Malfunctioning and Malpositioned PCIOLs

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Financial Disclosures

• B&L: S
• Alcon: S, C, Research Grant
• J&J: S, C
• Allergan: C
• Shire: C, S
• Biotissue: S, C
• CorneaGen: S, C, MAB
• Ocular Science: C, MAB
• Zeiss: C, S
Almost everything I will talk about is OFF-LABEL
Introduction

- Malfunctioning IOLs
  - Dysphotopsias
  - IOL power error

- Malpositioned IOLs
  - Zonulopathy (PEX, PPV)
  - Trauma (Blunt or surgical)
  - RP, High Myopia, Uveitis, ROP
  - Capsule Contraction/Phimosis
**Barrett Rx Formula - Outcome Analysis**

<table>
<thead>
<tr>
<th>K Index</th>
<th>K Index</th>
<th>+ve Cyl</th>
<th>-ve Cyl</th>
<th>ELP</th>
<th>IOL</th>
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**Calculate**

- **Right (OD)**
- **Left (OS)**
- **Optional:** K1, K2

**Enter Data and Calculate**

<table>
<thead>
<tr>
<th>Doctor Name</th>
<th>Fram</th>
<th>Patient Name</th>
<th>JG</th>
<th>Patient ID</th>
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<table>
<thead>
<tr>
<th>Power IOL (Implanted)</th>
<th>Toric</th>
<th>Axis</th>
<th>Post Op Refraction: Sphere</th>
<th>Cyl</th>
<th>Axis</th>
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<th>Toric</th>
<th>Axis</th>
<th>Lens Factor IOL (Implanted)</th>
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<td>(-2.0–5.0) or A Constant</td>
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<td>(112–125) Personal Constant</td>
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<th>Lens Factor IOL (Exchange)</th>
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<td>(-2.0–5.0) or A Constant</td>
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<td></td>
<td>(112–125) Personal Constant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Flat K**

- **(Post Op)**
- **(Pre Op)**
- **(0–60 D)**
- **(30–60 D)**

**Flat Axis**

- **(Post Op)**
- **(Pre Op)**
- **(0–180 deg.)**
- **(0–180 deg.)**

**Steep K**

- **(Post Op)**
- **(Pre Op)**
- **(0–60 D)**
- **(30–60 D)**

**Steep Axis**

- **(Post Op)**
- **(Pre Op)**
- **(0–180 deg.)**
- **(0–180 deg.)**

**Axial Length**

- **(12–38 mm)**
- **(0–180 mm)**

**Optical ACD**

- **(0.0–6.0 mm)**

**Target Refraction**

- **0**

**Incision SIA**

- **(0.0–2.0 D)**
- **(0–360 degrees)**

**Incision Location**

- **0**
- **(0–360 degrees)**

**Lens Thickness**

- **(2.0–6.0 mm)**

**WTW**

- **(8–14 mm)**

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**How to Calculate the IOL Exchange Power?**

**Short cut:**

- SE of refraction \( \times 1.2 \) for myopic
- or \( 1.5 \times \) for hyperopic

**Example:**

- IOL surprise with 21.5
- \(-1.75 \times 1.2 = -2.1\)
- New Implant 19.5
## Know your bag to sulcus adjustment

<table>
<thead>
<tr>
<th>Power at Capsular Bag</th>
<th>Power at Ciliary Sulcus</th>
<th>Bag / Sulcus Difference</th>
<th>Subtract from Bag Power</th>
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<td>+21.00 D</td>
<td>+20.05 D</td>
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</table>

Courtesy of Warren Hill, MD
Malfunctioning PCIOLs
Secondary Femtosecond Assisted Capsulotomy

**CAPSULOTOMY**

- **Template Name:** 5.0 scanned capsule
- **Pattern:** Circular
- **Diameter:** 4.9 mm
- **Center Method:** *Pupil Maximized
- **Incision Status, Capsulotomy:** Treated
- **Incision Depth:** 400 μm
- **Horizontal Spot Spacing:** 5 μm
- **Vertical Spot Spacing:** 15 μm
- **Pulse Energy:** 4.0 μJ
- **Total Energy, Capsulotomy:** 0.3 J
Have you met this patient?
Recent Literature

New preventative approach for negative dysphotopsia
Bonnie A. Henderson, MD, David Hyrangan Y, MD, John B. Constantine, MD, Ivayla I. Ganeva, MD, PhD

PURPOSE: To evaluate whether positioning the intraocular lens (IOL) to decrease the entry of interoeular light would reduce the incidence of negative dysphotopsia.

SETTING: Private practice, Boston and Cummington, Massachusetts, USA.

DESIGN: Prospective randomized case study.

METHODS: Patients had cataract surgery with implantation of either a silicone IOL, inferotemporally or vertically (randomly assigned) or a 1-piece acrylic IOL with the optic haptic portion inferotemporally or vertically (randomly assigned). Other patients received an acrylic IOL inferotemporally and inferovertically without randomization. Patients were asked about negative dysphotopsia symptoms postoperatively. Data were analyzed using the t test and a chi-square test for assessing the difference of negative dysphotopsia between the 3 groups.

RESULTS: The study comprised 385 subjects (445 eyes). A silicone IOL was included inferotemporally in 39 eyes and inferovertically in 80 eyes. An acrylic IOL was implanted with the optic haptic portion inferotemporally in 135 eyes and inferovertically in 144 eyes. Forty-two eyes had bilateral inferotemporal implantation of an acrylic IOL. For the acrylic IOL, on the first postoperative day, the incidence of negative dysphotopsia was smaller for the inferotemporal IOL, relative to a 39% rate in the control group (42%, P = .31). The use of posterior negative dysphotopsia increased in both groups over time, and the difference in rate after surgery was no longer statistically significant. The negative dysphotopsia rate for the silicone IOL was 13%.

CONCLUSIONS: Positioning the optic-haptic portion of an acrylic IOL inferotemporally resulted in a 2.3-fold decrease in the incidence of negative dysphotopsia after cataract surgery. When implanted in the vertical position, acrylic IOLs seemed to lead to a higher incidence of negative dysphotopsia than silicone IOLs.

- 2.3 X decrease in ND with inferotemporal placement of haptic
- Not significant after 1 mo
- No ND with silicone IOL

- Implicates nasal capsule overlap
- Large Angle kappa
- Small pupil
- Equi-Biconvex IOL
- IOL material, edge, etc
Surgical management of negative dysphotopsia

Samuel Masket, MD, Nicole R. Frana, MD, Andrew Cho, BS, Isaac Park, BA, Don Pham, BS

Purpose: To evaluate curative and preventative surgical strategies for negative dysphotopsia.

Setting: Private practice, Los Angeles, California, USA

Design: Retrospective case series.

Methods: Patients with self-reported chronic negative dysphotopsia had corrective surgery as the therapeutic group. Second eye surgery, in cases with negative dysphotopsia in the previously operated eye, comprised the preventative group. Chronologically, several surgical strategies were used, including bag-to-bag intraocular lens (IOL) exchange, reducing posterior chamber depth, piggyback secondary IOL placement, bag-to-salutary IOL exchange, and reverse optic capture. The primary outcome measure was improvement of negative dysphotopsia by 3 months postoperatively.

Results: The therapeutic group comprised 40 eyes of 37 patients; 75.6% of curative IOLs were acrylic and 23.4% were silicone and all were bag-treated. There were 21 eyes in the preventative group of which 11 were second eyes from the therapeutic group; the remaining 10 did not require surgery for the symptomatic eye. Successful outcomes for each surgical strategy were as follows: bag-to-bag IOL exchange (3/3), a reduction in posterior chamber depth with iris suture fixation of the bag-in-lens complex (8/11), piggyback secondary IOL (8/11), secondary reverse optic capture (7/7), anterior sulcus posterior chamber IOL exchange (1/1), and primary reverse optic capture (2/2).

Conclusions: Negative dysphotopsia was associated with acrylic or silicone IOLs of either square- or round-edge design. Negative dysphotopsia was reduced, eliminated, or prevented when the IOL optic overlaid the anterior capsule rather than when the capsule edge overlaid the optic. Bag-to-salutary IOL exchange and reverse optic capture were highly successful in managing or preventing negative dysphotopsia.

J Cataract Refract Surg 2018; 44:5-16 © 2018 Published by Elsevier Inc. on behalf of ASCRS and ESCRS.
Positive and Negative Dysphotopsia
Patient with ND and PD
Anterior/Reverse Optic Capture
Treatment: Malfunctioning PCIOLs

- **Multifocal PCIOLs**
  - Removal and Replacement with monofocal

- **Positive Dysphotopsia**
  - Pharmacological treatment
  - Removal and replacement for different IOL material

- **Negative Dysphotopsia**
  - Reverse (anterior) optic capture
  - Sulcus placed IOL
Malpositioned PCIOLs
Malpositioned 3-Piece IOL
How to Avoid An Oval Pupil
Double Needle Iris Fixation

ASCRS Film Festival 2015
John Hart, MD
Bloomfield Hills, Michigan
Iris Suture Fixation Pearls

- Clear corneal incision 3.5-4mm
- Fold 3 piece IOL at 3 and 9 o’clock: bucket handle delivery
- Intracameral pharmacological control of pupil size
- Start with McCannel Suture technique
- Suture retrieval: present suture to yourself with additional hook if there is peripheral corneal edema
- Push down on the optic rather than rotating while placing optic behind the iris
Iris Suture Fixation: Check list

- 10-0 polypropylene PC7 needle (Alcon) or 10-0 polypropylene CIF-4 needle (Ethicon)
- Bonn microhooks (FST; No. 10031-13), Kuglen hook or Condon Snare
- Dispersive viscoelastic
- McCannel suture technique
- Siepser suture technique
Lasso Hoffman Pockets
Hoffman Pocket Pearls

- Mark pockets 180 degrees apart
  - Avoid 3 and 9 o’clock if possible
- 300 micron grooved incision; stay 1mm in clear cornea to avoid dellen post-op
- Dissect corneal scleral pocket with crescent blade approximately 2.5x 2.5mm
- Mark boarders of pocket; check with spatula prior to sclerotomies
- Phenylephrine in the pocket to assist with hemostasis
Caution: Extrusion of Gore-Tex through Hoffman Pocket
Large Incision SSF: Checklist

- Crescent blade
- Gore-Tex CV8 thread, Ttc-9 needle (off-label use; W. L. Gore & Associates, Inc.)
- Anterior chamber maintainer 23 gauge
- 23 gauge MVR blade
- 25 gauge Grieshaber MAXGrip(TM) retina forceps (Alcon)
- 23 and 25 gauge microforceps (MST)
- CZ70BD (ALCON)
Pearls: Pars Plana Basket Suture

- Bend 10-0 polypropylene needle 30 degrees, 3-4mm from the needle tip
- Place all entries 3mm posterior to the limbus and 3mm apart
- Do not retrieve the 10-0 polypropylene needle until you “feel” you are docked

Masket, S, Fram, N. Safety basket Suture for Management of malpositioned PCIOLs. JCRS 2013
Everyone wants to do the latest craze...
Yamane technique: Flanged PCIOL
Practice Practice Practice: SimulEye
IOL exchange: Yamane
57 y/o male with a subluxed PCIOL

- Pre op
  - UCVA CF @ 2ft
- Surgery: IOL exchange
  - Intrascleral haptic fixation EC3-PAL
    - POD# 1
      - UCVA 20/25
    - POW#2
      - UCVA 20/200
- BCVA: +0.75 -2.25 x 080 (20/20)
What the #!!!##!!! Happened?
Ultrasound Biomicroscopy

- IOL centered 6 o'clock
- IOL tilted 3 o'clock

This is still two point fixation

Need to know how to reposition/remove!
Repositioning the ISHF IOL
When repositioning internally...

Cut the haptic/flange on a bevel
Re-Centering the ISHF IOL
Yamane Technique Checklist

- Toric/scleral marker
- AC maintainer or posterior infusion
- TSK Ultra Thin Wall Needle (Delasco)
- IOL with durable haptics
  - EC-3 (PVDF -polyvinylidene haptics)
  - ZA9003 (PMMA haptics)
- Low temp cautery

https://www.delasco.com/pcat/1/Sharps/30_Gauge_Dispose/3012UTW/
Opacification of hydrophilic acrylic IOLs with air or gas

***Caution in eyes that may need gas or multiple air injections; IOL opacification has been reported (Werner, L et al 2013)
*** Terveen et al (2015) 2/26 combined cases with gas opacified

Picture c/o Brandon Ayres, MD

Treatment: Malpositioned PCIOLs

Single piece acrylic IOL

- Sulcus
  - Removal and Replacement
    - ISF 3-piece IOL sulcus
    - Intrascleral fixation

- In the bag
  - Lasso scleral suture fixation (SSF)

Three-piece IOL

- Sulcus

- In the bag
  - Capsular support
    - Yes
      - optic capture or ISF
    - No
      - Removal and Replacement CZ70BD SSF or Intrascleral fixation
Thank you!

Email: nicfram@yahoo.com
Summary:
IOL Fixation Algorithm

- Can I use the capsule bag?
  - Optic capture (anterior or posterior)
  - Reverse Optic Capture
    - Best with intact zonules
    - Posterior optic capture

- Can I use the iris/sulcus?
  - Iris suture fixation
  - Avoid with significant iridodonesis or iris atrophy

- Can I use the sclera?
  - Suture fixation
  - Intrasceral Fixation
    - Consider when there is no capsule support