

# REFRACTIVE SURGERY FOR KERATOCONUS IS IT STABLE?

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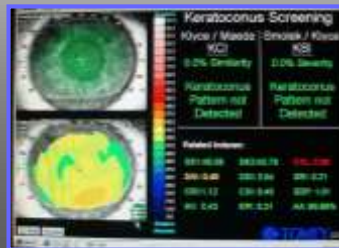
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## KERATOCONUS

### **Visual & Refractive State: Poor quality of Vision**

- **Optical correction with spectacles : Difficult & defitient**
- **Contact lenses:**
  - *May not achieve satisfactory visual result*
  - *Intolerance (high astigmatism)*

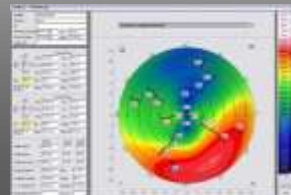
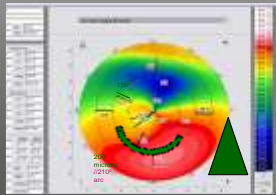
**-NEED: REFRACTIVE & STRUCTURAL SOLUTION**



## KERATOCONUS

### SURGICAL OPTIONS

- PENETRATING / LAMELLAR KERATOPLASTY
- SUPERFICIAL ABLATION (PRK): CONTROVERSY
- CORNEAL CROSS-LINKING
- INTRAESTROMAL CORNEAL RINGS: Good Results
  - Stabilize corneal ectasia (36 months) Alió J.L. Shabayek HM, Artola A JCRS 2006; 32:978-985
  - Improve quality of vision
  - Leave myopia & astigmatism Uncorrected : CONTACT LENSES



## KERATOCONUS

### REFRACTIVE & STRUCTURAL SOLUTION

#### 1st OPTION

**INTRASTROMAL RINGS  
+  
EPICAPSULAR LENSES**



## KERATOCONUS

### COMBINED STRUCTURAL & REFRACTIVE SURGERY

#### INTRASTROMAL RINGS + SPHERICAL ICL



#### INDICATIONS

BCVA  $\geq$  0,5  
Transparent Córnea  
Paquimetry  $\geq$  400  $\mu$   
AC  $\geq$  3 mm  
K < 55 D  
Refractive Stability



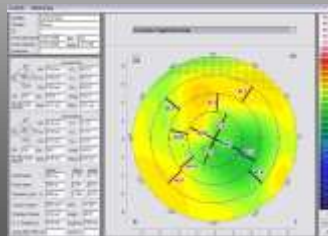
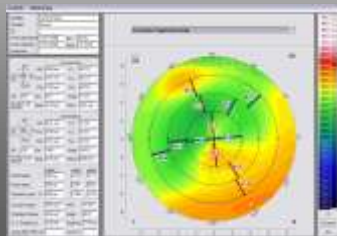
#### INTRAESTROMAL RINGS + SPHERICAL ICL + CORNEAL INCISIONS

(Arias A et al, Cirugía Combinada SECOIR 2008)

Spherical ICL vs Toric ICL?  
Refractive Stability with Corneal Rings?

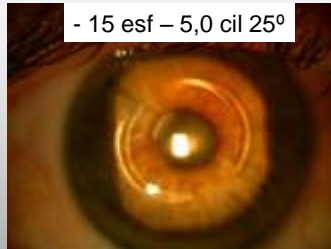
## CLINICAL CASE

### SURGICAL PLAN : INTRAESTROMAL RINGS + ICL

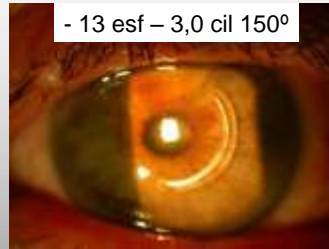


**CLINICAL CASE**

**SURGICAL PLAN : INTRAESTROMAL RINGS + ICL**



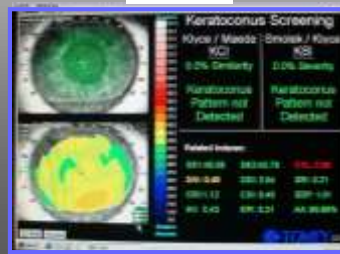
- 15 esf – 5,0 cil 25°



- 13 esf – 3,0 cil 150°

- 16 esf – 0,50 cil 120°

- 14 esf

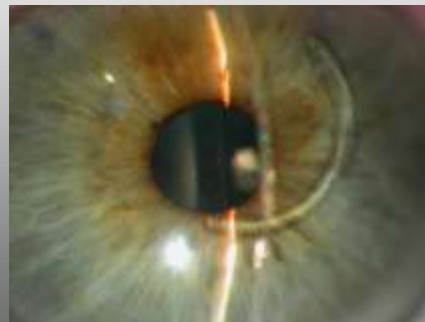


**CLINICAL CASE**

**SURGICAL PLAN : ICL IMPLANT**

**O.D. = - 21,5 D**

**O.I. = - 19,0 D**



**A.V. = 0,7**  
**+ 0,75 cil 95°**

**A.V. = 0,8**  
**neutro**

## KERATOCONUS

### COMBINED SURGERY

### INTRASTROMAL RINGS + ICL

			PREOPERATORIO				POSTOP ANILLOS			ICL	POSTOP FINAL			
Caso	Ojo	Ed ad	Sexo	esf	cil x eje	MAVC	esf	cil x eje	MAVC		esf	cil x eje	MAV SC	MAV C
1	D	36	V	-.18,0	-.7,00 x 30°	0,2	19,0	-.1,5 x 60°	0,5	-23,0	+.025	-.0,75 x 20°	0,5	0,6
2	D	38	H	-.15,5	-.3,50 x 20°	0,3	16,0	0	0,6	-20,5	-.0,25	-.0,25 x 90°	0,6	0,6
3	I	38	H	-.14,0	-.4,0 x 120°	0,2	15,0	-.0,50 x 100°	0,5	-19,5	-.0,25	0	0,6	0,6
4	D	43	V	-.15,0	-.5,00 x 25°	0,6	16,0	-.0,50 x 120°	0,6	-21,5	0	+.0,75 x 95°	0,7	0,7
5	I	43	V	-.12,0	-.3,00 x 145°	0,7	12,5	0	0,7	-19,0	0	0	0,8	0,8
6	D	39	H	-.15,5	-.6,00 x 70°	0,2	17,0	-.1,75 x 90°	0,5	-21,5	-.0,50	-.1,25 x 90°	0,4	0,7
7	I	39	H	-.10,0	-.6,00 x 110°	0,3	11,0	-.3,00 x 110°	0,6	-15,0	-.0,75	-.2,50 x 90°	0,3	0,8
8	I	40	V	12,0	-.5,0 x 85°	0,5	11,	-.3,50 x 95°	0,5	14,5	0	-.2,50 x 90°	0,4	0,7

## KERATOCONUS

### COMBINED SURGERY

### INTRAESTROMAL RINGS + ICL

			PREOPERATORIO				POSTOP ANILLOS			ICL	POSTOP FINAL			
Caso	Ojo	Ed ad	Sexo	esf	cil x eje	MAVC	esf	cil x eje	MAVC		esf	cil x eje	MAV SC	MAV C
9	D	32	V	-.14,5	-.3,00 x 50°	0,5	15,0	-.1,5 x 60°	0,5		+.025	-.0,50 x 50°	0,7	0,8
10	D	34	H	-.13,5	-.4,50 x 20°	0,3	13,0	0	0,6		-.0,25	-.0,25 x 90°	0,6	0,6
11	I	34	H	-.14,0	-.6,0 x 120°	0,2	15,0	-.0,75 x 100°	0,5		-.0,25	-.0,25 x 90°	0,6	0,6
12	D	37	V	-.15,0	-.3,75 x 125°	0,6	16,0	-.2,50 x 120°	0,6		-.0,50	-.2,0 x 195°	0,2	0,7
13	I	37	V	-.17,0	-.4,50 x 145°	0,7	18,0	-.0,75x130°	0,7		0	0	0,8	0,8
14	D	28	V	-.12,5	-.5,00 x 50°	0,2	17,0	-.1,75 x 90°	0,5		-.0,50	-.1,25 x 90°	0,4	0,7
15	I	28	V	-.12,0	-.5,00 x 100°	0,3	11,0	-.1,00 x 110°	0,6		-.0,75	-.0,50 x 90°	0,5	0,8

## KERATOCONUS

### ASTIGMATIC POWER CHANGE:

- **PREOP:**  $4,75 \pm 1,18 D$  ( $r$  3,0 – 7,0)
  - **RINGS:**  $1,22 \pm 1,13 D$  ( $r$  0 – 1,13)
  - **INCISIONS:**  $0,85 \pm 0,87 D$  ( $r$  0 – 2,50)
- $3,42 \pm 1,22 D$   
 $r$  (1,25 – 5,50)
- $0,53 \pm 0,38 D$   
 $r$  (0 – 1,25)



### Results

### INTRASTROMAL RING SEGMENTS



Maximum Keratometric values before and after Intrastromal Ring Implantation

K-max = keratometría máxima D = dioptrías

## KERATOCONUS

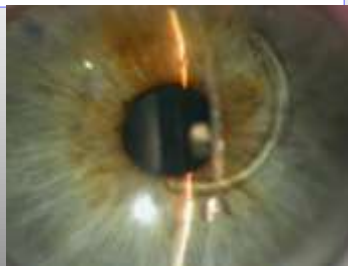
### ASTIGMATIC POWER CHANGE : 4 YEARS EVOLUTION

- **PREOP:**  $51,84 \pm 3,17 D$  ( $r$  57,88 – 47,56)  $3,42 \pm 1,22 D$   
 $r$  (1,25 – 5,50)
- **RINGS 1 YEAR:**  $48,42 \pm 3,36 D$  ( $r$  55,80 – 44,98)  $3,55 \pm 1,38 D$   
 $r$  (0 – 1,25)
- **RINGS 4 YEARS:**  $48,29 \pm 2,91 D$  ( $r$  54,0 – 44,63)



## CLINICAL EXPERIENCE

### SURGICAL OPTION : INTRASTROMAL RINGS + ICL

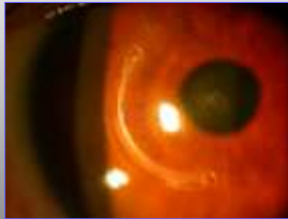


- Regulates irregular corneal surface
- Stabilizes or delays evolution of the corneal pathology
- Efficient Refractive Surgery
- **Reversible surgery: does not limit other surgical options**

## KERATOCONUS

### COMBINED STRUCTURAL & REFRACTIVE SURGERY

#### INTRASTROMAL RINGS + SPHERICAL/ TORIC ICL



#### INDICATIONS

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AC  $\geq$  3 mm  
K < 55 D  
Refractive Stability



*INTRASTROMAL RINGS + ICL+CI (Arias A et al, Cirugía Combinada SECOIR 2008)*

*INTRASTROMAL RINGS + ICL+CI (Alfonso JF et al, JCRS 2011;37:706-713)*

***Intrastromal Rings + Toric ICL (Coskunseven et al, Am J Ophthalmol 2007; 144:387-9)***

## Muchas Gracias

