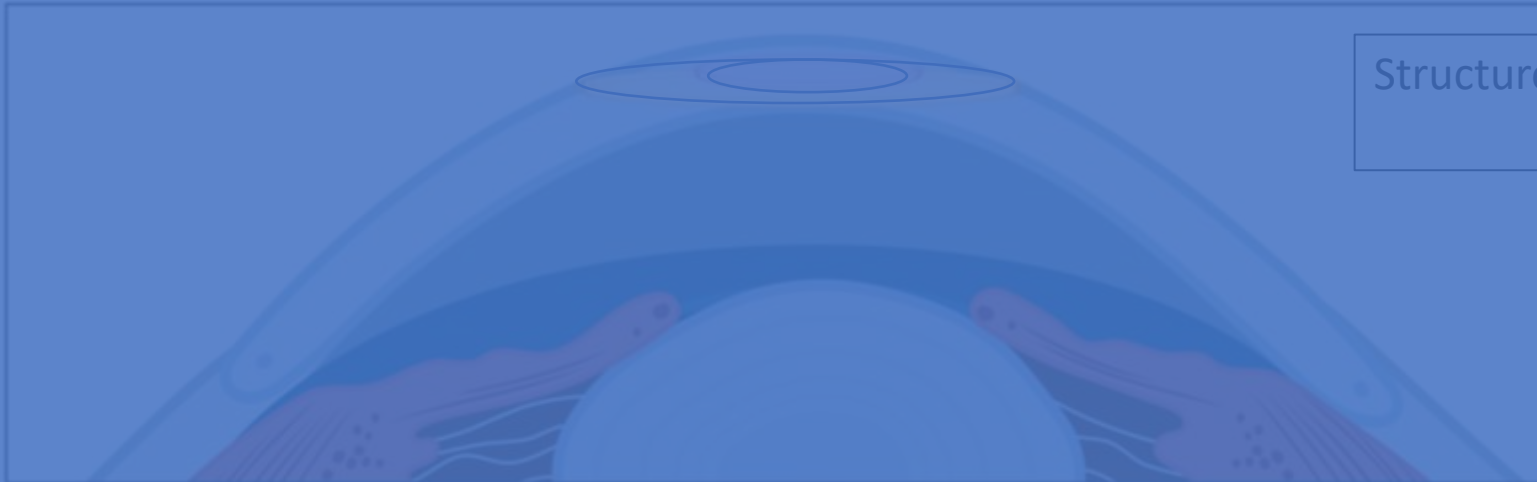
Softpoly (diméthylsiloxane)
(PDMS) optique centrale en
silicone et un disque de
fluorocarbone opaque de PTFE
poreux (jupe).



Structure en bouton de manchette

- Optique
- Plaque postérieure

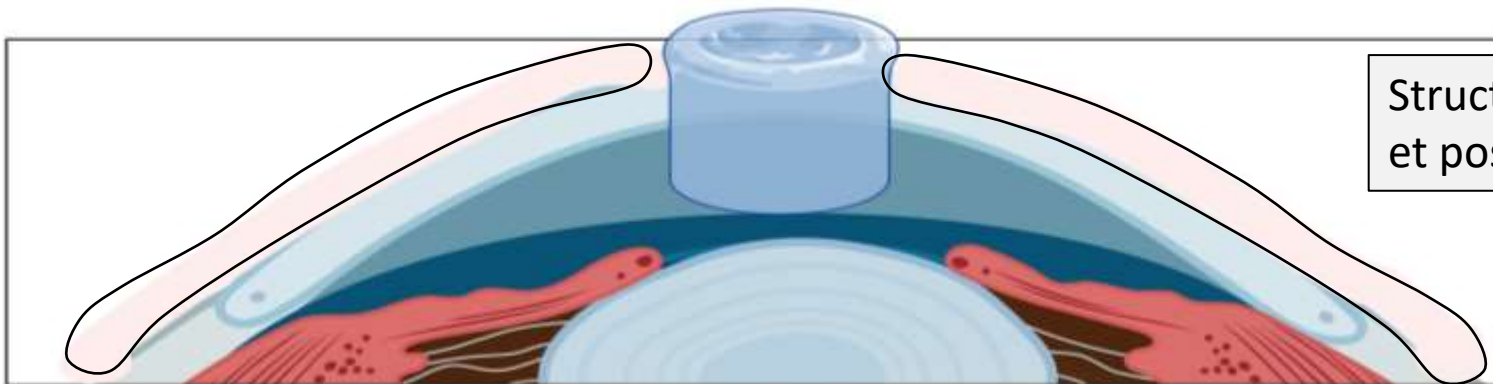
Bio intégration : Cornée allogénique



Structure insérée dans la cornée
« Intrastromal »

- Optique
- Jupe périphérique

Bio intégration : Cornée du patient



Structure insérée à travers
et positionnée **par dessus** la cornée

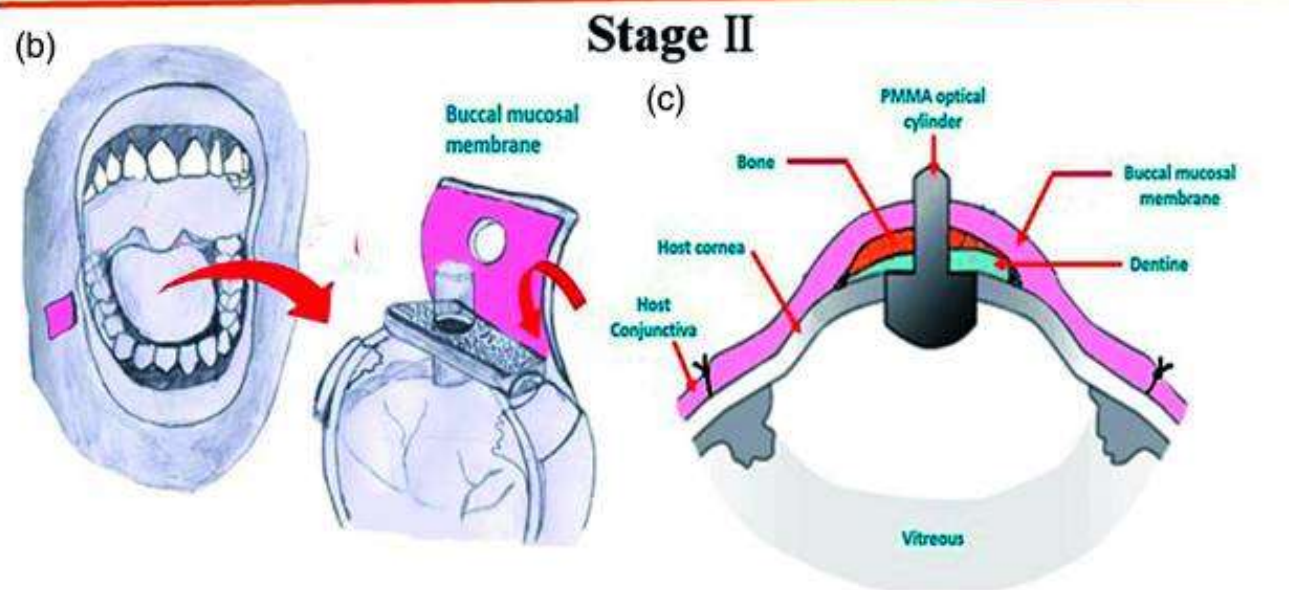
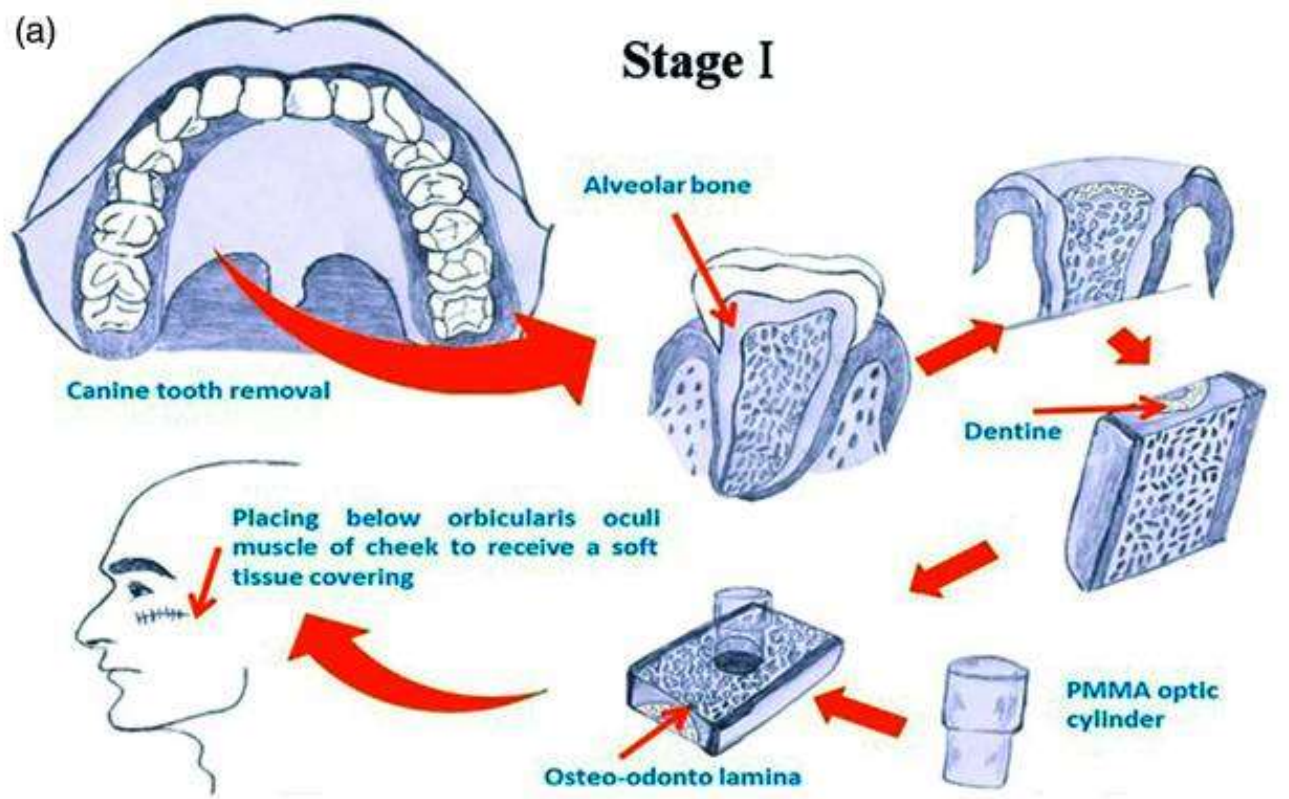
- Optique
- Jupe périphérique

Bio intégration : Tissu Autologue

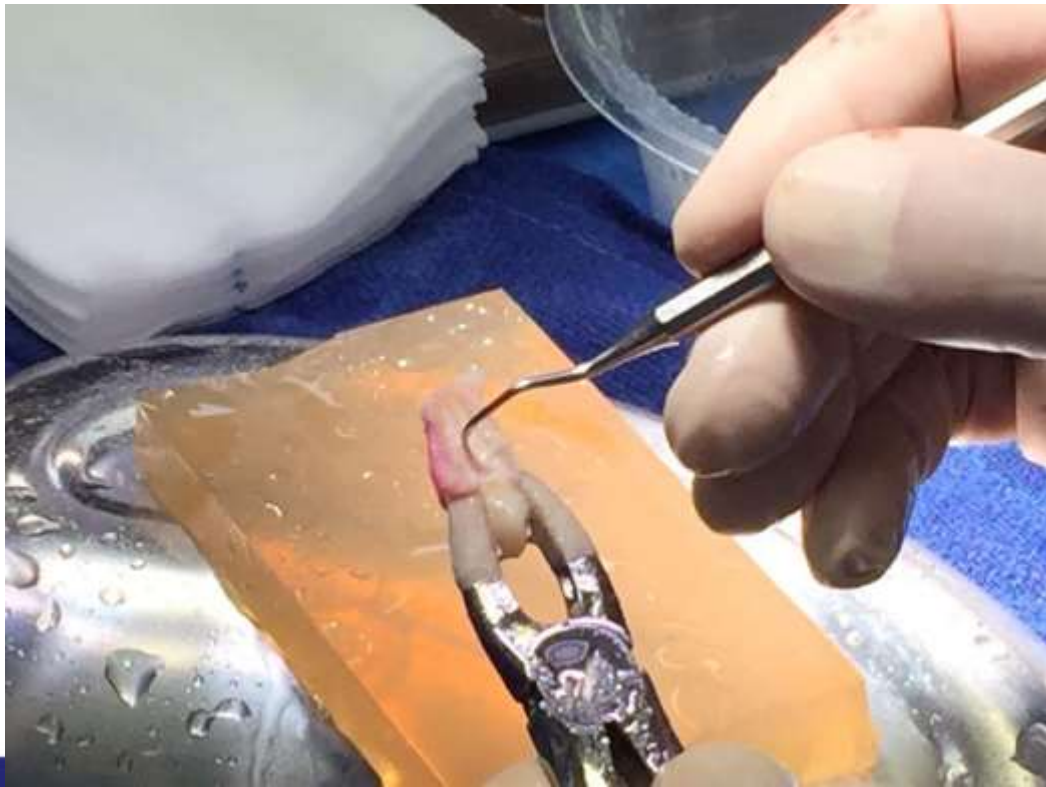
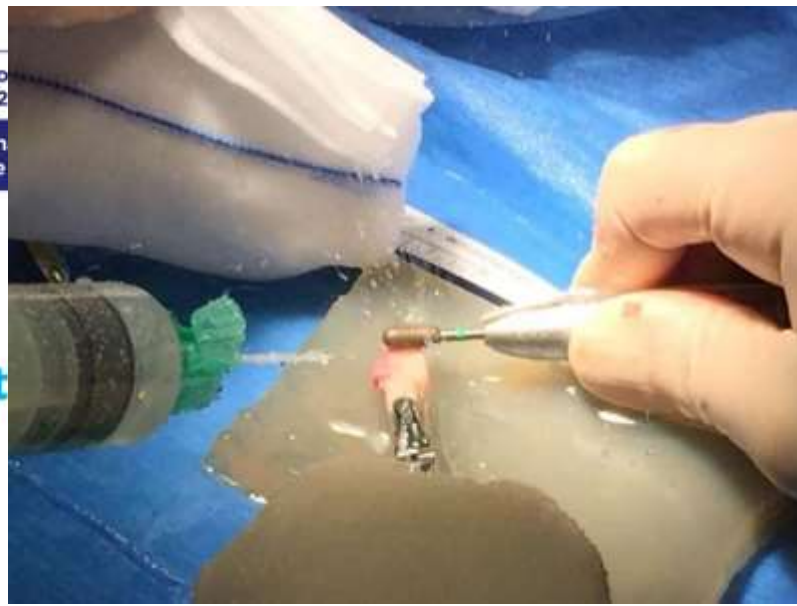
Ostéo-Ondoto-kératoprothèse



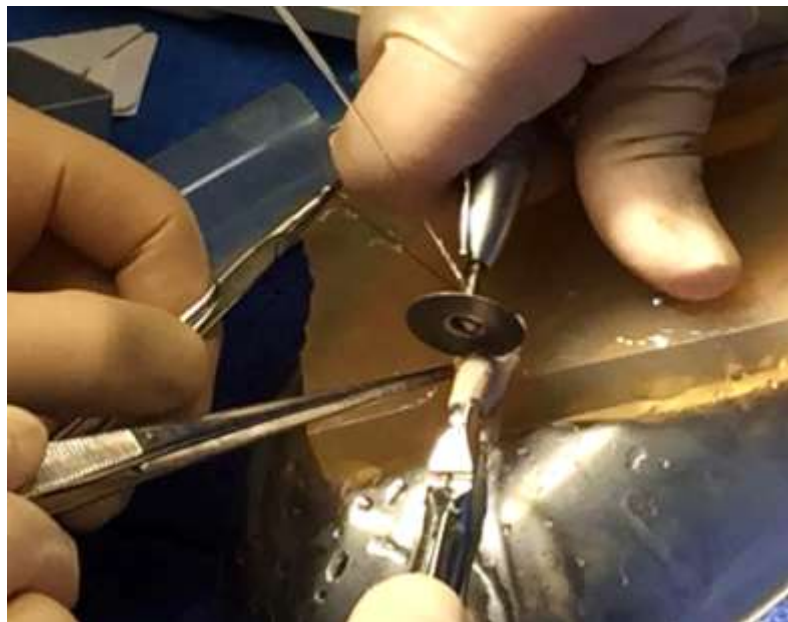
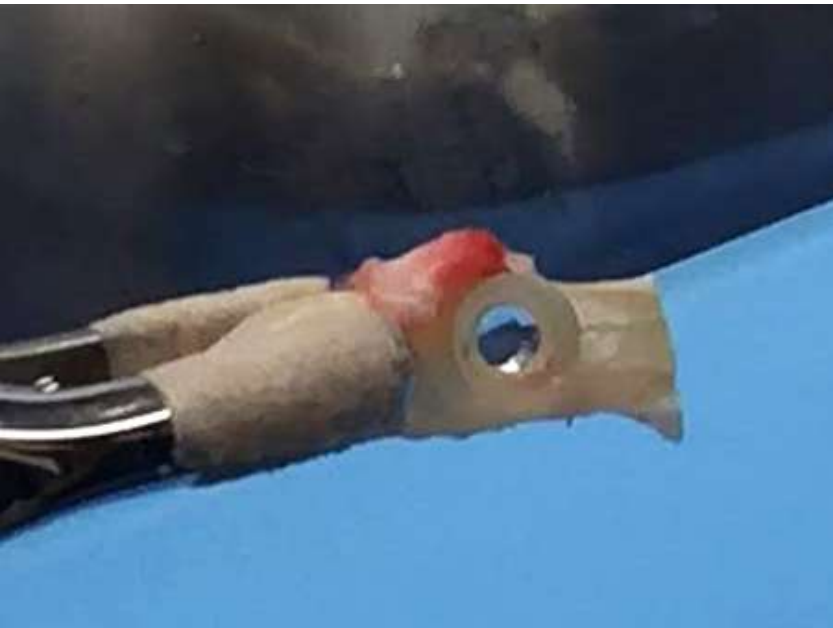
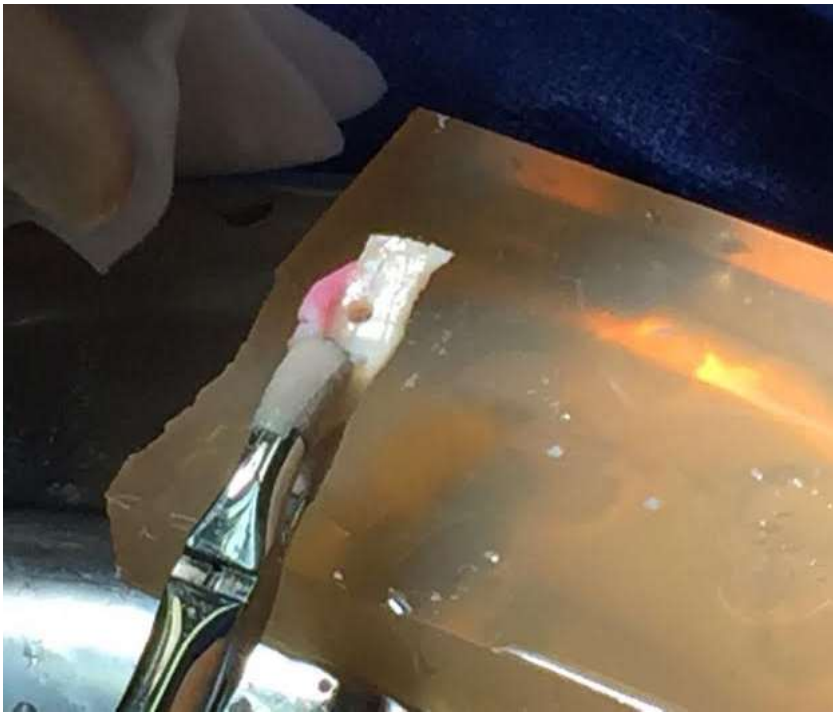
Eitan Livny, Iftach Yassur, Irit Bahar
Rabin M.C, Israel



J Biomater Appl. 2021 Mar; 35(8): 1043–1060.



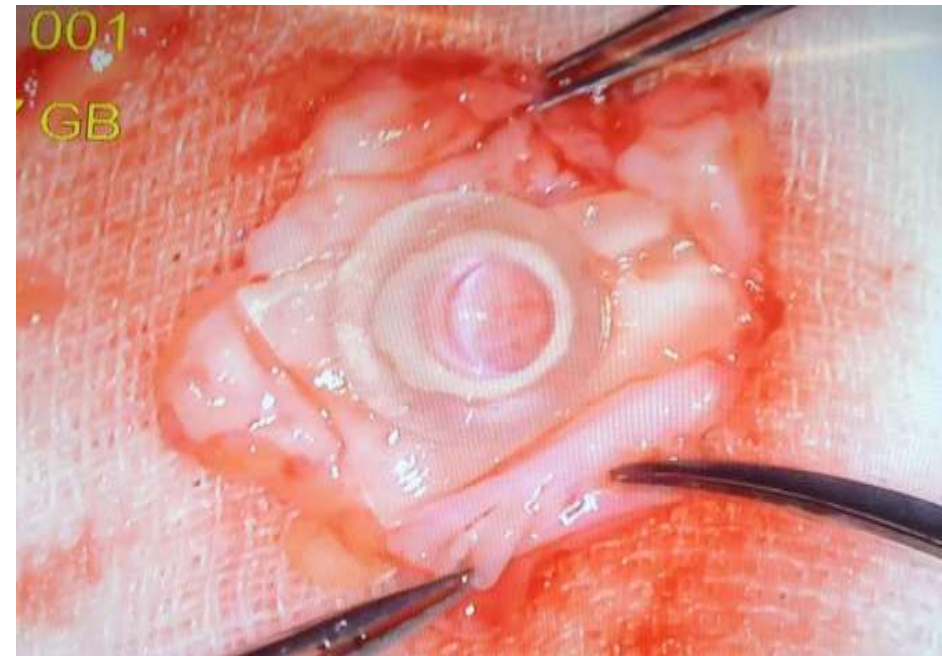
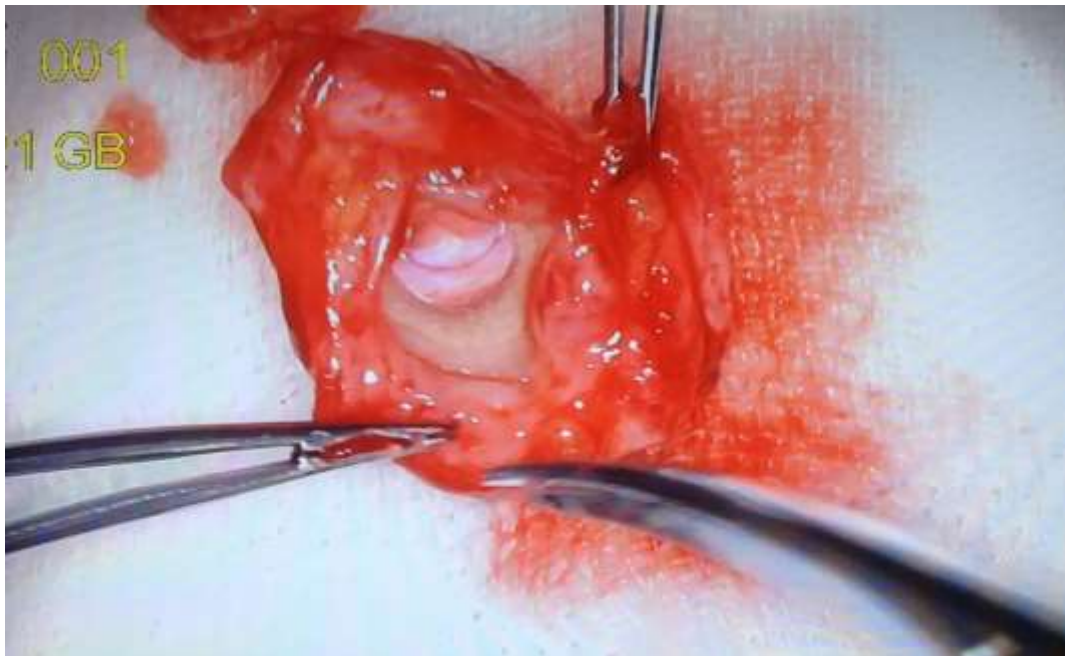
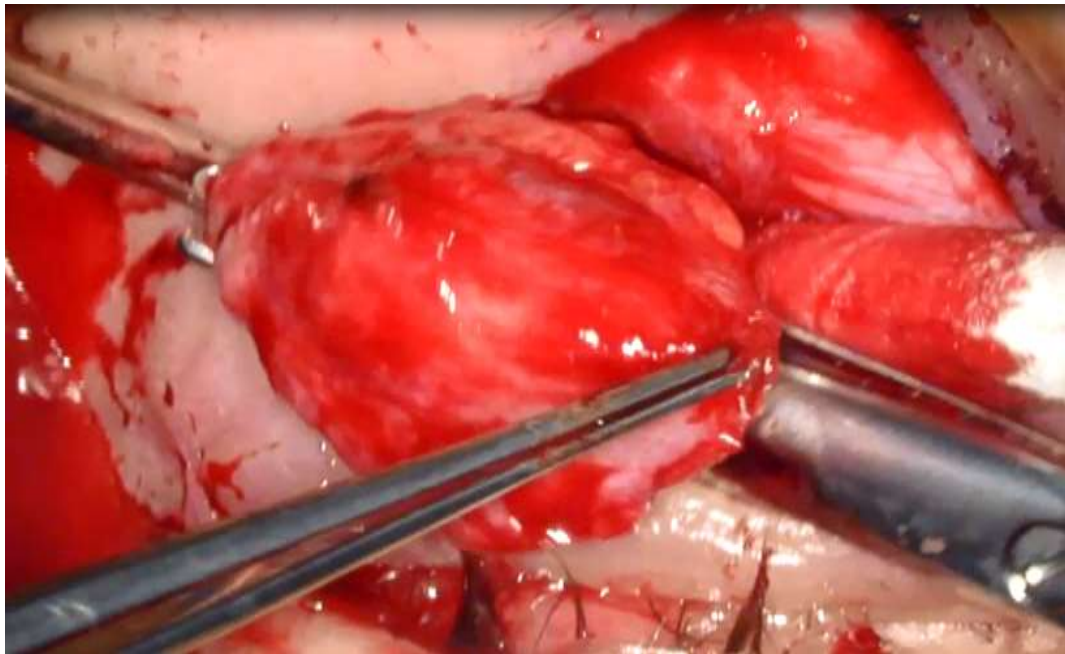
Eitan Livny, Iftach Yassur, Irit Bahar
Rabin M.C, Israel

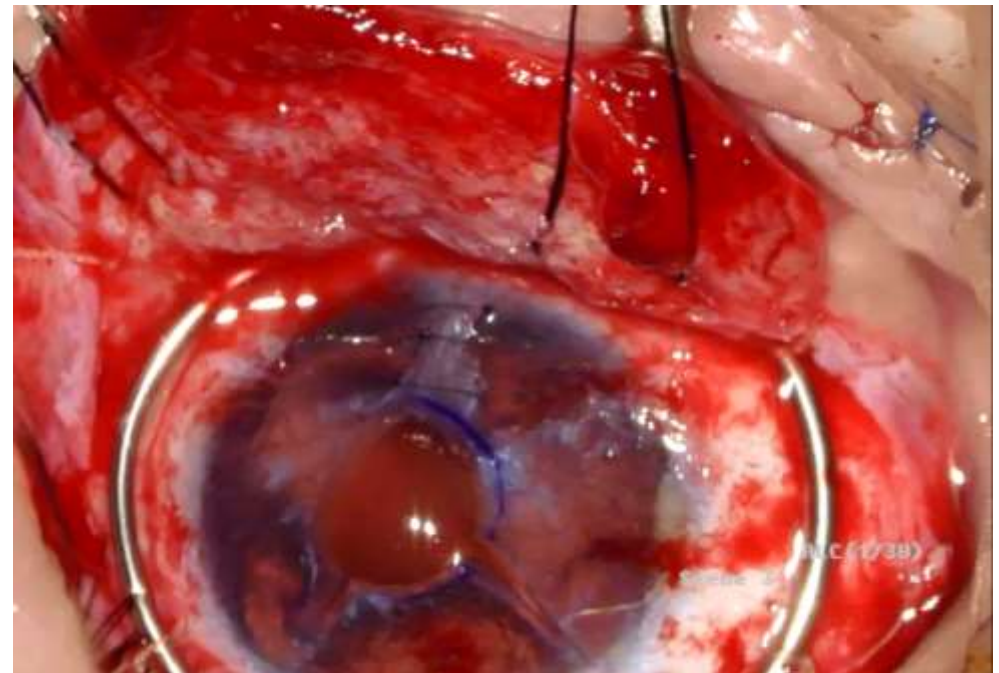
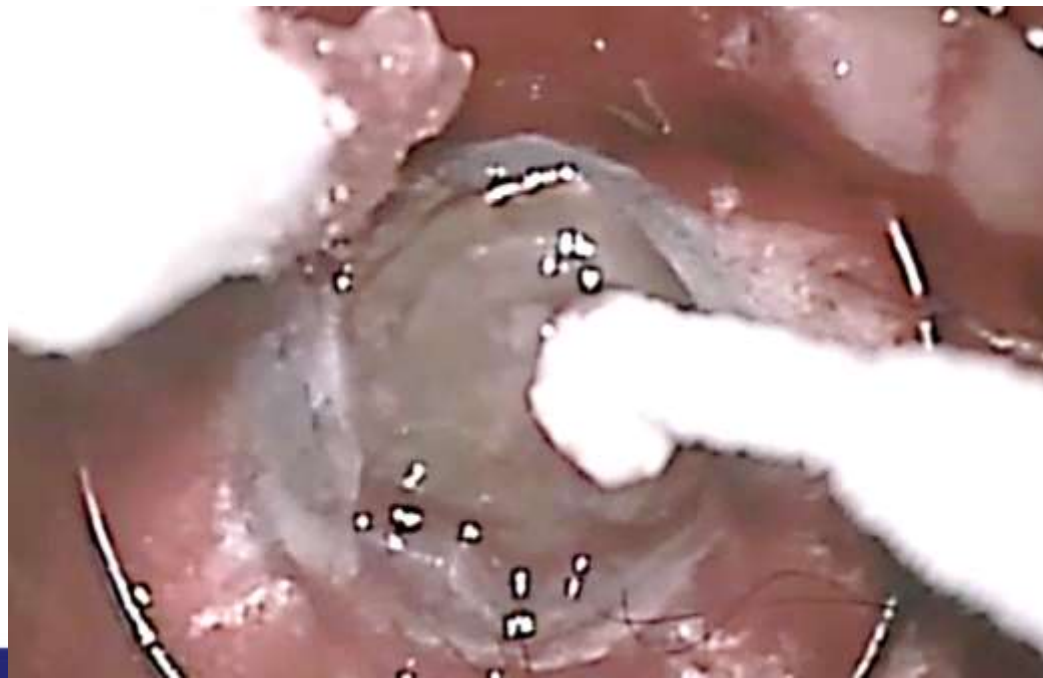
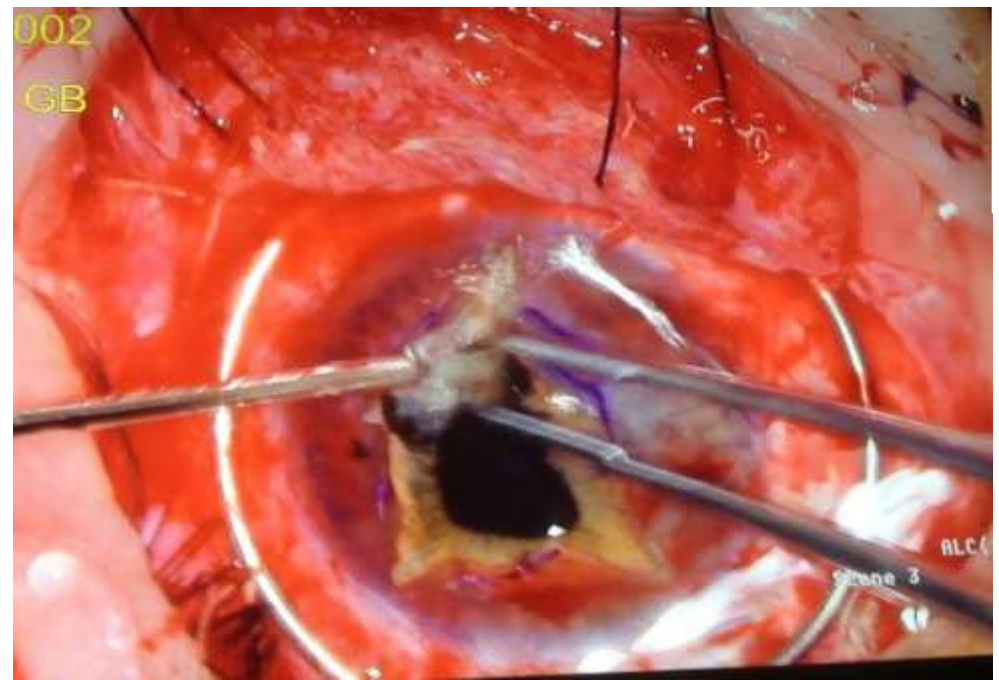
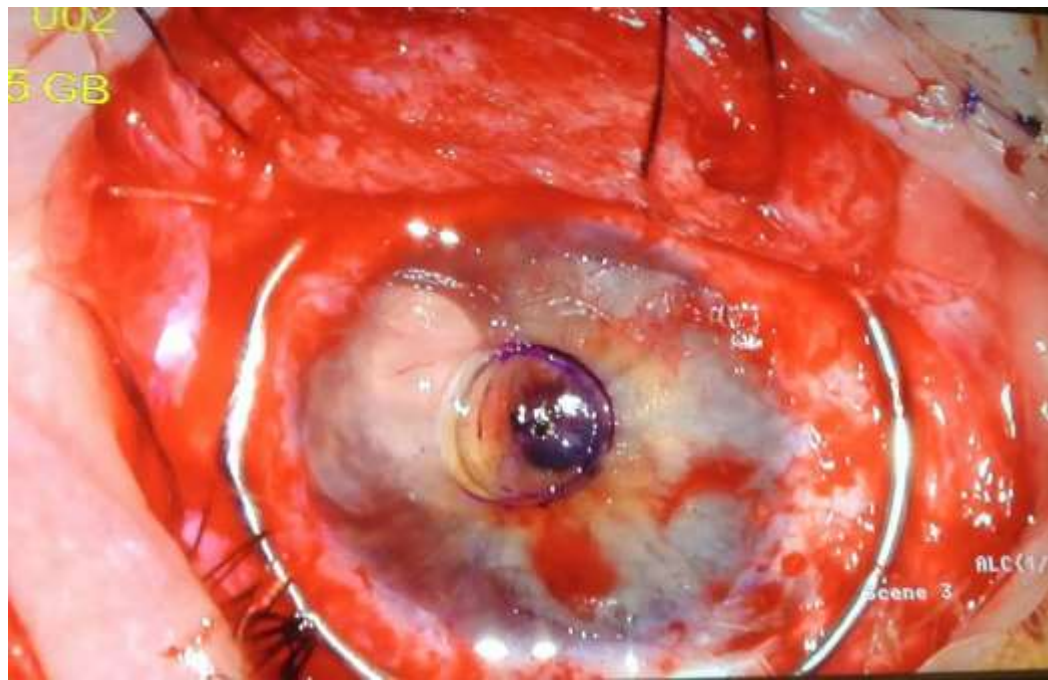


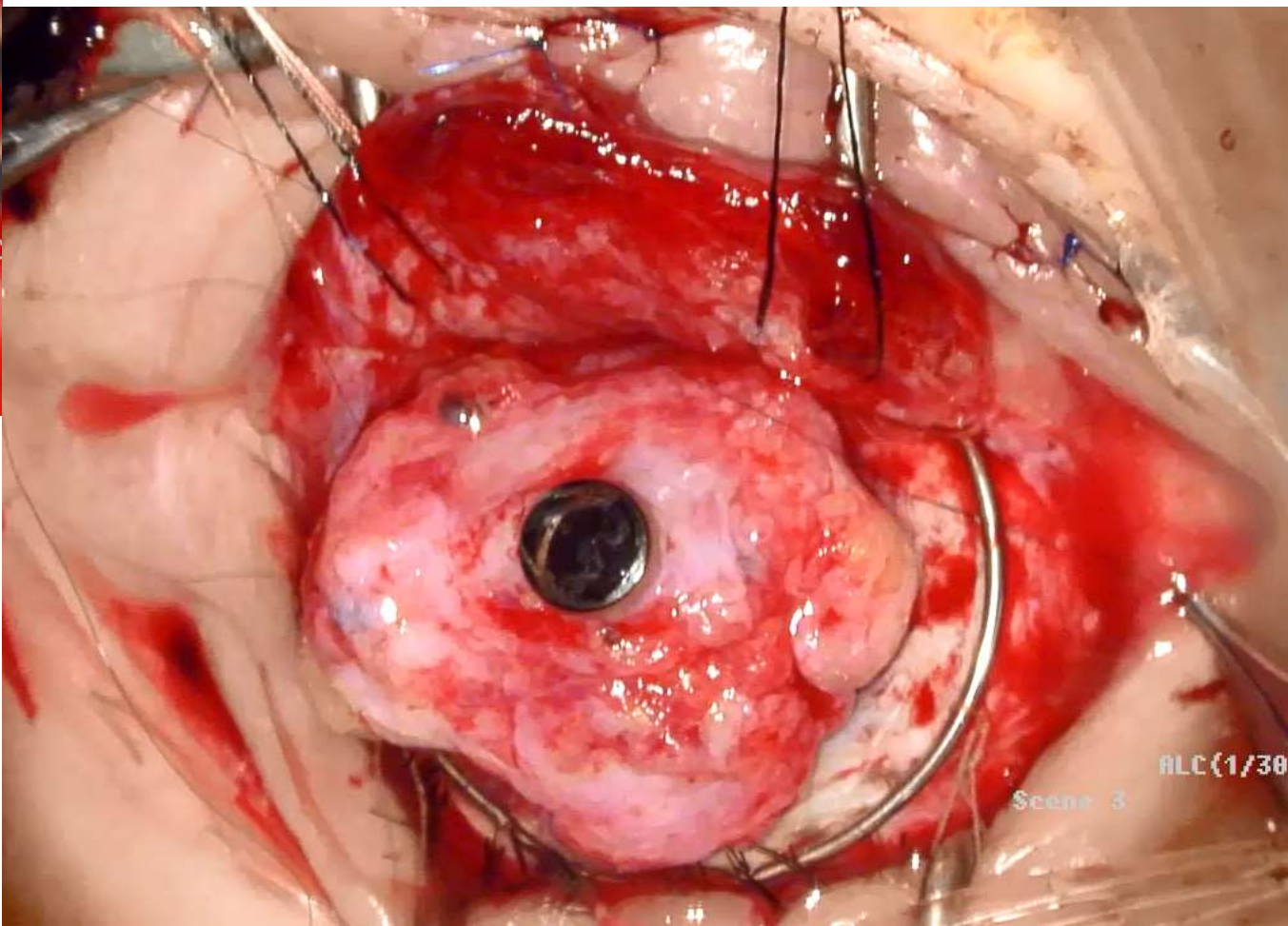
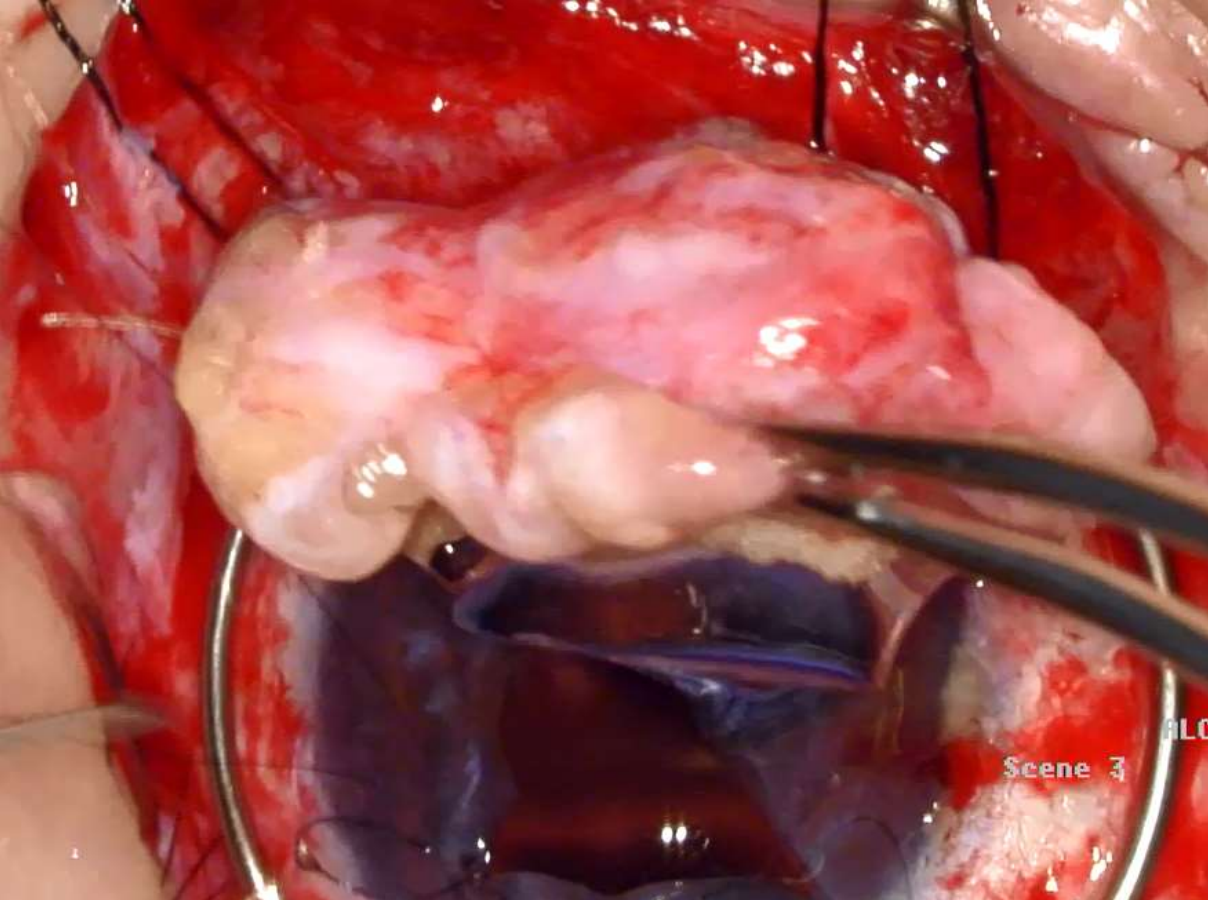


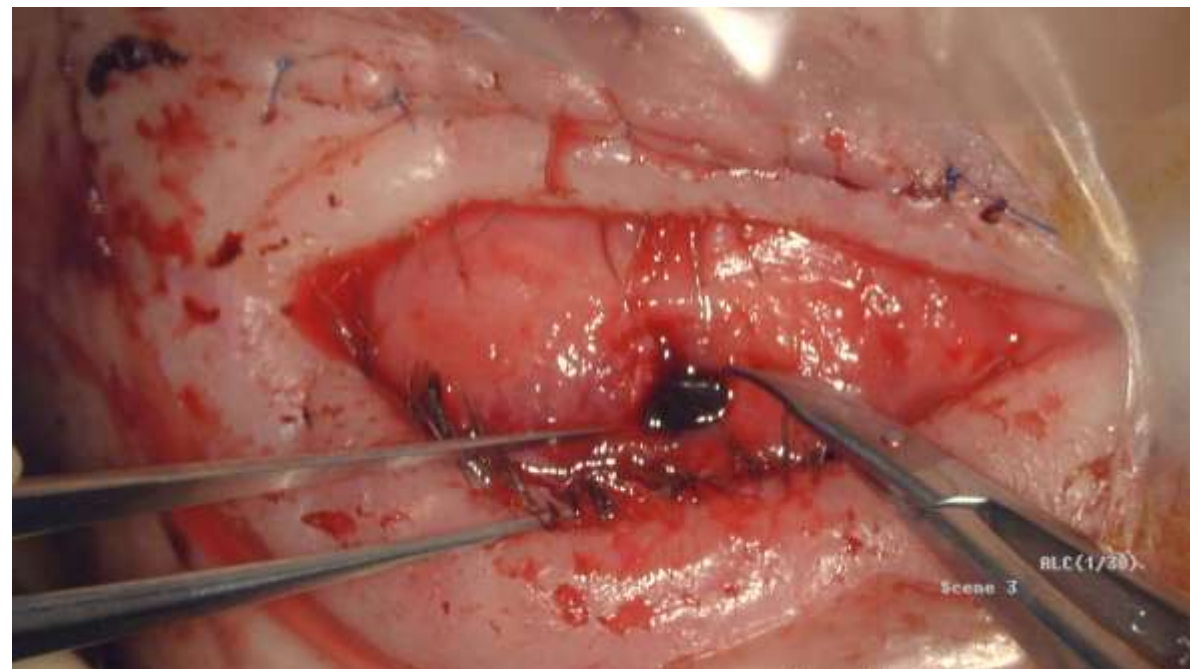
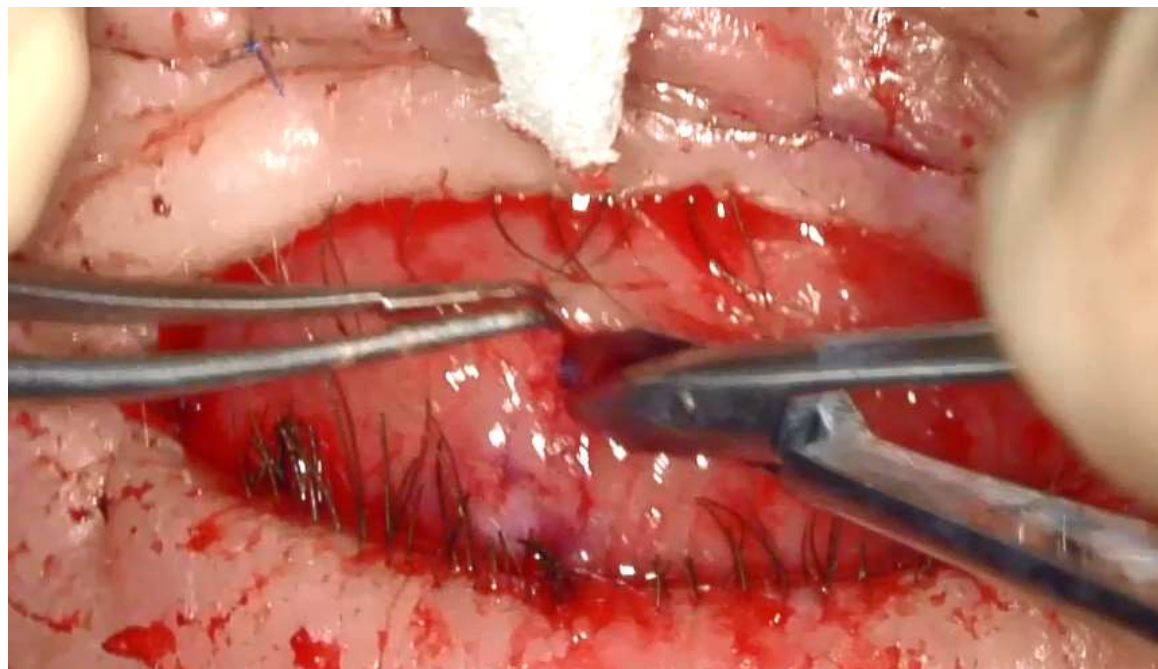
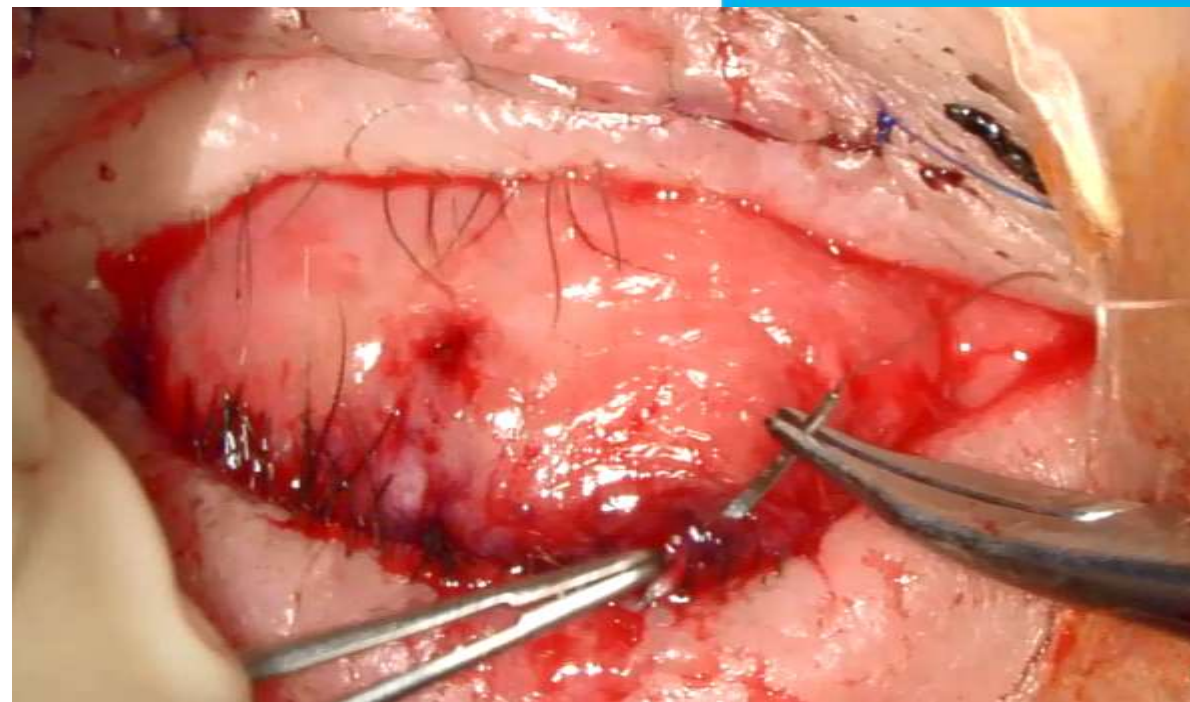
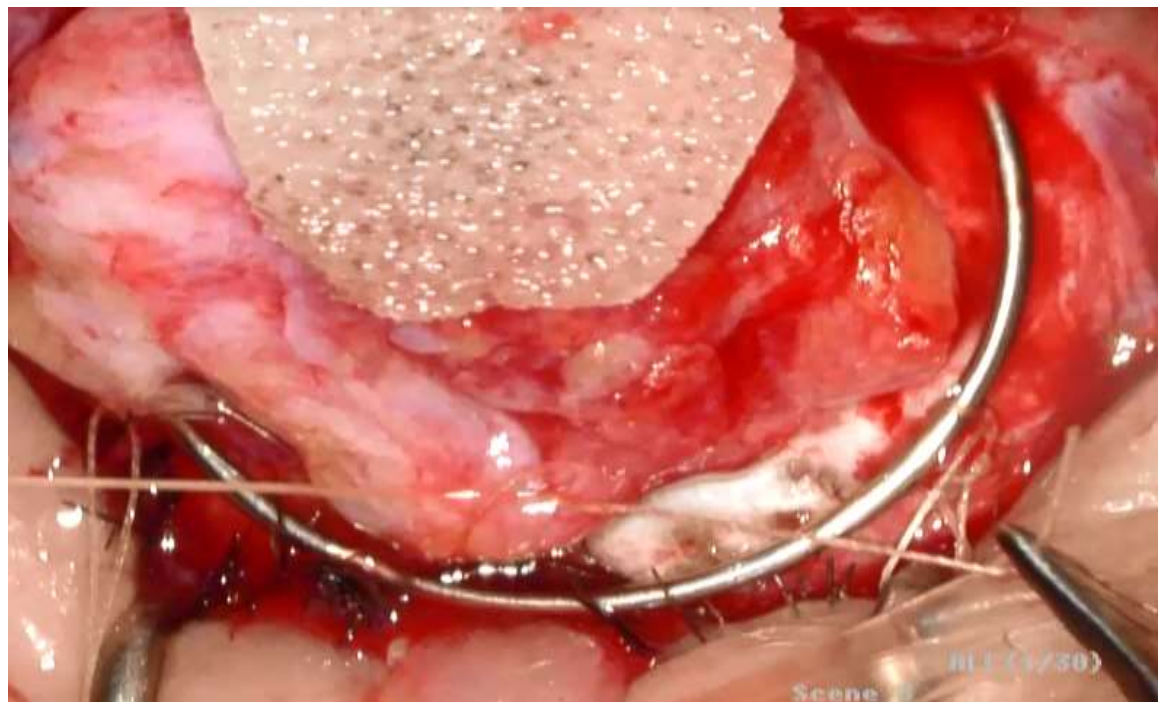
3 mois plus tard – prêt pour
l'implantation

Eitan Livny, Iftach Yassur, Irit Bahar
Rabin M.C, Israel







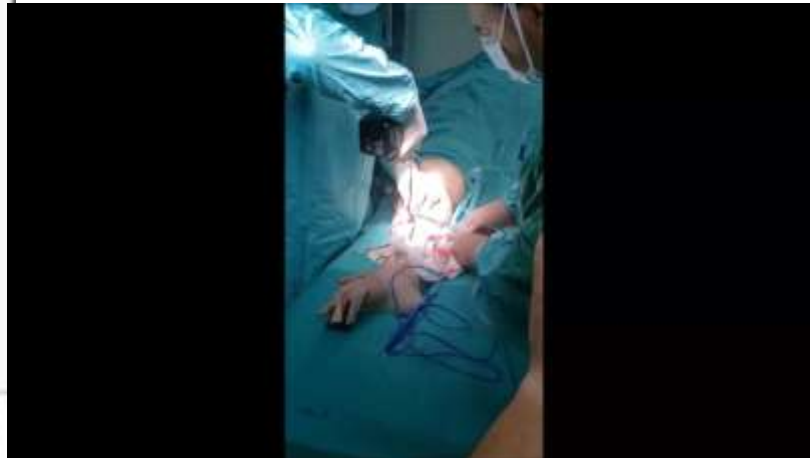
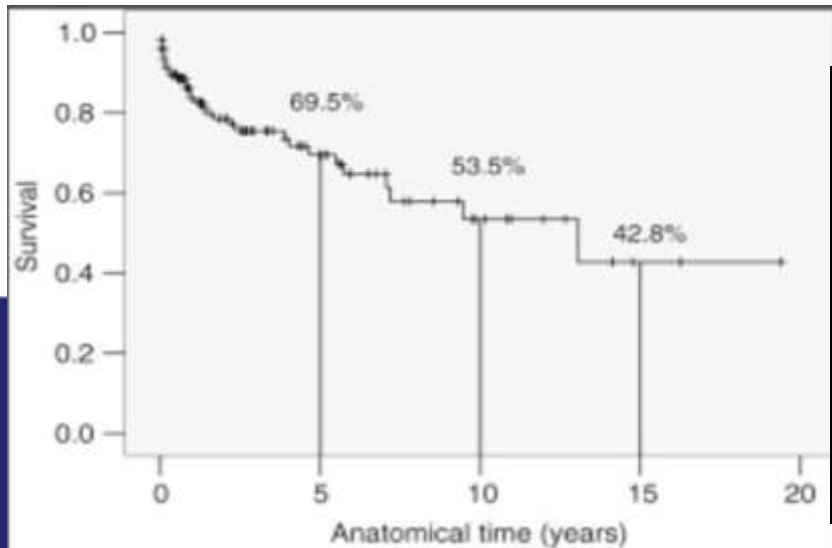




Osteokeratoprosthesis Using Tibial Bone: Surgical Technique and Outcomes

Victor Charoenrook MD, PhD, Ralph Michael PhD, Maria Fideliz de la Paz MD, PhD, Angela Ding MD, Rafael I. Barraquer MD, PhD and Jose Temprano MD, PhD

Ocular Surface, The, 2016-10-01, Volume 14, Issue 4, Pages 495-506, Copyright © 2016 Elsevier Inc.

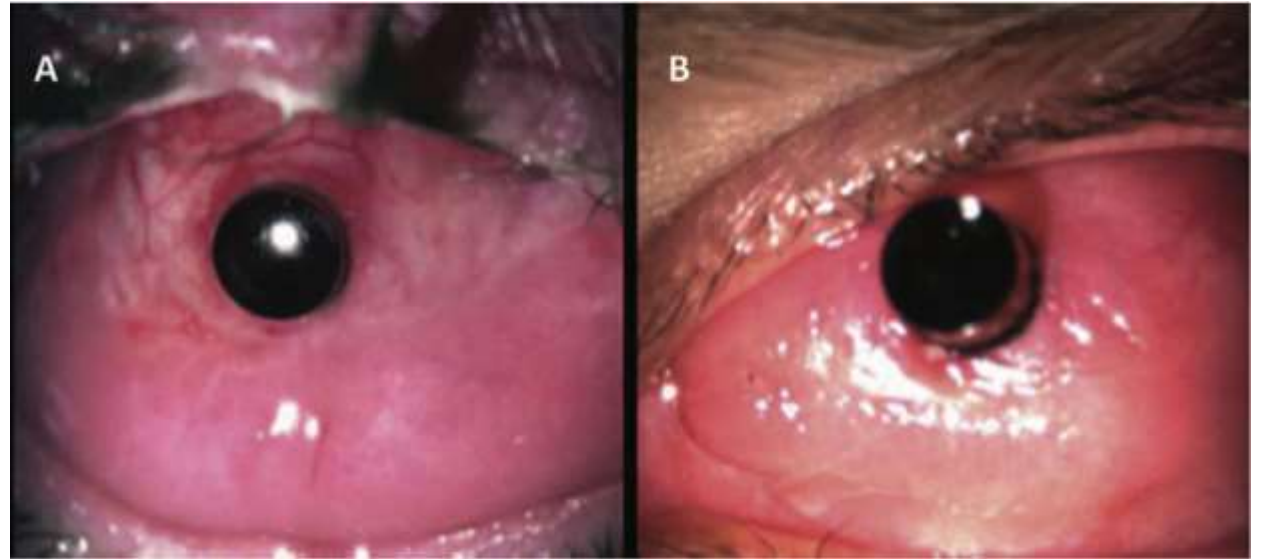
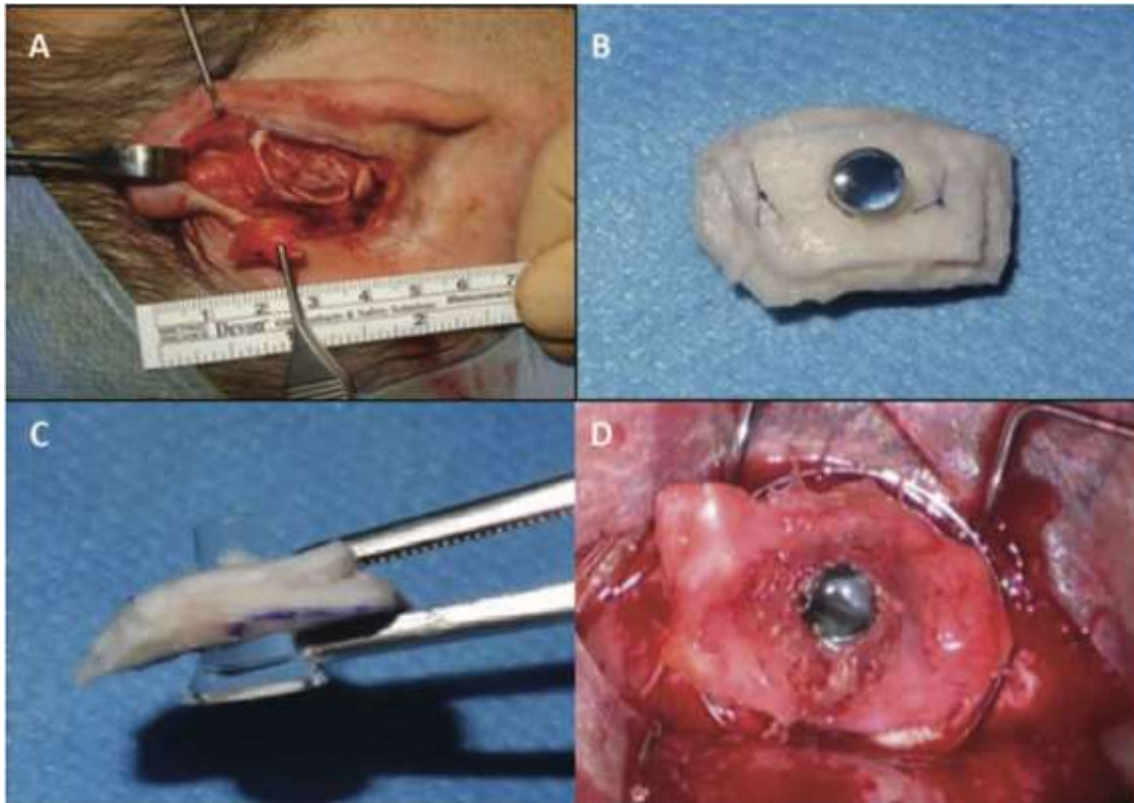


Chondro-keratoprosthesis: an alternative to OOKP?

Louis Hoffart¹, Laurent Guyot²

¹Ophthalmology Department, Aix-Marseille University, APHM, Hôpital de la Timone, Marseille - France

²Oral and Maxillofacial Surgery Department, Aix-Marseille University, APHM, Hôpital Nord, Marseille - France



ARTICLE



The first-in-human implantation of the CorNeat keratoprosthesis

Irit Bahar^{1,2}, Olga Reitblat^{1,2}, Eitan Livny^{1,2} and Gilad Litvin³

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OBJECTIVES: To describe the first clinical implantation of the CorNeat™ keratoprosthesis, which utilizes a polymeric scaffold for biointegration within ocular tissue.

METHODS: The CorNeat keratoprosthesis was implanted in the right eye of a patient with bilateral corneal opacification and neovascularization secondary to multiple failed grafts. The following surgical technique was used: 360 degree peritomy; epithelial scraping and corneal marking; pre-placement of three corneo-scleral sutures through the implant; central trephination using a 7 mm trephine and host cornea removal; keratoprosthesis placement and sutures tightening while fitting the corneal edge into the posterior groove of the CorNeat keratoprosthesis; and repositioning of the conjunctiva over the implant skirt and fixation with sutures and Fibrin sealant.

RESULTS: Twelve months postoperatively visual acuity improved to 1/16 from hand movement. The keratoprosthesis was properly positioned. Tactile intraocular pressure was assessed as normal. Regional, mostly nasal, conjunctival retraction of 4–5 mm over the nano-fibre skirt was seen throughout follow-up. The anterior chamber was quiet and well-formed. No other postoperative complications were observed.

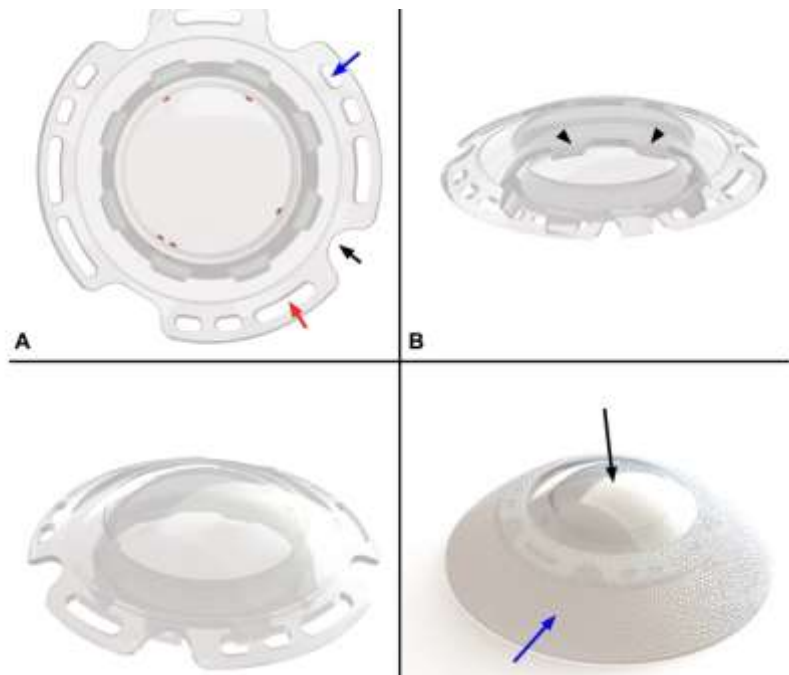
CONCLUSION: This initial case may imply a potential breakthrough in the treatment of corneal disease not amenable to standard corneal transplant. Long follow-up and additional implantations are desired to prove the long-term safety and efficacy of this device.

Eye; <https://doi.org/10.1038/s41433-022-02105-3>



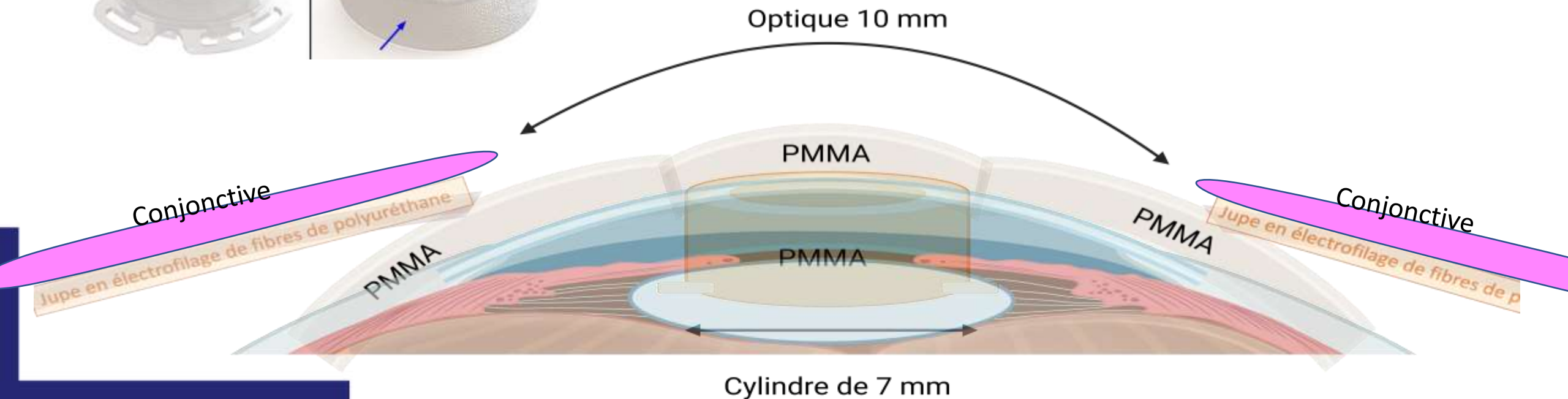
Kératoprothèse 100% Synthétique

CorNeat Kpro



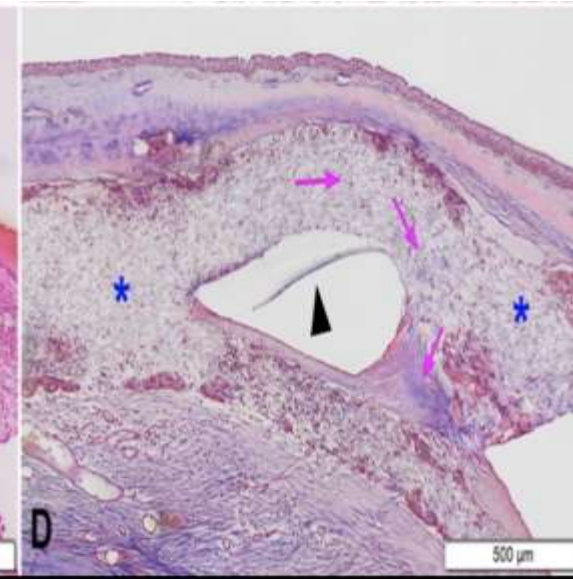
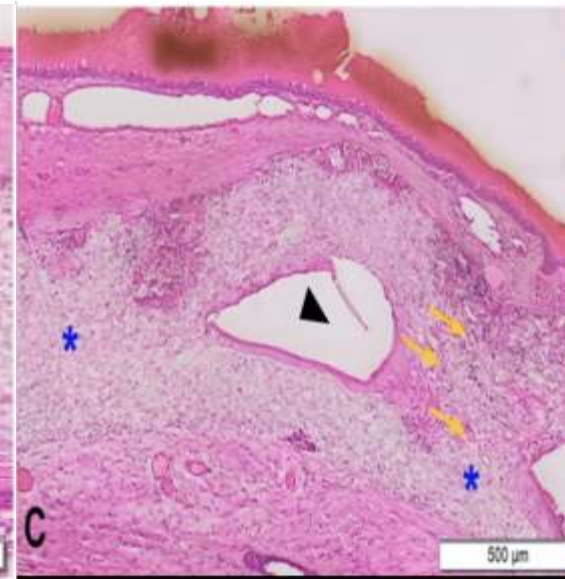
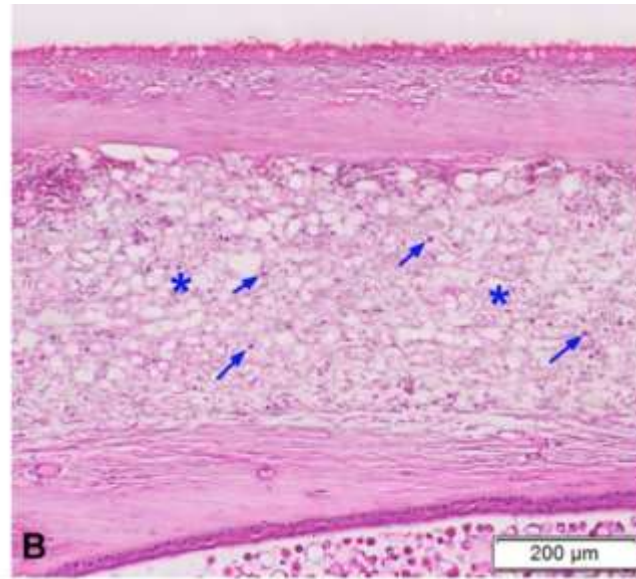
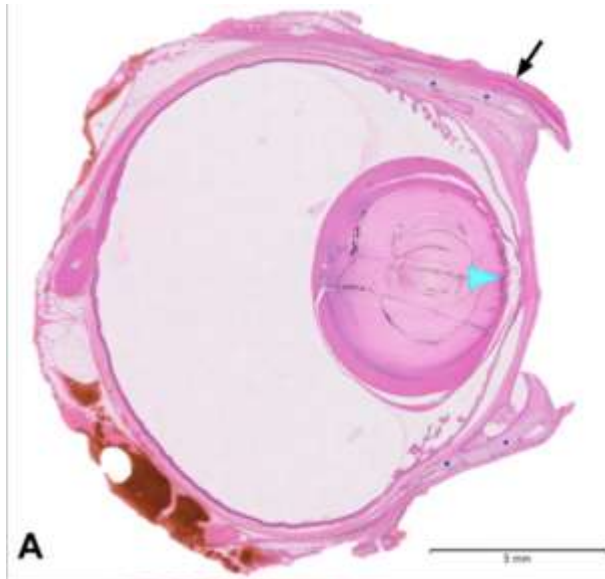
Optique en PMMA

Jupe en électrofilage de fibres de polyuréthane

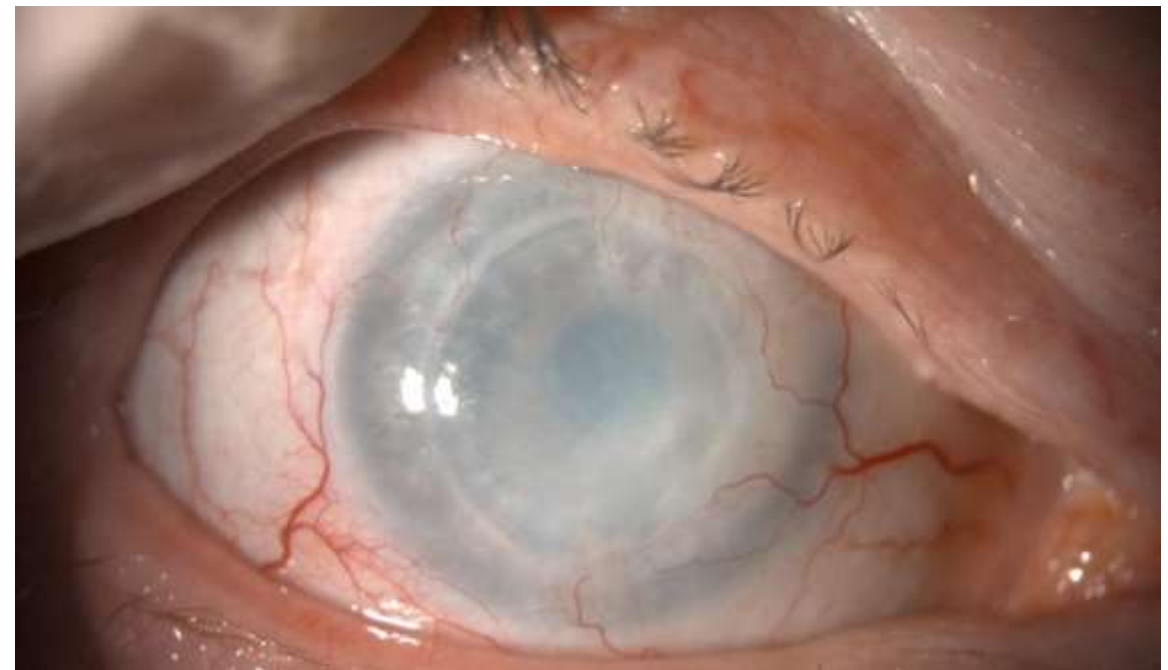
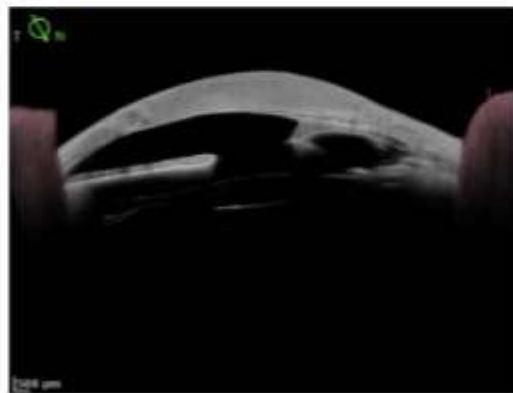
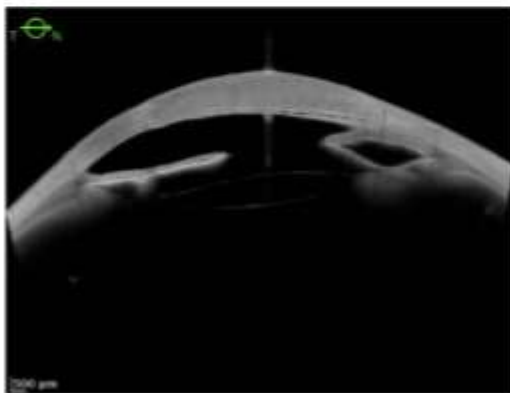
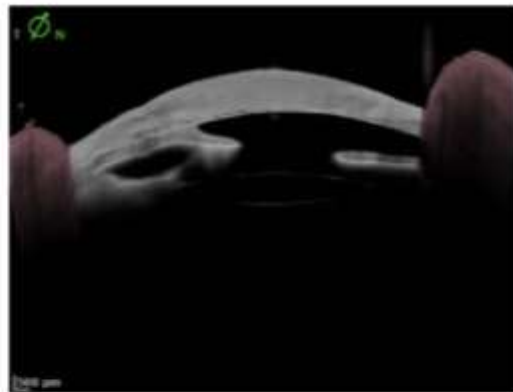
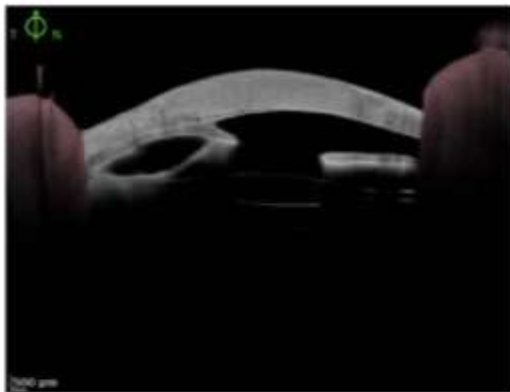


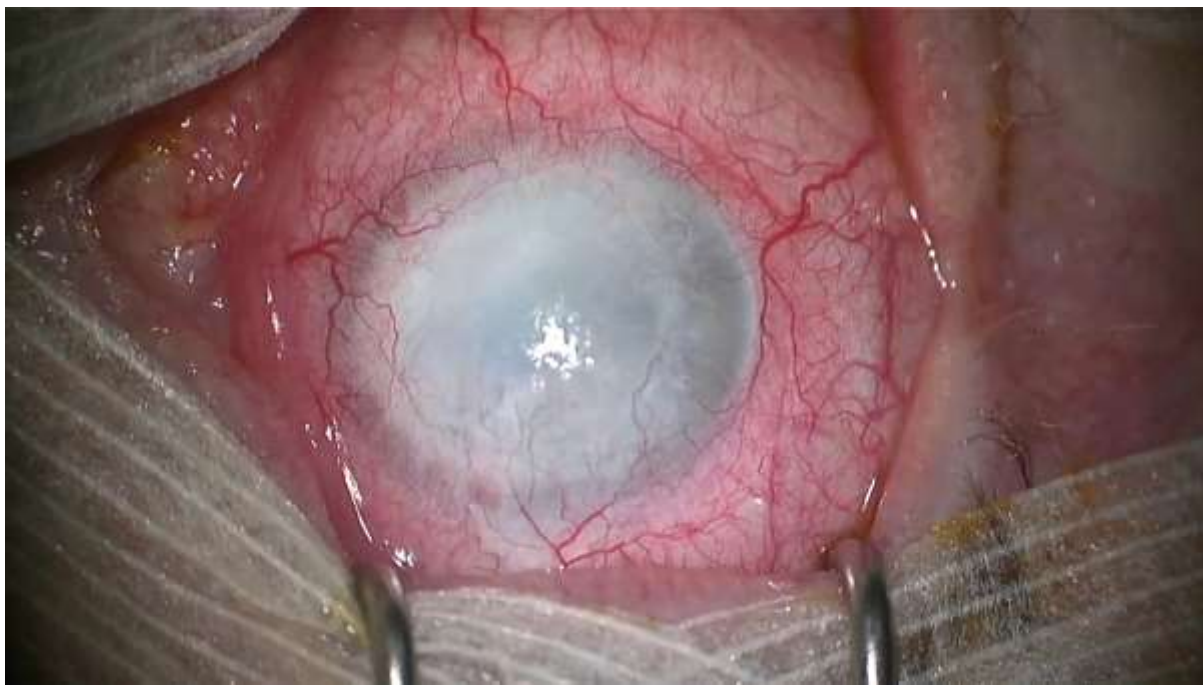
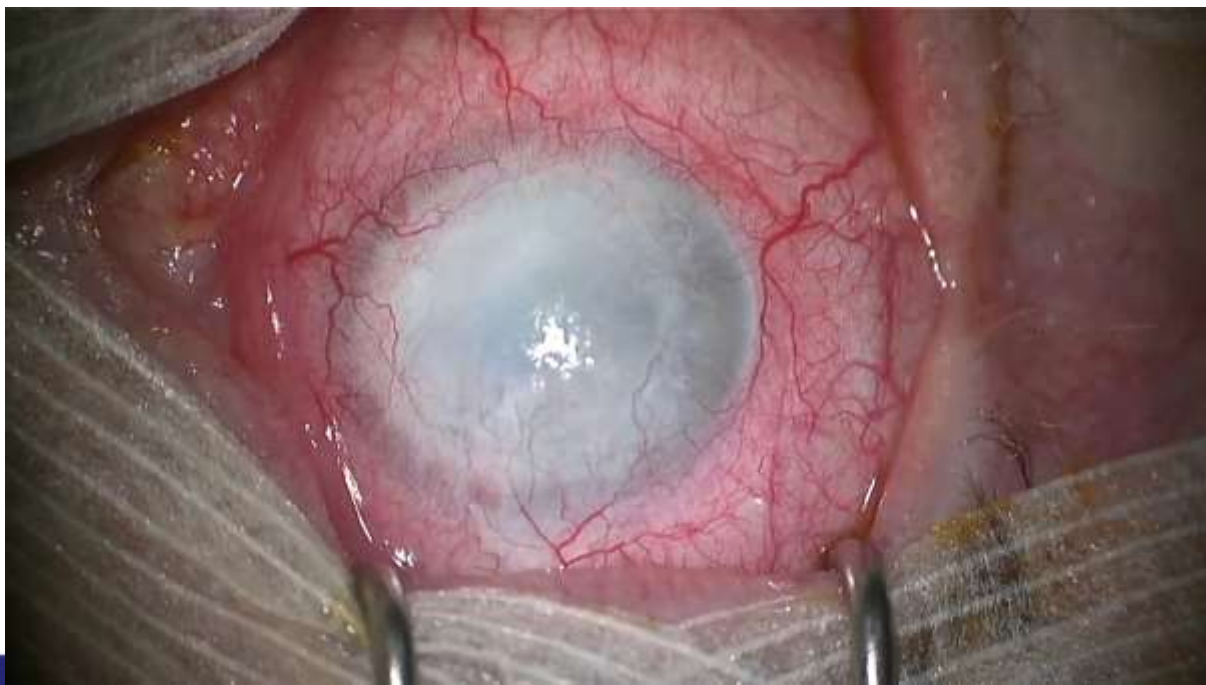
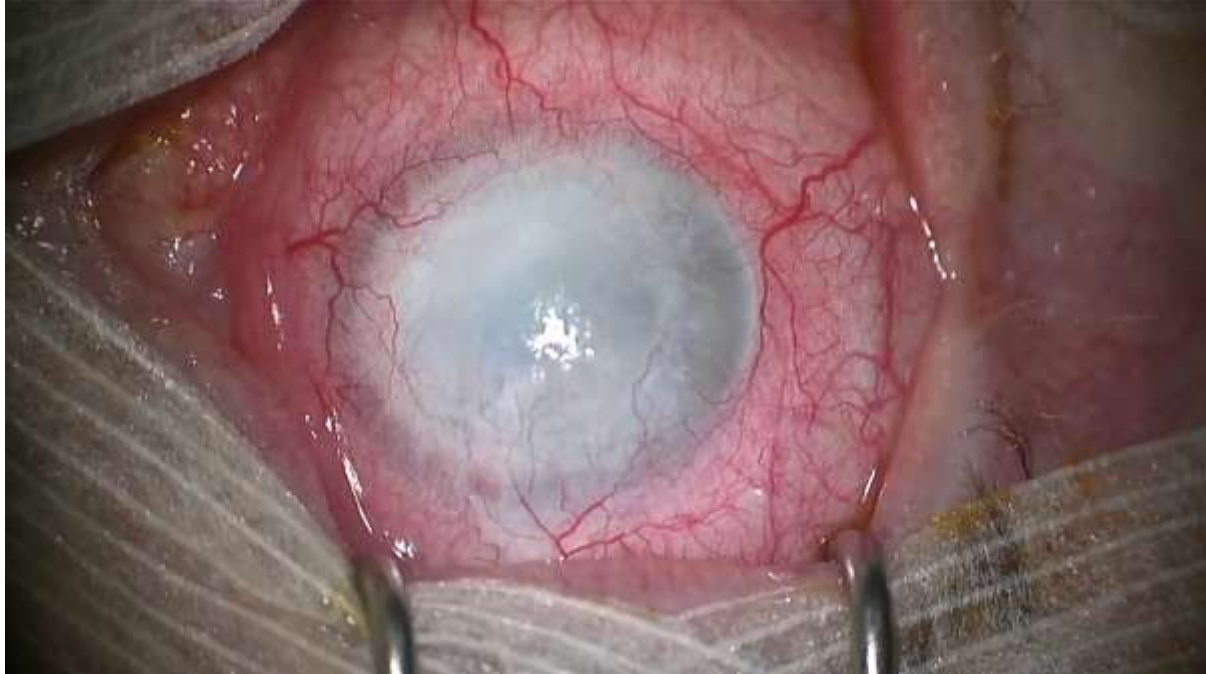
CorNeat Kpro :

- ❑ Optique centrale en poly(méthacrylate de méthyle) (PMMA) (10 mm)
- ❑ Jupe d'intégration externe formée par électrofilage de fibres de polyuréthane



Innovation dans la greffe de tissus : focus sur la cornée





OCT post-opératoire



J1

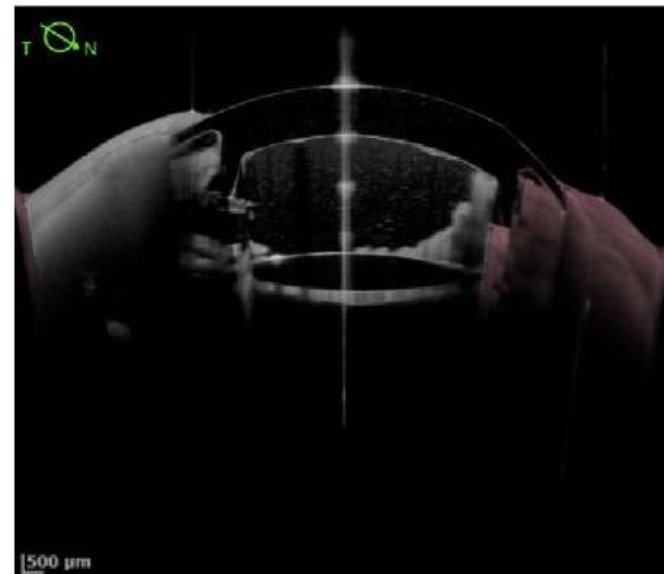
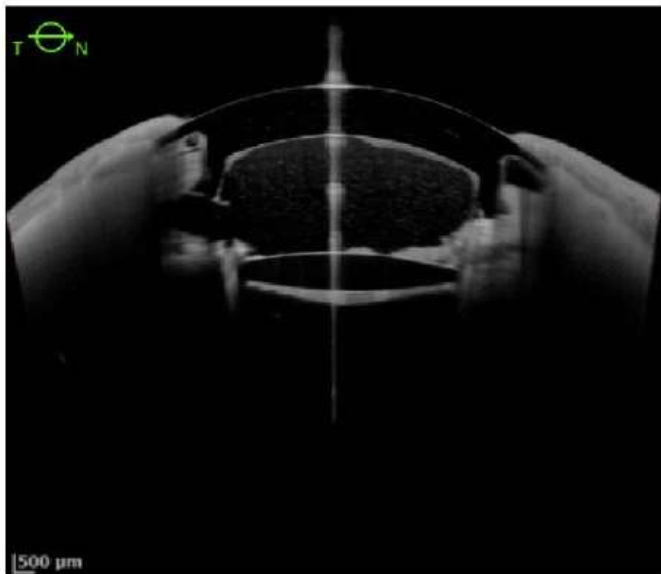
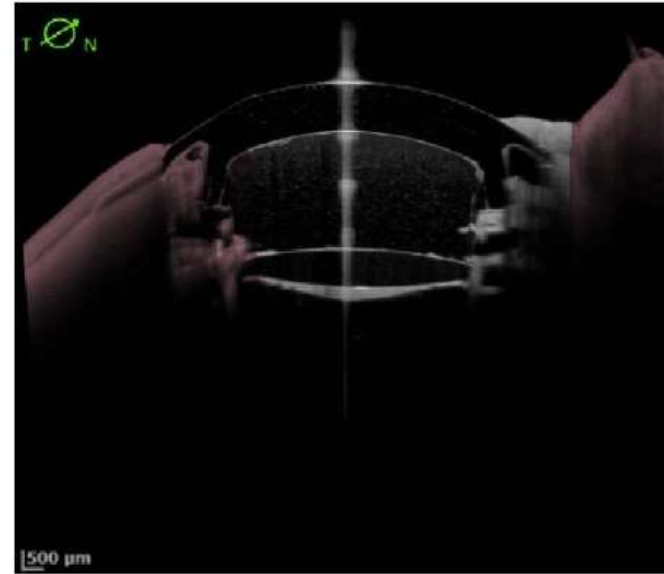
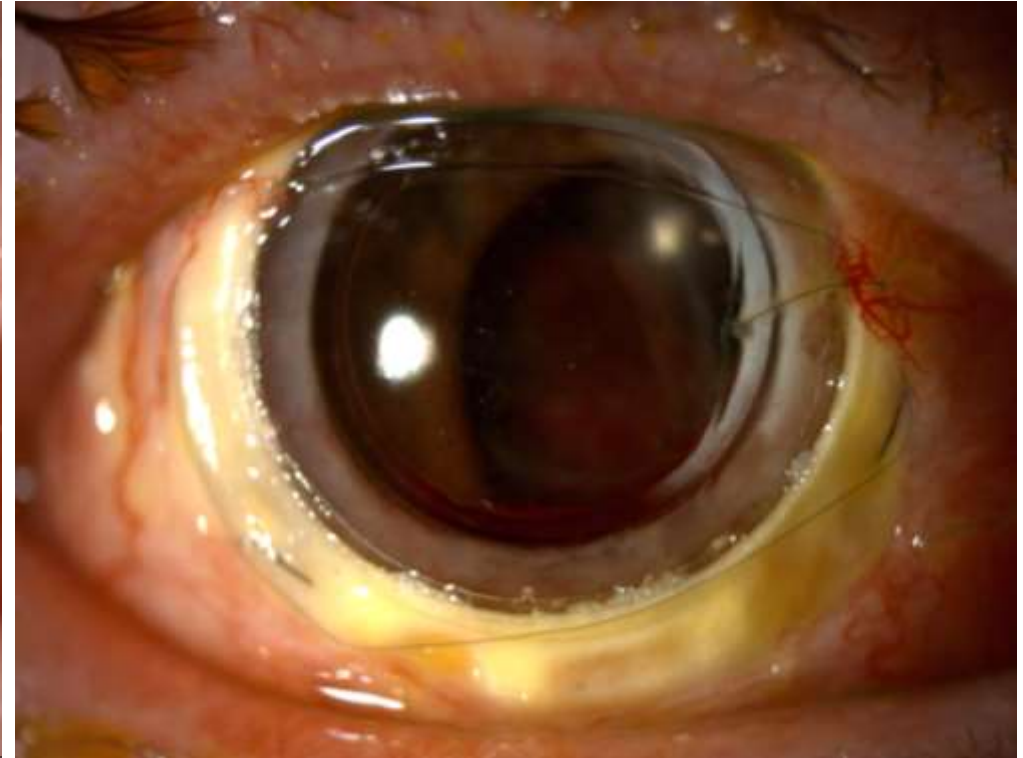


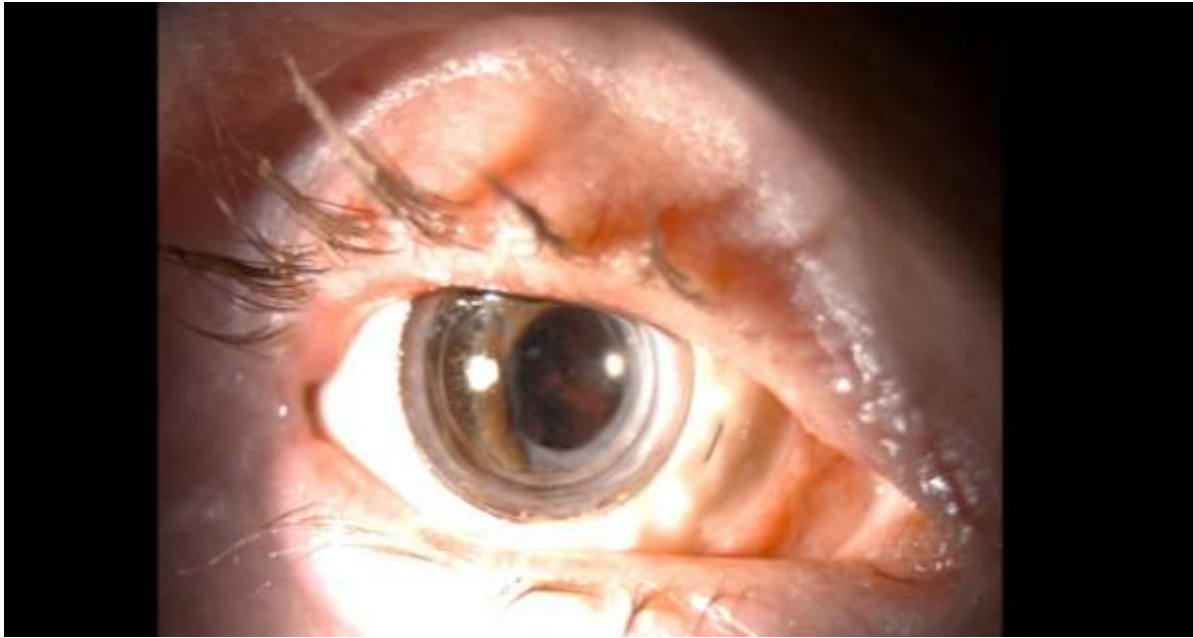
Photo LAF post-op



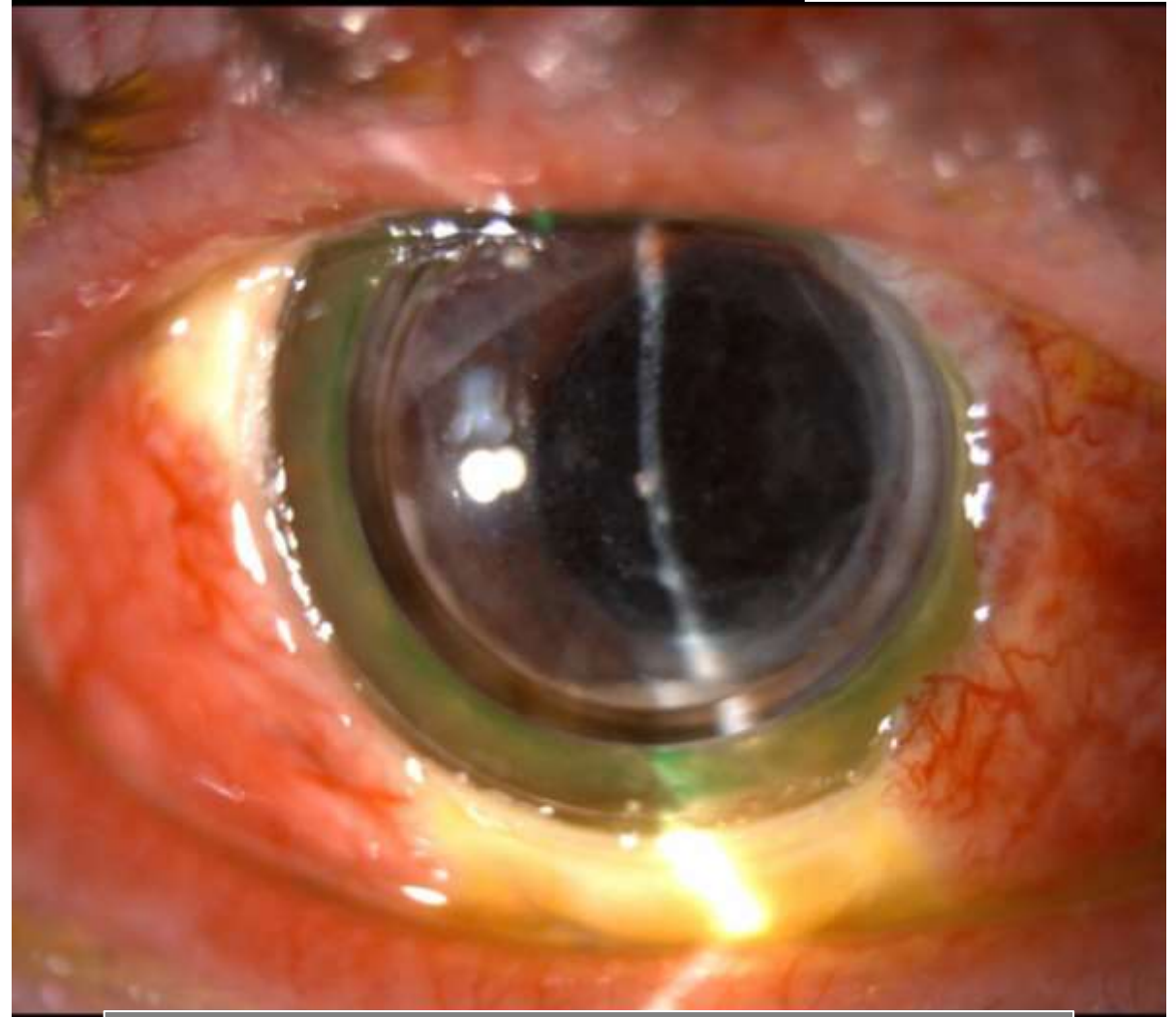
J1



J32



M4



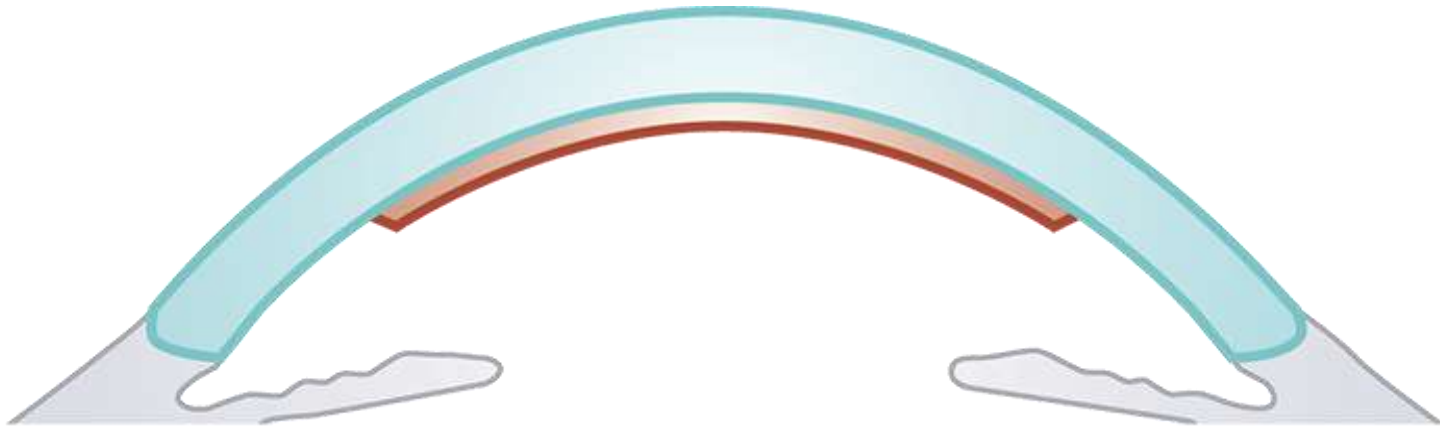
M13



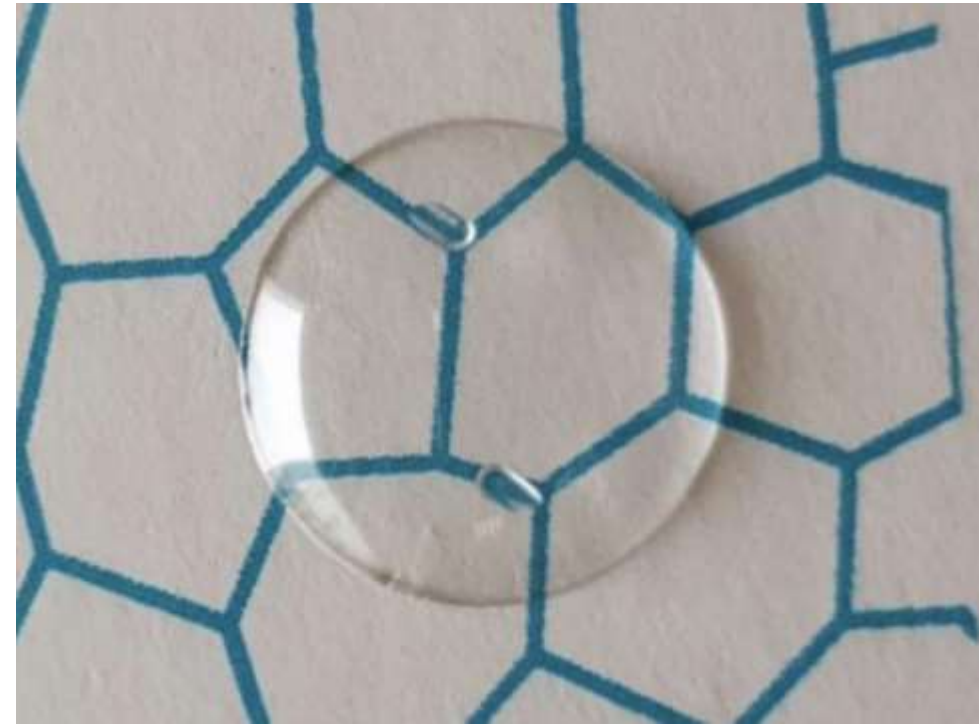


12 mois : Acuité visuelle 8/10.
22 mois : Acuité visuelle 4/10
32 mois : Acuité visuelle 2/10 (en attente LASER YAG)
5 chirurgies de recouvrement conjonctival
3 chirurgies de recouvrement par muqueuse buccale
4 LASER YAG pour membrane rétroprothétique

EndoArt®:

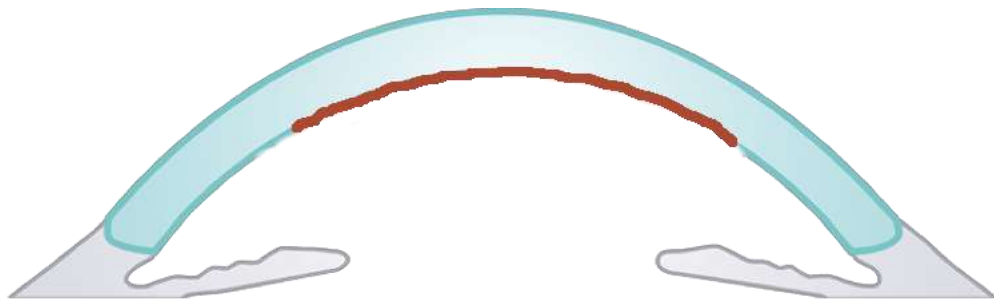


Décompensations Endothéliales



DESCEMET MEMBRANE
ENDOTHELIAL KERATOPLASTY

GREFFE ENDOTHELIALE "PURE"

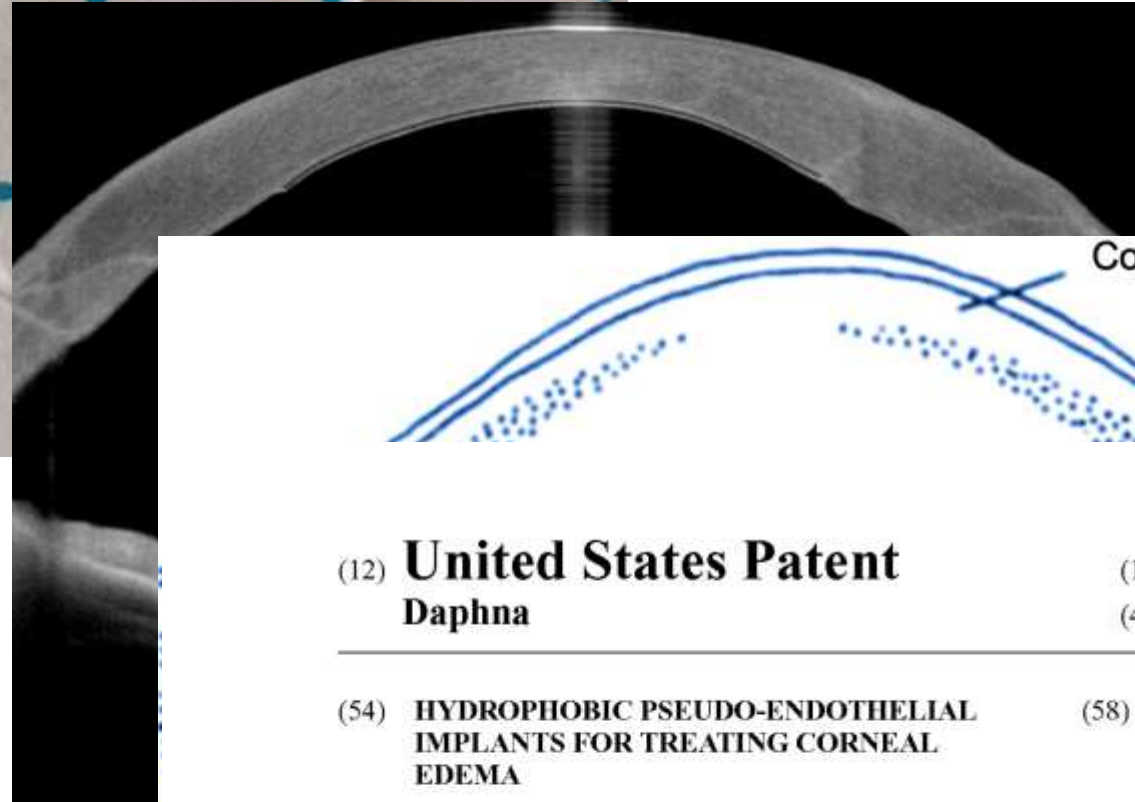
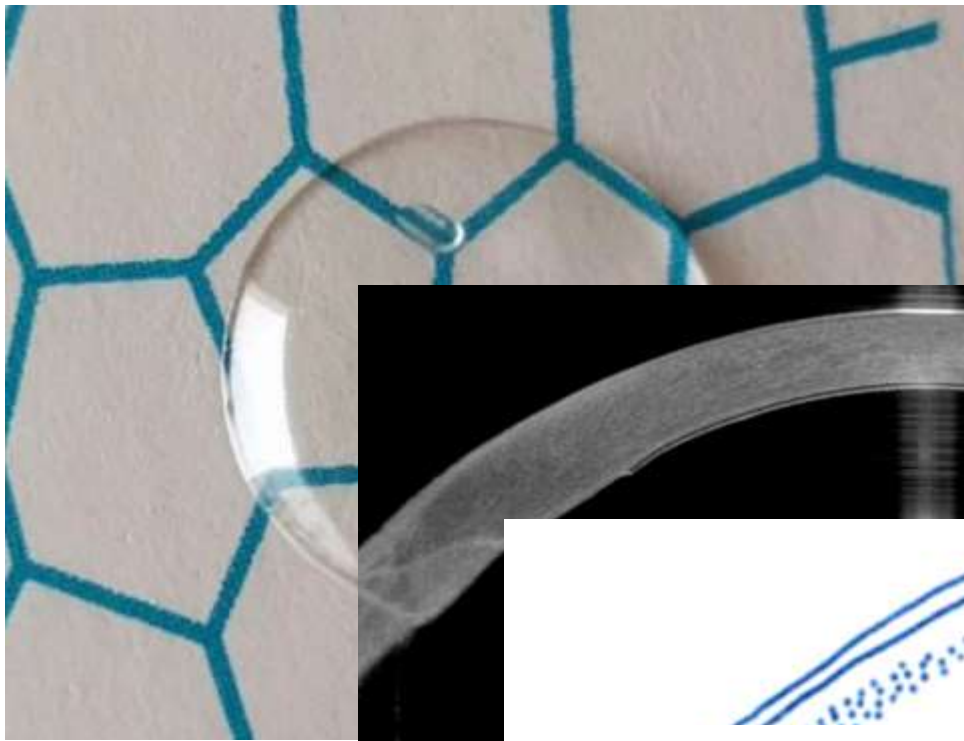


- 1 : RETRET DE LA MEMBRANE DE DESCEMET
- 2 : INJECTION DU GREFFON
- 3 : POSITIONNEMENT ET INJECTION D'AIR



PREPARATION DU GREFFON (MANUELLE)





Corneal Nutrition

US008500803B2

(12) **United States Patent**
Daphna

(10) **Patent No.:** **US 8,500,803 B2**
(45) **Date of Patent:** ***Aug. 6, 2013**

(54) **HYDROPHOBIC PSEUDO-ENDOTHELIAL IMPLANTS FOR TREATING CORNEAL EDEMA**

(58) **Field of Classification Search**
USPC 623/5.11
See application file for complete search history.

(75) **Inventor:** **Ofer Daphna, Ashkelon (IL)**

(56) **References Cited**

(73) **Assignee:** **Mor Research Applications Ltd., Tel Aviv (IL)**

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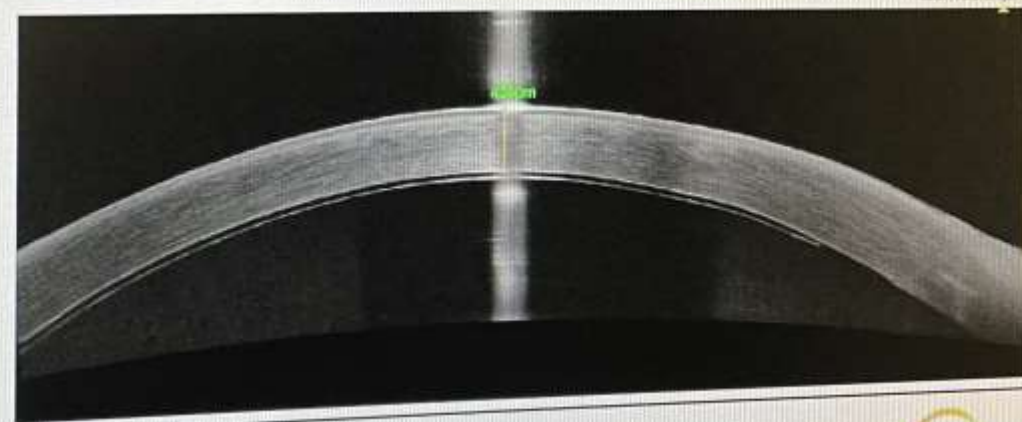
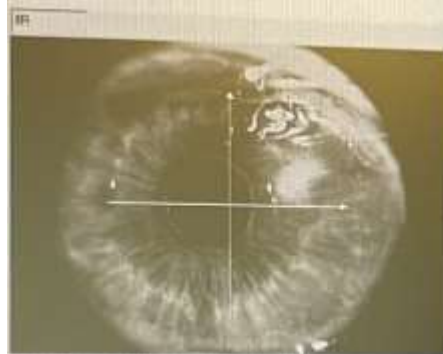
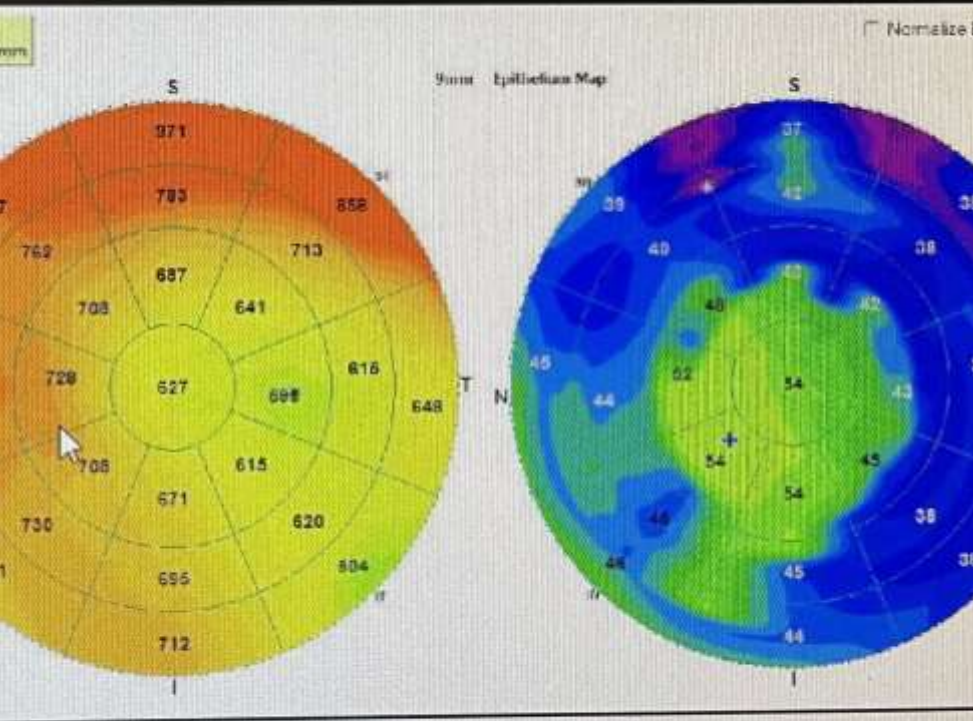
(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal dis-

FOREIGN PATENT DOCUMENTS

EP 1364663 * 11/2003

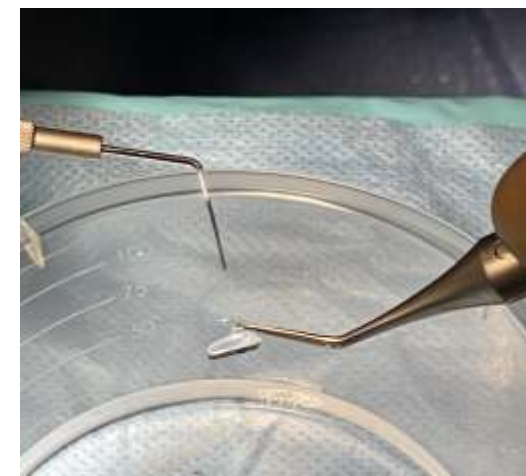




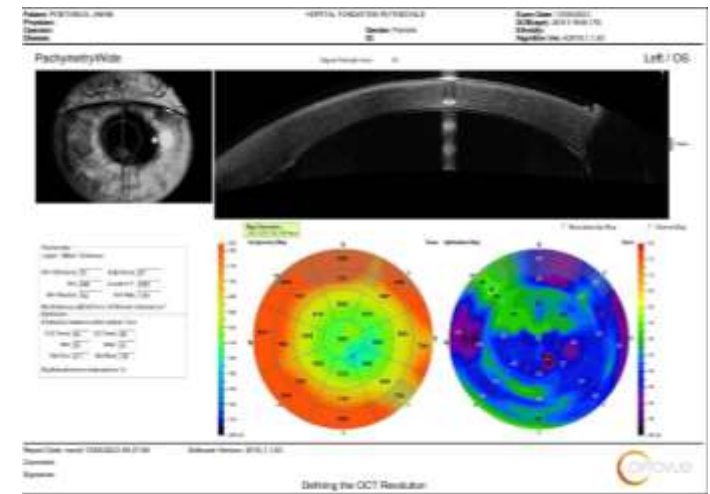
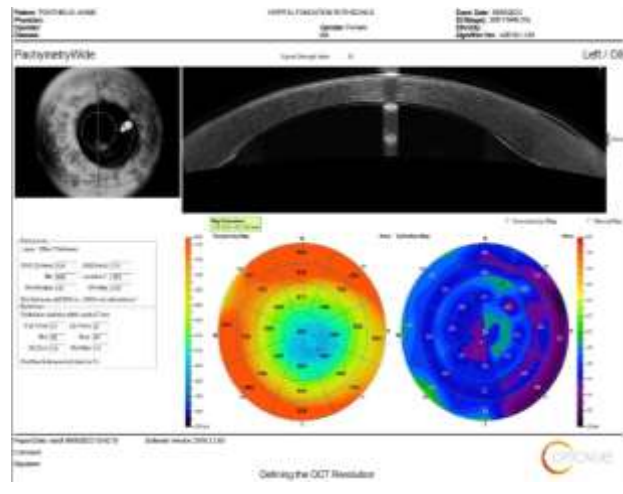
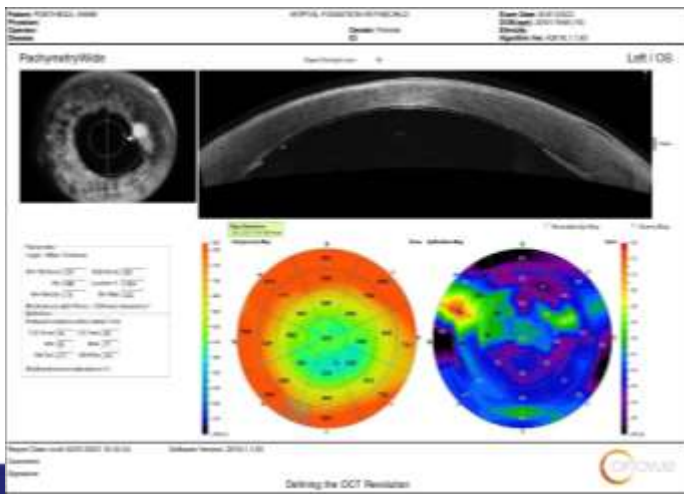
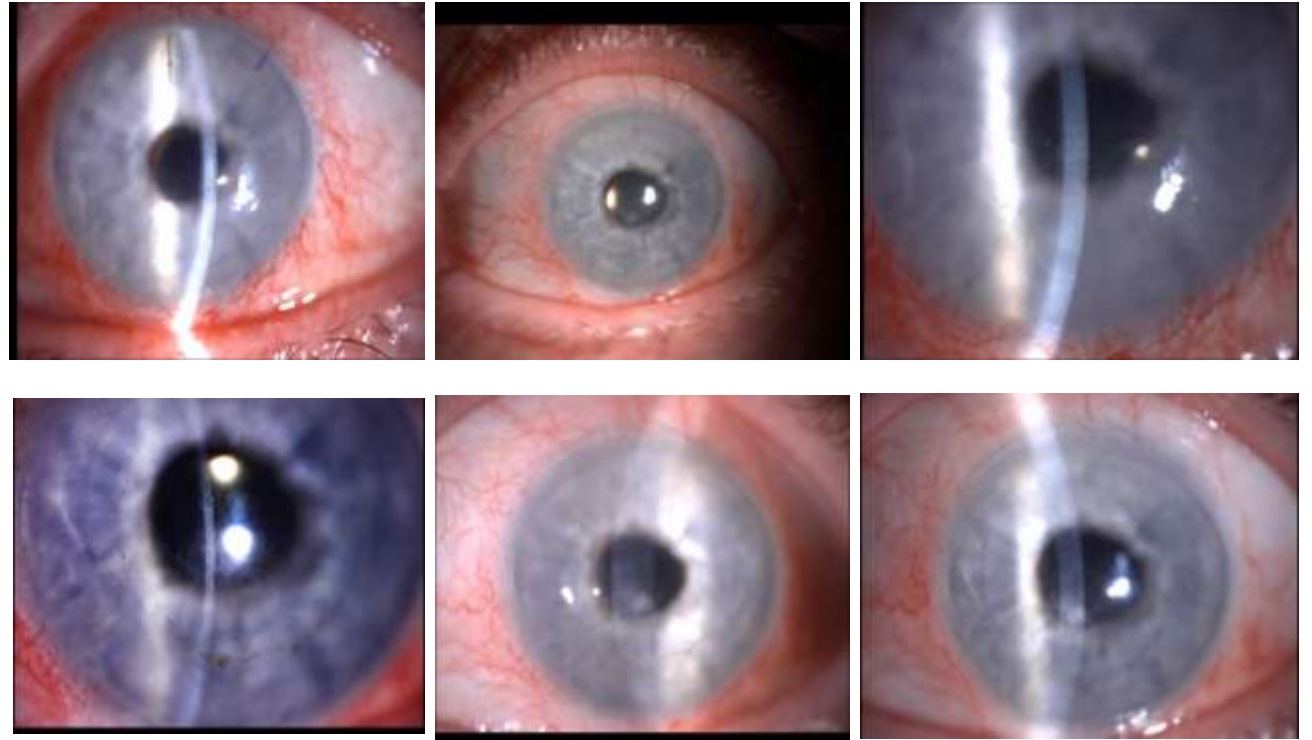
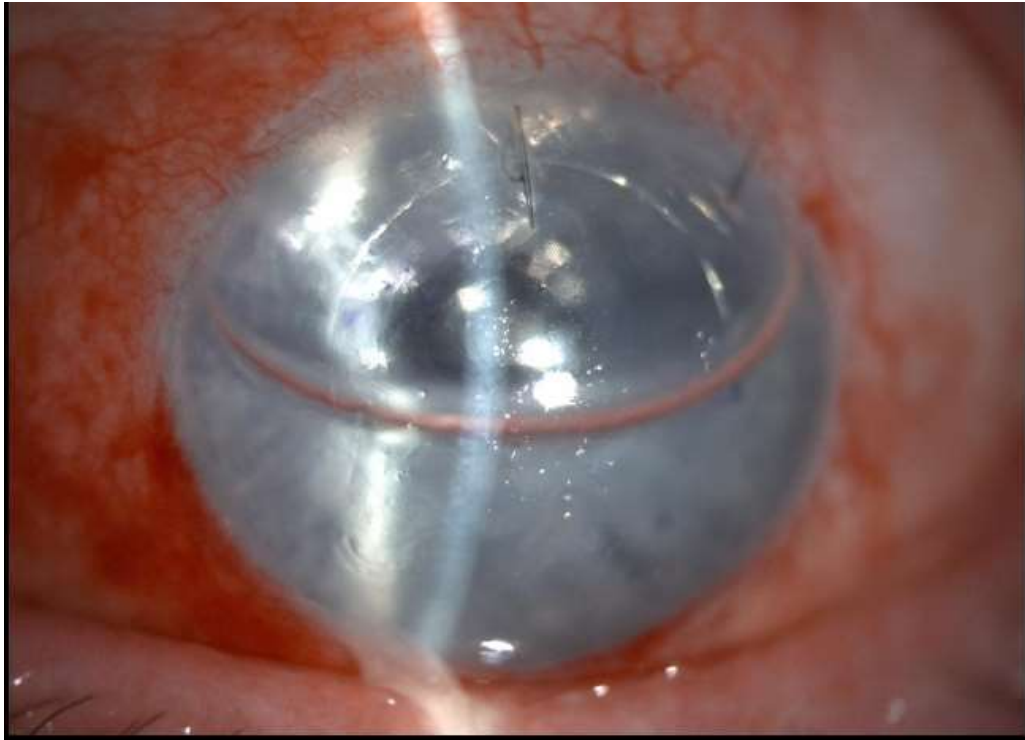
Software Version: 2018,1,1,63



Defining the OCT Revolution



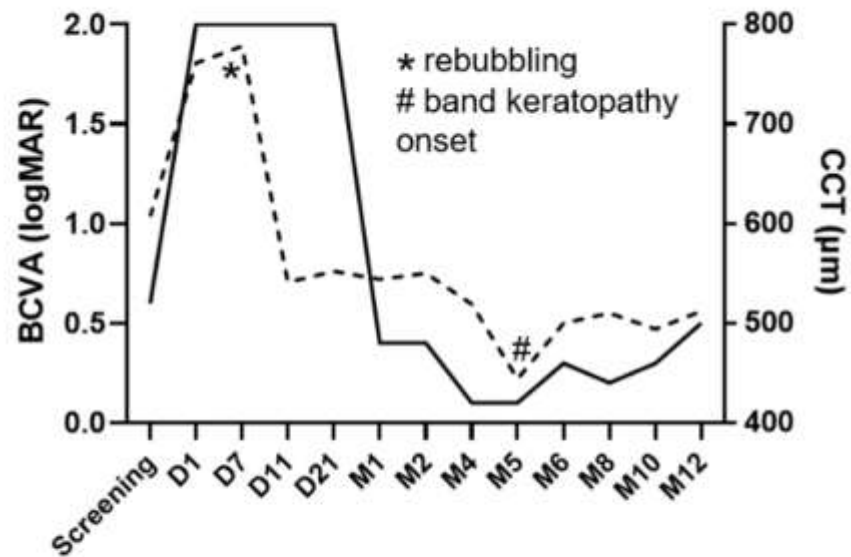
Une année sans endothélium ni membrane de Descemet.....



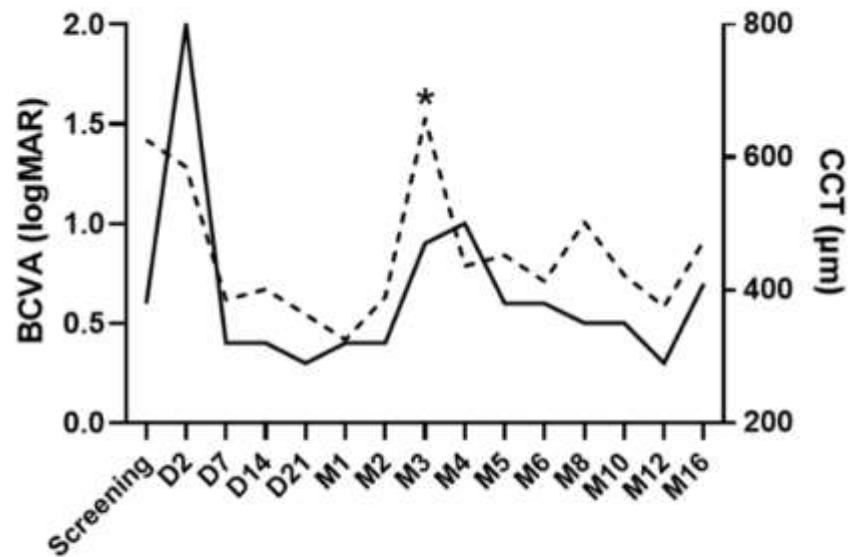
— BCVA (logMAR)

- - - CCT (μm)

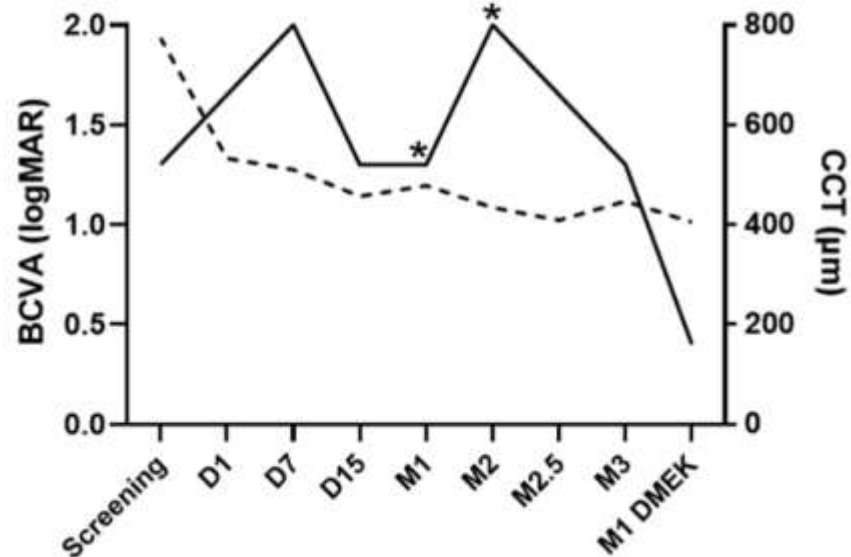
Patient 1



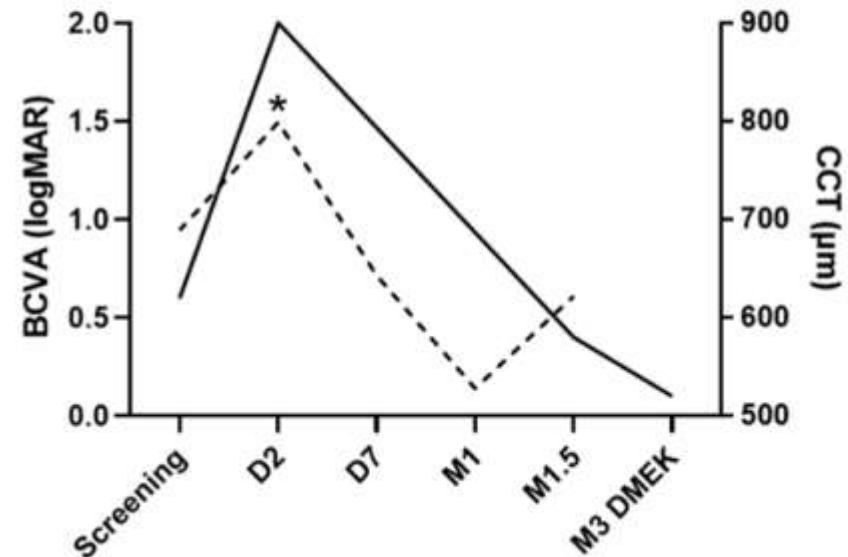
Patient 2



Patient 3



Patient 4



Kératoprothèses Kératoplasties

Kératoplasties

PROCÉDURES SIMPLES

PRIVILEGE IMMUNITAIRE CORNEEN

RISQUES DE PERTE DE GLOBE AVEC
KERATOPROTHESE

RISQUE DE GLAUCOME AVEC
KERATOPROTHESE

RISQUE DE GLAUCOME

Kératoprothèses

CHIRURGIE POSSIBLE
SI
LESION LIMBIQUE

REJETS MULTIPLES

SECHERESSE SEVERES

TROUBLES DE LA CICATRISATION

ANTI-REJETS

INGENIEURIE
TISSULAIRE

THERAPIE
GENIQUE