Retrospective Study Evaluating Cases with Moderate Degree of Keratoconus post ICR segments Implantation and CXL

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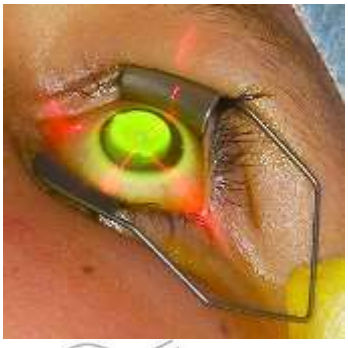
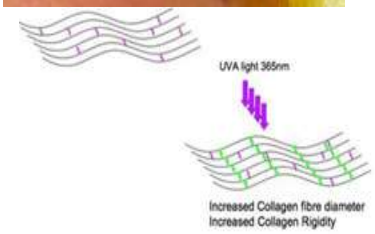
Corneal collagen cross-linking (CXL) is a treatment intended to halt the progression of keratectasia. The procedure uses ultraviolet (UV) light and riboflavin to strengthen the stromal collagen.





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CXL Number Facts

Parameter	Value
UV type	UVA
Wavelength	370 nm
Total Energy	5400 mJ
Total Irradiance	90 mW/cm2
Irradiation delivery	3 mw/cm2 for 30 m : 30 mw/cm2 for 3 m.*

* Bunsen-Roscoe law of reciprocity

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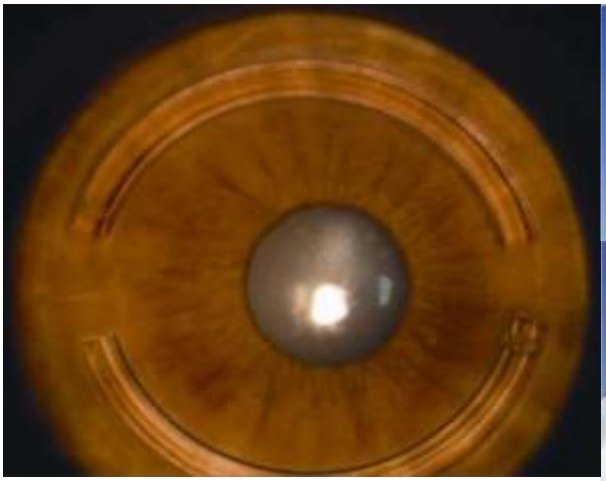
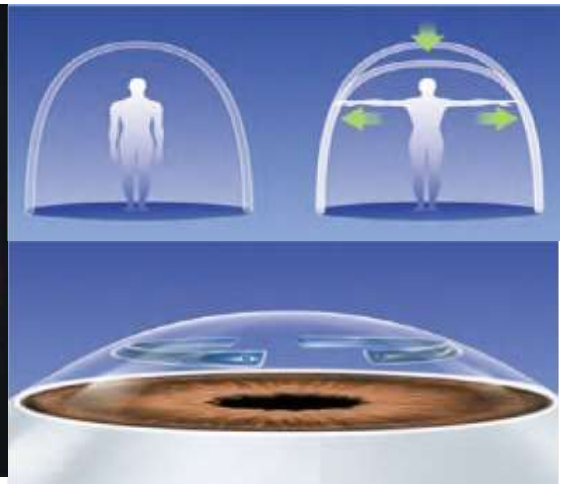
ICRS





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ICRS implantation

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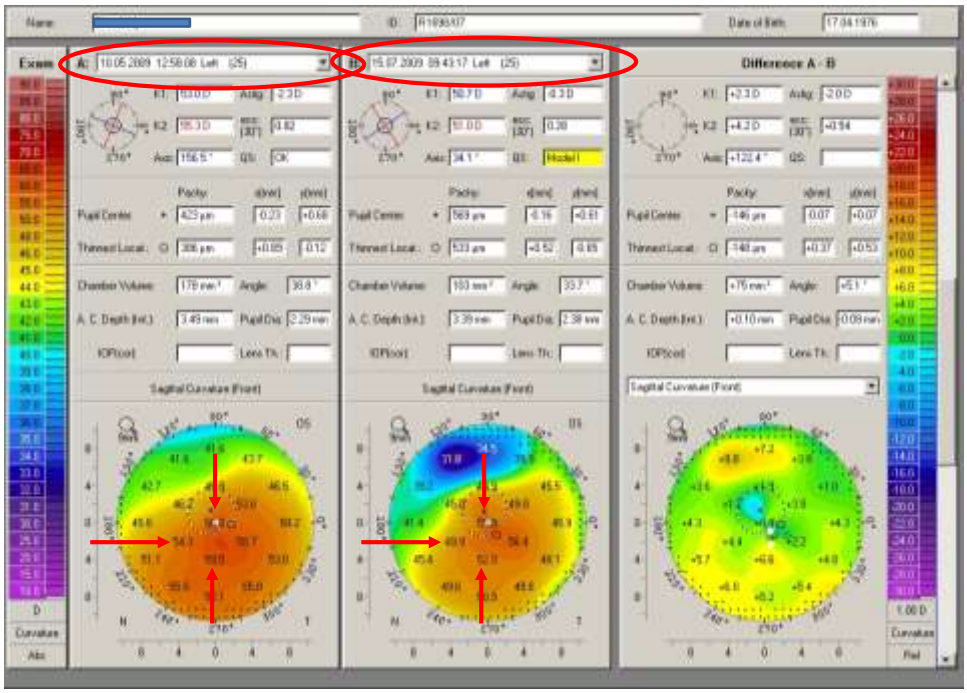

AIM

To evaluate the efficacy and stability of ICRS implantation in eyes with moderate Keratoconus after 2 years of ICRS implantation and corneal cross-linking.

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SUBJECTS

*The study was carried out on **50 eyes** of 31 keratoconic patients who performed corneal cross-linking and ICRS implantation.*

❖***Study design:***

A retrospective non comparative interventional clinical trial (case series)

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SUBJECTS

❖Inclusion criteria:

1. **Patients with keratoconus and intolerance to contact lenses wear**
2. **Patient age 18-45 years**
3. **Clear central cornea**
4. **BSCVA 6/60 or better**

❖Exclusion criteria:

1. **Severe keratoconus (keratometry readings steeper than 65.0 D).**
2. **Central corneal thickness less than 400.**
3. **Corneal haze or opacity.**
4. **Acute hydrops.**
5. **Systemic collagen disorders.**
6. **Ocular infection.**
7. **Other ocular diseases.**

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METHODS

- ***UCVA , MR & BSCVA..***
- ***Scheimpflug imaging with pentacam to measure keratometric readings and corneal thickness at thinnest location.***
- ***Anterior segment OCT™ (Visante) to measure corneal thickness at incision site.***

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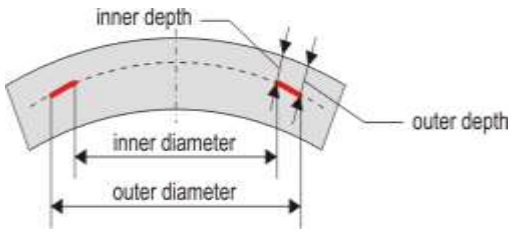
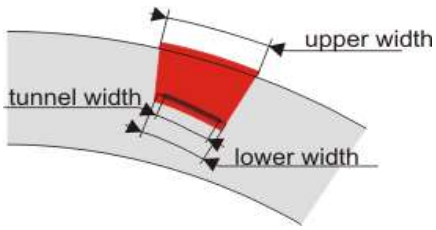
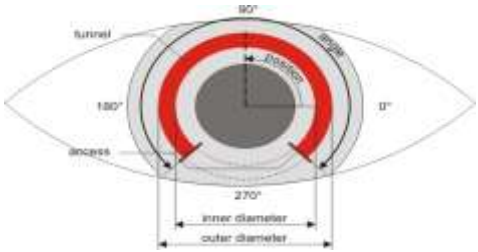
METHODS







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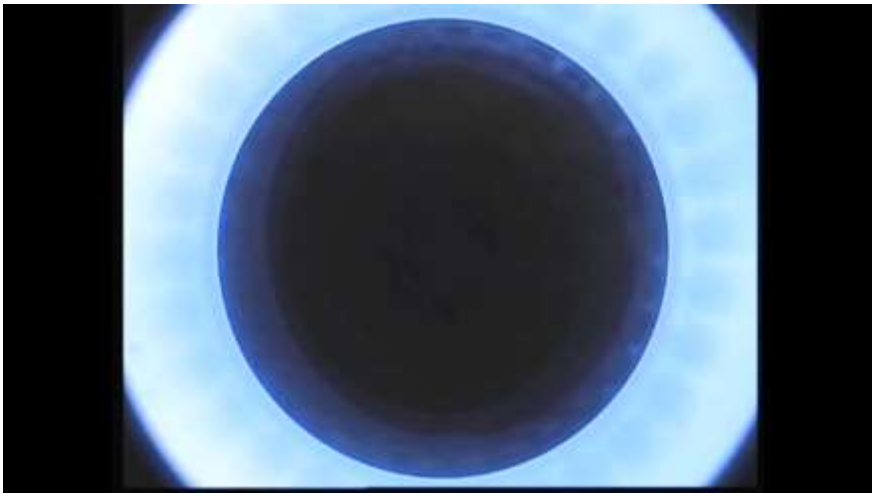
ICRs both, & CXL both eyes at the same setting.*



**El-Massry's video "edited":Kera ring insertion using Viisuomax* Femtolaser*

VisuMax: Iincision for ICR,A flexible solution for ICR implantation, CarlZeiss MaeditecAG, Germany

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Results

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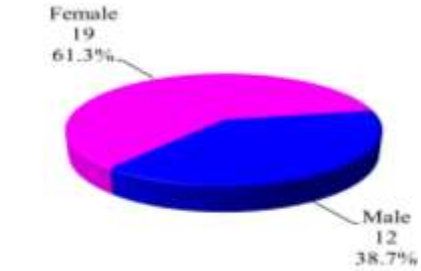
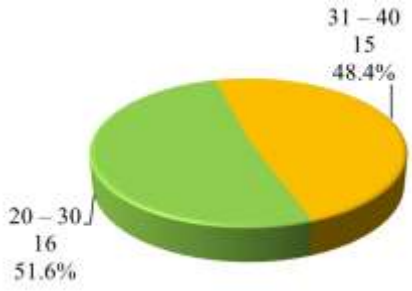
Demographic data among the 31 patient

	No.	%
Gender		
Male	12	38.7
Female	19	61.3
Age (years)		
20 – 30	16	51.6
31 – 40	15	48.4
Min. – Max.	21.0 – 36.0	
Mean ± SD.	29.7 ± 4.6	
Median	30.0	





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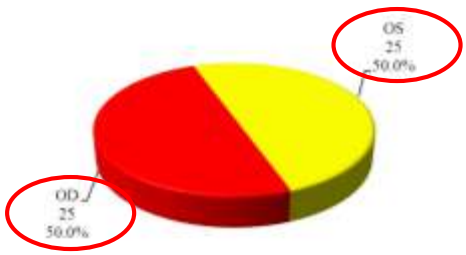

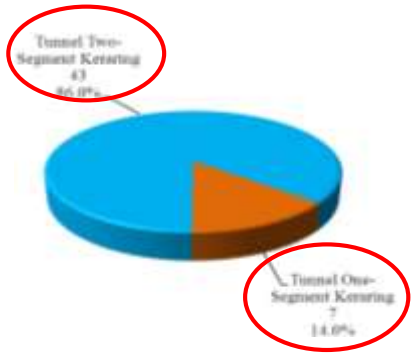

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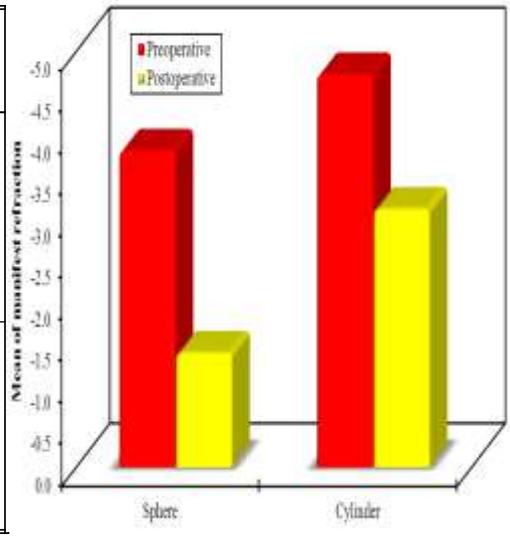
Manifest refraction	Preoperative (n=50)	Postoperative (n=50)	p
Sphere			
Min. – Max.	-20.0 – 1.50	-14.50 – 1.75	
Mean ± SD.	-3.80 ± 3.39	-1.37 ± 2.71	**<0.001***
Median	-3.0	-0.63	
Cylinder			
Min. – Max.	-8.0 - -1.50	-9.0 – 0.0	
Mean ± SD.	-4.72 ± 1.76	-3.10 ± 1.93	**<0.001***
Median	-5.0	-3.0	



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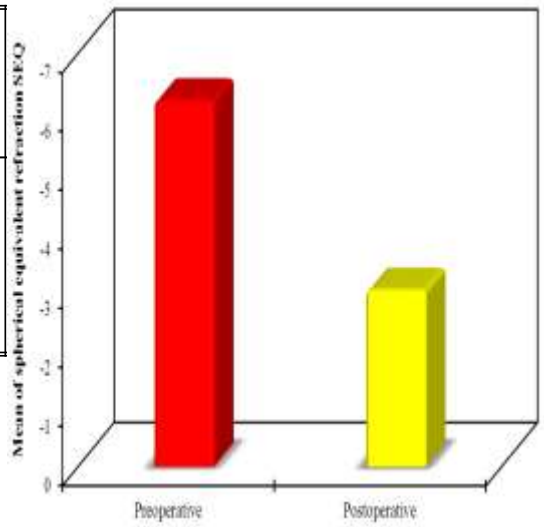
Spherical equivalent refraction SEQ	Preoperative (n=50)	Postoperative (n=50)	p
Min. – Max.	-23.0 - -2.5	-17.50 – 0.50	
Mean ± SD.	-6.2 ± 3.3	-2.99 ± 3.0	<0.001*
Median	-5.75	-2.38	



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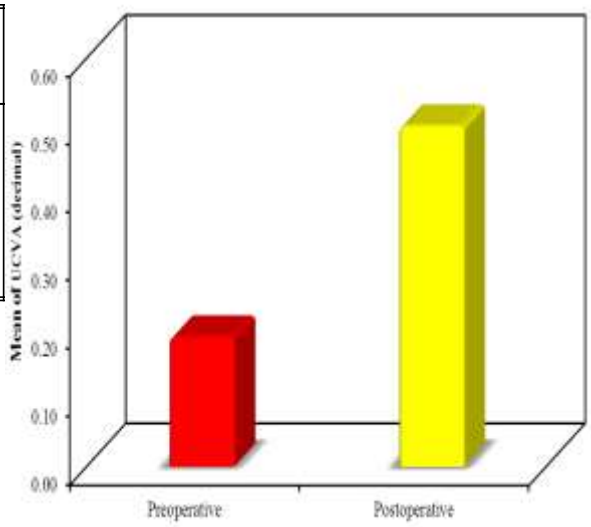
UCVA	Preoperative (n=50)	Postoperative (n=50)	p
Decimal			
Min. – Max.	0.05 – 0.63	0.10 – 1.0	
Mean ± SD.	0.19 ± 0.15	0.50 ± 0.21	<0.001*
Median	0.13	0.50	



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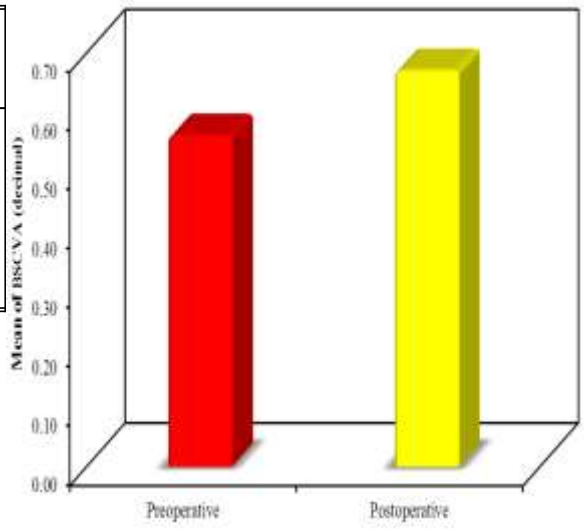
BSCVA	Preoperative (n=50)	Postostoperative (n=50)	p
Decimal			
Min. – Max.	0.1 – 0.8	0.10 – 1.25	
Mean ± SD.	0.56 ± 0.24	0.67 ± 0.23	**<0.001***
Median	0.63	0.63	



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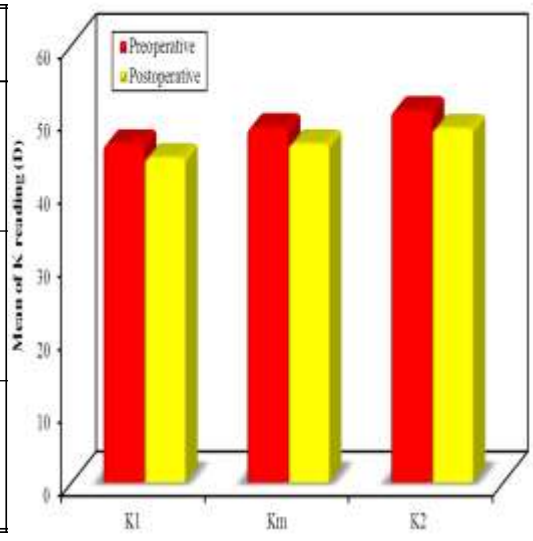
K reading (D)	Preoperative (n=50)	Postoperative (n=50)	p
K1 (K Min)			
Min. – Max.	38.20 – 57.50	38.80 – 53.25	
Mean ± SD.	46.40 ± 4.45	44.49 ± 3.50	<0.001*
Median	45.63	44.50	
K2 (K Max)			
Min. – Max.	42.0 – 63.0	40.25 – 61.0	
Mean ± SD.	50.95 ± 5.10	48.50 ± 4.71	<0.001*
Median	50.75	47.88	
Km (K average)			
Min. – Max.	40.25 – 60.0	40.0 – 56.75	
Mean ± SD.	48.62 ± 4.69	46.39 ± 3.88	<0.001*
Median	47.75	46.0	



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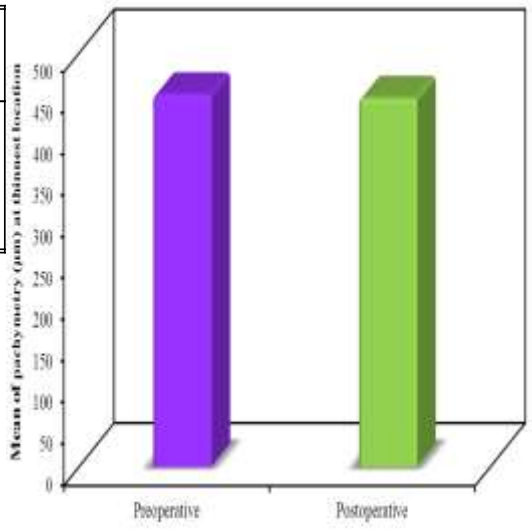
Pachymetry (µm) at thinnest location	Preoperative (n=50)	Postoperative (n=50)	p
Min. – Max.	400.0 – 517.0	390.0 – 514.0	
Mean ± SD.	449.9 ± 31.4	445.7 ± 35.9	0.104
Median	450.0	445.0	



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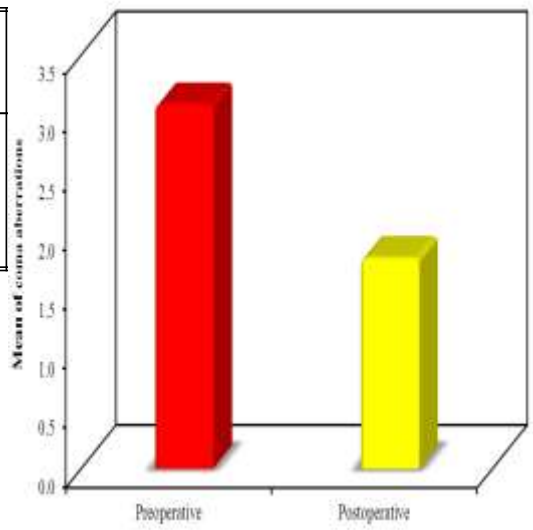
Coma aberrations	Preoperative (n=50)	Postoperative (n=50)	p
Min. – Max.	0.24 – 10.56	0.18 – 7.91	
Mean ± SD.	3.08 ± 1.90	1.78 ± 1.40	**<0.001***
Median	2.52	1.43	



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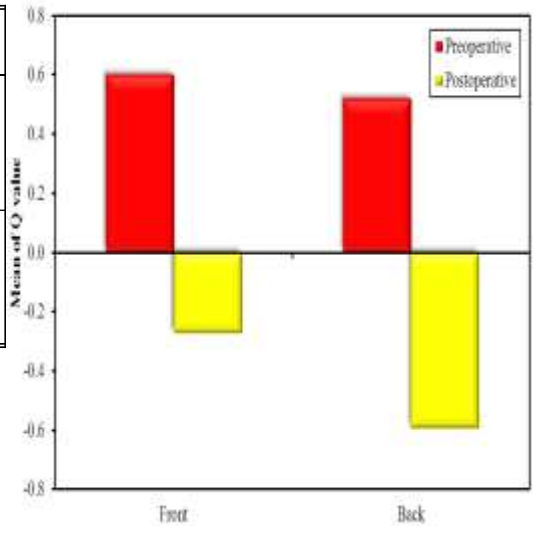
Q value	Preoperative (n=50)	Postoperative (n=50)	p
Front			
Min. – Max.	-1.55 – 1.47	-1.52 – 1.29	
Mean ± SD.	0.60 ± 0.67	0.27 ± 0.68	<0.001*
Median	0.87	-0.32	
Back			
Min. – Max.	-1.15 – 1.48	-1.90 – 1.49	
Mean ± SD.	0.52 ± 0.80	-0.59 ± 0.78	<0.001*
Median	0.91	-0.64	



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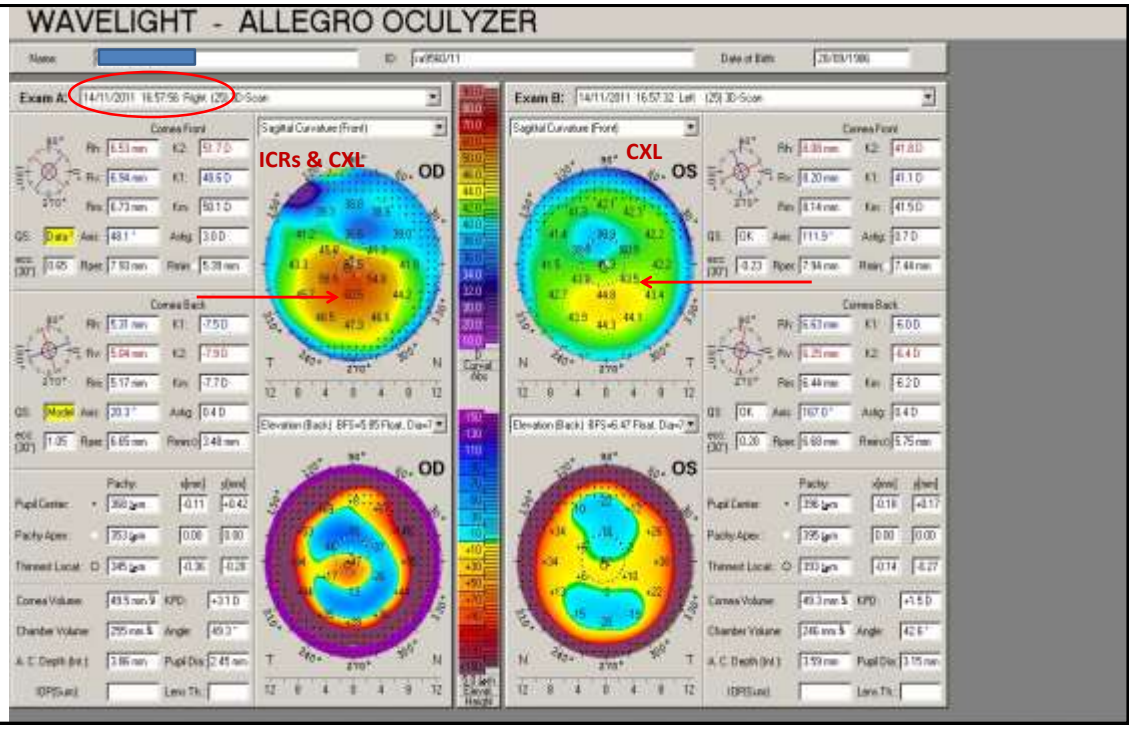
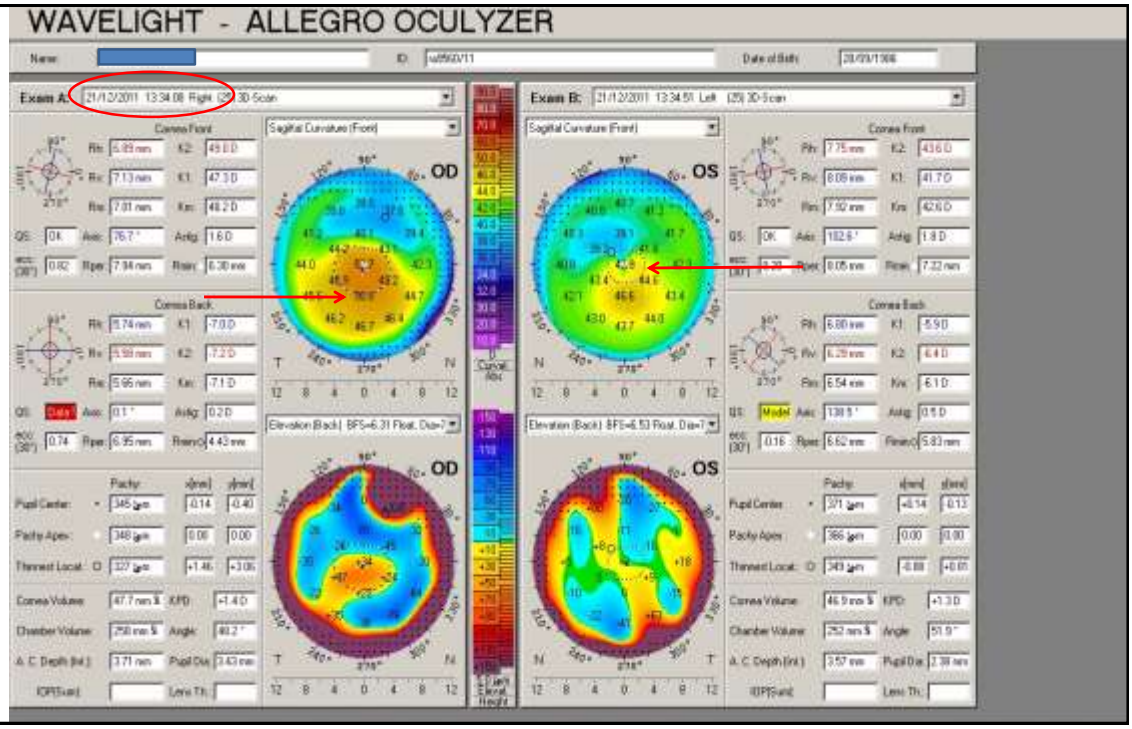

WAVELIGHT - ALLEGRO OCULYZER
ICRs & CXL
CXL
OD
OS


WAVELIGHT - ALLEGRO OCULYZER
OD
OS

If both eyes have poor vision which improves with P.H.

& Intolerable to CL
or DOes not accept RGP CL

Insert Intracorneal ring segments
&
CXL both eyes in the same setting*

** Combined Intracorneal rings (kera ring) and CCXL (UV-X) in patients with Keratoconus Jankov II,Coskeunseven ,Syrbeia :UVX+ICR book page1-18*

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CONCLUSIONS

- **CXL is essential to stop keratoconus progression.**
- **ICRS is a valuable solution for improving vision of keratoconus patients.**
- **ICRS in additional CXL is a safe, stable and effective procedure for patients with keratoconus**
- **Patient's satisfaction in most cases was achieved because of a better quality of vision and less aberrations with subsequent better quality of life as well as contact lenses tolerance.**

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- Early KC with good vision → CXL immediately.
- Uncomfortable KC with RGP CL → ICRs, &CXL at the same setting.
- Advanced KC which does not full fill criteria of ICRs → DALK.
- Ruptured Descement's or Hydrops → P.K.P.

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Thank You

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