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Combined PRK & CXL, 1-Year Study

1/50

Prevalence of Emmetropia among cases of combined PRK and CXL in the treatment of KC



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**Cairo,
Egypt
2019**

2



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Outlines

5

Outlines

- Introduction
- Purpose & Aim
- Patients & Methods
- Results
- Conclusion & Recommendations



6



Introduction

Keratoconus (KC):

- Progressive, non-inflammatory disease, affects the cornea
- Cause is **Idiopathic**
- Prevalence is 1 : 2000
- Usually starts at **puberty**
- **20%** of cases can progress to the degree causing visual symptoms, necessitating ophthalmic intervention.



9

Introduction



Keratoconus (KC)



KC Problems

1. Refractive Error → ↓ **Acuity**
2. Asymmetry → ↓ **Quality**
3. Progression → ↓ **stability**
4. Transparency → **Scarring**

10

Introduction

PRK



- The most predictable tool to treat **irregular astigmatism**
- **50um** ablation is reasonably safe in **early KC** cases
- A new **ablation** profile will save tissue more
- Can be used to **enhance** results of other procedures

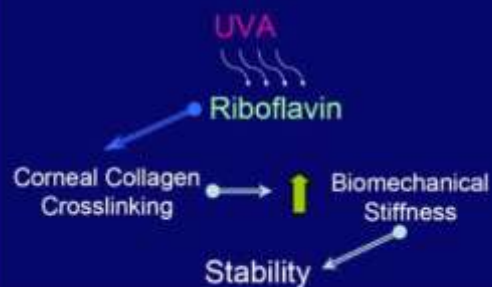
11

Introduction

CXL



C3-R Mechanism



12

Introduction

CXL



- An effective way to **stop** the progression of **KC**
- There is a **consensus** in the literature that it is highly effective when applied at earlier stages.
- Our **experience** confirms the same conclusion

13

Introduction

The Amsler-Krumeich classification for the grading of keratoconus

Stage I

- Eccentric steeping.
- Myopia and/or induced astigmatism <5.00 D
- Mean central K readings <48.00 D.

Stage III

- Myopia and/or induced Astigmatism from 8.00 to 10.00 D.
- Mean central K readings >53.00 D.
- Absence of scarring.
- Minimum corneal thickness 300 to 400 μm .

Stage II

- Myopia and/or induced astigmatism from 5.00 to 8.00 D
- Mean central K readings <53.00 D
- Absence of scarring.
- Minimum corneal thickness >400 μm

Stage IV

- Refraction not measurable.
- Mean central K readings >55.00 D.
- Central corneal scarring.
- Minimum corneal thickness 200 μm .

14

Introduction

Clinical Studies

Study	# of Pts # of eyes	Mean Follow up	Progression of KC in treated eyes	Progres- sion of KC in control eyes	Post- operative increase in VA	Post- operative regression in K value	Post- operative regression in RE
Wollensak et al AJO 2003	22 pts 23 eyes	23.3 (range 3 to 47 months)	None 70% have reduction	22%	Improved By 1.26 lines in 65%	In 70% by 2.01 D P=.001	Improved by 1.42 D P=.03
Caporossi et al JCRS May 2006	10 pts 10 eyes	3 months	None	37%	Improved by 3.6 lines P=.00001	By 2.1 D	Improved by 2.49 D
ESCRS 2008	44 eyes	12 months	None	30%			
Braun ARVO 2005	22 pts 27 eyes	6 months	None		Slightly improved in 65%	In 44% by 3.1 D	In 44% by 2.14 D

15

Purpose & Aim

الخبطة ELITE

16

Purpose & Aim

PRK + CXL has Dual goal



PRK

• Stop Progression

KC



CXL

• Regularize cornea
• Make it close to emmetropia



17

Purpose & Aim

Definition of Success

- **Visual Goal:** Post-Op UDVA = Pre-Op CDVA
- **Refractive Goal:** Emmetropia $\pm 1.0D$ of SE
- **Quality Goal:**
 - **Objective:** Reduction of Corneal Coma (Neural adaptation)
 - **Subjective:** Measuring patient Satisfaction on quality of vision issues

18

Purpose & Aim

Concept of Patient Satisfaction

- It is the patient's **judgment** of the quality of care
- Used as a measure of **outcome**
- **Functional** changes correlate linearly with patient satisfaction
- Change in **life style** is now considered in the decision of accepting or rejecting the procedure

19

Patients & Methods

20

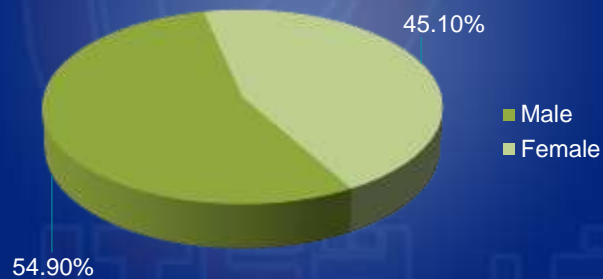
Patients & Methods

- Prospective Interventional non-controlled non-randomized study
- Elite Medical Center, Riyadh, **KSA**
- **117** patients: **153** eyes (2008-2011)
- Age **27.48** \pm 5.67 (18 – 45) years

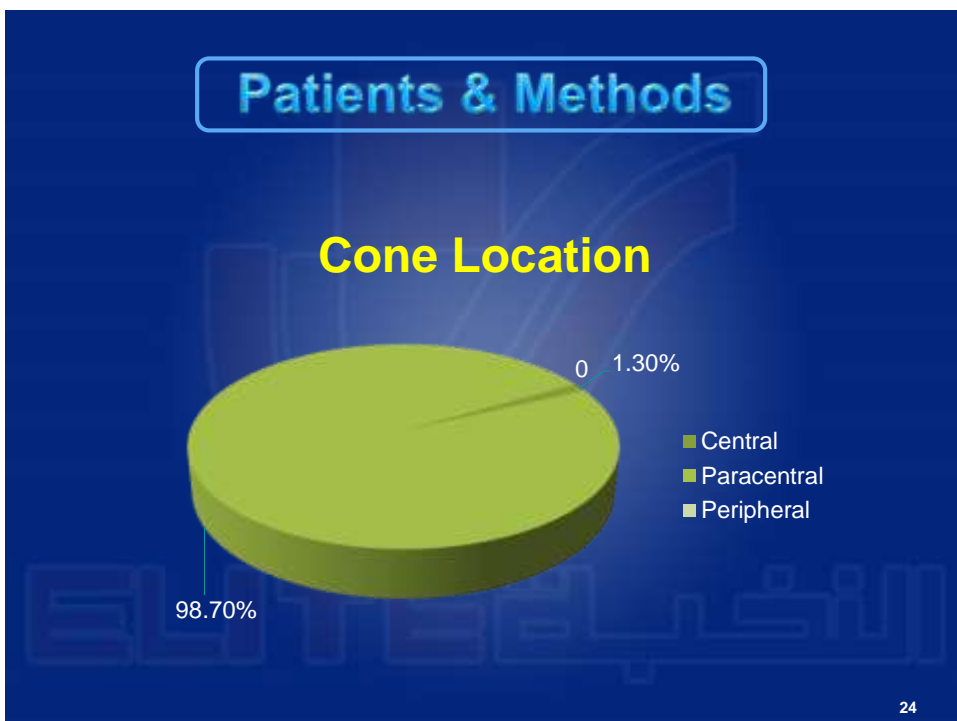
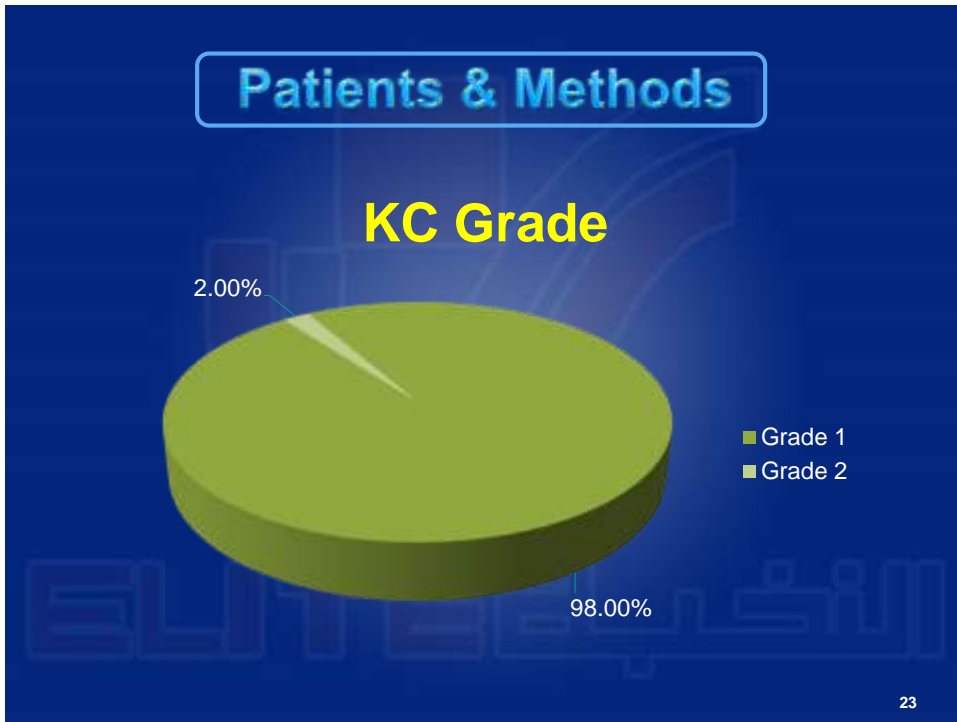
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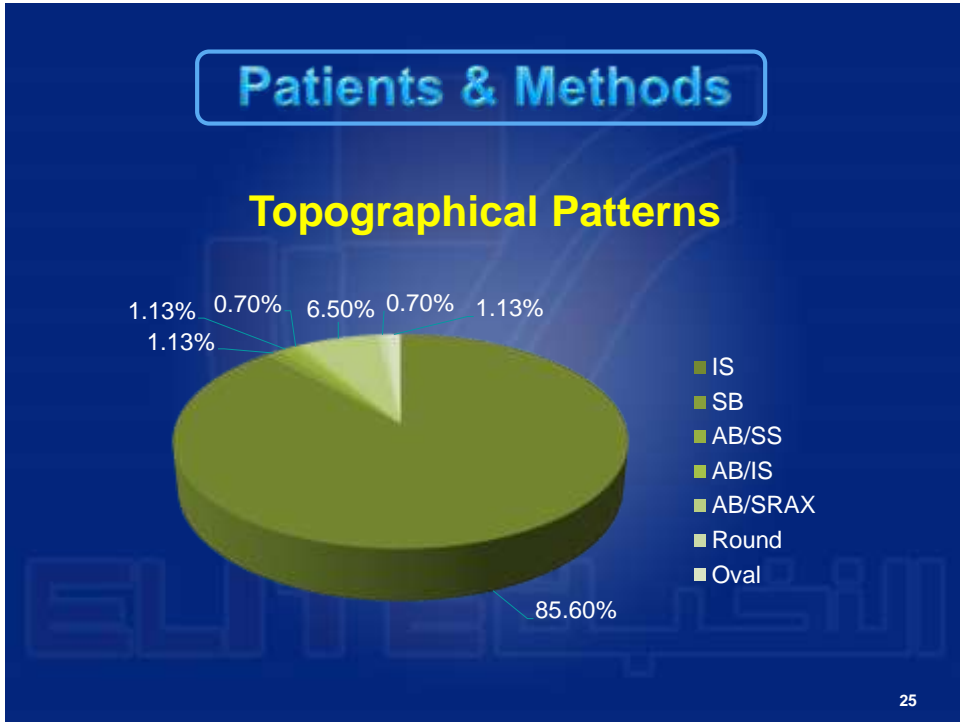
Patients & Methods

Sex



22





Patients & Methods

Topographical Patterns

Round	R
Oval	O
Superior Steepening	SS
Inferior Steepening	IS
Irregular	IR
Symmetric Bowtie	SB
Symmetric Bowtie with Skewed Radial Axis	SBSK
Asymmetric Bowtie with Skewed Radial Axis	ABSK
Asymmetric Bowtie with Inferior Steepening	ABIS
Asymmetric Bowtie with Superior Steepening	ABSS
Asymmetric Bowtie with Skewed Radial Axis	ABSK
Butterfly	B
Claw	C
Junctional	J

Patients & Methods

Krumeich Classification of Keratoconus

severity	Km (sim K)	thickness	spherical equivalent	Cornea
4	>55	<200	Not measurable	Central scars
3	54-55	200-400	>-8D	No central scars
2	48-53	400-500	[-5,-8]D	No central scars
1	<48	>500	<-5	No central scars

27

Patients & Methods

Pre operative demographics

	UDVA	CDVA	Sph	cyl	SE	Steep K	Flat K	Sim K	CCT	TL	coma
Avg	0.29	0.95	-2.26	-2.13	-3.31	45.95	43.67	44.79	515.44	496.02	1.09
SD	0.242	0.18	2.2	1.5	2.07	1.96	1.79	1.76	31.86	35.12	0.68
Range	0.01 to 0.9	0.3 to 1.2	-9.25 to +2.5	-6 To 0	-10.5 to +1	41.45 to 51.51	38.72 to 48.54	40.57 to 50.02	426 to 636	384 to 612	0.07 to 3.79

28

Patients & Methods

Intra operative demographics

- Optical zone: (5.25 to 6) mm
- Mean ablation depth: 60.75 ± 23.20 μm (11-130)

29

Patients & Methods

Follow up

@ 6M

30

Patients & Methods

How patients were divided?

Satisfied

Dissatisfied

31

Patients & Methods

Patient Satisfaction Questionnaire

C. ما مدى رضاك عن نوعية الرؤية لديك في الظروف المختلفة (خاصة الرؤية الليلية- رؤية هالات حول الأتوار):

1. لا توجد أي مشكلة في ظروف الرؤية المختلفة
2. تحسنت نوعية الرؤية في الظروف المختلفة عما كانت عليه سابقا مع وجود بعض الملاحظات
3. ازدادت سوءا بعد العملية

A. ما مدى رضاك الكلي عن العملية التي أجريت لك بشكل عام:

1. راض جدا
2. راض إلى حد ما
3. غير راض أبدا

B. ما مدى شعورك بوجود تحسن بالرؤية وكيف تقيم الفرق بين ما قبل العملية وما بعدها:

1. تحسن ممتاز والفرق واضح جدا
2. تحسن بسيط ولا يوجد فرق مهم
3. لا يوجد تحسن أبدا والوظيفة البصرية نفسها

D. لو استشارك أحد أصدقائك أو معارفك فهل تنصحه بإجراء نفس العملية التي أجريت لك:

1. أنصحه بشدة
2. الأزم الحياد ولا أبدي له رأيي
3. لا أنصحه بإجراء العملية أبدا

عزيزي المراجع
نشكرك على ثقتك في
مركز النخبة الطبي
الجراحي ونود منك أن
تساهم في دفع عملية
التطور في هذا المركز
من خلال مساهمتك في
الاستبيان التالي بوضع
إشارة عند الإجابة التي
تراها مناسبة

32

Patients & Methods

Patient Satisfaction Questionnaire

Dear patient, we do thank you for trusting ELITE Medical & Surgical center. We appreciate your cooperation in pushing ahead the evolutionary process by answering the following Qs

A) How far are satisfied about the surgery was done for you in general?

- 1- Very satisfied
- 2- Satisfied relatively
- 3- Unsatisfied at all

B) How better did you notice the vision improved, and how do you estimate the difference in vision pre & postoperatively?

- 1- Excellent improvement and the difference is clearly noticed
- 2- Trivial improvement & no valuable difference
- 3- No improvement at all & the visual function remains the same

C) How better did you notice the quality of vision improved in the various vision conditions (especially night vision – hallos around light sources)?

- 1- No problem at all in the various conditions of vision
- 2- Vision improved in various conditions of vision , with reservation
- 3- Vision got worse postoperatively

D) Suppose one of your relatives or friends asked you the advice concerning the surgery to be done for him, what will you tell?

- 1- I will advise him strictly
- 2- I will be neutral and say nothing
- 3- I will never advise the surgery at all

33

Patients & Methods

Scores

A1 → 5 marks

A2 → 3 marks

A3 → 1 mark

**If the score is ≥ 12
Patient is considered Satisfied**

34

Patients & Methods

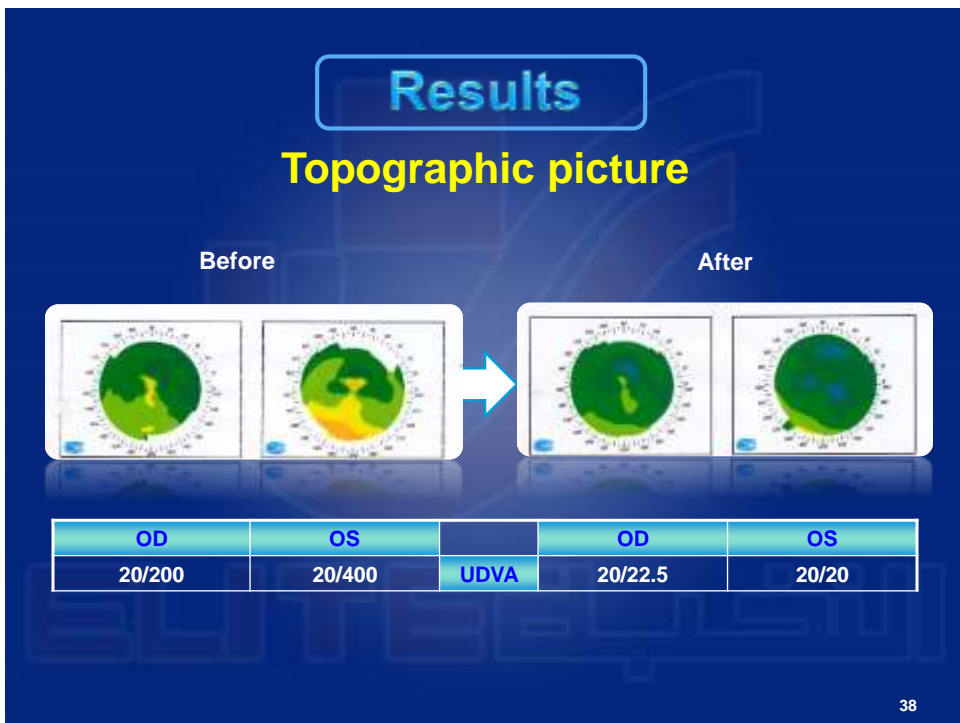
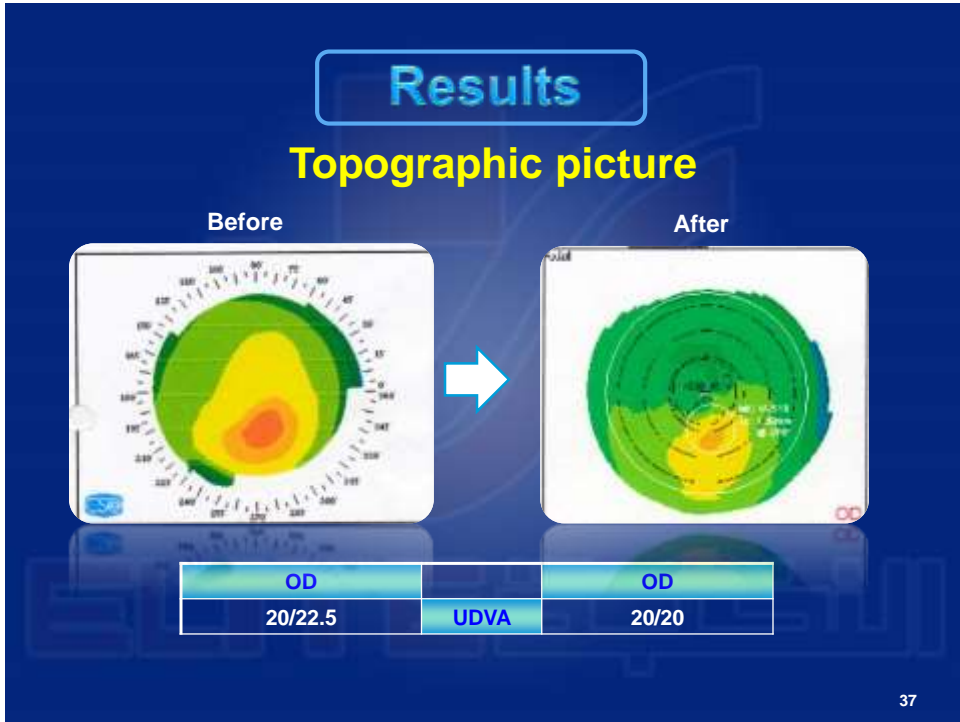
Statistical Analysis

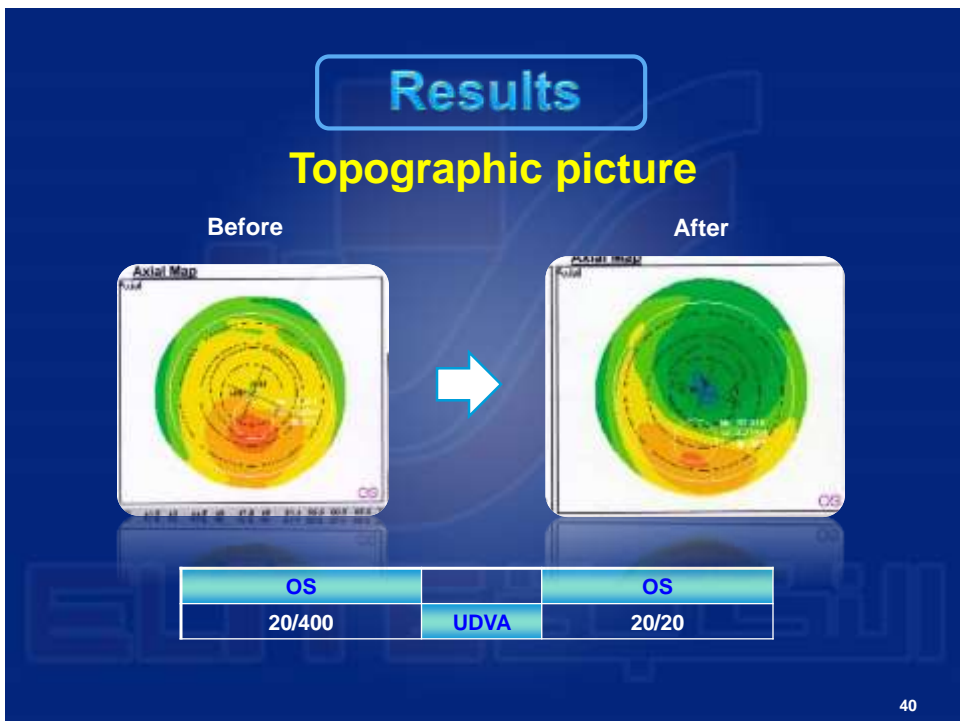
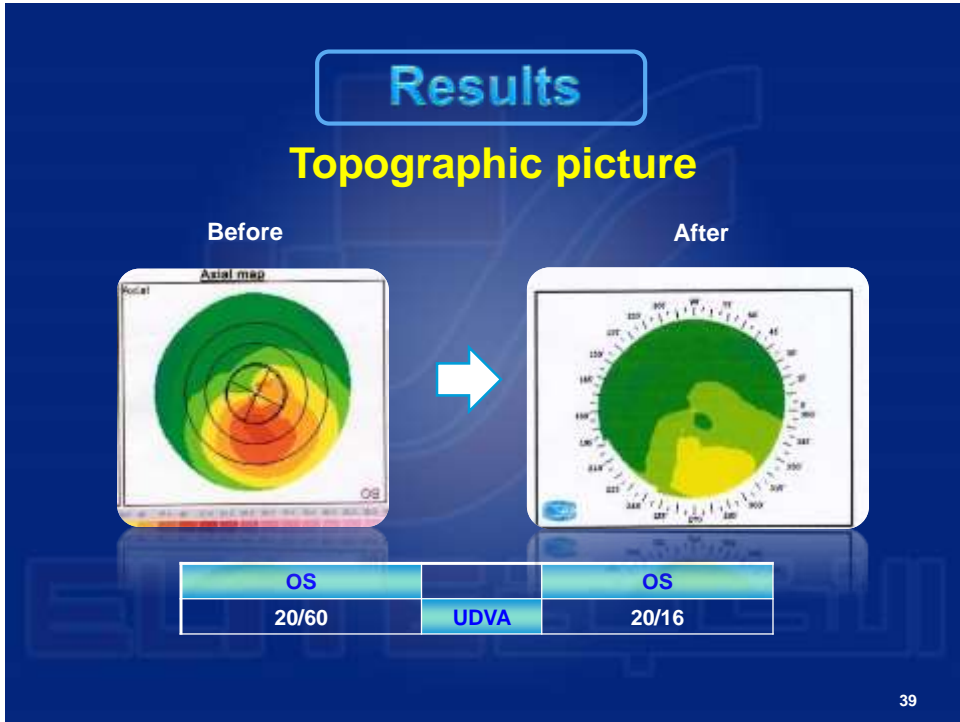
- Changes in **UDVA**, **CDVA**, **K**, **Sphere** and **SE** were studied using **t Test** paired two tailed: $p < 0.05$
- Emmetropic evaluation was studied using **t Test** unpaired two tailed: $p < 0.05$
- **GraphPad** Prism Software

35

Results

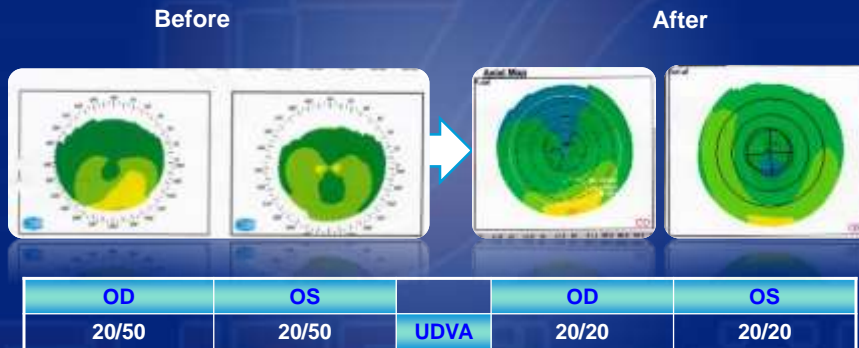
36





Results

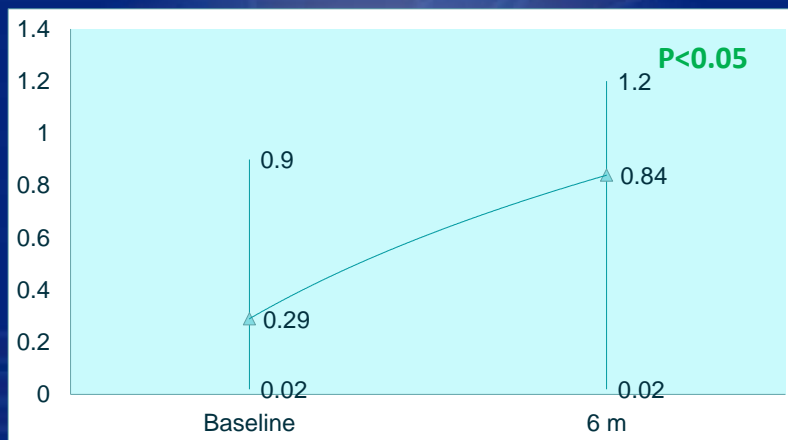
Topographic picture



41

Results

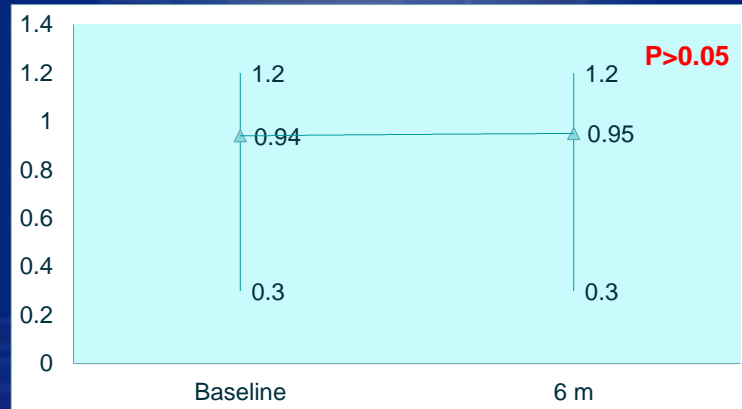
Changes in UDVA



42

Results

Changes in CDVA



43

Results

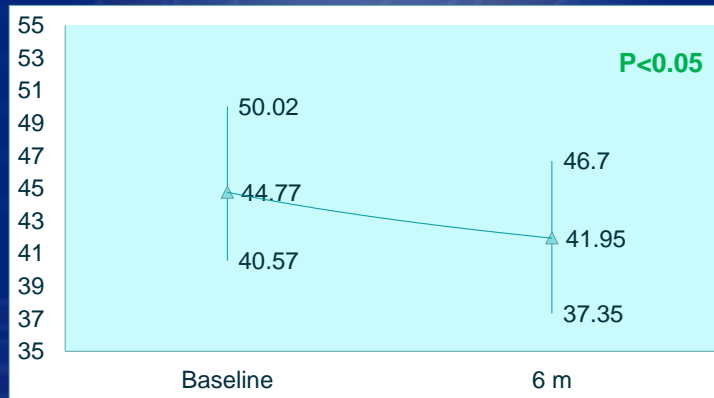
Visual Goal

57.5% (88/153 Eyes)
 had 20/20 or
 at least Post-Op UDVA = Pre-OP CDVA

44

Results

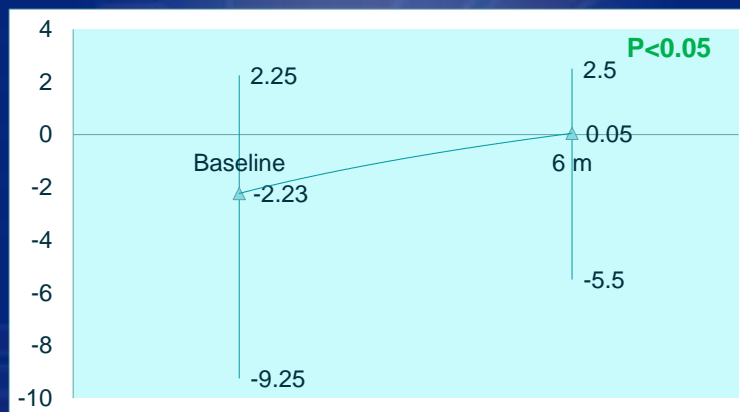
Changes in SimK



45

Results

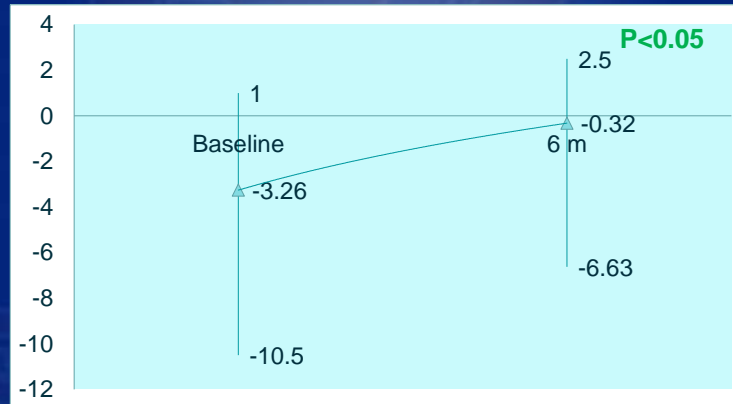
Changes in Sphere



46

Results

Changes in SE



47

Results

Emmetropia (Refractive Goal)

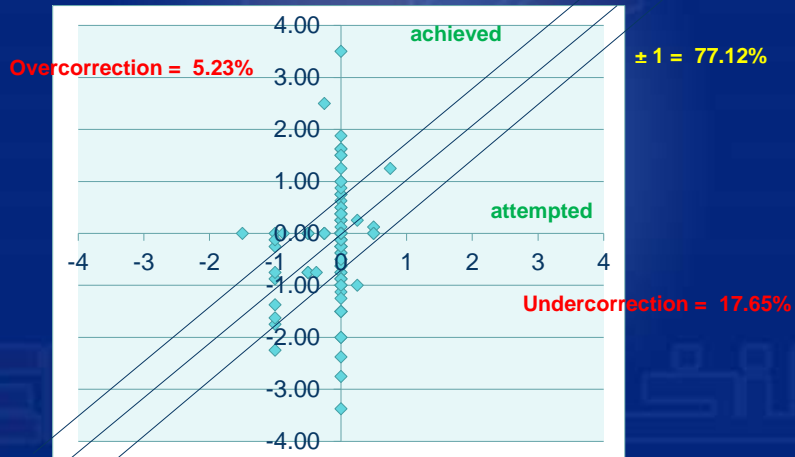
Achieved Emmetropia
is defined as within

$\pm 1.0D$

48

Results

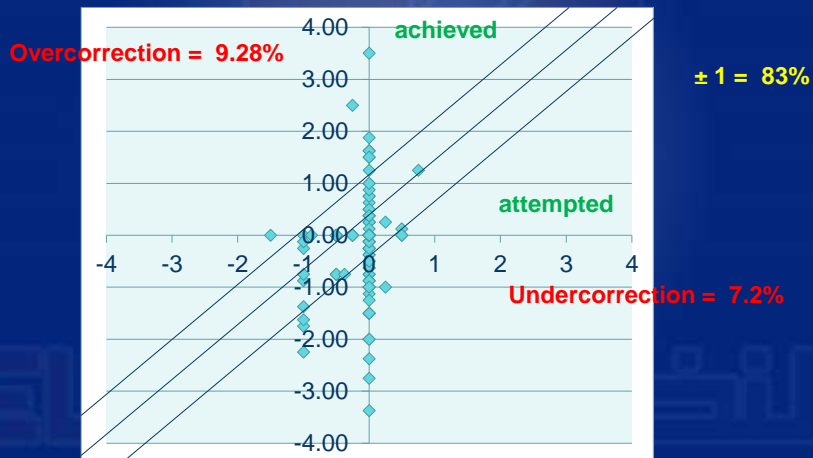
Attempted to achieve ± 1 dpt SE (**Refractive Goal**)



49

Results

Attempted to achieve ± 1 dpt Sphere

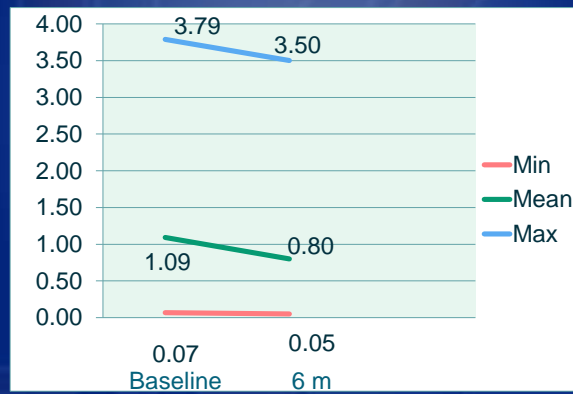


50

Results

(Quality Goal - Objective)

Mean of corneal Coma by topography @6mm

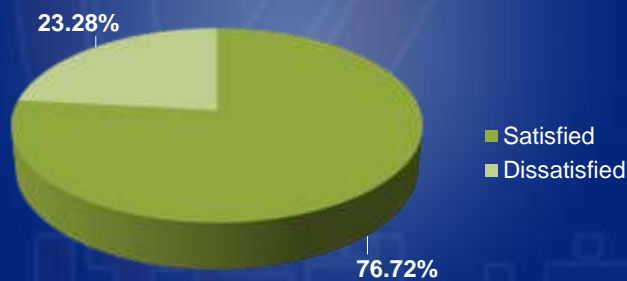


51

Results

(Quality Goal - Subjective)

Patients' Satisfaction



52

Results

Patient Satisfaction to Coma

Pre-Op Coma	Eyes	Satisfied	%
<1.5	94	81	86.1%
>1.5	23	19	82.6%

53

Results

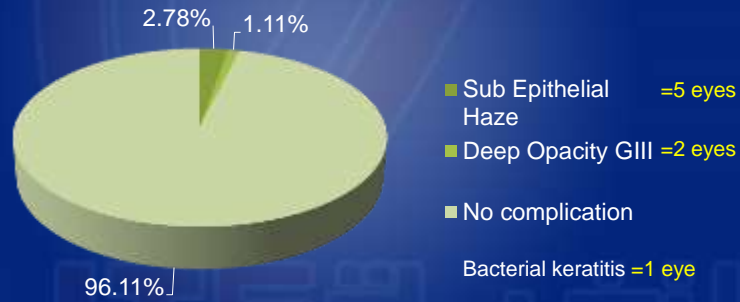
Summary of Success

- **Refractive Goal:** Emmetropia $\pm 1.0D$ of SE = **77.12%**
- **Visual Goal:** Post-Op UDVA = Pre-Op CDVA = **57.5%**
- **Quality Goal:**
 - **Objective:** Reduction of Corneal Coma (Neural adaptation) = **0.29 μ m**
 - **Subjective:** Measuring patient Satisfaction on quality of vision issues = **76.72%**

54

Results

Complications



55

Results

Complications

Complication	Eyes	%
Sub-Epithelial Haze	5	2.7%
Deep Opacity GIII	2	1.1%
Bacterial Keratitis	1	0.07%
Over-Correction	8	5.2%
Under-Correction	27	17.6%
Loss of 2 Lines	14	9%

56



Slide 58 features a dark blue background with a faint, stylized graphic of a person's head and shoulders. A white rounded rectangle at the top contains the text "Conclusion & Recommendations" in a light blue font. Below this, a yellow-bordered box contains a list of four bullet points. The text "58" is located at the bottom right of the slide.

Conclusion & Recommendations

- Emmetropia was achieved in **77.12%** (± 1 dpt)
- Significant improvement in **UDVA, SimK, Sphere** and **SE**
- Complications = **5%**
- **No** correlation between achieving Emmetropia and any demographic data

Conclusion & Recommendations

Our Recommended Nomogram

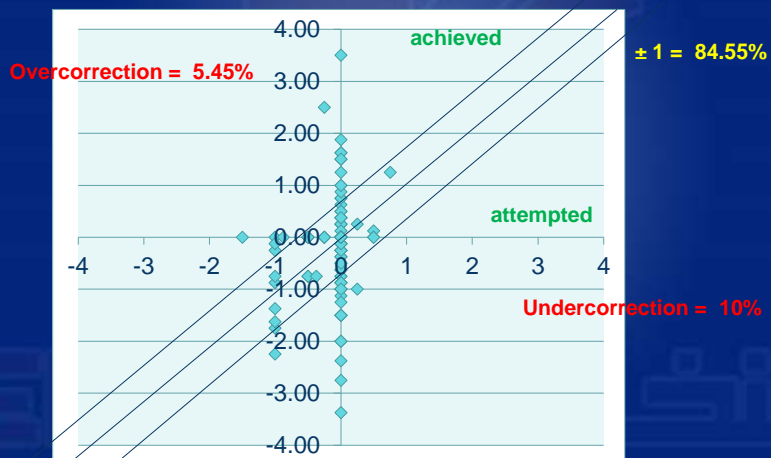
- ≤ 30 y/o \rightarrow Over-Correct by 0.5D
- > 30 y/o \rightarrow Under-Correct by 1.0D



59

Conclusion & Recommendations

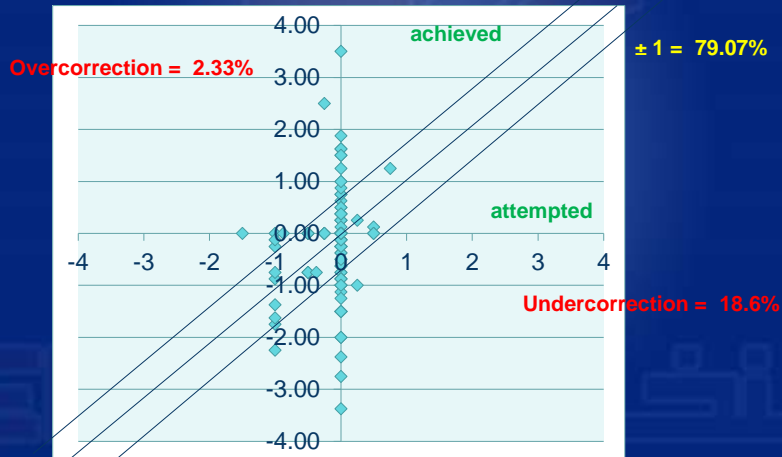
Over-Correction by 0.5D in age group ≤ 30 y/o



60

Conclusion & Recommendations

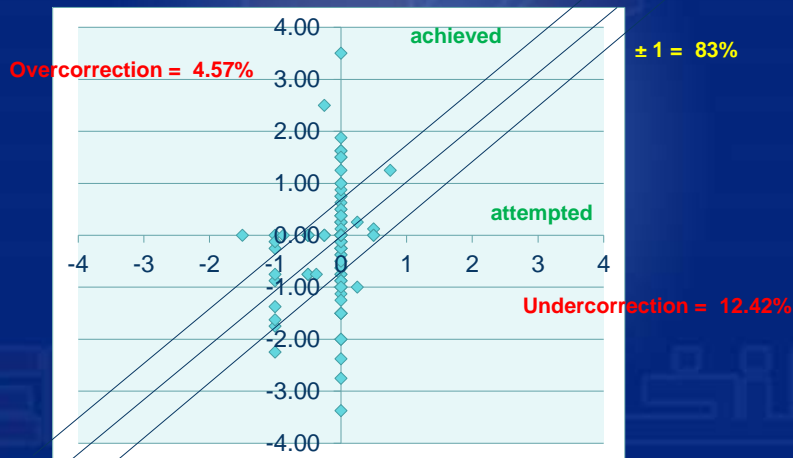
Under-Correction by 1.0D in age group >30y/o



61

Conclusion & Recommendations

Over all Results in all age groups



62

Conclusion & Recommendations

Actual Results



Nomogram Adjusted



63

Thank You

64