

# Cataract Post RK

## The problems – The solutions

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Radial Keratotomy (RK) was a popular refractive surgical procedure to correct myopia in the 1980s before the advent of excimer laser for refractive treatment.



Today, these patients are at least 30 years older and some of them have developed cataract.

# The problems

- Biometry after RK is fundamentally different.
- The problem is in the keratometric measurement.



# Effect of RK on corneal shape

- RKs result in corneal flattening in the center and corneal steepening, or bulging, in the periphery.
- The more the cuts the more the effect (4, 8, 16)
- The smaller the optical zone the more the effect



## Stability of the RK

- In some eyes, this central flattening progressed with time resulting in hyperopic shifts and also progressive against-the-rule astigmatism\*

\*Holladay JT, Lynn M, Waring GO, et al. The relationship of visual acuity, refractive error and pupil size after radial keratotomy. Arch Ophthalmol 1991;109:70-76.

## Problem I

### Measurement of Central Corneal Power

#### 1- Manual Keratometry:

- \* Measures at 3.2 mm optical zone missing the central flatter zone of effective corneal power.
- \* The available instruments, such as the Javal-Schiotz keratometer, make too many assumptions, not taking into account irregular corneal astigmatism.



**Least accurate  
method in RK cases.**



# Problem 1

## Measurement of Central Corneal Power

### 2- Automated Keratometry:



- \* More accurate than manual keratometers in corneas with small optical zone ( $\leq 3$  mm) RKs, because they sample a smaller central area of the cornea (2.6 mm).
- \* It almost always gives a central corneal power that is greater than the true refractive power of the cornea.
- \* This error occurs because the samples at 2.6 mm are very close to the paracentral knee of the RK.

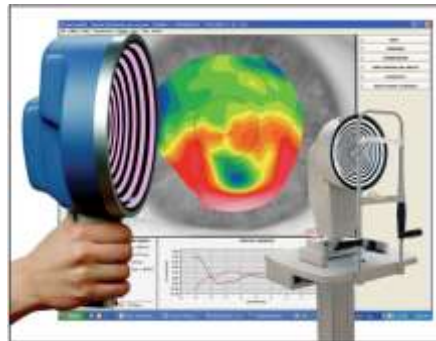
# Problem 1

## Measurement of Central Corneal Power

### 3- Topography:

A simulated keratometry (simK) value is determined based on the power of Placido mires 7, 8 and 9 of the videokeratoscope.

**Better than  
manual keratometry**



## Problem 1

### Measurement of central Corneal Power

#### 4- Pentacam:

- \* It measures the central 3 mm zone as the camera rotates around the visual axis of the eye. It measures net power.



## Problem 1

### Measurement of central Corneal Power

#### 5- Calculation Method:

Three parameters must be known

- \* K-readings before the RK
- \* Refraction before the RK
- \* Stabilized refraction after the RK  
(This must be measured before any myopic shift from the cataract).



## Problem I

### Measurement of central Corneal Power

#### 6- Hard Contact Lens Trial Method:

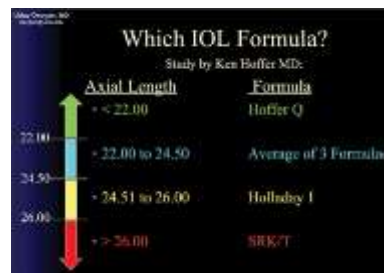
- \* It requires a plano hard contact lens with a known base curve and a patient whose cataract does not prevent refraction to approximately  $\pm 0.50$  D.



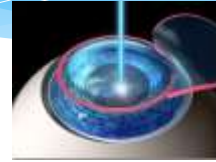
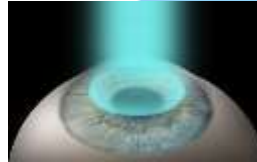
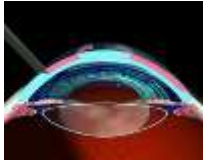
## Problem II

### Choosing the proper IOL formula

The third-generation formulas (Holladay 1, Hoffer Q, and the SRK-T) and the holladay 2 are much more accurate than previous formulas.



## Difference between RK, PRK and Lasik



RK causes relatively proportionally equal flattening of both the front and back surfaces of the cornea, leaving the refractive index unchanged.

PRK and Lasik flatten only the front surface, thereby changing refractive index calculations.

## Problem III Refractive Target



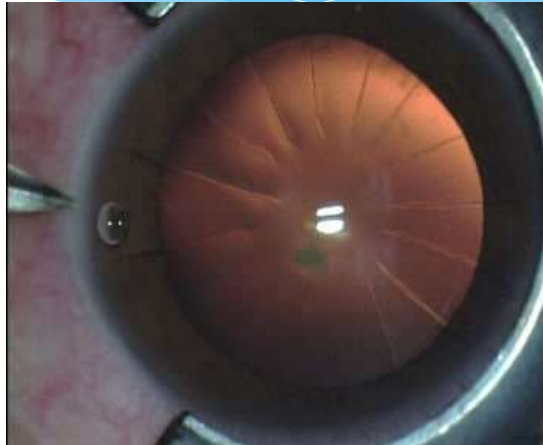
- \* The resulting errors are almost always in the hyperopic direction following keratorefractive surgery.
- \* It is safer to aim for -1.00 D or even -1.50 D of myopia.

## Problem IV

### The Surgery – The Incision

#### INCISION:

The main incision must not encroach on any of the RK scars.

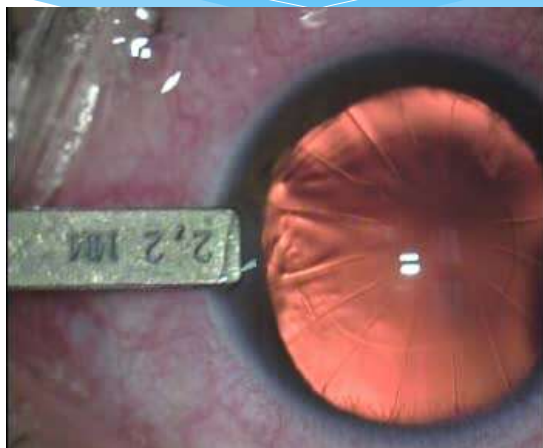


## Problem IV

### The Surgery – The Incision

#### SIZE:

Choose the minimal size of the incision through which you can comfortably perform all the surgical steps e.g. 2.2 mm instead of 2.4 .



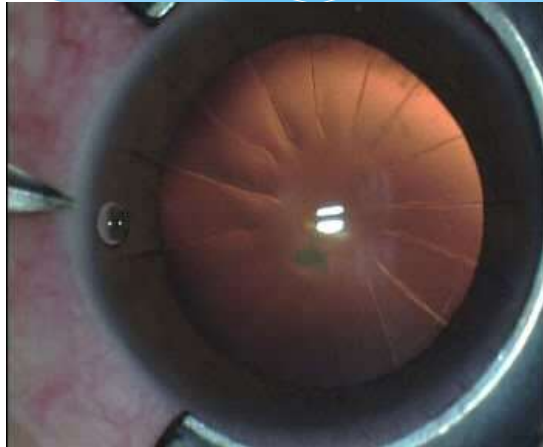


## **Problem IV**

### **The Surgery – The Incision**

#### **SITE:**

Between the 2 RK cuts and not approaching any of them to avoid splitting or leakage of any of the radial cuts.

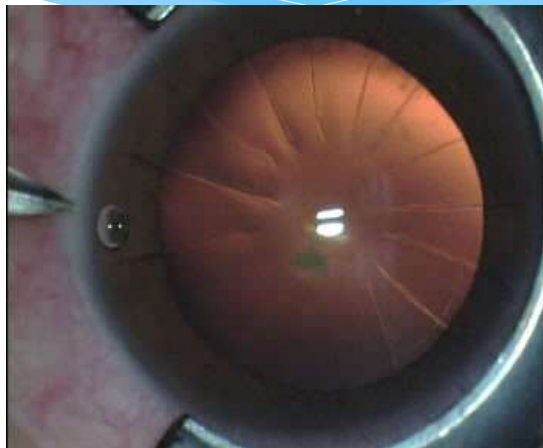


## **Problem IV**

### **The Surgery – The Incision**

#### **SITE:**

Better horizontal to account for the expected progressive against-the-rule astigmatism.

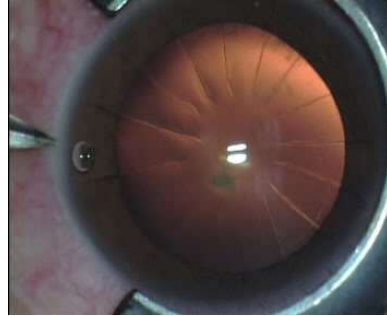


## Problem IV

### The Surgery – The Incision

#### SITE:

If no space between the cuts (16 cuts) better perform a scleral tunnel incision while taking care to avoid entry into the Ach across any radial incision.



If any RK scar is crossed by the primary incision  
→ suture it at once with 10.0 nylon or tissue glue

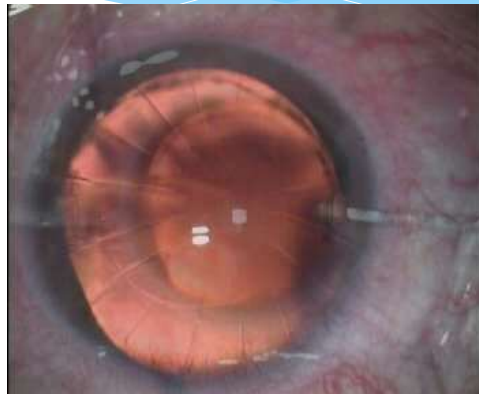


**Surgery** → routine except some visualization problems due to scarring around the RK lines



## IOL

- Do not use multifocals: the usual shape of the cornea (central flattening plus peripheral bulging: reversed asphericity) combined with the multifocal zones of the IOL can lead to halos and glare & Poor optical performance.
- Toric IOL only if we can define an axis
- Possible IOL exchange: use an IOL easier to exchange → hydrophilic.



## Postoperative Result

It can take 1 to 3 months after cataract surgery with RK for the eye to reach its final refraction.



## Conclusion

- Use Topographic or Pentacam K values
- Use 3<sup>rd</sup> generation formula
- Aim for slight myopia
- Take care of incision size and site
- Use monofocal IOL
- Wait 1 month for visual stabilization

