

0.9 mm (20G) Incision?

Notches & Flanges
No Helical Loops/ Scrolls

**Bhattacharjee Pupil Expansion Rings
20G Insertion & Removal**

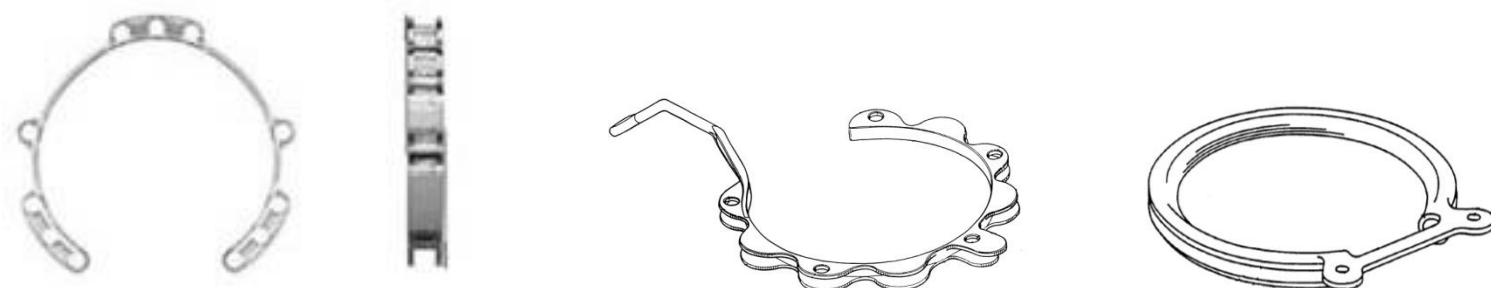
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No Financial Interest

Nayan Eye Associates
Kolkata. INDIA.
www.nayaneyassoc.com

Introduction - What we already have

- Pupil expansion rings mechanically dilate the pupil, prevent it from constricting, and restrain the iris from prolapsing.¹
- Morcher Ring, Perfect Pupil and the Graether ring
 - Difficult to position if pupil is less than 4.0 mm¹
 - If Anterior Chamber is shallow.¹



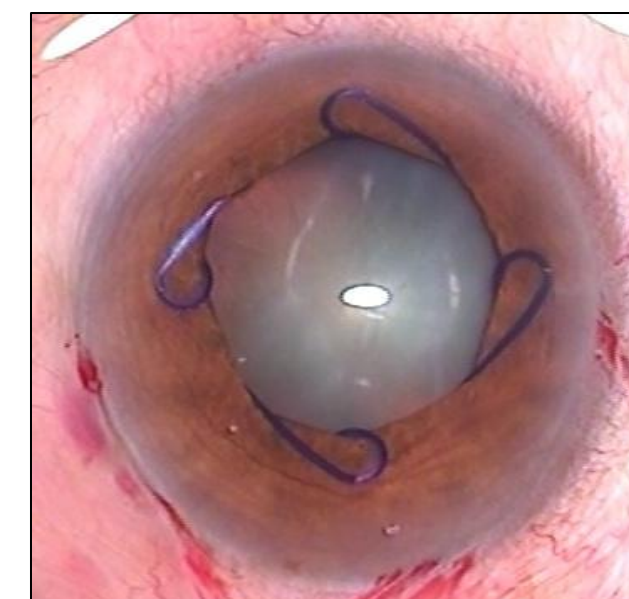
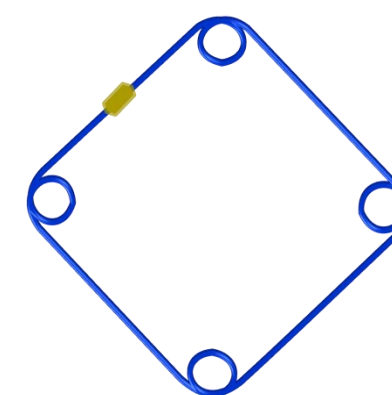
1. Chang DF, Braga-Mele R, Mamalis N et al. ASCRS White Paper: Clinical review of intraoperative floppy-iris syndrome; J Cataract Refract Surg 2008; 34:2153–2162.

The author has No Financial Interest in the products & devices mentioned in this Presentation.

Patent applications are Pending (National & PCT) for authors devices

Introduction - What we already have

- Malyugin Ring is:²
 - Highly effective in eyes with IFIS (Intraoperative Floppy Iris Syndrome),²
 - Easier & faster than iris retractors/ other Pupil expansion rings.²



1. Chang DF: Use of Malyugin pupil expansion device for intraoperative floppy-iris syndrome: Results in 30 consecutive cases. J Cataract Refract Surg 2008; 34:835–841

Introduction - Do we have what we need?

- Is the Malyugin Ring the end of the Road ??
- Does it meet all our present day needs?

Introduction – What we Need & Why ?

- Bimanual MICS (Micro Incision Cataract Surgery) – tight fluidic seal - Useful Surgical strategy in IFIS patients.⁴
- Suppression of iris prolapse in IFIS - Advantage of Bimanual and Coaxial MICS.⁵
- **Malyugin Ring** requires a **2.2 mm or larger incision**
- Coaxial MICS uses **Incisions < 2.0 mm** &
- Bimanual MICS uses **Incisions < 1.5 mm.**

4. Chang DF, Campbell JR: Intraoperative floppy iris syndrome associated with tamsulosin. J Cataract Refract Surg 2005; 31:664–673.

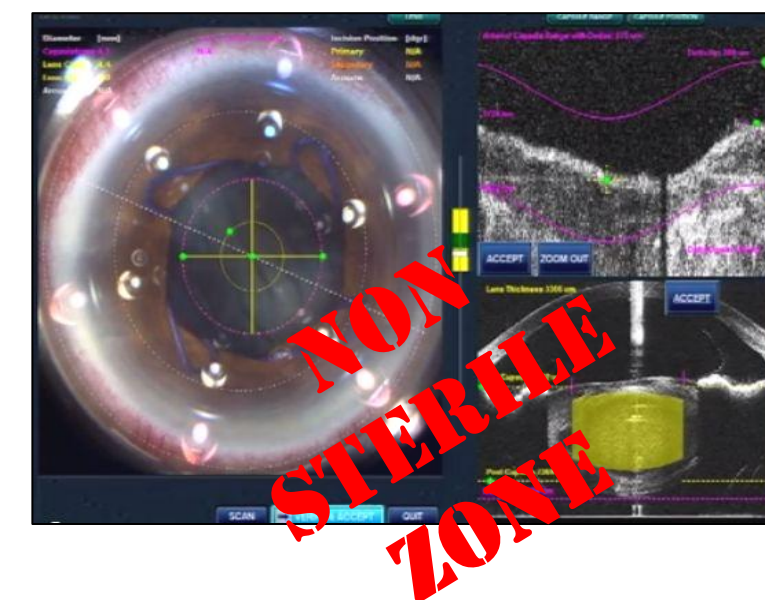
5. Moore SP, Goggin M. Intraoperative floppy-iris syndrome and microincision cataract surgery. Correspondence . J Cataract Refract Surg 2010; 36:2008.

Introduction – What we Need & Why ?

- Femtosecond Laser Assisted Small Pupil Phaco³
- A possible consequence of surgically entering the eye manually and then using the femtosecond laser - ingress of fluid into the anterior chamber - increasing the risk of endophthalmitis.³

- Malyugin Ring – Sterile Zone – 2.75 mm
- Femto Laser - Non Sterile Zone
- Phacoemulsification - Sterile Zone

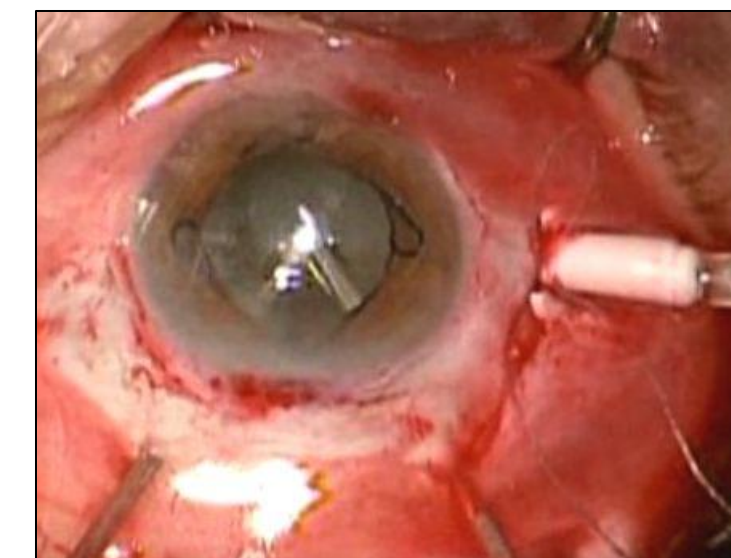
**A Ring through a Smaller incision would
Reduce the Risk of Infection!!**



3. Conrad-Hengerer I, Hengerer FH, Schultz T, Dick HB. Femtosecond laser–assisted cataract surgery in eyes with a small pupil: J Cataract Refract Surg. 2013;39:1314-1320.

Introduction – What we Need & Why ?

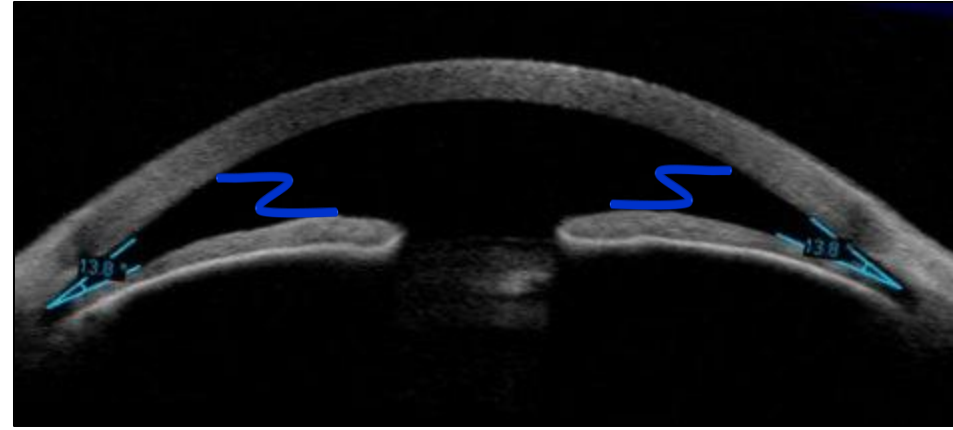
- 25G/23G/20G Small Pupil PPV⁶ (Pars Plana Vitrectomy)
- > 2.2 mm Corneal incision to insert Malyugin ring in **Undesirable & Self defeating**
- **A Smaller incision is desirable**



6. Cholevík D, Němčanský J, Mašek P. Malyugin ring in vitrectomy. In Tenth E.V.R.S. Congress - Sevilla - Spain. 2010.

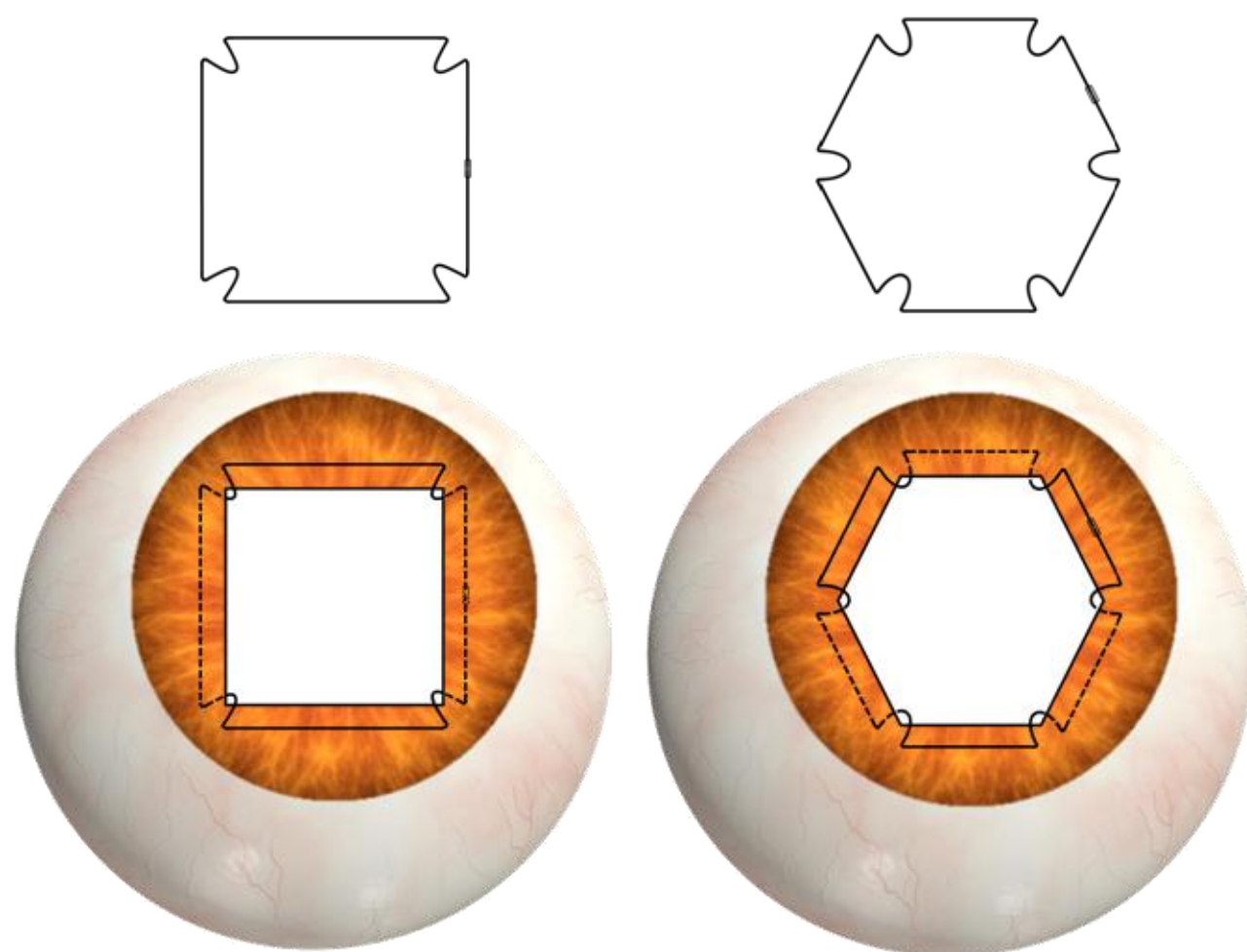
Introduction – What we Need & Why ?

- Shallow Anterior Chamber –
 - Vertical profile of the Scrolls of Malyugin ring (0.7 – 0.9 mm) - Can cause Endothelial touch



A Thinner Profile Device would be Safer !!!

Bhattacharjee Pupil Expansion Rings -Schematic

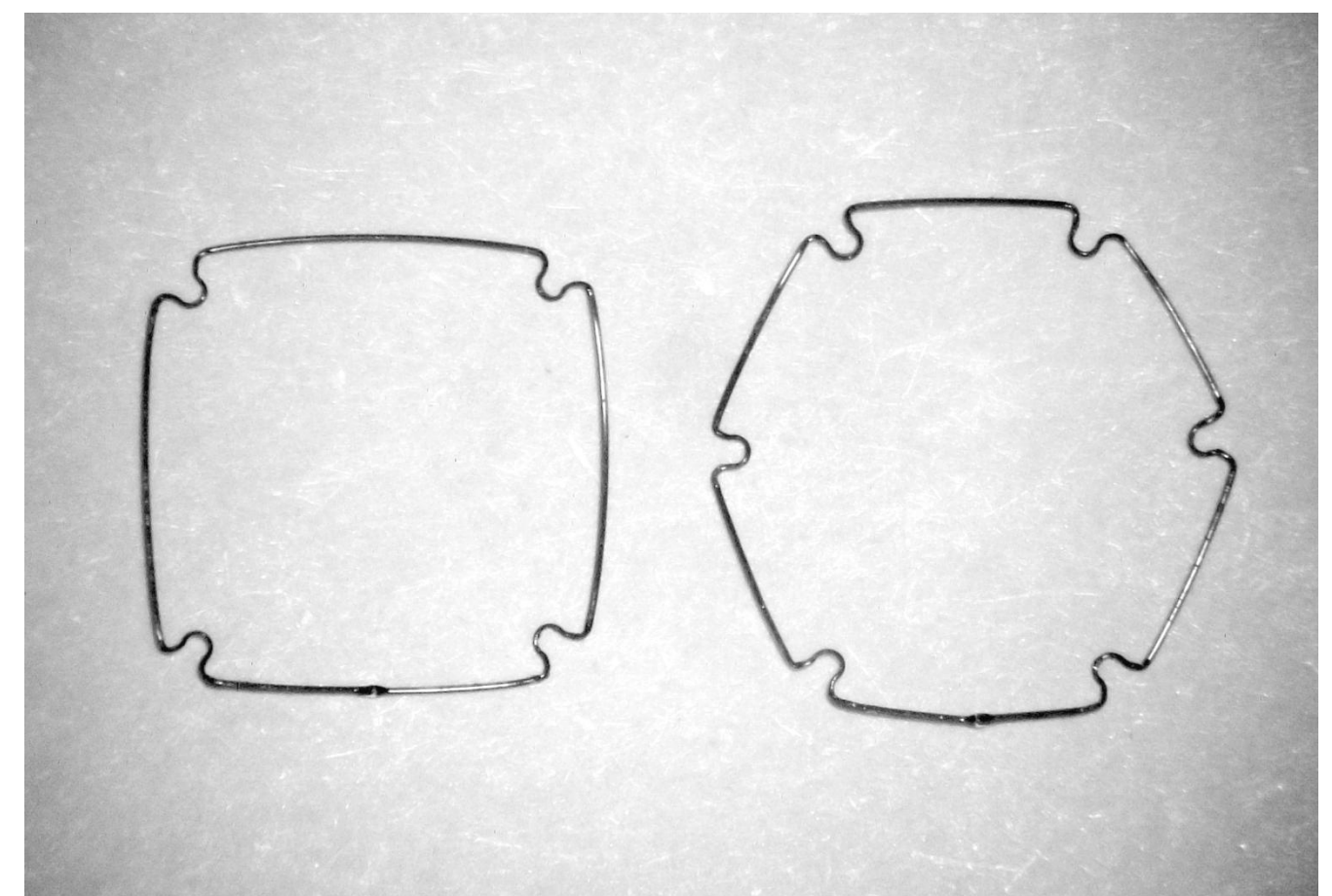


Bhattacharjee Rings - Description

Bhattacharjee Pupil Expansion Rings

- Flexible closed rings made from 5-0 black monofilament polyamide (Nylon) (Off label use, Ethilon Nylon sutures, Johnson & Johnson Ltd.)
- Ends are butt joined with glue. The joint is notably slim
- Available in Square and Hexagon shapes.
- Rings have inward **notches** at corners and **flanges** at the sides.
- The entire ring is disposed within a thin single plane.
- Alternate flanges are tucked under the iris so that the notches engage the pupillary margin at different parts, pushing them apart, resulting in sustained enlargement of the pupil
- Square device 6.5 & 7.0 mm sizes & Hexagon 6.0, 6.5 & 7.0 mm sizes.

Bhattacharjee Pupil Expansion Rings – Square & Hexagon

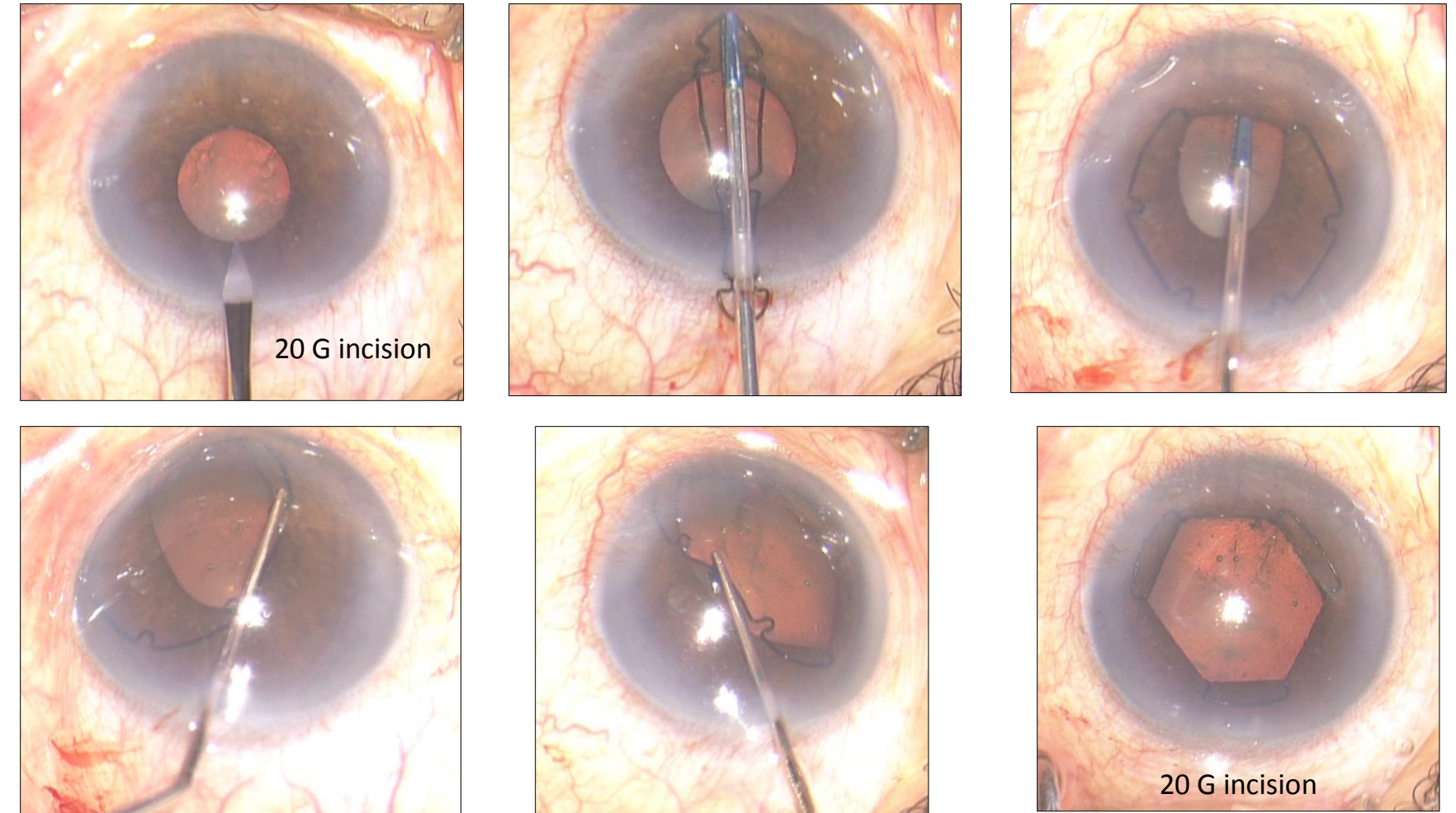


Bhattacharjee Rings - Description

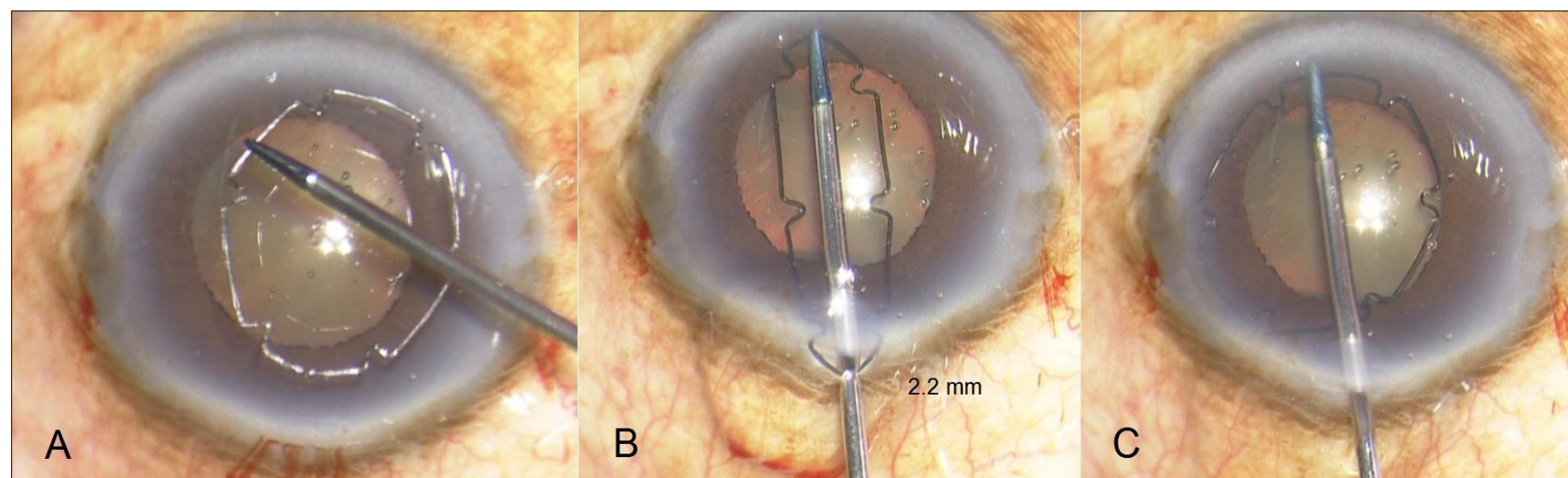
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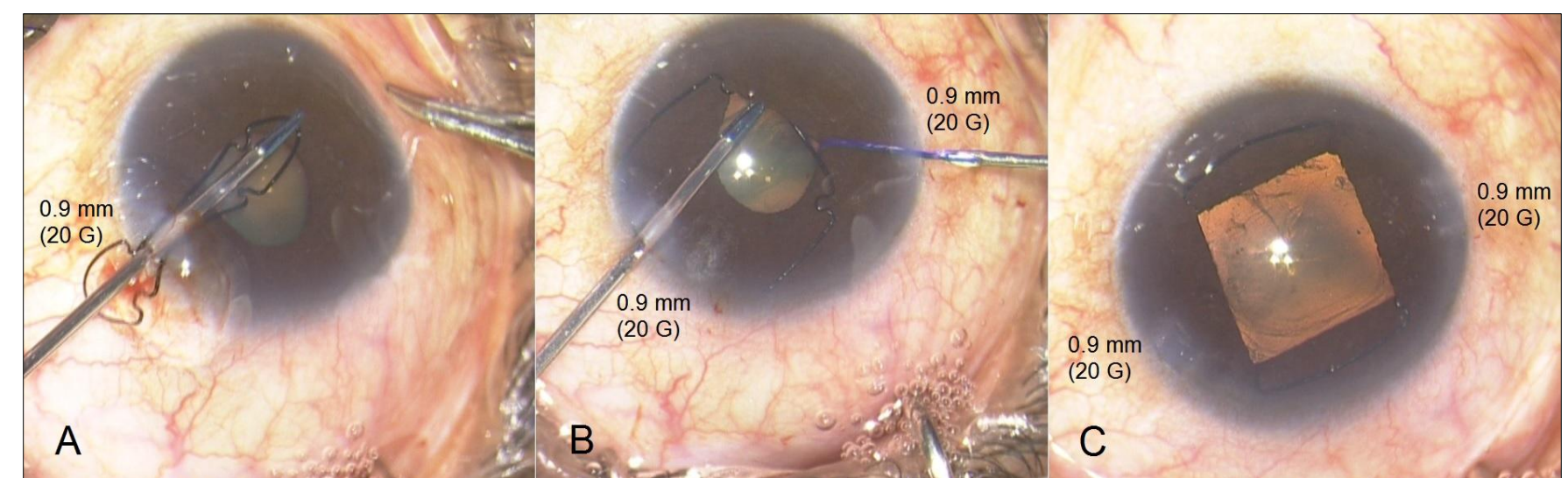
Insertion & Pupil Expansion – Single 20G Incision



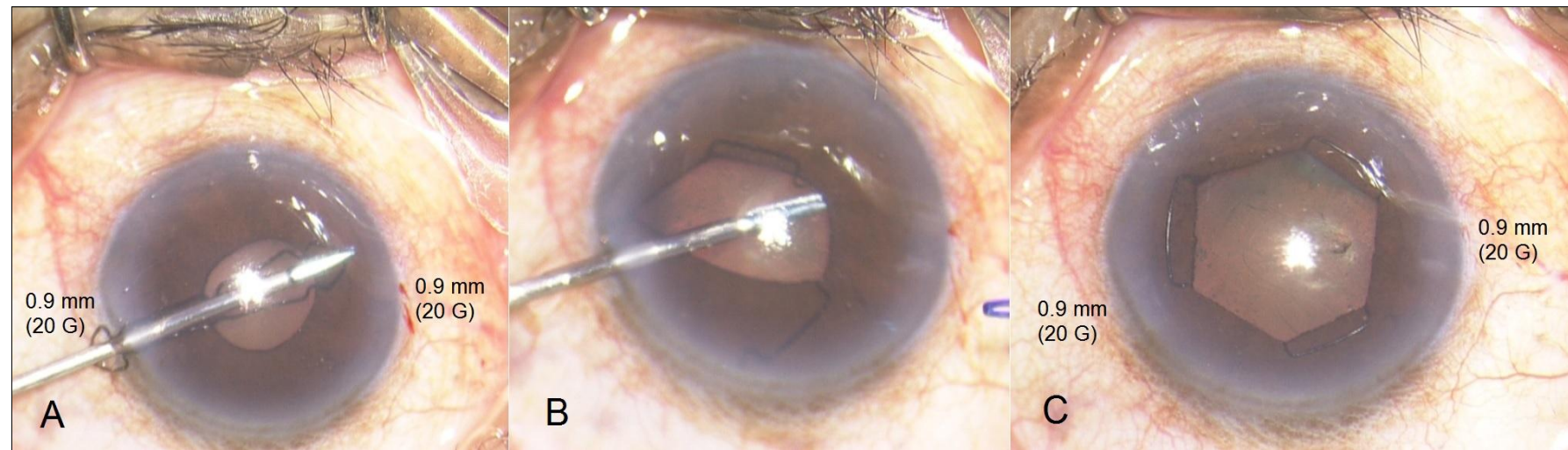
Insertion 2.2 mm Incision



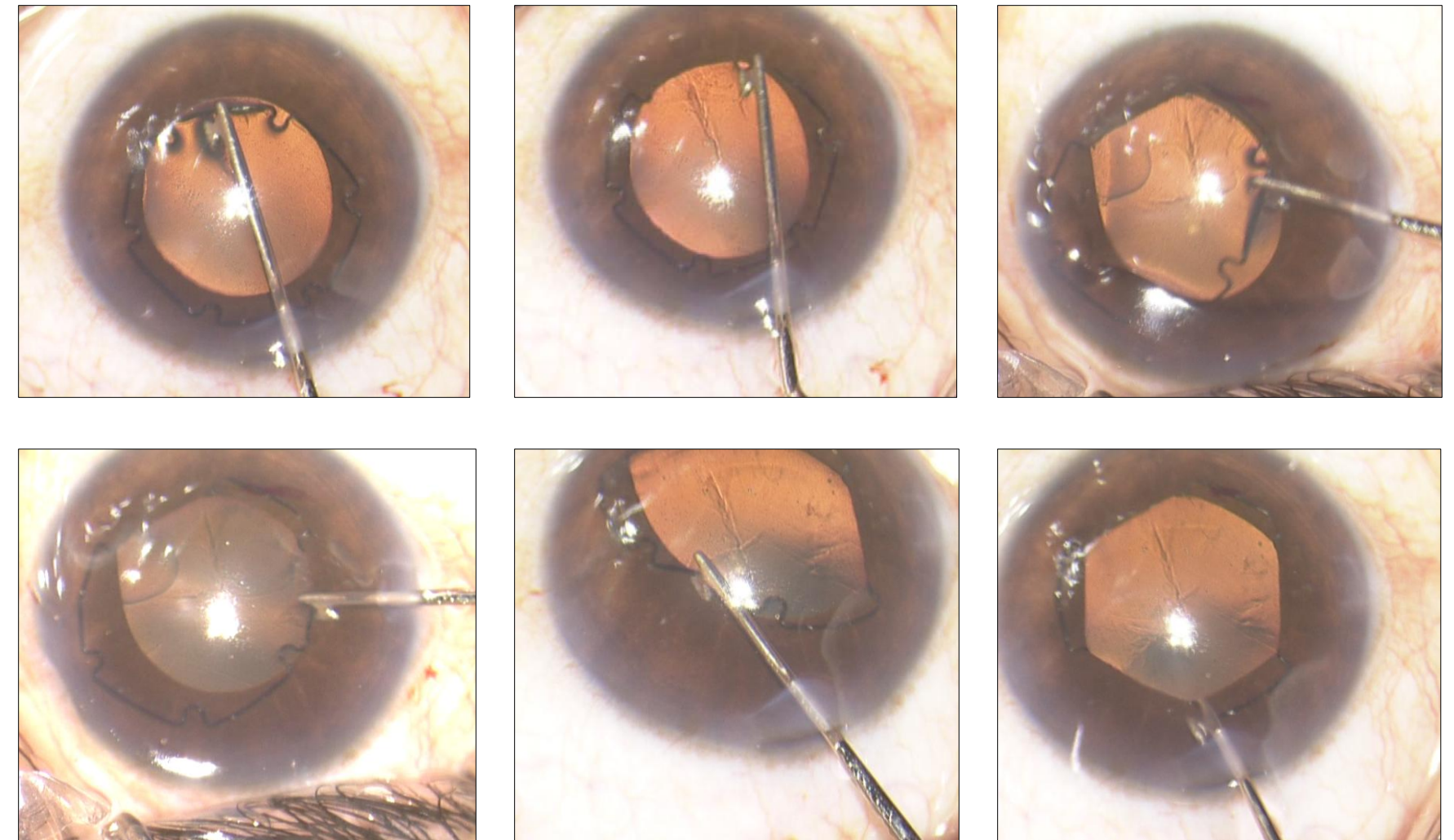
Square - Insertion & Engagement – Only Two 20G Incision



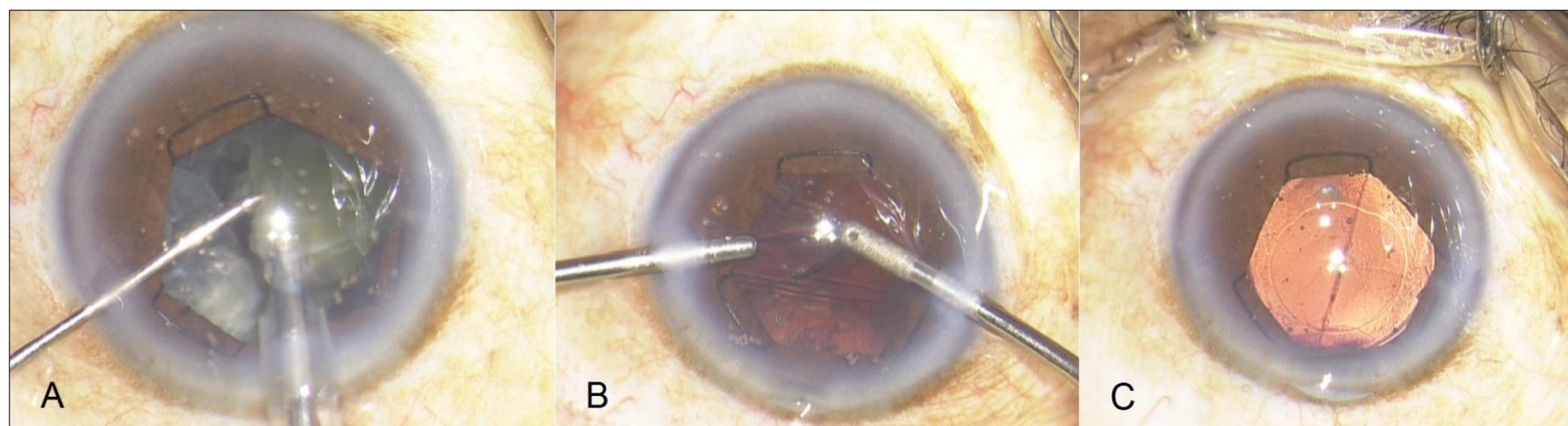
Hexagon - Insertion & Engagement – Only Two 20G Incision



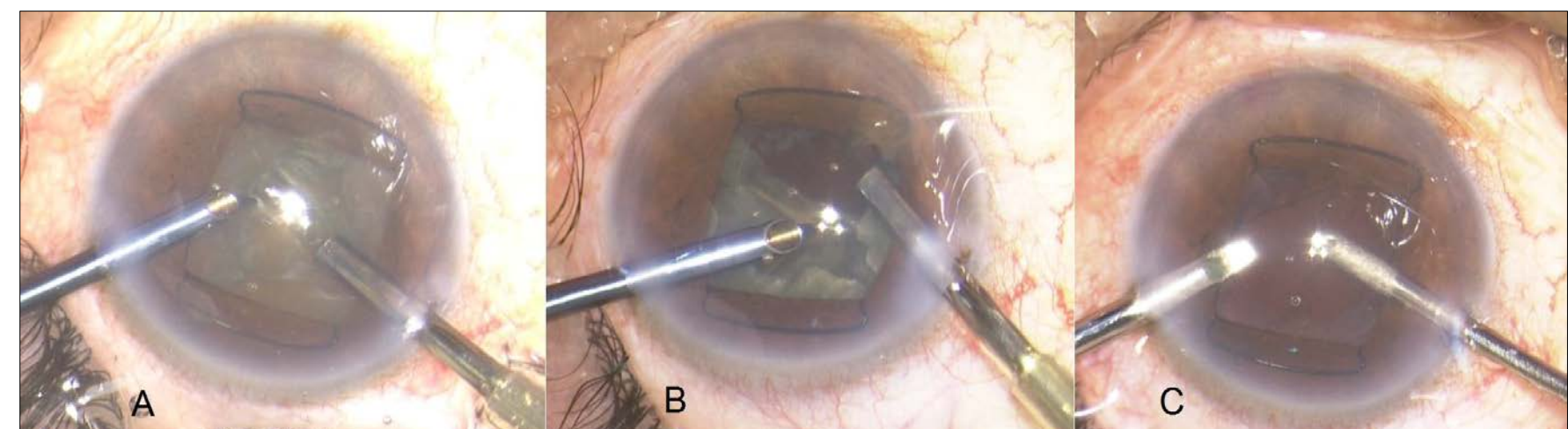
Hexagon – Unimanual Engagement – Kuglen Hook



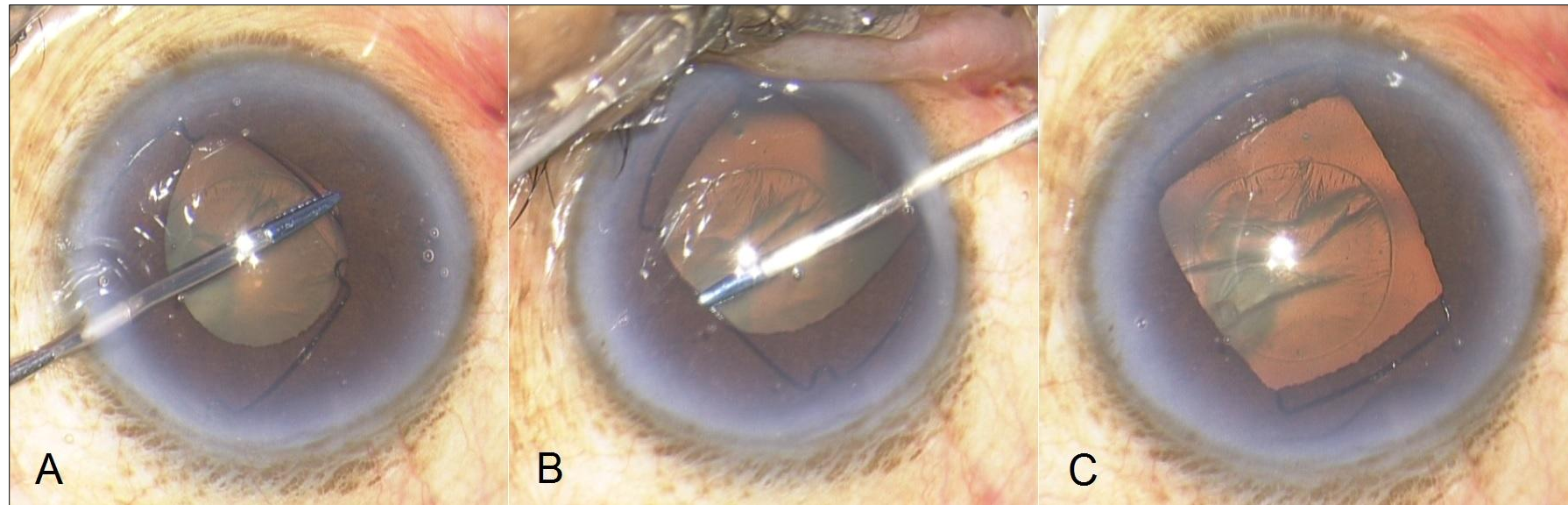
Hexagon – 2.2 mm Micro Coaxial Phaco



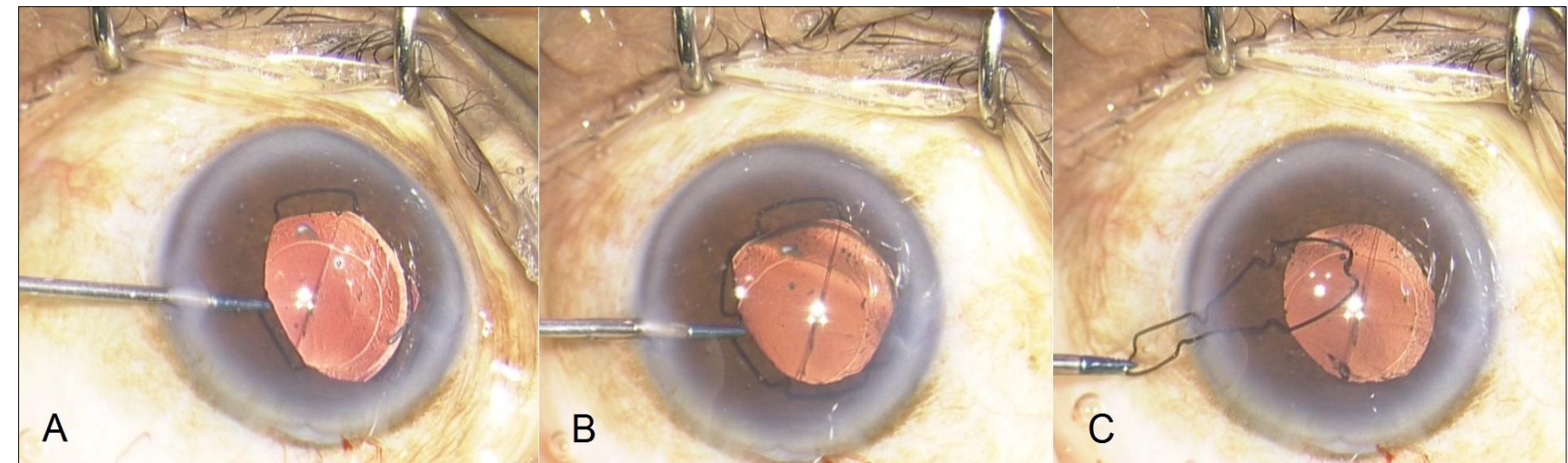
Square – 1.4 mm Bimanual MICS



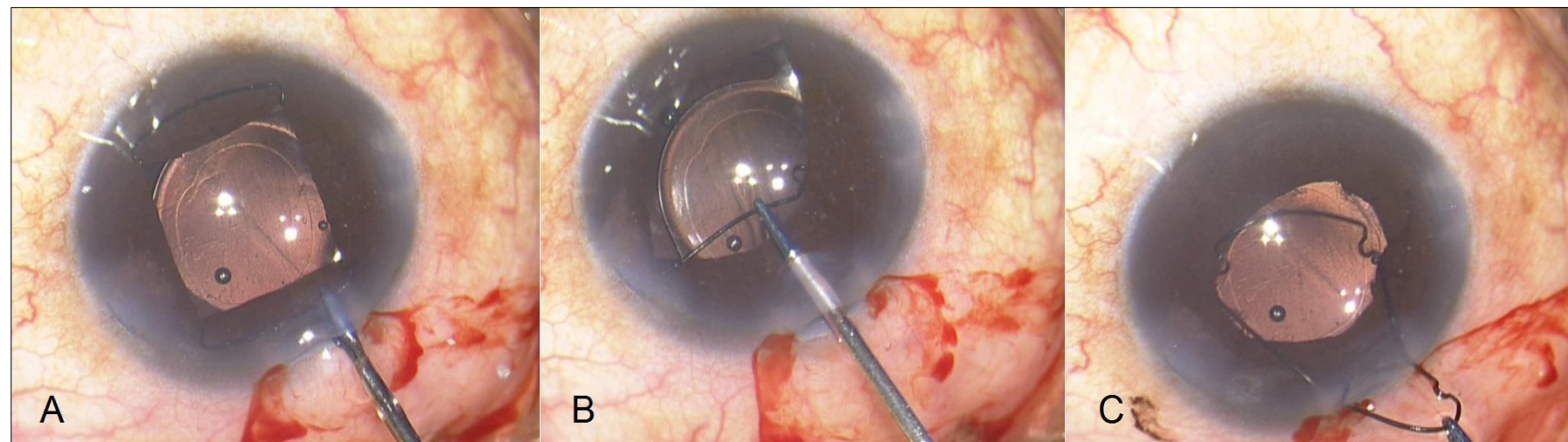
Intra Operative Miosis – Square Used Safely



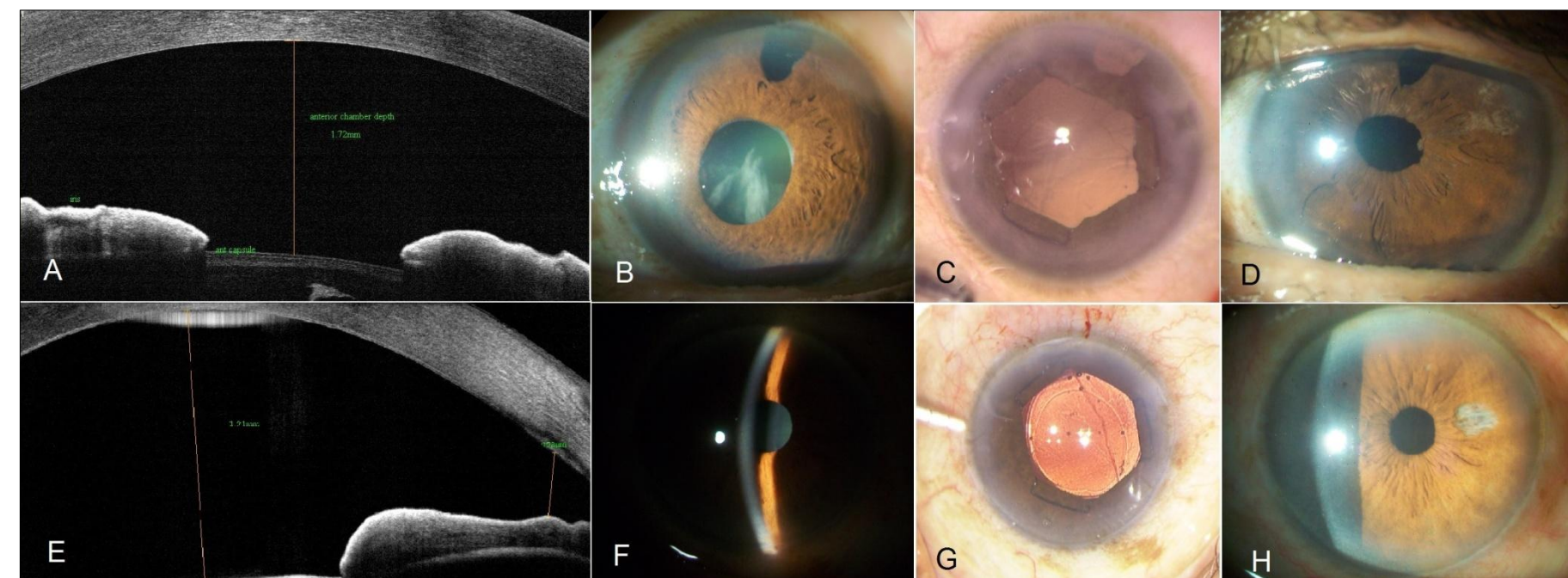
Removal – 20 G Side Port Incision



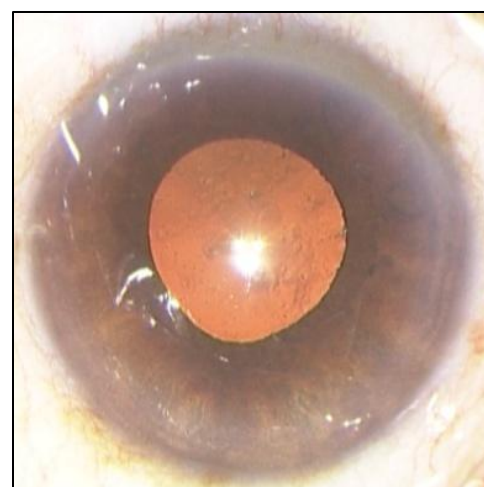
Removal – 2.8 mm Phaco Incision



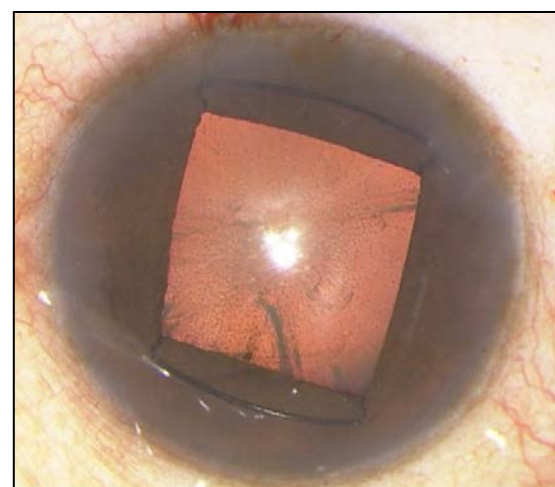
Rings used in Shallow Anterior Chamber Eyes
Eye1- ACD 1.72 mm, Eye2- ACD 1.91 mm



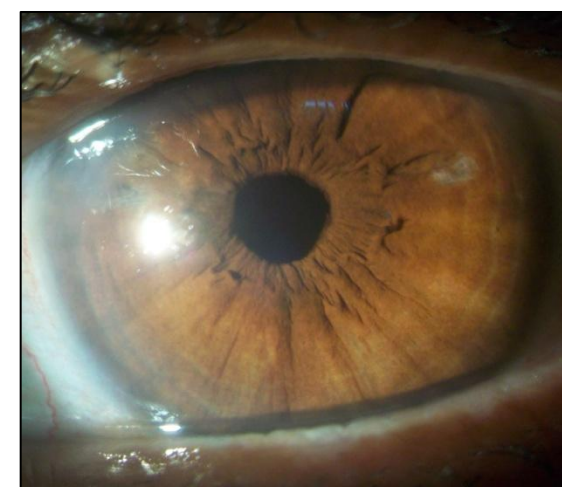
Results - Square Device



Pre Operative
(Inverted)

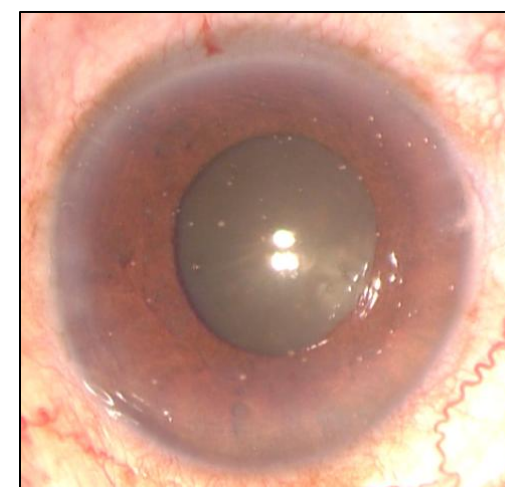


Intra Operative
(Inverted)

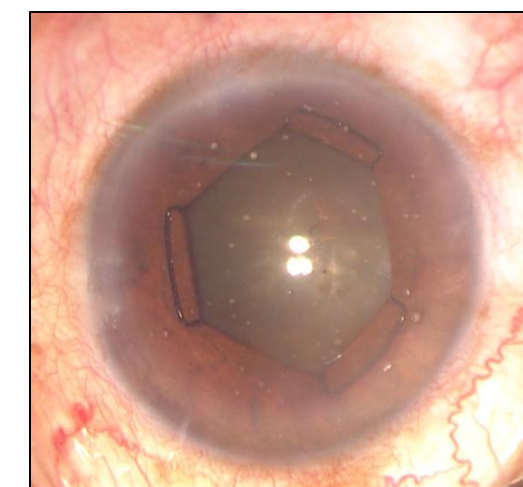


Post Op Day 7
Round Pupil

Results - Hexagon Device



Pre Operative
(Inverted)



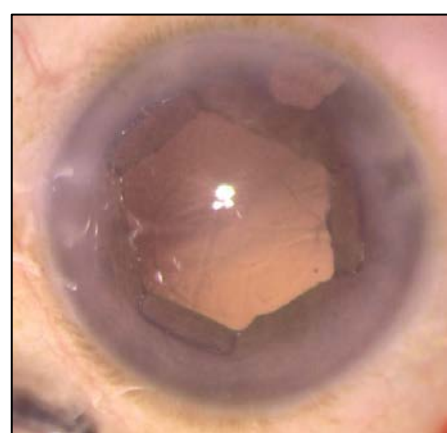
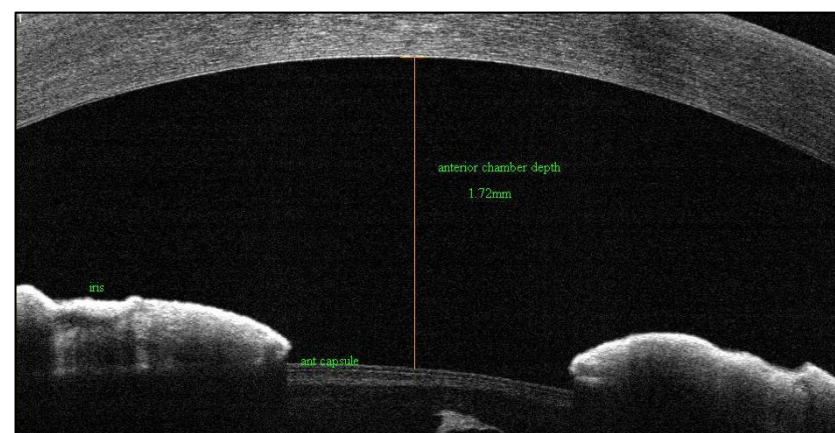
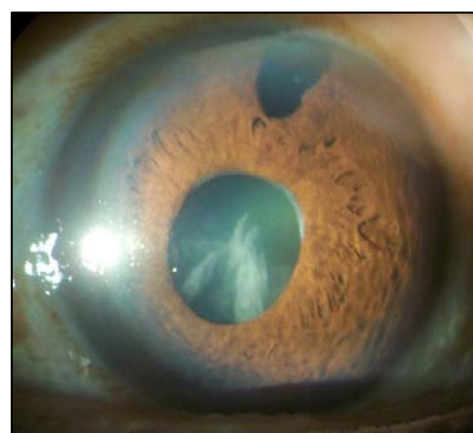
Intra Operative
(Inverted)



Post Op Day 7
Round Pupil

Results – Shallow Anterior Chamber

- **Other Eye RE: Blind** – Angle Closure Glaucoma.
- This Eye LE: Peripheral Iridectomy – 20 Yrs. Anterior Chamber Depth – **1.72 mm**



Post Op
Day 7
Unaided – 6/9

Conclusion

Bhattacharjee Rings (Square & Hexagon) :

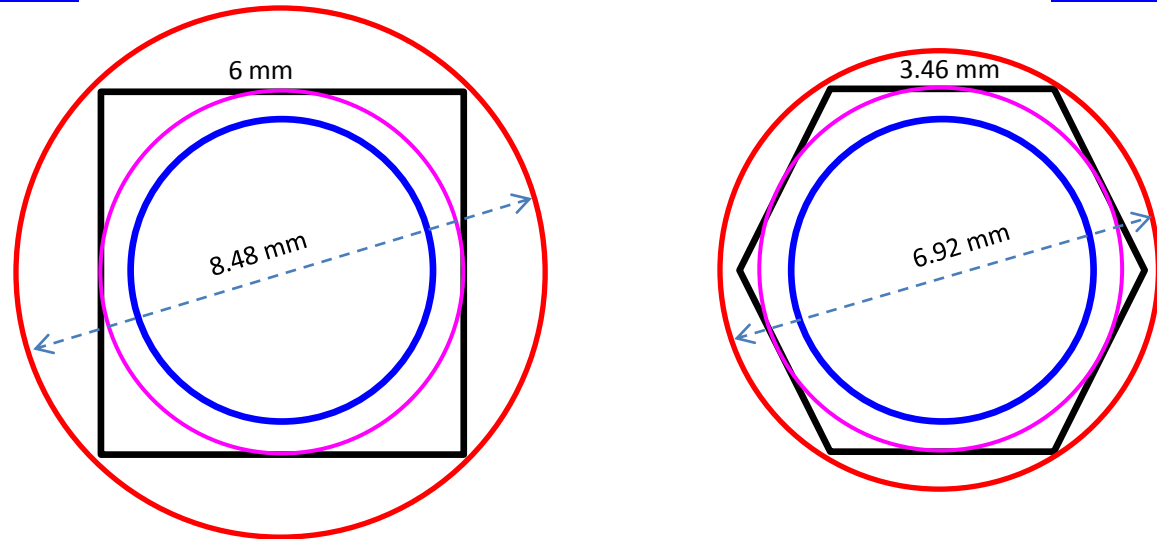
- Can be Inserted & Removed through 0.9 mm (20 G) Incisions
- Can Effectively & Safely dilate the Pupil
- Hexagon preferred–Small Eyes – Geometric Advantage
- Useful For :
 - Standard Phaco & MICS
 - Femto Small Pupil Phaco
 - Shallow Anterior Chamber
 - Small Pupil Vitrectomy (PPV)
- Injector not yet available – though not necessary

Conclusion

Square

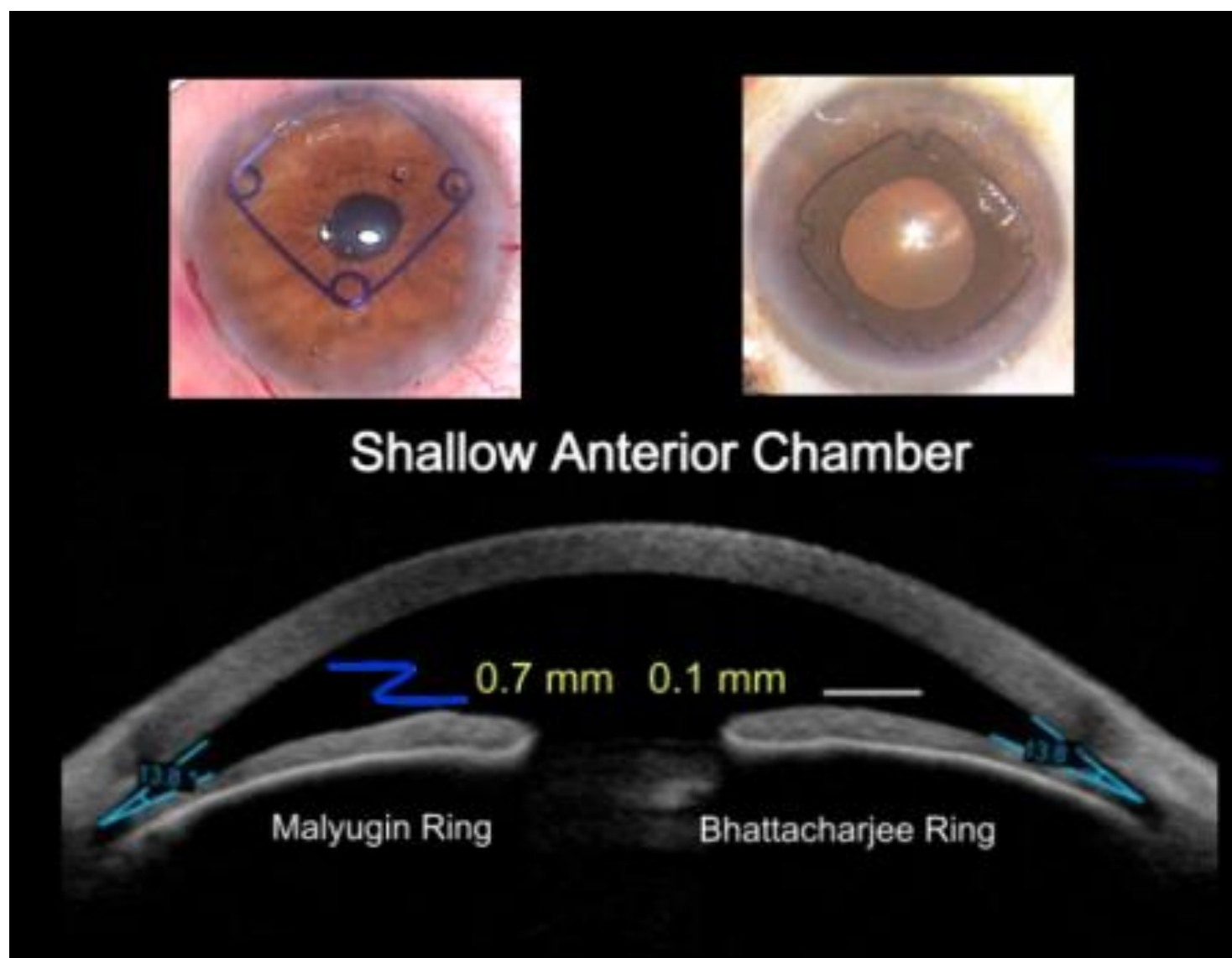
or

Hexagon ?



- For a 5 mm Capsulorhexis, an **Incircle of 6 mm** is required within the Regular Polygon shaped Pupil Dilating device. (Regular Polygon: All sides & angles equal)
- A Square with an **Incircle of 6 mm**, lies within a **8.48 mm Circumcircle**.
- A Hexagon with an **Incircle of 6 mm**, lies within a **6.92 mm Circumcircle**.
- Smaller Hexagonal device - easier to handle – less injury to Cornea, Iris & Angle.
- Smaller Hexagonal device - less stretch & damage to sphincter – Post Op Round pupil.

Conclusion



Conclusion

Property	Polypropylene	Nylon	Significance
	Malyugin	Bhattacharjee	
Floatability (in Water/ BSS)	Floats	No	PP tends to float and when disengaged may touch endothelium
Stiffness (Bend Recovery)	Good	Excellent	Nylon device regains shape better after being deformed as it passes through the incision, giving desired pupil size and shape
Flicking (springiness)	Good	Excellent	Nylon device regains shape faster after being deformed
Stiffness in Water	Excellent	Fair	Nylon (6 & 66) tends to soften a little by the end of the procedure. Removal is Easier.
Water Absorption	Poor	Fair	PP does not absorb water & does not soften.
Heat Distortion/ Deflection Temperature	60-80 °C	165 - 185°C	PP can be bent and worked upon at lower temperature
Cost	Cheaper	Costlier	A very small quantity being required to make a device, the difference is not significant.

Conclusion

Feature	Malyugin Ring	Bhattacharjee Ring
Strand Thickness	0.2 mm	0.1 mm
Design	Biplanar Snags incision & Injector Unpredictable twisting	Single Plane No snagging No twisting
Pupil engaging part	Helical coil – Scroll Torsion/Compression spring Crushes & releases unpredictably	Flat Notch Paper clip action No crushing
Usage	Side facing pupil engaging gaps in scrolls difficult to visualize from Top view	Flat notches easily visualized from Top View
Incision Size required	≥2.2 mm	≥ 0.9 mm
Single use Injector	Required	Not required
2.2 mm Std Coaxial Phaco	Yes	Yes
1.4 mm Bimanual MICS	No	Yes
Sub 2.0 mm Coaxial MICS	No	Yes
Femto Laser Assisted Cataract Surgery	2.2 – 2.75 mm incision Increased Infection risk	0.9 mm incision Reduced Infection risk
Vertical Profile	0.7 – 0.9 mm Precluded in Shallow anterior Chamber	0.1 mm Can be used in Shallow anterior Chamber

Conclusion

- Mechanical devices like [Malyugin Ring](#) incur:²
 - Additional Surgical time
 - Expense
- The [Bhattacharjee Rings](#):
 - Easier /Faster/ Safer than the Malyugin Ring
 - Simple single plane design –
 - Plastic Molding/ Stamping may be used
 - Truly continuous Ring with no joint can be manufactured
- Translating to - **Faster production- Reduced Costs – Less Financial Burden**

Thank You for your attention!

2. Chang DF: Use of Malyugin pupil expansion device for intraoperative floppy-iris syndrome: Results in 30 consecutive cases. J Cataract Refract Surg 2008; 34:835–841