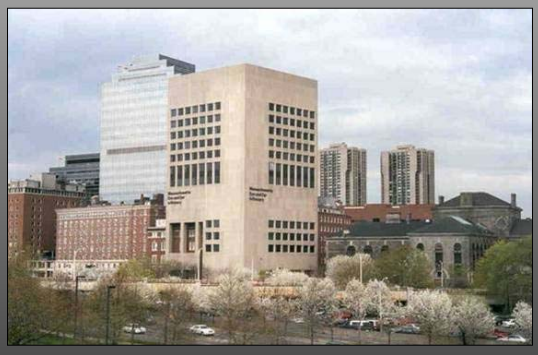
IOP, PACHYMETRY, & HYSTERESIS



Teresa C. Chen, M.D.
Associate Professor of Ophthalmology, Harvard Medical School
Glaucoma Service, Massachusetts Eye and Ear Infirmary

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NO RELEVANT FINANCIAL DISCLOSURES

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OUTLINE

IOP, PACHYMETRY, & HYSTERESIS

- IOP
  - Methods of IOP assessment
    - Goldmann
    - Perkins
    - Pneumatonometry
    - Tonopen
    - iCare
    - Schiotz
    - Air-puff
    - Palpation
  - When to check IOP
    - EUA?
    - In the office?
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  - DCT
    - Dynamic contour tonometer
  - ORA
    - Ocular response analyzer

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METHODS OF IOP ASSESSMENT

GOLDMANN APPLANATION TONOMETRY

- gold standard
- applanation tonometry
  - Imbert-Fick principle
    - eye = dry, thin-walled sphere

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METHODS OF IOP ASSESSMENT

GOLDMANN APPLANATION TONOMETRY

- gold standard
- applanation tonometry
  - Imbert-Fick principle
    - **Pressure** = Force/Area

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METHODS OF IOP ASSESSMENT

GOLDMANN APPLANATION TONOMETRY

- Sources of error
  - Squeezing
  - Breath holding
  - Valsalva
  - Pressure on the eye
  - Corneal irregularity
    - Scarring
    - High astigmatism
  - Cornea thickness

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METHODS OF IOP ASSESSMENT

PERKINS APPLANATION TONOMETRY

applanation tonometry

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METHODS OF IOP ASSESSMENT

PERKINS APPLANATION TONOMETRY

- applanation tonometry
- portable

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METHODS OF IOP ASSESSMENT

PERKINS APPLANATION TONOMETRY

- applanation tonometry
- portable
  - upright
  - supine (EUA)

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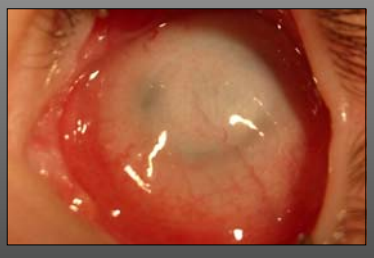
METHODS OF IOP ASSESSMENT

PNEUMATONOMETRY



- pressure-sensing device
- gas-filled chamber covered by a Silastic diaphragm
- gas in the chamber escapes through an exhaust vent
- As the diaphragm touches the cornea, the gas vent is reduced in size and the pressure in the chamber rises.
- useful with corneal scars or corneal edema

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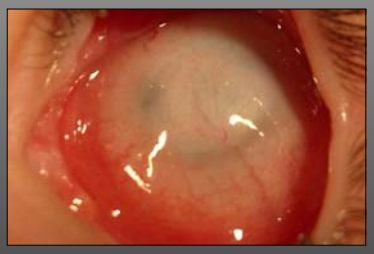
METHODS OF IOP ASSESSMENT

PNEUMATONOMETRY



- pneumatonometry IOPs > Goldmann IOPs
  - ….even 8.6 mm Hg higher

Eisenberg et al. Ophthalmol 1998.
Currie et al. J Glaucoma 2011.
Breitfeller et al. AJO 1980.

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METHODS OF IOP ASSESSMENT

TONOPEN

- electronic applanation devices
- portable
- applanates a small area of cornea
- useful with corneal scars or edema
- overestimates IOP
  - 1.4 to 12.1 mmHg higher
  - "marked increase in IOP by Tonopen"…"use with caution…" *

Levy et al, JAAPOS 2005.
Gharaei et al. E Med Health Journal 2006.
**Whitacre et al. AJO 1991.*

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METHODS OF IOP ASSESSMENT

ICARE

- rebound technology
- portable
- light-weight probe makes momentary contact with the cornea
- induction-based coil system measures deceleration and contact time of the probe
  - high IOP associated with faster deceleration and shorter contact time
  - anesthesia not needed

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METHODS OF IOP ASSESSMENT

ICARE

- Overestimates Goldmann/Perkins pressures by 2.0-3.1 mmHg[1-4] (range -5 to 12 mmHg)
  - especially as CCT increases
- iCare IOP > Goldmann in 75% of cases

1. *Lambert et al. Ophthalmology 2013.*
2. *Li et al. J Glaucoma 2012.*
3. *Flemmons et al. JAAPOS 2011.*
4. *Martinez-de-la-Casa. J Glaucoma 2009.*

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METHODS OF IOP ASSESSMENT
SCHIOTZ

Tonometer Scale Reading (Units)	Tonometer Weights (g) 5.5 (mm Hg)	7.5 (mm Hg)	10.0 (mm Hg)
2.5	27	39	55
3.0	24	36	51
3.5	22	33	47
4.0	21	30	43
4.5	19	28	40
5.0	17	26	37
5.5	16	24	34
6.0	15	22	32
6.5	13	20	29
7.0	12	18	27
7.5	11	17	25
8.0	10	16	23
8.5	9	14	21
9.0	8	13	20
9.5	8	12	18
10.0	7	11	16

- Indentation tonometer
- Measures indentation of the cornea produced by a known weight
- Portable
- Low cost
- Higher IOP readings (up to 16.5 mm Hg) *
- Affected by ocular rigidity
  - Pediatric eye may be “elastic”

**Whitacre et al. AJO 1991.*

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METHODS OF IOP ASSESSMENT

NONCONTACT (AIR-PUFF) TONOMETERS

"…airpuff tonometry must be regarded as a qualitative test, good enough for screening, but not to be relied upon as a quantitative measurement of IOP."

Lagerlof, Acta Ophthalmologica1990.

- noncontact
- measures time necessary for a given force of air to flatten a given area of the cornea
- correlates well with applanation except at extremes of IOP
- inaccurate between 20-30 mmHg
- large spread with false positives and false negatives
- often used in large-scale screening programs

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METHODS OF IOP ASSESSMENT

PALPATION

- Last resort…

1. *Birnbach, Leen. Oph Surg Laser 1998;29(9):754-7.*
2. *Rubinfeld et al. Ophth Surg Laser 1998; 29(3):213-5.*
3. *Feldman, Katz, Spaeth, Gross, Varma. Ocular Palpation in Pseudophakia. AJO 1987:104(3):307.*

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WHEN TO CHECK IOP

EUA?

- Pubmed search (past 20 years)
  - "eye pressure" and "anesthesia"
  - 45 articles

↑ after intubation ↑ LMA ↑ extubation

↓ halothane, nitrous, propofol, sevo- iso- en- flurane

↑↓ ketamine, succinylcholine, suxamethonium

after 3 minutes…

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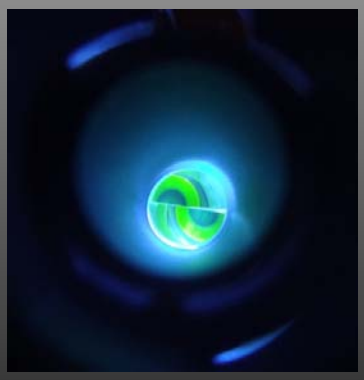
IOP AND PACHYMETRY

APPLANATION TONOMETRY AFFECTED BY CCT



- Goldmann tonometer most accurate with a CCT of 520 µm
- Population studies wide range of normal
  - Mean CCT 537 and 554 µm
- High CCT values → artifactually high IOP measurement
- Low CCT values → artifactually low IOP measurement
- 4.9 to 6.8 mmHg difference*

**Whitacre et al, AJO 1993.*

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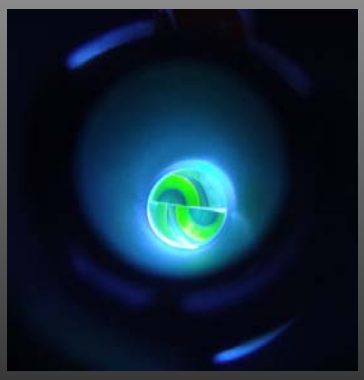
IOP AND PACHYMETRY

TONOMETRY AFFECTED BY CCT INCLUDE…



- Goldmann
- Perkins
- Pneumatonometry
- Tonopen
- Noncontact tonometer

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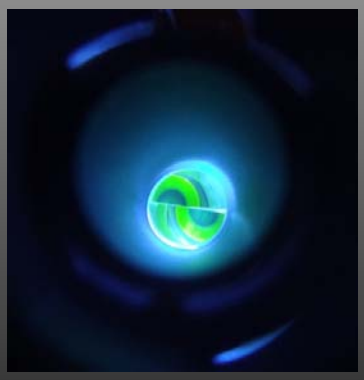
IOP AND PACHYMETRY

APPLANATION TONOMETRY AFFECTED BY CCT



- Currently, there is no valid correction factor for the effect of CCT on applanation tonometers, so clinical application of any of the proposed correction methods should be avoided
  - Relationship between IOP measurements and CCT is not linear
  - Biomechanical properties of an individual cornea may vary (relative stiffness or rigidity)

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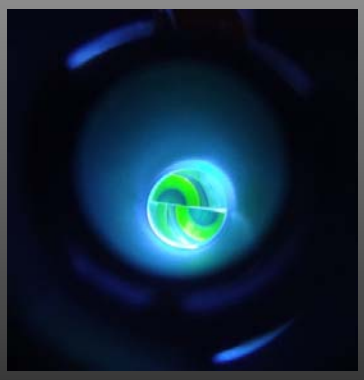
IOP AND PACHYMETRY

APPLANATION TONOMETRY AFFECTED BY CCT



- The recognition that the accuracy of applanation tonometry is dependent on many uncontrollable factors has led to a renewed interest in the development of novel tonometers….
- Especially tonometers that are less affected by CCT and corneal rigidity

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METHODS OF PACHYMETRY (CCT) ASSESSMENT

MANY METHODS…

- ultrasound
- OCT (Visante)
- confocal microscopy (Confoscan)
- Scheimpflug camera (Sirius, Pentacam, Galilei)
- optical coherence pachymetry (OCP or Orbscan)

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IOP AND PACHYMETRY

APPLANATION TONOMETRY AFFECTED BY CCT

- Normal CCT = 548 - 558
- Congenital glaucoma CCT = 543
- Aphakic glaucoma CCT = 642-663
- Aniridia CCT = 632 – 755
- Sturge Weber CCT = 592
- Microcornea CCT = 821
- Ocular hypertension CCT = 595
- Anterior segment dysgenesis and uveitis CCT = 529 – 541

Lopes, JPOS 2007. Muir, AJO 2007. Lopez, JPOS 2011. Brandt, AJO 2004. Whitson, Eye CL 2005. Simon, JAAPOS 2005. Tai, J Glaucoma 2006. Muir, Ophthalmol 2004.

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METHODS OF IOP ASSESSMENT

DYNAMIC CONTOUR TONOMETER (DCT)

PASCAL

- nonapplanation
- contact tonometer
- may be more independent of corneal rigidity and thickness
- handheld version
- DCT IOPs > Goldmann IOPs
  - 0.9 to 5.2 mmHg
  - IOPs not interchangeable
- 8 second contact time

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METHODS OF IOP ASSESSMENT

OCULAR RESPONSE ANALYZER (ORA)

REICHERT

- Measures corneal hysteresis
- Non-contact “air puff” tonometer
- ORA IOP > Goldmann IOP
  - 2.8 to 8.3 mmHg
  - IOPs not interchangeable
- May be affected to a slight degree (or not at all) by CCT
- Why bother?
  - prognosis?
  - magic number?

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METHODS OF IOP ASSESSMENT

OCULAR RESPONSE ANALYZER (ORA)

REICHERT

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METHODS OF IOP ASSESSMENT

OCULAR RESPONSE ANALYZER (ORA)

REICHERT

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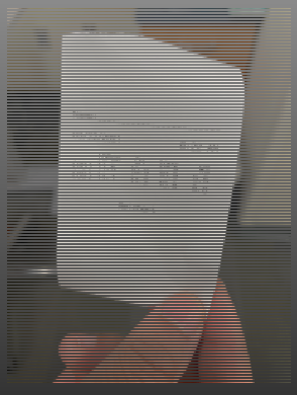
METHODS OF IOP ASSESSMENT

OCULAR RESPONSE ANALYZER (ORA)

REICHERT



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METHODS OF IOP ASSESSMENT

OCULAR RESPONSE ANALYZER (ORA)

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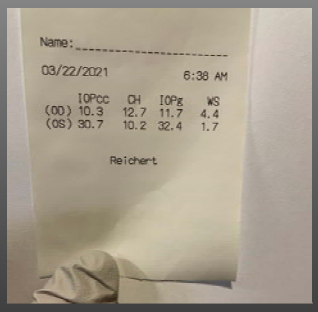

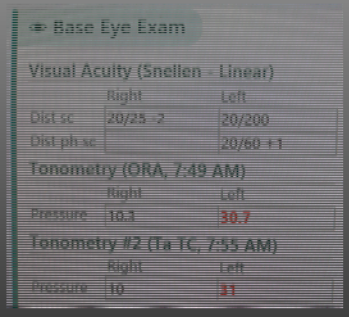

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METHODS OF IOP ASSESSMENT

OCULAR RESPONSE ANALYZER (ORA)

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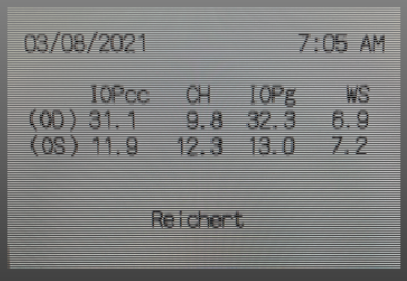

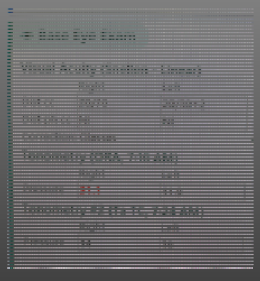

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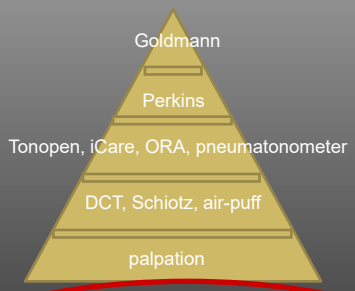

  - When to check IOP
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      - since anesthetics, intubation, extubation, LMA, all affect IOP

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  - CCT should be measured in all
- IOP & PACHYMETRY
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most don't have these
may be hard to use
IOP higher than Goldmann

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SUMMARY
IOP, PACHYMETRY, & HYSTERESIS

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SUMMARY
IOP, PACHYMETRY, & HYSTERESIS

IT'S NOT ALL ABOUT IOP!

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SUMMARY
IOP, PACHYMETRY, & HYSTERESIS

SURVEY OF OPHTHALMOLOGY 64 (2019) 810–825

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ELSEVIER

Survey of Ophthalmology

Major review

Pediatric intraocular pressure measurements: Tonometers, central corneal thickness, and anesthesia

*Mahmoud A. Fayed, MD, Teresa C. Chen, MD**

Department of Ophthalmology, Harvard Medical School, Massachusetts Eye and Ear Infirmary, Boston, Massachusetts, USA

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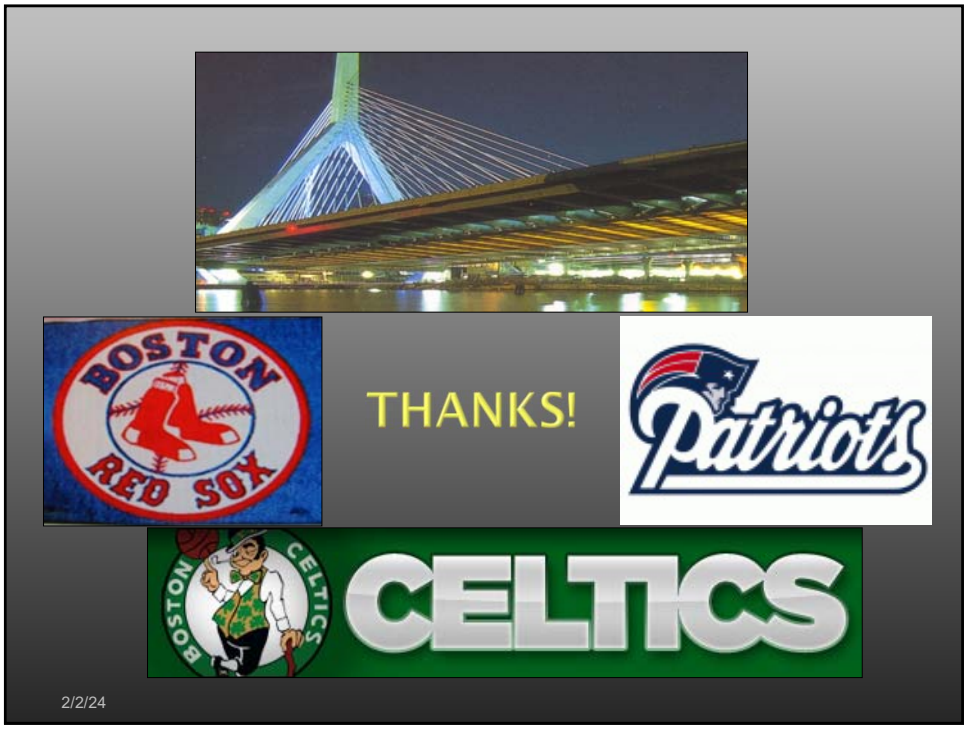
THANKS!
BOSTON
RED SOX
Patriots
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2/2/24

53

Slit Lamp Procedures in Glaucoma Management

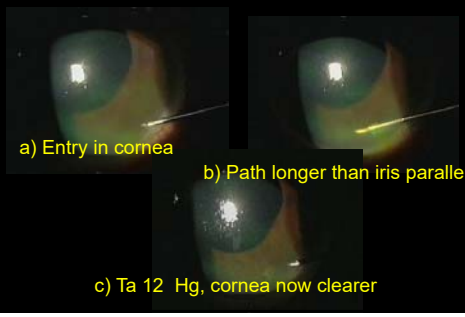
Paul Palmberg, MD, PhD
Bascom Palmer Eye Institute

Angle Closure Attack

- How do you get the cornea clear enough to do the laser iridotomy?

- Topical agents?
- Oral agents?
- Press on cornea with muscle hook?
- 30g needle paracentesis?

Fig 1 30 g needle paracentesis



Relieving Pressure With 30-Gauge Needle

Paul Palmberg MD, PhD
Herbert Fechter MD

Case: Traumatic Hyphema

A 9 year old African-American boy presented with a microhyphema after a minor blunt injury

Sickle cell prep negative

The IOP was 55 mm Hg after 3 days on timolol/dorzolamide, brimonidine, latanoprost, given in the hospital

A 2+ relative afferent pupil defect developed

The Residents asked me to attend a trab

Case: Traumatic Hyphema

Upon my exam the vision was 20/25, IOP 55,
2+ relative afferent defect confirmed

SLE and *gentle* Zeiss gonioscopy revealed no visible cells in the AC, normal appearing TM, lens, fundus

What was the mechanism of IOP elevation now?

What was the best management option?

Surprise Resolution!

The eye was prepped with proparacaine, apraclonidine and 5% povidone iodide and a solid bladed speculum placed.

The IOP fell to 9 mm Hg just after the paracentesis

The IOP stabilized at 12 mm Hg after 30 minutes and remained normal after stopping all IOP meds. WHY?

Presumably, the eye's Tissue Plasminogen Activator had lysed the fibrin that had been elevating the IOP

But why then was the IOP still elevated until paracentesis?

Collapse of Schlemm's Canal

Robert Moses, MD, at Washington University in St. Louis investigated circumferential flow in Schlemm's canal in fresh normal human eyes in the 1970s.

He cannulated the canal and observed the flow resistance for saline through 90 degrees of canal after filling the AC with silicone oil.

Then he slowly raised the IOP and kept checking

The resistance rose abruptly and reversibly at IOP about 35-40 mm Hg in most eyes.

- Invest Ophthalmol Vis Sci. 1981 Jan;20(1):61-8.
- Schlemm's canal: the effect of intraocular pressure.
- Moses RA, Grodzki WJ Jr, Etheridge EL, Wilson CD.
- Abstract
- We have shown that in the excised eye when oil in the anterior chamber has made the trabecular mesh impermeable, resistance to circumferential flow along the canal increases moderately as transmural pressure is increased. At the same time, resistance to outflow from the canal through the collector channels increases markedly as transmural pressure is increased from low levels to 35 or 40 mm Hg. We have suggested that the usual primary defect in open-angle glaucoma is reduced facility of the inner canal wall and that collapse of the canal with reduction of filtering area and plugging of collector channels is a secondary effect.

When is This Worth Trying?

- In cases in which the initial cause is gone; I have seen three similar cases to this one
- 30g needle paracentesis is also useful to lower IOP when meds will not in POAG, as about a third are then controlled on meds, and others at least are operated upon after a few days at a lower pressure.
- Before anti-VEGF injection

Figure 2. Bent 30 g needle

Fig a. Bend back 30 degrees at hub of needle

Fig b. Bend forward 60 degrees a few mm from the hub

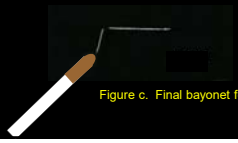
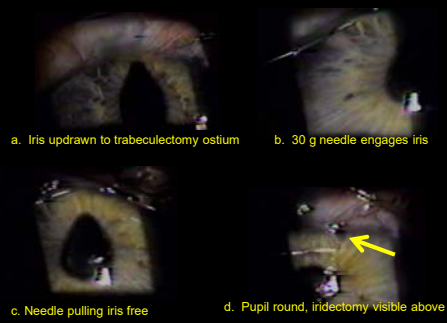


Figure c. Final bayonet form

Tugging iris from trabeculectomy ostium



a. Iris updrawn to trabeculectomy ostium

b. 30 g needle engages iris

c. Needle pulling iris free

d. Pupil round, iridectomy visible above

Needling Failing Blebs

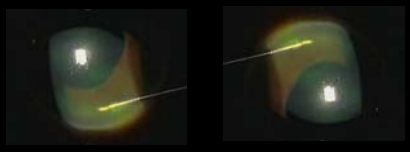
- Blebs require continual flow of aqueous humor or they will send out stimuli for vessel ingrowth
- need continual flow to preserve a bleb
- *Where is the site* of increased resistance?:
  - Internal ostium blocked? Iris, vitreous?
  - Scleral flap edges? High IOP, bleb soft to touch
  - Bleb wall? Bleb feels firm and is delimited

Prep for Slit Lamp Procedure

Proparacaine gel Apraclonidine Povidone Iodine 5% 3.5% Xylocaine

IOP 40 mm Hg 4 years after a MMC Trab

Hey, what if we used that transcorneal entry to needle a bleb from inside?



Trans-corneal needling (IOP elevated, Bleb soft)

Advantages of This Technique

No leak in conjunctiva

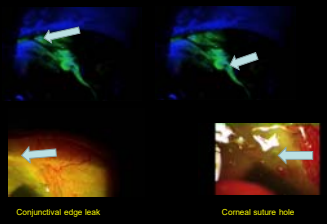
Usually no hypotony--bleb still has a margin

Usually no bleeding
cut only membrane at edge of scleral flap

Needling Pupillary Membrane

Oh No, There is a Leak at the Limbus!

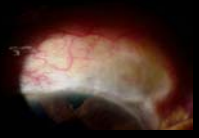
What Type of Leak(s)?



Conjunctival edge leak

Corneal suture hole

How to Avoid It Next Time



Tenon's Capsule Dehiscence

Why Did This Happen?

- Tenon's capsule dehiscence leaves just fragile conjunctival flap
- Skimming scleral suture bites loosen!
- Conjunctival-conjunctival closure without scleral bite support
- (MMC touching conj edge NOT important!)

What NOT to do!

Do NOT Stop Steroids!
- You don't want the bleb to fail
- Inflammation melts tissue (cf Schuman elevated MMP-9, "gelatinase" in eyes with leaks Exp Eye Res 2005;81(4):429-436)

Do Not Observe if bleb flat
- When the rivulet closes the bleb is gone
- Risks infection
- Risks epithelial downgrowth

How to Fix It at the Slit Lamp

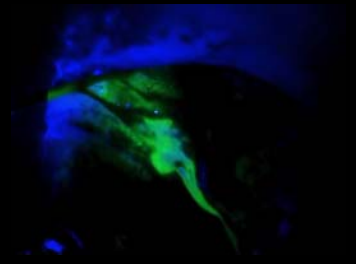
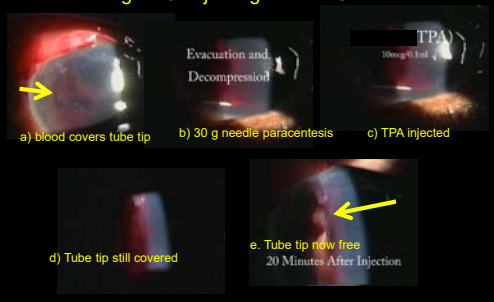


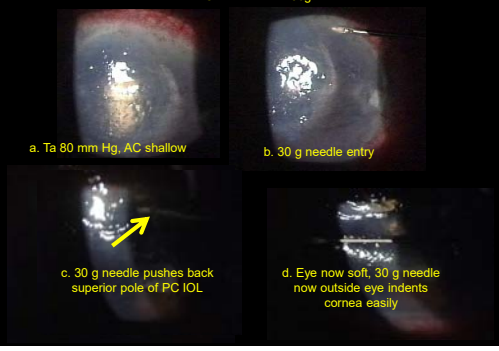
Figure 9. Injecting TPA for Clot



Attack of Malignant Glaucoma

- It is Friday afternoon at 6 PM.
- The retina specialists have all gone home.
- A patient with a 3-day attack of malignant glaucoma
- Ta 80 on dorzolamide/timolol, brimonidine, acetazolamide, atropine and oral glycerin.
- What can you do?

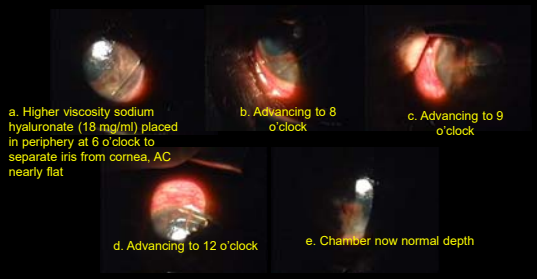
Figure 8. Breaking Attack of Aqueous Misdirection Glaucoma with 30g Needle



AC Collapse due to Intravitreal Gas

- Pressure of 60 mm Hg on meds.
- Intravitreal gas was used with PPV for retinal detachment repair.
- AC is collapsed, despite iridectomy.
- Can not put a tube drain in the vitreous cavity because of the gas.
- Can not put a tube in the AC, there is no space.
- Filter very unlikely to work.

Figure 13. Collapsed AC after Intravitreal Gas



a. Higher viscosity sodium hyaluronate (18 mg/ml) placed in periphery at 6 o'clock to separate iris from cornea, AC nearly flat

b. Advancing to 8 o'clock

c. Advancing to 9 o'clock

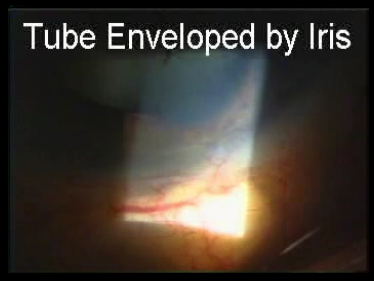
d. Advancing to 12 o'clock

e. Chamber now normal depth

What to do if the IOP is very high early post-op after placing a ligated large plate aqueous drainage implant

Slit Lamp Fenestrations

What to do if the IOP is too high on meds 3 weeks after a ligated aqueous drainage implant



Sunset Syndrome and Failing Bleb

KERATOPROSTHESIS AND GLAUCOMA
A 20/20 VIEW

Teresa C. Chen, MD
Associate Professor of Ophthalmology, Harvard Medical School
Glaucoma Service, Massachusetts Eye and Ear Infirmary

FINANCIAL DISCLOSURES

NIH R01 EB033321
NIH R44EY034409
NIH UG1 EY033703

Alcon Laboratories

Harvard Foundation
(Fidelity Charitable Fund)

Keratoprosthesis and Glaucoma

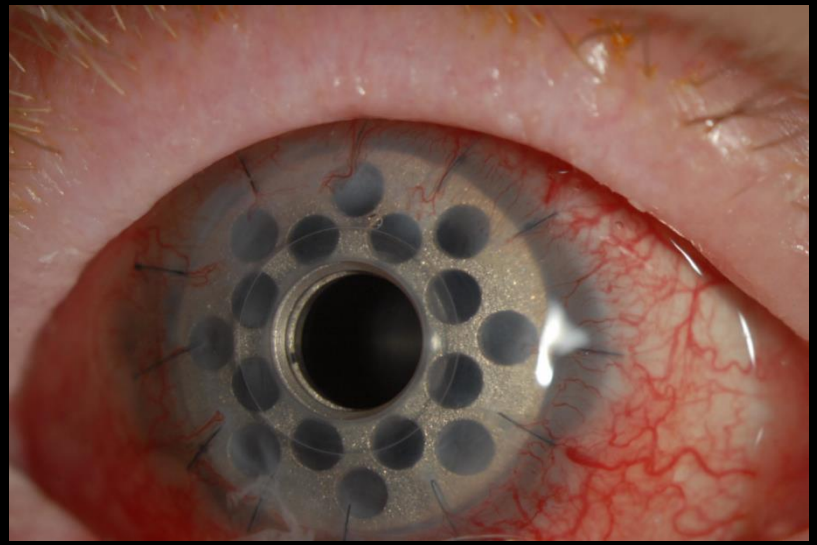
TOP 20 TAKE HOME POINTS

Keratoprosthesis and Glaucoma

TAKE HOME POINT #1

Keratoprosthesis and Glaucoma

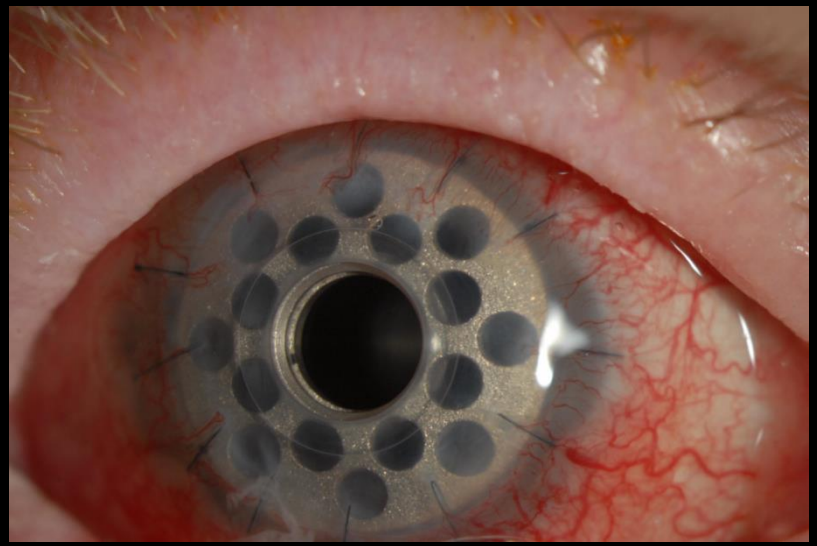
TAKE HOME POINT #1



Keratoprosthesis and Glaucoma

TAKE HOME POINT #1

KPro Type I

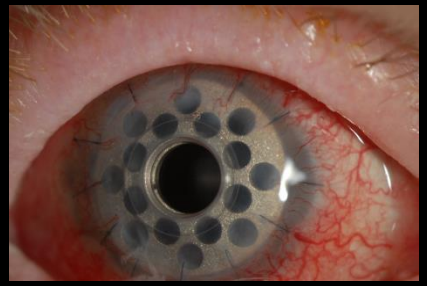


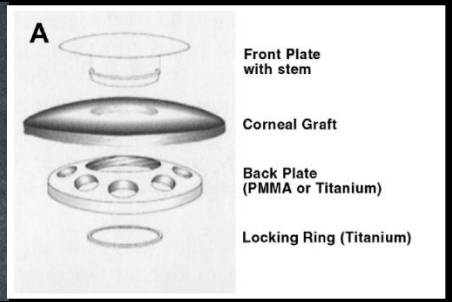
KPro Type II

Keratoprosthesis and Glaucoma

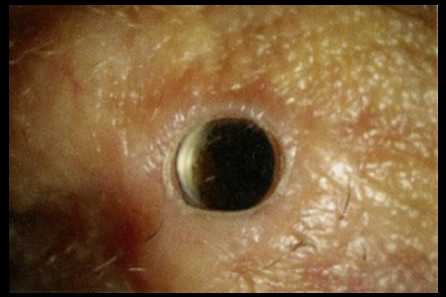
TAKE HOME POINT #1

KPro Type I





KPro Type II



Keratoprosthesis and Glaucoma

TAKE HOME POINT #1

KPro Type I

- indicated in eyes with poor prognosis for PKPs
- better ocular surface

KPro Type II

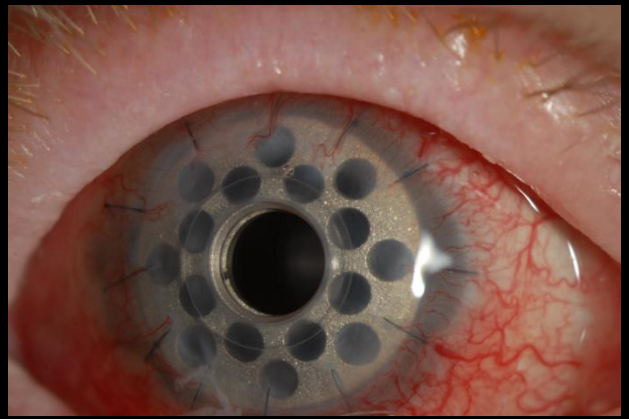
- indicated in eyes with poor prognosis for Kpro I
- worse ocular surface
  - burn patients, ocular cicatricial pemphigoid, Stevens Johnson Syndrome, etc.

Keratoprosthesis and Glaucoma

TAKE HOME POINT #1

KPro Type I

- tube at time of primary Kpro



KPro Type II

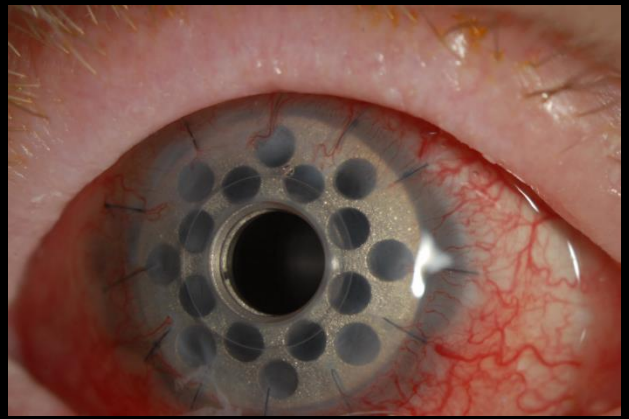
- tube at time of primary Kpro

Keratoprosthesis and Glaucoma

TAKE HOME POINT #1

KPro Type I

- ABC and AvB studies



KPro Type II

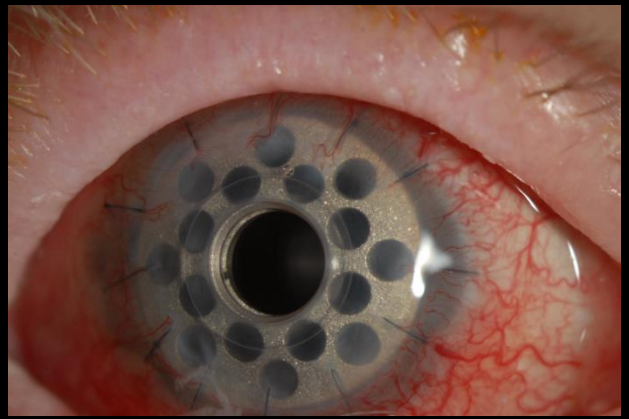
- ABC and AvB studies

Keratoprosthesis and Glaucoma

TAKE HOME POINT #1

KPro Type I

- tube superior temporal



KPro Type II

- tube inferior temporal

Keratoprosthesis and Glaucoma

TAKE HOME POINT #1

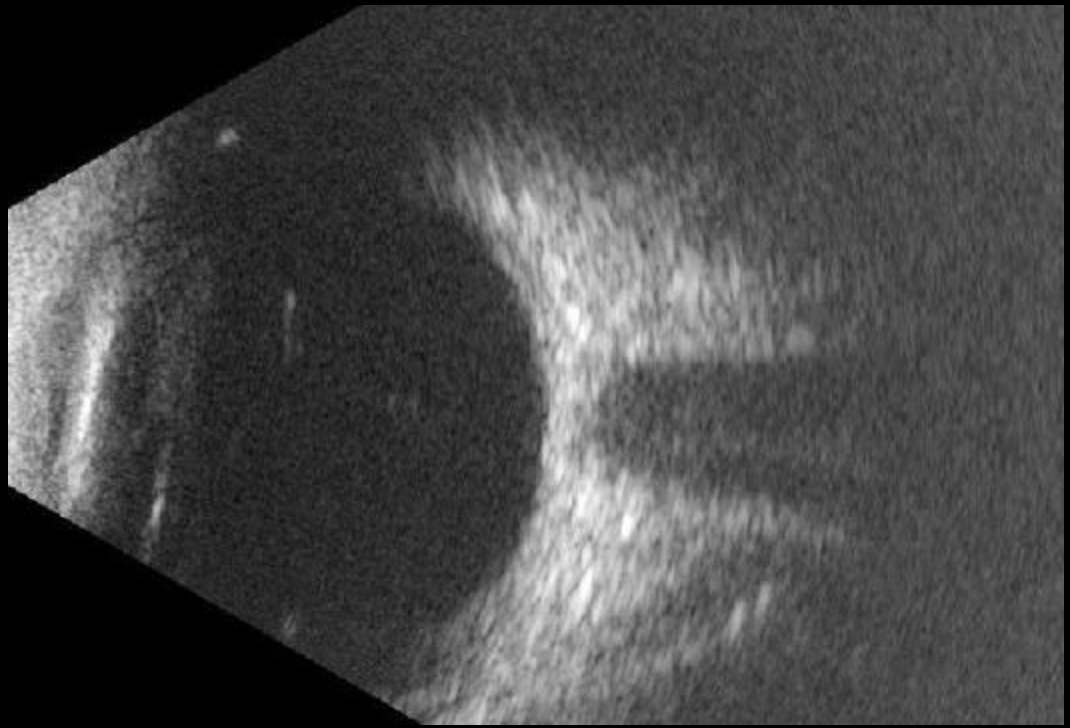
Know the 2 types….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #2

Keratoprosthesis and Glaucoma

TAKE HOME POINT #2



Keratoprosthesis and Glaucoma

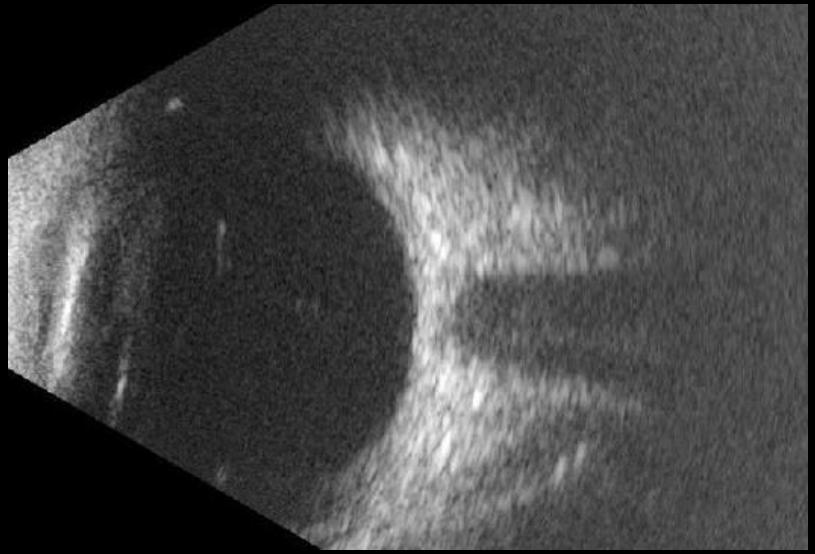
TAKE HOME POINT #2

For eyes that were reported to have no cupping (15 of 48 eyes, 31.3%) on the preoperative B-scan, 33.3% (5 of 15 eyes) had demonstrated cupping ≥ 0.7 C/D ratio during the intraoperative period or within 2 months after surgery.[1]

[1] Lee R, Khoueir Z, Tsikata E, Chodosh J, Dohlman CH, Chen TC. Long-term visual outcomes and complications of Boston Keratoprosthesis Type II implantation. Ophthalmology. 2017 Jan;124(1):27-35

Keratoprosthesis and Glaucoma

TAKE HOME POINT #2



- To operate or not to operate
  - cupping
  - RD
  - etc.
- If there is Bscan cupping, do be sure the patient knows the prognosis is poor.
- Get the Ascan too.

Keratoprosthesis and Glaucoma

TAKE HOME POINT #2

Don’t forget to ultrasound preop….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #3

Keratoprosthesis and Glaucoma

TAKE HOME POINT #3

Kids and Kpros….don’t do it….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #4

Keratoprosthesis and Glaucoma

TAKE HOME POINT #4

Long-term Visual Outcomes and Complications of Boston Keratoprosthesis Type II Implantation

Ramon Lee, MD,[1] Ziad Khoueir, MD,[2] Edem Tsikata, PhD,[2] James Chodosh, MD, MPH,[3] Claes H. Dohlman, MD, PhD,[3] Teresa C. Chen, MD[2]

Table 3. Postoperative Complications of 48 Eyes After Boston Keratoprosthesis Type II Implantation

Postoperative Complications	Number of Eyes	% of Eyes
Retroprosthetic membrane	29	60.4
Skin/tarsorrhaphy revision	25	52.1
Boston keratoprosthesis type II device replacement or extrusion	24	50.0
Glaucoma: new onset or progression of glaucoma after surgery	17	35.4
Vitritis	12	25.0
Choroidal detachment or hemorrhage	4	8.3
Cystoid macular edema	4	8.3
Epiretinal membrane	4	8.3
Infectious endophthalmitis	3	6.3
Retinal detachment with pars plana vitrectomy	3	6.3
Vitreous hemorrhage with pars plana vitrectomy	2	4.2
Posterior capsular opacification with Nd:YAG capsulotomy	2	4.2
Other (membrane peel, diode laser, endolaser, uveitis, keratitis, anterior vitreal band Nd:YAG, hypotony)	5	10.4

Nd:YAG = neodymium yttrium–aluminum–garnet laser.

Keratoprosthesis and Glaucoma

TAKE HOME POINT #4

- Nothing lasts forever
  - infection
  - retro Kpro membrane
  - retina
  - glaucoma
- Patient need to know this beforehand
- Save the other eye

Keratoprosthesis and Glaucoma

TAKE HOME POINT #4

Nothing lasts forever….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #5

Keratoprosthesis and Glaucoma

TAKE HOME POINT #5

- It's a 3 doctor surgery
  - cornea
  - glaucoma
  - retina

Keratoprosthesis and Glaucoma

TAKE HOME POINT #5

Don’t forget the glaucoma and retina doctors….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #6

Keratoprosthesis and Glaucoma

TAKE HOME POINT #6

Don’t forget the tube….

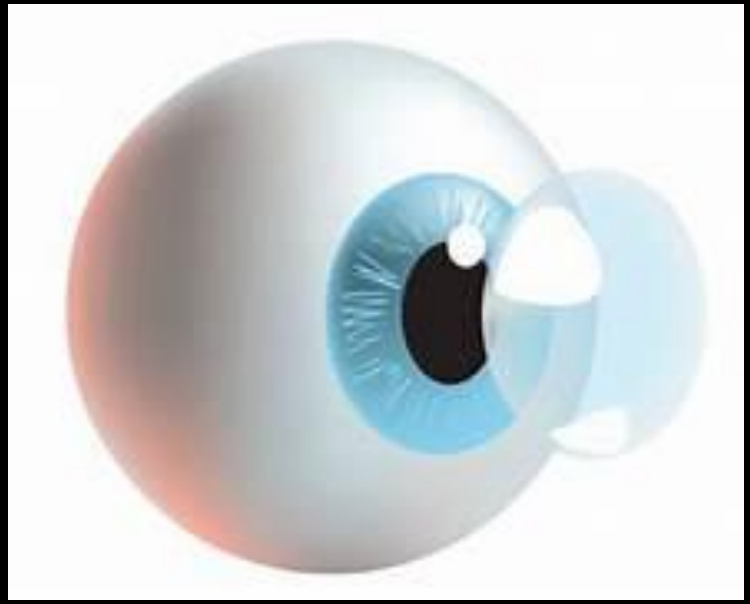
Keratoprosthesis and Glaucoma

TAKE HOME POINT #7

- postoperative care
  - cornea postop visits
  - baseline glaucoma testing at 1 month
  - retina prn

Keratoprosthesis and Glaucoma

TAKE HOME POINT #8



Keratoprosthesis and Glaucoma

TAKE HOME POINT #8

Don’t forget the BCL (bandage contact lens)….

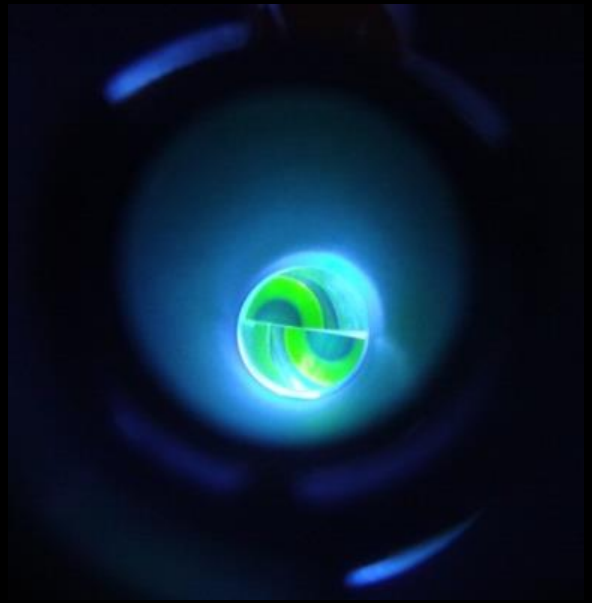
Keratoprosthesis and Glaucoma

TAKE HOME POINT #9

Don’t forget the antibiotics….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #10



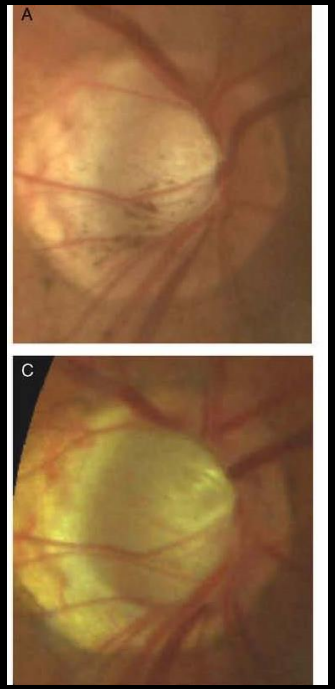
Keratoprosthesis and Glaucoma

TAKE HOME POINT #10

Don’t palpate over the plate….

Keratoprosthesis and Glaucoma

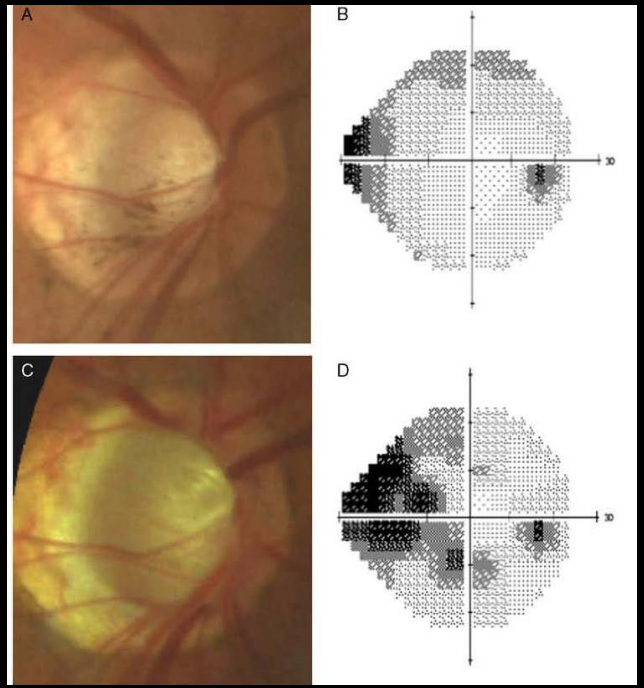
TAKE HOME POINT #11



Poon LY, Chodosh J, Vavvas D, Dohlman CH, **Chen TC**. Endoscopic cyclophotocoagulation for the treatment of glaucoma in Boston keratoprosthesis type II patients. J Glaucoma. 2017 Apr;26(4):e146-e149.

Keratoprosthesis and Glaucoma

TAKE HOME POINT #11



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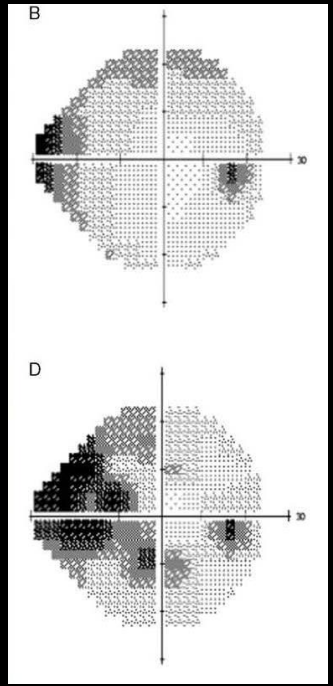
Keratoprosthesis and Glaucoma

TAKE HOME POINT #11

Don’t forget the disc photo….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #12



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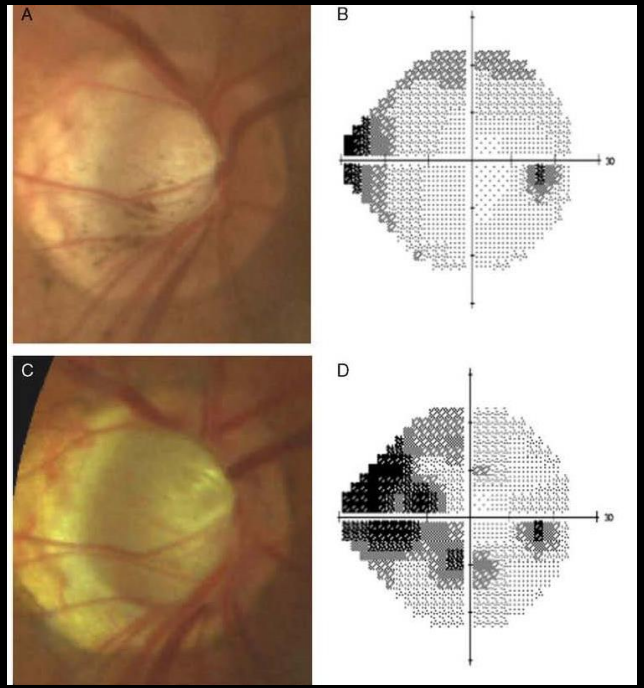
Keratoprosthesis and Glaucoma

TAKE HOME POINT #12



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Keratoprosthesis and Glaucoma

TAKE HOME POINT #12

Don’t forget the field….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #13

Get the OCT….

Khoueir Z, Jassim F, Braaf B, Poon LYC, MD, Tsikata E, Chodosh J, Dohlman CH, Vakoc BJ, Bouma BE, de Boer JF, **Chen TC**. Three-dimensional optical coherence tomography imaging for glaucoma associated with Boston keratoprosthesis type I and II. J Glaucoma. 2019 Aug; 28(8):718-726.

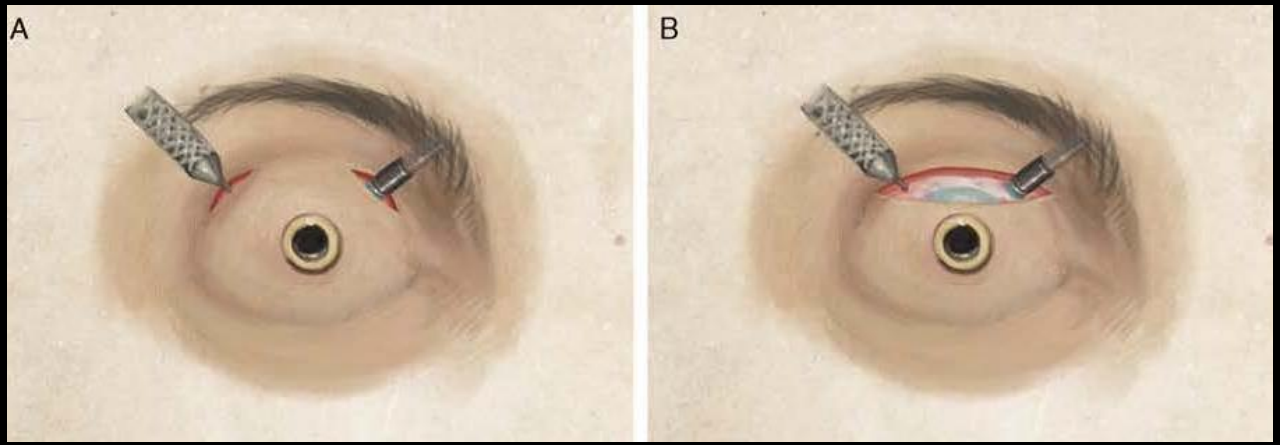
Keratoprosthesis and Glaucoma

TAKE HOME POINT #14

oral carbonic anhydrase inhibitors….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #15

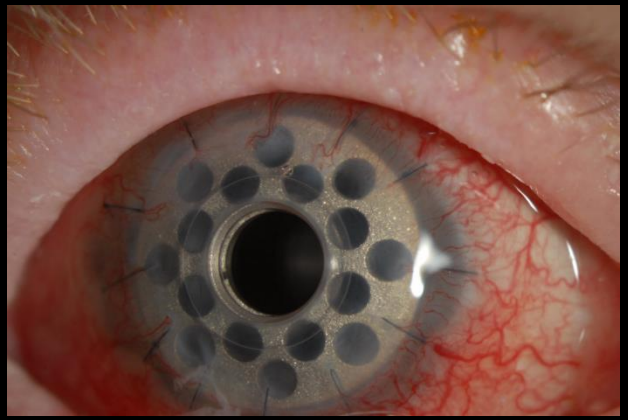


Keratoprosthesis and Glaucoma

TAKE HOME POINT #15

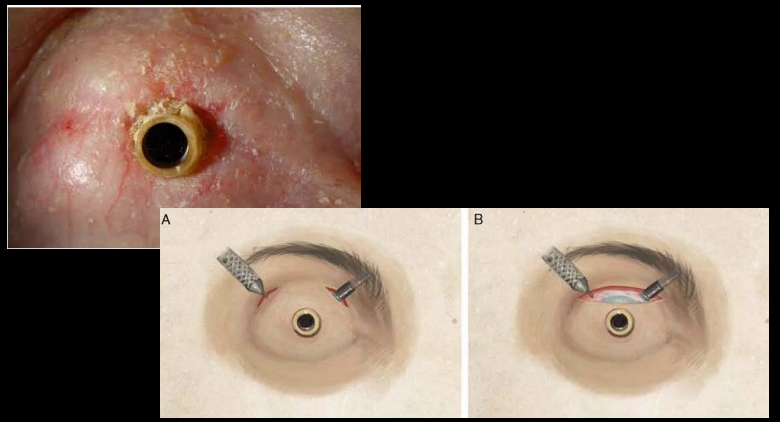
KPro Type I

- tube superior temporal



KPro Type II

- tube inferior temporal



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Keratoprosthesis and Glaucoma

TAKE HOME POINT #15

Know plan B for when the tube fails?

Keratoprosthesis and Glaucoma

TAKE HOME POINT #16

Beware of the dark side (retina)

Keratoprosthesis and Glaucoma

TAKE HOME POINT #17

Beware of the tormentors (RPM)

Keratoprosthesis and Glaucoma

TAKE HOME POINT #18

Protoplasm matters

Keratoprosthesis and Glaucoma

TAKE HOME POINT #19

Keratoprosthesis and Glaucoma

TAKE HOME POINT #19

- The optic nerve can go fast
- The optic nerve can go faster without the tube.

Keratoprosthesis and Glaucoma

TAKE HOME POINT #19

Kpro-related glaucoma is bad ….

Keratoprosthesis and Glaucoma

TAKE HOME POINT #20

1992:
First received FDA approval

2015:
11,000 type I devices implanted
200 type II devices implanted

?

Keratoprosthesis and Glaucoma

TAKE HOME POINT #20

The future can be brighter

Keratoprosthesis and Glaucoma

A 20/20 View

- Kpro I and Kpro II
- To operate or not to operate
  - Bscan's role
- Kpro and kids
- It doesn't last forever
  - Patients need to know BEFORE
- It's a 3 doctor surgery
- Glaucoma always occurs
  - tubes in everyone
- Postoperative care
- Proper care and feeding of Kpros
  - BCLs
  - Prophylactic antibiotics
- Don't palpate over the plate….please!
- Disc photos
- Humphrey visual fields
- OCT testing
- Glaucoma medications (Kpro I vs II)
- Another tube? ECP?
- The Dark Side (retina = RDs and endophthalmitis)
- The Tormentors (RPM)
- Protoplasm (intraoperative and postoperative issues)
- Kpro glaucoma vs. all other glaucomas
- Future look at the bright side
  - Better ways to monitor IOP?
  - New materials?
  - New surgery?

Keratoprosthesis and Glaucoma

Top 20 Take Home Points

- Kpro I and Kpro II
- To operate or not to operate
  - Bscan's role
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Thank you!


A legacy of healing. A future of hope.
200
Years
Mass General Brigham
Mass Eye and Ear
A future of cures.