

## Lenses in Glaucoma

Aditi Singh, Meena Menon

Department of Glaucoma, Sankara Eye Hospital, Bangalore, India

### Abstract

Lenses and mirrors have always been an integral part of an ophthalmologist's armamentarium. Since time immemorial curious minds have been trying to peep inside the eye using various techniques, be it indentation of the limbus and using direct ophthalmoscope as done by Trantas<sup>1</sup> or using contact lenses meant for correction of keratoconus, as done by Salzman<sup>2</sup> for viewing the anterior chamber angle. With the invention of slit lamp, microscopes and various lenses / mirrors which are much easier to handle, visualization of ocular structures have become quite easy. In glaucoma, these lenses/mirrors have come in handy for the diagnosis as well as the treatment of various conditions such as diagnosis of angle closure, performing peripheral iridotomy, laser trabeculoplasty and laser suturelysis, to name a few.

Delhi J Ophthalmol 2018;28;55-7; Doi: <http://dx.doi.org/10.7869/djo.338>

**Keywords:** glaucoma, lenses, gonioscopy

Since times immemorial, curious minds have been trying to peep inside the eye using various techniques, be it indentation of the limbus and using direct ophthalmoscope as done by Trantas<sup>1</sup> or using contact lenses meant for correction of keratoconus, as done by Salzman<sup>2</sup> for viewing the anterior chamber angle. In this article, we will be discussing in brief about the various lenses used in glaucoma but not the technique of usage per se.

### Lenses are used for:

1. Gonioscopy
2. Iridotomy
3. Trabeculoplasty
4. Laser suturelysis

### I. Gonioscopy

- a) Direct (goniolenses)
- b) Indirect (goniomirrors)

#### a) Direct (goniolenses):

1. **Koeppe**<sup>3</sup>: Prototype diagnostic goniolens in children. It is a 50 D lens which is available in different diameters (16-22.5 mm) and different posterior radii of curvature. It does not have an attached rod. Saline/viscous solution is used as a coupling medium.
2. **Swan Jacob**: Surgical goniolens in children and adults. It has got an attached rod. Vicoelastic is used as a coupling agent. Usage: goniotomy, ab interno trabeculotomy, while using trabectome<sup>4</sup>, putting i-stent or Cy Pass suprachoroidal device (Figure 1).
3. **Layden**: Used for premature infants. Has a diameter of 10.5 & 11.5.
4. **Hoskins Barkan**: It is the prototype surgical lens. There is no rod attached and is used in goniotomy.
5. **Thorpe**: Used in operating room (surgical and diagnostic lens). Has an attached rod and is dome shaped.
6. **Richardson Shaffer**: It is used for infants and is basically a small Koeppe lens.

#### b) Indirect (goniomirrors): (Figure 2, 3)

1. **Goldmann Single Mirror**: Single mirror inclined at 62°.
2. **Goldmann Three Mirror**: 3 mirrors .



Figure 1: Swan Jacob Lens

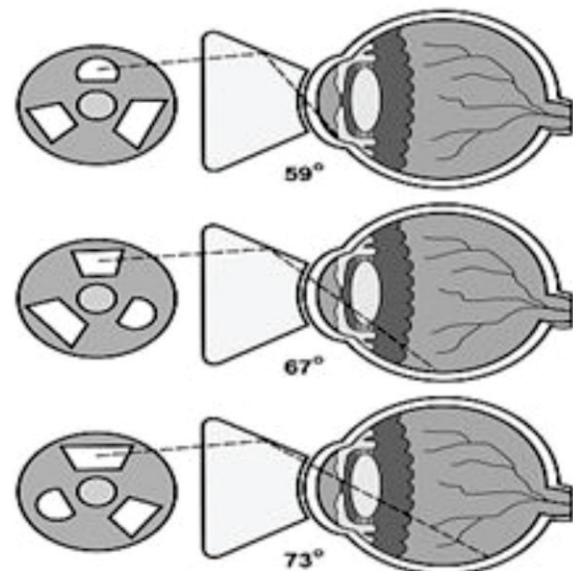


Figure 2: Goldmann 3 mirror lens



**Figure 3: Sussman Gonio Lens**

Mirror for gonioscopy is inclined at 59° and is tongue shaped

Mirror to view equator is inclined at 67° and is trapezoid  
Mirror to view parsplana is inclined at 73° and is rectangular.

3. **Zeiss Four Mirror:** It has four mirrors each inclined at 64°. Requires a holder(Unger)
4. **Posner Four mirror:** It is a modified Zeiss with attached handle.
5. **Sussmann:** Has four mirrors and is hand held Zeiss type.
6. **Ritch Trabeculoplasty Lens:** Has 2 mirrors inclined at 59° & 2 at 62°.
7. **Thorpe Four Mirror:** Has 4 mirrors inclined at 62° and it requires fluid bridge.

Comparison between Goldmann & Zeiss Gonioscopic Lens (Table 1)

Advantages & Disadvantages of Goldmann & Zeiss Lens (Table 2)

**Table 1: Comparison between Goldmann & Zeiss Gonioscopic Lens**

Type of lens	Goldmann Single mirror	Goldmann Three mirror	Zeiss four mirror
Diameter of corneal contact	12 mm	12 mm	9 mm
Overall diameter	15 mm	18 mm	9 mm
Size of rim	1.5mm	3 mm	None
Mirror angulation	62°	59°	64°
Mirror height	17 mm	12 mm	12 mm
Distance from central cornea	3 mm	7 mm	5 mm
Radius of curvature	7.4 mm	7.4 mm	7.85 mm
Coupling fluid	Required	Required	Not required
Dynamic gonioscopy	Manipulation	Manipulation	Indentation

**Table 2: Advantages & Disadvantages Of Goldmann and Zeiss Lens**

1. Needs coupling solution	Does not need
2. Coupling fluid produces suction-abrasion	No suction effect, difficult to stabilize
3. With rotation, continuous view of angles	Needs slight rotation for 360° view
4. Large diameter, small radius of curvature	Small diameter, lens can be moved over
5. Cannot be tilted with visual axis - falsely closing angles	Can be tilted without altering patient's gaze

## II. Iridotomy Lenses:

Advantages of using a lens during iridotomy:

- a) Keeps the lids separate.
- b) Acts as a heat sink , minimizes corneal burns.
- c) Controls the eye movements.
- d) Provides magnification of the target site with less loss of depth of field.
- e) Increases the power density at the iris and decreases it at the cornea.

### Commonly used lenses: (Figure 4)

**1. Abraham Lens<sup>5</sup>:** It has a 66 D planoconvex button. It doubles the laser diameter at the cornea and reduces its size to half at iris. It reduces the power at cornea to one fourth and increases the power at iris 4 times.

Other characteristics - Image magnification: 1.6 x

Laser Spot magnification : 0.63 x

Contact Diameter: 15.5 mm

Lens Height: 16.5mm

**2. Wise Lens:** It has got a 103 D optical button. At the iris, it reduces the size and increases the power.

### 3. Volk Blumenthal (Newer iridotomy lens):

- Its unique contact profile design allows indentation to open the angle and flatten the peripheral iris.



**Figure 4: Abraham Lens**

- Aspheric lens element provides superior optical quality for sharply focused laser spots.
- Improved lens performance ensures minimal 'collateral damage'; lower energy used, less iris tissue damage and less post-laser inflammation.
- Larger lens housing improves lens grip and alignment and allows more oblique viewing.
- Magnification : 1.54 x.
- Spot Size 0.65 x.

### III. Trabeculoplasty lens: (Figure 5)

These are contact lenses with a mirror which can be used for the visualisation of anterior chamber. eg. Goldmann 1 mirror / 3 mirror .

Disadvantage of this lens : Rotation is needed to view all quadrants.

This disadvantage is overcome by using – Thorpe four mirror gonioscope / Ritch trabeculoplasty lens.

Other popular lens used for trabeculoplasty : Latina lens .

**1. Ritch Lens<sup>6,7</sup>:** It has got a total of four mirrors: 2 at 59 degrees to view inferior quadrant and 2 mirrors inclined at 62 degrees to view the superior quadrant. A 17 D planocovex button is present in the mirrors.

Other characteristics: 1.4 x magnification.

Contact Diameter: 18mm

Lens Height: 23mm

**2. Latina Lens (for SLT) :** It is made of quartz and has a single mirror at 63 degree angle with 1x magnification.

**3. Thorpe four mirror gonioscope<sup>7</sup>:** Has four mirrors inclined at 62 degree.

### IV. Laser suturlysis lens: (Figure 6)

**1. Hoskins:** It has flanges. Its 120 D lens causes 1.2 x magnification. It has got a fragile neck.

**2. Blumenthal Lens:** It does not have flanges. It is particularly useful in encapsulated blebs with thick Tenon's layer. It causes two to three times magnification. Its unique pointed lens tip creates a strong compressive force to increase the



Figure 5: Ritch Lens



Figure 6: Blumenthal and Hoskin Lens

visibility of the suture and stabilize the treated area.

**3. Ritch lens:** It has got flanges. It has a slightly small viewing field. There is no magnification. It compresses tissue for easy suture visualization.

**4. Layden lens:** It has got flanges. It has a slightly small viewing field with no magnification and compresses tissue for easy suture visualization.

**5. Mandelkorn Lens:** No Flanges with 1.32 x magnification. Irradiance decreases at the level of suture by 1.7 x.

**6. Wells LS lens:** It has suture manipulator pin with larger area of viewing. Magnification of 1.2 x.

### References

1. Trantas A. Keratoglobule congenital. Soc. Imp. de med. De Constantinople a la séance du 22 Decembre 1899.
2. Alward WLM. A history of gonioscopy. *Optom Vis Sci* 2011; 88: 29-35.
3. Palmberg P. Gonioscopy in the Glaucoma. In: Ritch R, Shields MB & Krupin T eds. *The Glaucomas, I: Basic Sciences, II edition*. St. Louis: Mosby; 1996, Vol I, p455-469.
4. Samuel Boyd, Benjamin F Boyd. *New Trends in Ophthalmology: Medical and Surgical Management*: JP Medical Ltd, 30-Jul-2013.
5. *Ophthalmic Surgery and Lasers*, Vol. 27, No. 3, pp. 209-227, March 1996;
6. Sihota R. Lasers in primary open angle glaucoma. *Indian J Ophthalmol* 2011 Jan; 59 Suppl:S114-7.
7. Ashok Garg. Edition 1 : *Step by Step Minimally Invasive Glaucoma Surgery*: Jaypee Brothers, Medical Publishers, 2006

Cite This Article as: Singh A, Menon M. *Lenses in Glaucoma*

Acknowledgements: Nil

Conflict of interest: None declared

Source of Funding: Nil

Date of Submission: 10 September 2017

Date of Acceptance: 27 September 2017

### Address for correspondence

**Aditi Singh** M.S., FGRGUHS, FAICO  
Registrar, Department of Glaucoma,  
Sankara Eye Hospital, Bangalore, India  
Email id: adittisingh@gmail.com



Quick Response Code

