The most meticulous ophthalmologists will find that not more than 80% of their patients within 0.5 D of intended target refraction after perfect cataract surgery.(1) However surprise denoting extreme error dissatisfy both patients and doctors

(1)Kugelberg M, Lundström M. Factors related to the degree of success in achieving target refraction in cataract surgery; Swedish National Cataract Register study. J Cataract Refract Surg 2008; 34:1935–1939.

Catch The Cause

- Correct patient And Correct lens
- Data inserted correctly
- Formula used
- Which formula to which eye
- Special conditions (Postlasik ,Silicon)

First-generation formulas, **Sanders-Retzlaff-Kraff (SRK), used the power of the cornea and the axial length, along with the A-constant of the specific IOL, This was based on a regression study of many eyes, and for patients with average eyes, it was reasonable.**

Second-generation formula developed to manage eyes with shorter-than-average or longer-than-average axial lengths, modification was made to produce the SRK-II, the results were better but still less than ideal.

Third-generation formulae Moving from regression-based formulae to theoretical formulae helped increase accuracy because these Holladay 1, the SRK-T (T for theoretical) and the Hoffer Q. Each of these formulae estimates the position of the IOL within the eye based on the keratometry and/or axial length, These third-generation formulae have proven to be very popular because they balance good results with simplicity because the only biometric data points required are keratometry and axial length.

Fourth generation The latest formulae, the, use additional biometric parameters: the Haigis requires the anterior chamber depth, while the Holladay 2 needs that as well as the white-to-white, the lens thickness, the refraction and the age.

How do you choose which one to use for a specific patient?

*Certainly, avoid using the older regression formulae (SRK-I and SRK-II, among others) and instead third- or fourth-generation calculation.

*Holladay 1 or in most eyes.

*Hoffer Q for short eyes with an axial length less than 22 mm

* Hiagis for long eyes with an axial length equal to 26 mm or more.

US versus IOL master

The AL is the most important factor in IOL calculation: A 1-mm error in AL measurement results in a refractive error of approximately 2.88 D or about 3.0-3.5 D error of IOL power in an average eye. A mean shortening of 0.25–0.33mm can translate into an error of IOL power by approximately 1 D

The accuracy of axial length with ultrasound AL is approximately 0.10–0.12 mm compared to 0.012 mm for optical AL.

The technique of partial coherence interferometry measures the time required for infrared light to travel to the retina. This technique does not require contact with the globe.

Another advantage is usage of the visual axis since the patient is asked to fixate into the laser spot. In highly myopic or staphylomatous eyes, PCI is also superior to ultrasound in the measurement of pseudophakic and silicone oil-filled eyes.

Difficulty of use in dense cataract or other media opacities,

- **Previous refractive surgery**

corneal change as a result of refractive surgery complicates accurate keratometry, a key element of lens implant power calculation. After laser refractive surgery for myopia, this could result in overestimation of corneal power, underestimation of the IOL power required, and hyperopic outcomes after cataract surgery.

- **The instruments used by ophthalmologists to measure the corneal power (keratometers, corneal topographers) cannot obtain accurate measurements in eyes that have undergone corneal refractive surgery.**

The assumed index of refraction of the normal cornea is based on the relationship between the anterior and posterior corneal curvatures. This relationship is changed in LASIK eyes.

Most IOL power formulas use the axial length and keratometric reading (K) to predict the position of the IOL postoperatively (ELP). In post-LASIK eyes this causes an error in this prediction because the anterior chamber dimensions do not really change in these eyes with the much flatter K. In order to address this problem the double-K method was developed, which uses the pre-LASIK corneal power for the calculation of the ELP, and the post-LASIK corneal power for the calculation of the Vergence component of the formula

Management

Non surgical

IOL exchange

Corneal surgeries

Piggyback

- **Lens exchange**

-Can't guarantee second lens will be right unless you know why the first lens was wrong

-??? For small errors

- How long since original surgery ?

- **Corneal Refractive Surgery**
  - **Straightforward**
  - **Generally accepted as benign procedure**
  - **Treats astigmatism at the same time**

How Long Do You Wait?

LASIK vs. PRK

- **PRK can be done anytime**
- **LASIK – When is the incision stable?**

– Nobody knows for sure

– Marked elevation in IOP from microkeratome

– Wait at least 6 weeks and probably 3 months

– If unacceptable to patient then PRK

Piggyback

- Straightforward
- very accurate
- very short duration
- Same surgeon and same place

Hindawi Publishing Corporation
Journal of Ophthalmology
Volume **2016**, Article ID 4505812, 5 pages http://dx.doi.org/10.1155/2016/4505812
Clinical Study

Refractive Results: Safety and Efficacy of Secondary Piggyback Sensar*f* AR40 Intraocular Lens Implantation to Correct Pseudophakic Refractive Error

Alahmady ***Hamad Alsmman Hassan***, **Khulood** *M. Sayed, Mohammed* **ElAgooz**, *and Ashraf Mostafa* **Elhawary**

Department of Ophthalmology, **Sohag** Faculty of Medicine, **Sohag** University, **Sohag** 82511, **Egypt**

Correspondence should be addressed to Alahmady Hamad Alsmman Hassan; alahmady20@yahoo.com Received 17 February 2016; Accepted 10 May 2016

Academic Editor: **Edward Manche**

Piggyback IOL Calculation

Nichamin Nomogram for Sulcus IOL

- Minus power = 1:1
- Plus power = 1:1.5

Piggyback IOL Choices

AMO Sensar

- **Acrylic**
- **6.0 mm optic**
- **13.0 mm overall length**
- **OptiEdge (rounded front)**
  - **↓ Pigment dispersion**
- **-10.0 to +30.0 (half-diopter steps)**

Staar AQ 2010 and AQ5010

Thin Optic Edges

- **Silicone**
- **6.3 mm optic (larger optic = ↓ iris capture**
- **AQ2010**

13.5 mm length

+5 to +9 D (whole D steps)

+9.5 to 30 D (half D steps)

- **AQ5010**

14 mm length

-4 to + 4 D (whole D steps)

Raynor Sulcoflex

- **Designed for sulcus placement**
- **Hydrophilic acrylic**
- **6.5 mm aspheric optic**

Not FDA Approved

- **Posterior concave**

surface avoids physical contact between IOLs

- **Undulating haptics with posterior 10° angulation**

– Reduced risk of Pigment Dispersion Syndrome

– Rotational stability

How Long Do You Wait?

Ideally as long as possible to allow healing to be completed

– Refractive stability usually achieved by 2 weeks

but can be longer