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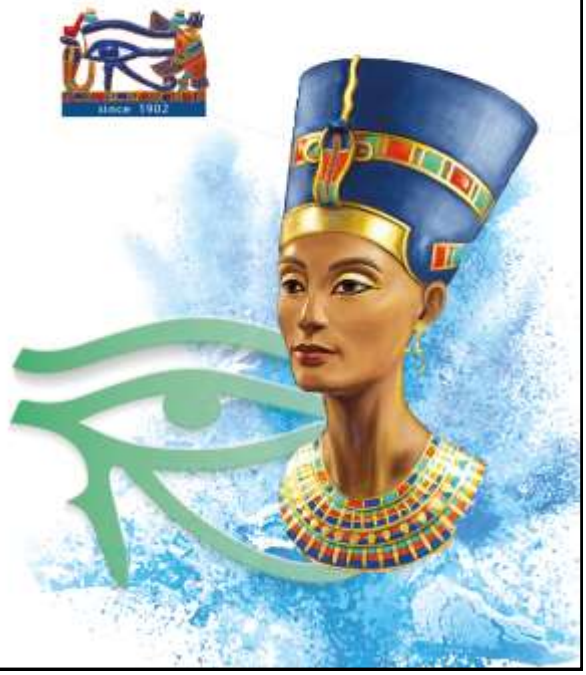
IS FLAP EXCIMER LASER SURGERY JUSTIFIED IN MODERATE MYOPIA ?

(10 Years Study Of Wavefront Guided PRK)



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Aim:

To assess the long term refractive and visual outcome of patients of wavefront-guided photorefractive keratectomy (PRK) in myopia up to 8 D

PRK Haze

- PRK, The 1st excimer laser refractive surgery
- LASIK, in late 1990s, Faster rehabilitation & less haze.
- Haze;
  - The time for epithelial healing.
  - The Ablation depth.
  - Irregularity of post op. stromal surface
  - Removal of the epithelial basement membrane
  - Ablation of Bowman`s layer

Grading of Haze

According to Fantis et.al, 1990.

- G 0; completely clear cornea.
- G 0.5; trace haze on careful oblique illumination.
- G 1; more prominent, not interfering with fine iris details.
- G 2,3 and 4; mild, moderate and severe opacification of the corneal stroma in the area of ablation.

Methods:

1400 eyes of 700 subjects

Wavefront-guided PRK with the **VISX Star S4 IR** excimer laser

Two groups according to Mitomycin-C

(MMC) application after photoablation :

Group **A** : Right eye with MMC application .
Group **B** : Left eye without MMC application .

And were followed between the year 2011 to 2021

The study included subjects aged 18 years or older with myopia −3.38 ± 2.60 (-7.92 to -0.47) D of manifest spherical equivalent (SE)

The main outcome measures are :

safety, predictability, efficacy, and stability.

Postoperative complications

Aberrations.

With follow up at 2, 3, 6 months, one year, five and ten years postoperatively.

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Patients & methods :

Parameter	OD group		OS group	
	Mean ± SD	Range	Mean ± SD	Range
Age	27.8±6.13	18,37	27.8±6.13	18 , 37
UCVA	0.13 ± 0.11	0.025 , 0.5	0.15 ± 0.12	0.025 , 0.4
BCVA	0.94 ± 0.14	0.4 , 1.2	0.96 ± 0.08	0.7 , 1
SE	-3.77 ± 2.07	-7.73 , -1.10	-3.79 ± 2.12	-7.92 , -0.47
WFA	-1.47 ± 1.07	-3.72 , -0.14	-1.35 ± 0.80	-3.47, -0.29
TA	-1.51 ± 0.99	-3.84 , -0.21	-1.39 ± 0.77	-2.97, -0.16
PACHYMETRY (Thin.location)	546.05±36.46	480 , 610	543.65 ±36.15	477 , 604
Ablation depth	64.93±26.93	21.80,115.40	65.16 ± 26.19	28.40,119.80
CCT	548.40±35.95	483 , 613	454.62 ±34.95	481 , 606
HI. order%	7.41±4.76	2.7 , 21.4	7.82 ± 3.75	2.5,15.4
EFFIECIENT.BLURR	4.09±1.92	1.18 , 8.1	3.90 ± 1.67	1.52 , 8.78
RMS	0.41±0.15	0.91 , 0.90	0.43 ± 0.16	0.16 , 0.84
COMA	0.23±0.12	0.065 ,0.742	0.22 ± 0.13	0.042 , 0.736
TREFOIL	0.21±0.09	0.062, 0.436	0.22 ± 0.15	0.015 , 0.593
SA	0.10±0.14	-0.182, 0.378	0.09 ± 0.11	-0.180 ,0.378

10 years characteristics in the 2 groups

Parameter	OD group		OS group	
	Mean ± SD	Range	Mean ± SD	Range
UCVA	1.03 ± 0.12	0.8,1.2	1.04 ± 0.13	0.8 , 1.5
BCVA	1.07± 0.13	0.9 ,1.5	1.09 ± 0.17	0.8 , 1.5
SE	-0.38 ±0.62	-1.38 , 1.28	-0.57 ± 0.44	-1.50 , 0.73
WFA	-0.57± 0.35	-1.96 ,-0.12	-0.56 ± 0.43	-1.81 , 0.69
TA	-0.76 ±0.40	-2.12 ,-0.12	-0.70 ± 0.37	-1.96, -0.20
PACHYMETRY	482.5± 56.56	345,580	482.6 ± 50.86	320 , 571
CCT	485.6 ± 55.7	339 , 581	490 ± 51.7	330 , 574
HI. order%	29.4 ±11.05	10.1 , 60	27.42 ±14.4	10.3 , 70.90
EFFIECIENT.BLURR	43.56 ±7.3	30 , 57	1.67 ±1.2	0.62 , 7.25
RMS	0.47± 0.16	0.18, 0.88	0.41 ± 0.21	0.10 , 0.78
COMA	0.21±0.12	0.08 , 0.63	0.25 ± 0.11	0.1 , 0.48
TREFOIL	0.18 ± 0.10	0.01, 0.52	0.22 ± 0.09	0.1 , 0.38
SA	0.12 ± 0.25	-0.27 , 0.78	0.07 ± 0.27	-0.98 , 0.51

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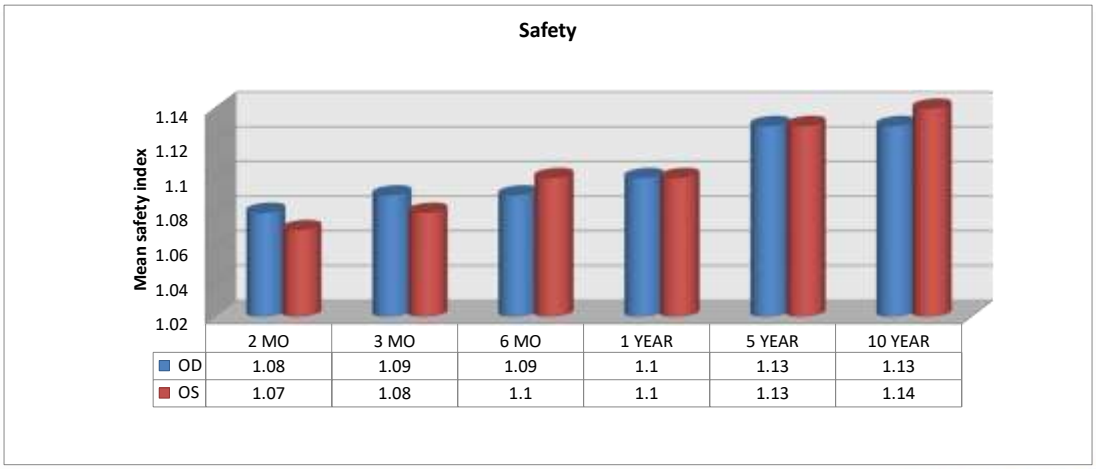
Safety

- The percentage of eyes that lost or gained Snellen lines
- No eye lost one line of best corrected vision
- The safety index (postoperative BCVA/preoperative BCVA)



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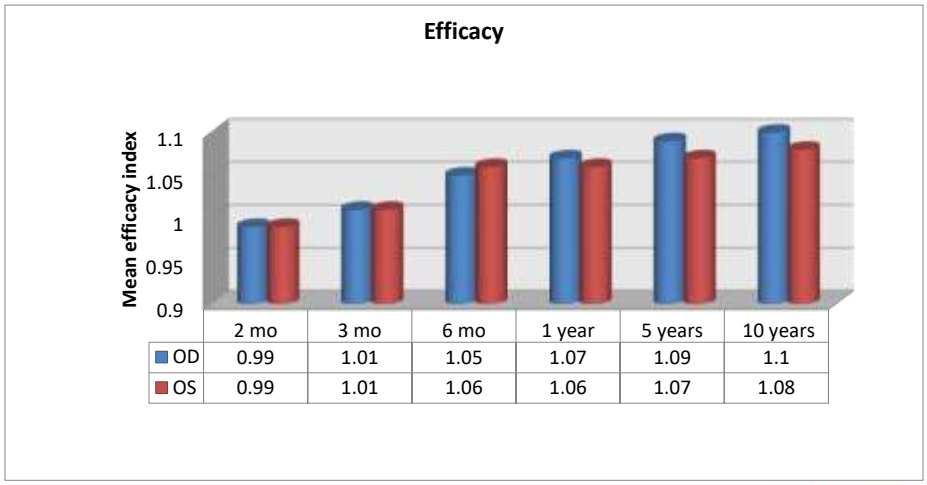
Efficacy

the efficacy index (postoperative UCVA/preoperative BCVA)



	2 mo	3 mo	6 mo	1 year	5 years	10 years
OD	0.99	1.01	1.05	1.07	1.09	1.1
OS	0.99	1.01	1.06	1.06	1.07	1.08

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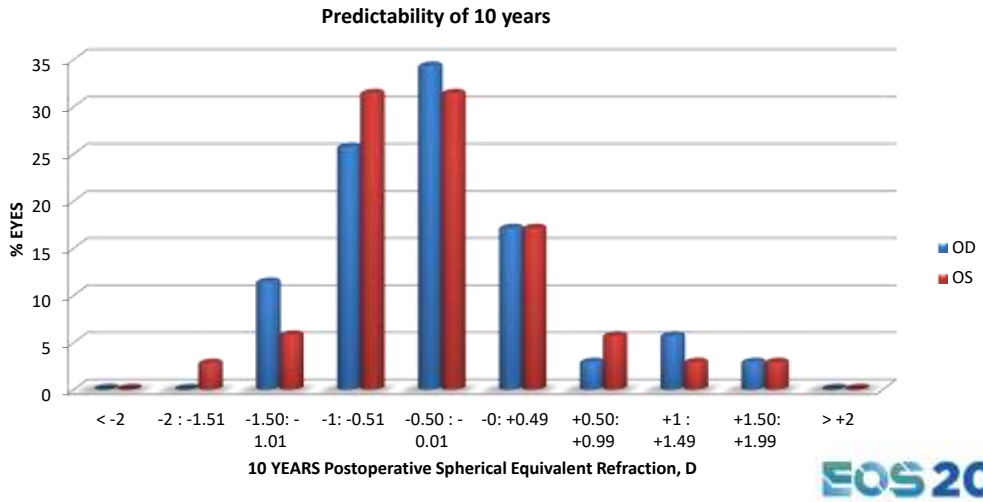
Predictability/Accuracy

the number of eyes within plus or minus 1D of the surgical plan

10 years after surgery 85.7% of OD group and 86.6%% of OS group were within ±1 which indicates good predictability



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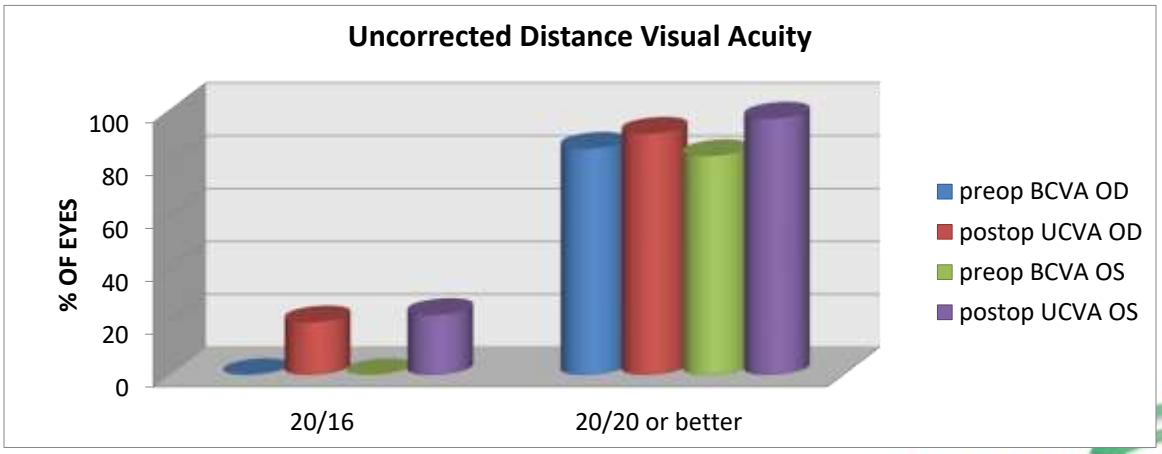
Cumulative changes in UCVA 10 years postoperative



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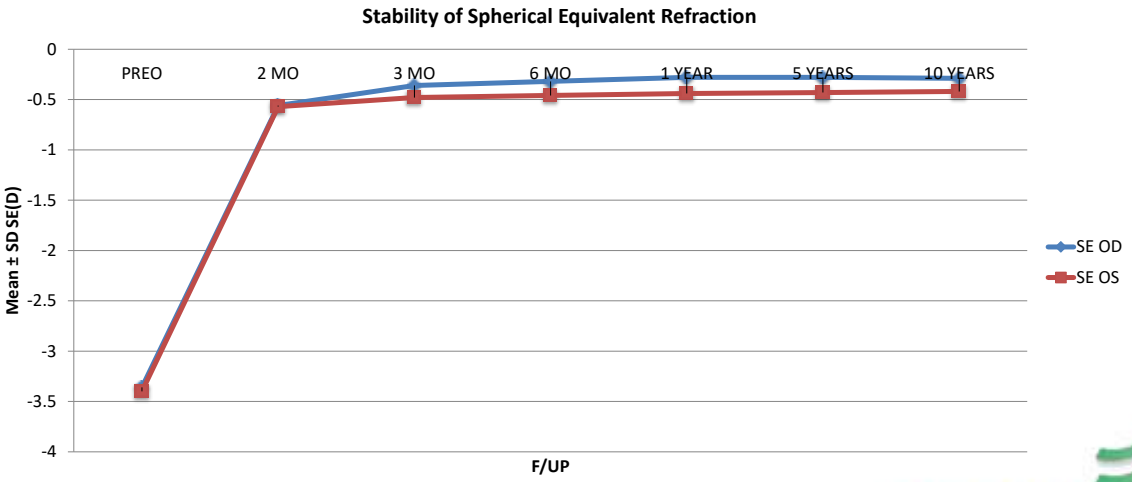
Stability



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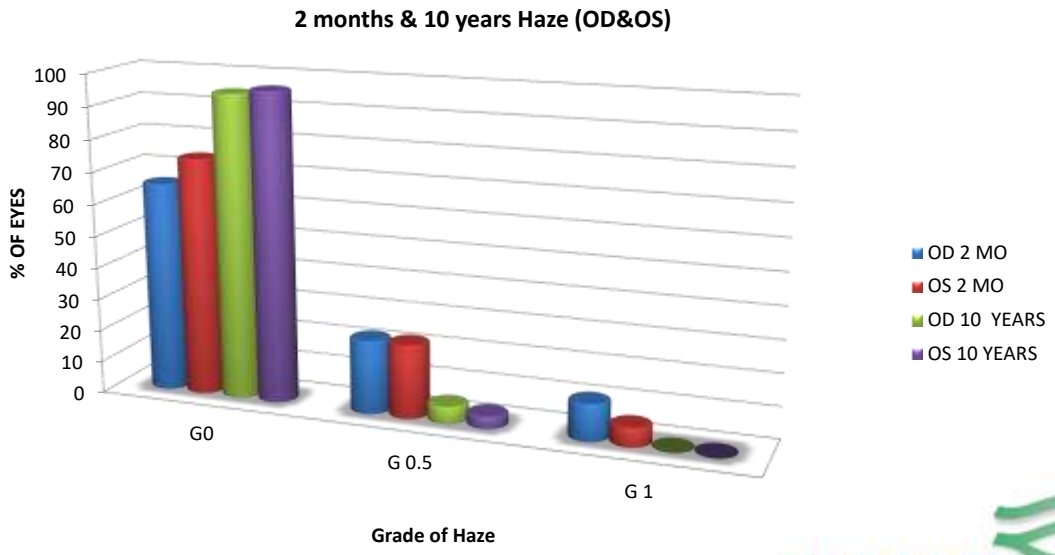
Corneal stability:

Pachymetry thinnest location.

	OD	OS	P.value
Preop	546.05±36.47	543.65±36.15	0.78
10 years postop	482.54±56.56	482.60±50.86	0.99

Haze

	OD (with MMC)			OS (without MMC)			P VALUE
	Grade of haze (% of eyes)			Grade of haze (% of eyes)			
	G0	G 0.5	G 1	G0	G 0.5	G 1	
2 MO	65.7	22.9	11.4	74.3	20	5.7	0.35
3 MO	74.2	22.9	2.9	74.2	22.9	2.9	1
6 MO	88.6	11.4	-	94.3	5.7	-	0.40
1 YEAR	91.4	8.6	-	94.3	5.7	-	0.64
5 YEARS	94.8	5.2	-	96.3	3.7	-	0.64
10 YEARS	94.8	5.2	-	96.3	3.7	-	0.64



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THE Quality of Vision

- Low order aberration, Myopia, Hyperopia and Astigmatism.
- The main aim of therapeutic modes of refractive surgery is to try to maintain the natural prolate shape of the cornea, and subsequently to reduce the induction of;
- High order aberration, Spherical aberrations, Coma, Trefoil,..

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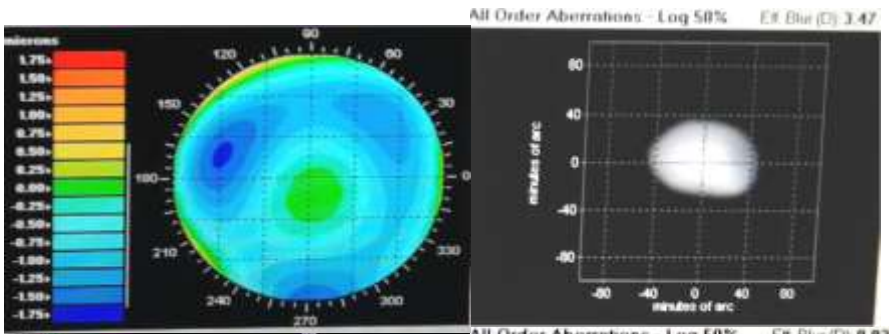
Change in Higher-Order Aberrations

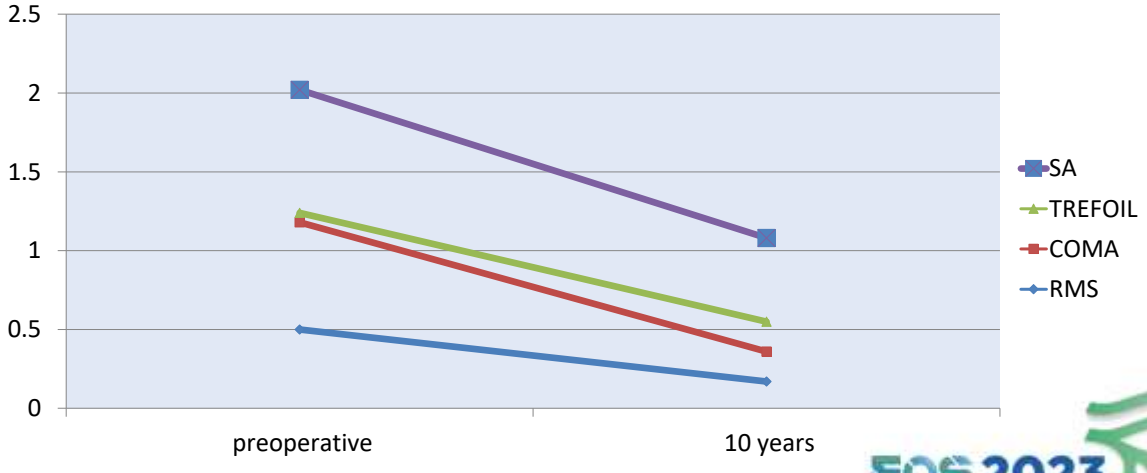
	OD				OS			
	RMS	COMA	TREFOIL	SA	RMS	COMA	TREFOIL	SA
Preop	0.41 ±0.02	0.23 ±0.02	0.21 ±0.02	0.10 ±0.02	0.43 ±0.02	0.22 ±0.02	0.27 ±0.02	0.09 ±0.02
10 years postop	0.47 ±0.02	0.21 ±0.02	0.18 ±0.01	0.11 ±0.04	0.41 ±0.03	0.25 ±0.02	0.21 ±0.01	0.07 ±0.04
P.value	0.04	0.33	0.16	0.70	0.53	0.23	0.01	0.64



P value for both groups preoperative and 10 years postoperative :

P value	RMS	COMA	TREFOIL	SA
Preop	0.50	0.68	0.06	0.78
Postop	0.17	0.19	0.19	0.53

Change in Higher-Order Aberrations



Tips for the best results :

- laser ablation profile creating a 6 mm optical zone and 8.00 mm transition zone.
- Using chilled, not just cold BSS, directly after laser treatment ablation.
- The subtle features of laser beam distribution with custom ablation may play a role in saving much stimulation of keratocytes [Wilson SE, et al .]
- 3 months of gradual tapering of corticosteroid eye drops helps to cover most of myofibroblastic activity.
- Explanation the nature of the early symptoms makes things easier to be accepted and to retain excellent follow up visits.

CONCLUSION

- **The safety, efficacy, predictability and stability of Wave-front guided PRK, made in our experience;**

  Flap surgery with excimer laser, unjustified in moderate myopia in a healthy person.

Thank You