

**In the name of GOD**

***Femtolaser assisted LASIK versus  
Laser Assisted Subepithelial Keratectomy for the  
Correction of High Myopia and Astigmatism***

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## FA-LASIK v/sLASEK

In the 21-year history of laser refractive surgery, 2 primary approaches to refractive error correction have developed:

- LASIK (Microkeratom v/s FemtoLASIK)
- Surface ablation (PRK, epi-LASIK, LASEK)
- The goal of achieving a more optically perfect ablation still depends on :
  - Appropriate patient selection,
  - High-quality wavefront data,
  - Successful surgery,
  - Accurately predicting and managing the changes that occur during healing.

**The Corrective Refractive Procedures preferences is dependent on:** Safety Index, Efficacy Index, Predictability, Stability of result and Complications.

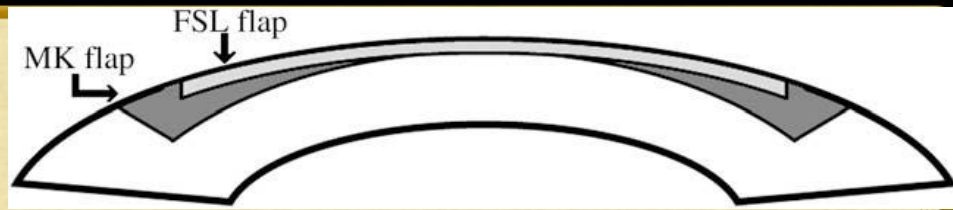
**LASIK offers several theoretical advantages over Surface Ablation, including**

Faster clinical and functional rehabilitation,  
Minimal postoperative pain,  
Reduced central epithelial stromal interactions and subepithelial scarring,  
Reduced need for prolonged steroid therapy,  
Absence of postoperative epithelial defects,  
Possibly reduced risk of infectious keratitis,  
Less irregular astigmatism and fewer central islands,  
Minimal regression or progression of the refractive change, and stable refraction with reasonably predictable outcomes occurring much earlier after surgery.



# FA-LASIK

- ♦ More predictable flap thickness.
- ♦ An insignificant increase in higher-order aberrations after flap creation,
- ♦ Better uncorrected visual acuity (UCVA), and
- ♦ Decreased epithelial injury relative to mechanical microkeratomes.
- ♦ Use of a thinner flap results in a more biomechanically stable cornea and decreases incidence of ectasia given the thicker residual stroma.
- ♦ The software controls the planned flap diameter and thickness, angle of the side cut, hinge size and location, and all energy settings to create the flap.
- ♦ Femtosecond laser for LASIK seems to be better, considering the improvement in CS and to avoid the negative effect on visual performance found after standard LASIK



## Femtosecond laser Flap-complications:

- ♦ **Decentred flap**, which is usually attributed to surgical error,
- ♦ **Suction loss** leading to incomplete or irregular flap
- ♦ **Opaque bubble** layer,
- ♦ Anterior chamber bubbles and
- ♦ **Vertical gas breakthrough**.
- ♦ **Epithelial ingrowth** its incidence is less than with mechanical microkeratomes

## Surface Ablation

*Safer for thinner corneas*

*Safer for eyes with pre-existing dry eye*

*Safer for deep set eyes*

*Better for eyes with previous refractive surgery*

*Safer for patients with nystagmus*

*. Safer for patients with extreme anxiety*

*Safer for patients with uncontrolled movements*

- ♦ **Purpose:** To compare the visual and refractive outcomes and higher order aberration changes of FA-CustomLASIK versus Customized LASEK in the treatment of high myopia and astigmatism
- ♦ **Methods:** A prospective comparative case series study comprised 54 eyes of patients with manifest refraction spherical component greater than -6.00 diopters (D) and cylinder components lower than -3.00 D were assigned to 2 groups: 28 eyes were treated with FA-LASIK and 26 eyes with LASEK. Uncorrected visual acuity (UCVA), distant corrected visual acuity (DCVA), higher order aberration(HOAs) changes and complications were evaluated at 1 week, 2, and 6 months postoperation.

### Patient Demography

	FA-Custom LASIK	Custom LASEK	P Value
Number Eye/Patient	28/14	26/13	-
Age Mean±SD	28.29±7.30	26.62±4.20	0.312
Sex Female N(%) Male	20 (71.4%) 8 (28.6%)	24 (92.3%) 2 (7.7%)	0.048
Pre-Op SE Mean±SD (Range)	-6.94±1.36 (-9.75 to -5.00)	-6.81±0.79 (-8.50 to -5.25)	0.673
Pre-Op Cylinder Mean±SD (Range)	-1.41±1.08 (-3.50 to 0.0)	-1.01±0.92 (-3.25 to 0.0)	0.148
Pre-Op Packymetry	552±23	543±22	0.170



**Techniques:** LASEK was performed under topical anesthesia. Static and dynamic pre ablation iris recognition was attempted. After a pre incision of the epithelium with a trephine of 8.5 mm diameter, 0.2 cc of ethyl alcohol 20 % was instilled inside the trephine well and left for 15 to 20 seconds to allow epithelium detachment. This was then lift, detached, and folded at the 12 o'clock position with a modified spatula.

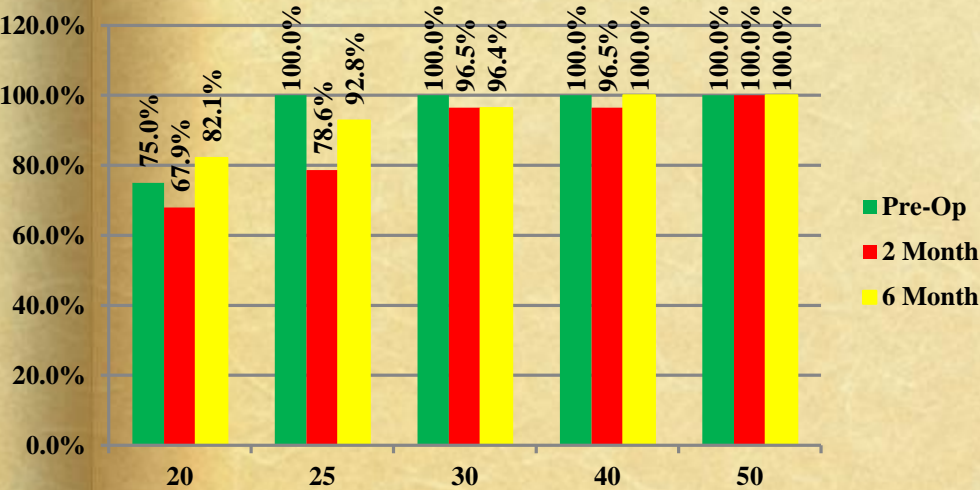
- ♦ Laser ablation was done using Technolas laser 217 Z 100 (Bausch and Lomb). All patients treated with PAT profile (Aspheric algorithm based on the correction at the Q factor and spherical aberration and also, wave front guided ablation profile).
- ♦ FA-Custom LASIK: Thin flap with 110  $\mu\text{m}$  thickness and 9.0 mm diameter created by Femtec femt laser.( Technolas Perfect Vision) Then laser ablation was done using Technolas laser 217 Z 100 (Bausch and Lomb). All patients treated with PAT profile

**Results:** Preoperatively the mean refractive spherical equivalent (MRSE) was  $-6.93 \pm 1.35\text{SD}$  in FA-LASIK group and  $-6.80 \pm 0.79\text{D}$  in LASEK group, at 1 week and 6 months it was  $-0.25 \pm 0.40$  and  $-0.32 \pm 0.44$ ,  $-0.06 \pm 0.78$  and  $-0.04 \pm 0.37$  respectively.

There were no any statistically significant differences in term of UCVA  $P=0.35$ , DCVA  $P=1.0$ , Defocus  $p=0.16$ , Cylinder  $p=0.99\text{D}$ , HOA changes  $p=0.22$ , safety index  $p=0.35$ , efficacy index  $p=0.13$ , and gained 1 line or more of DCVA in all post operation visits between groups.

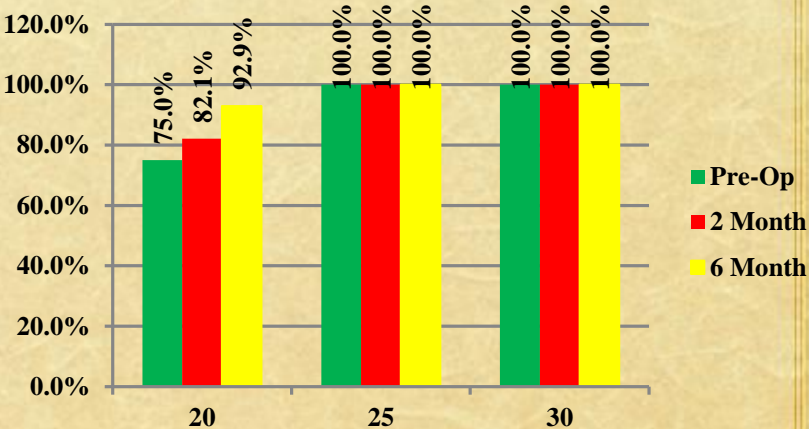
Spherical aberration was increased significantly in LASEK group  $p=0.03$ .

Cumulative Pre Operative CDVA and Post Operative UDVA in FA-Custom LASIK Group; Efficacy

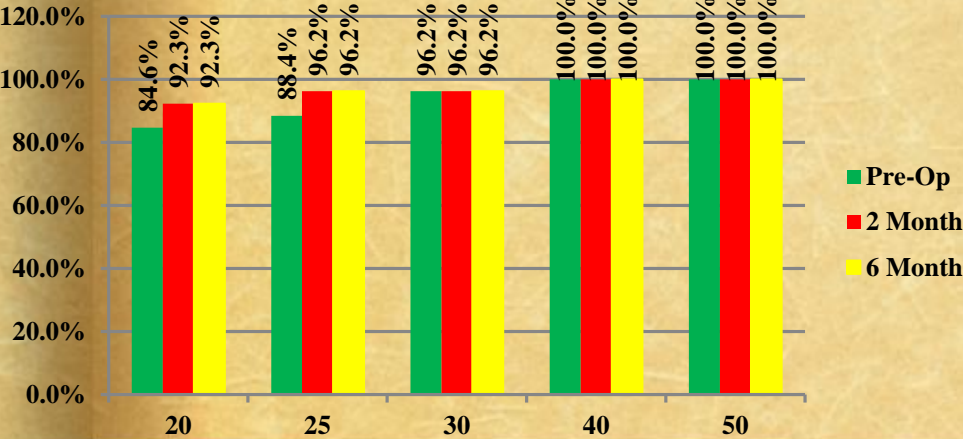


	FA-Custom LASIK	Custom LASEK
Safety	1.038	1.042
Efficacy	99.88%	102.68%

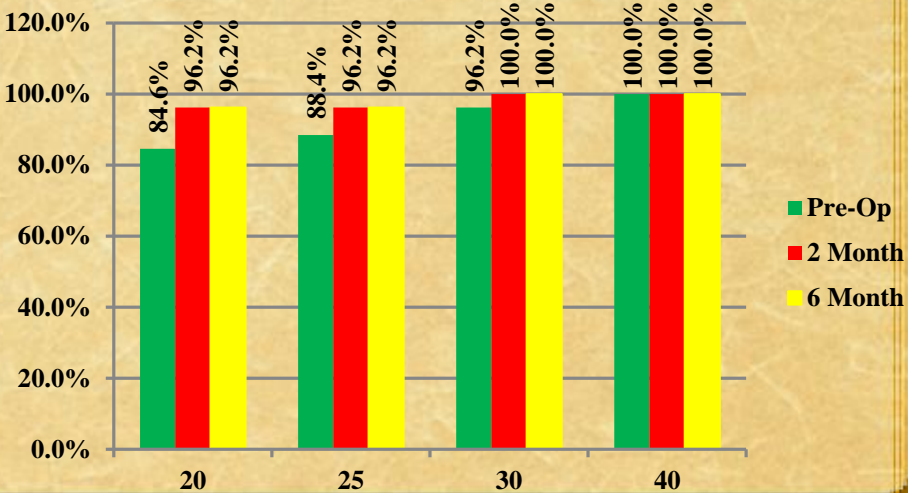
Cumulative Pre and Post Operative CDVA in FA-Custom LASIK Group; Predictability



Cumulative Pre Operative CDVA and Post Operative UDVA in Custom LASEK Group; Efficacy

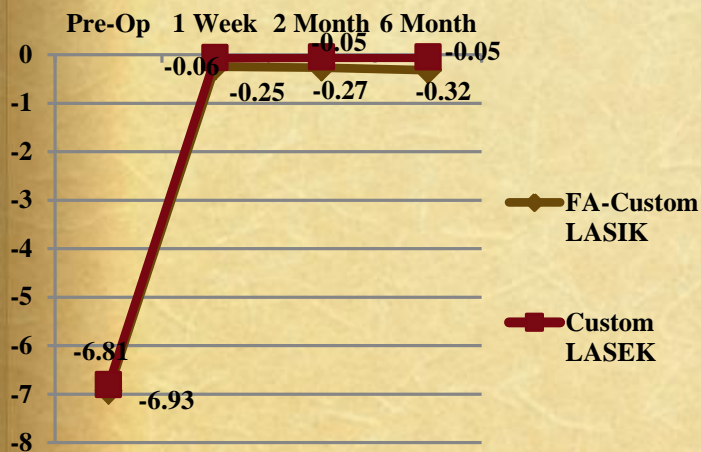


Cumulative Pre and Post Operative CDVA in Custom LASEK Group; Predictability

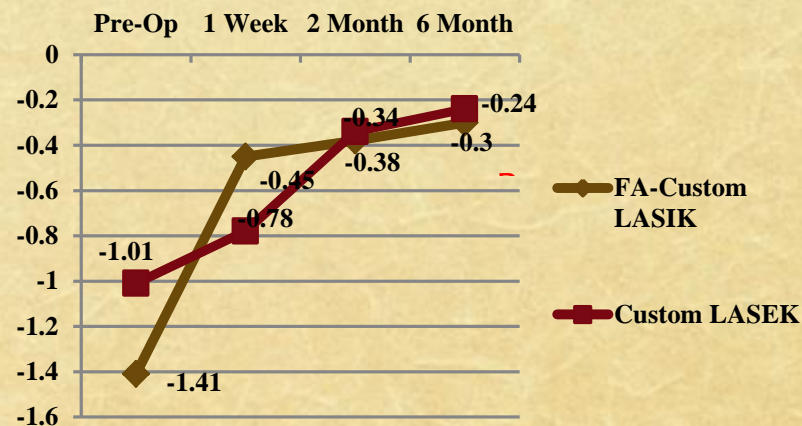




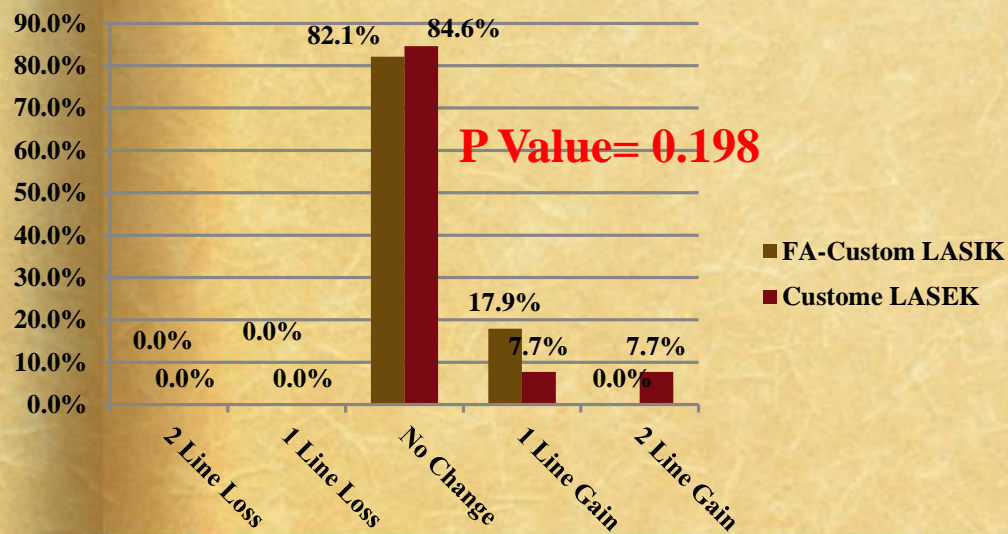
## Stability of Refraction



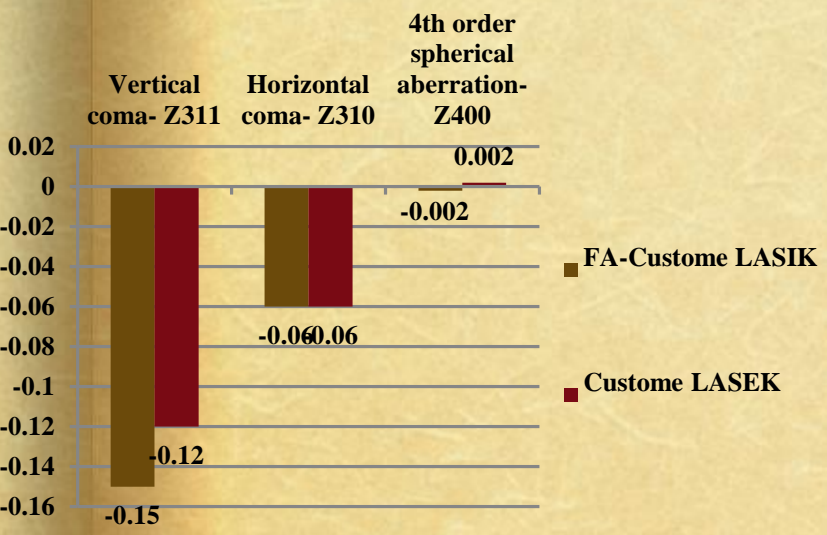
## Stability of Cylinder



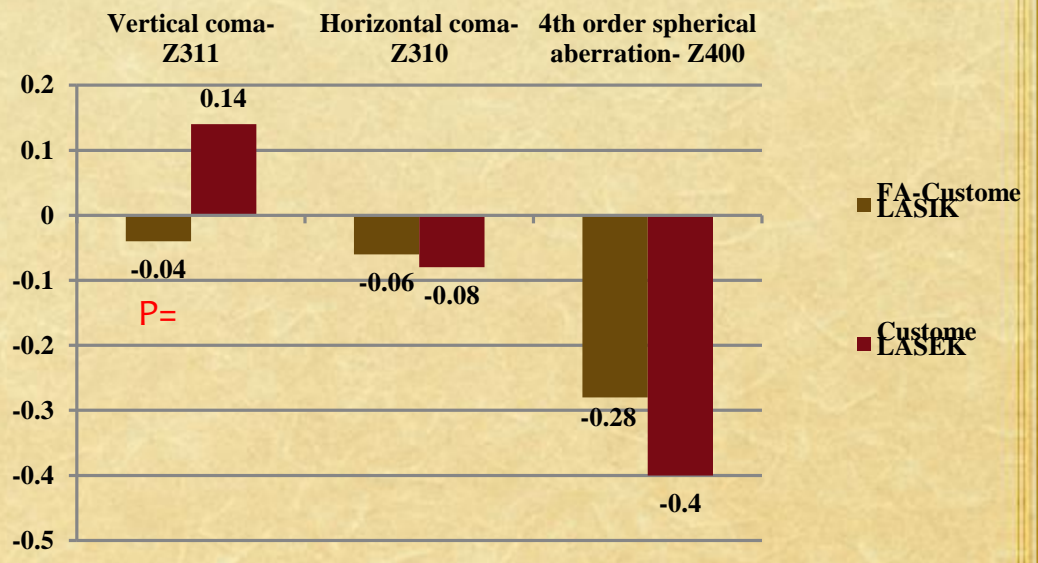
## 6 Month Loss and Gain Line in BDVA



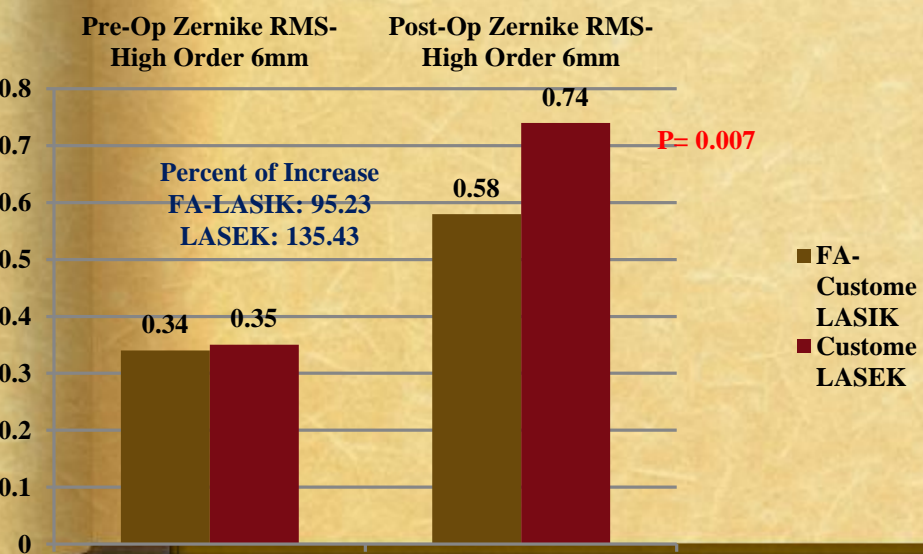
Pre Operative Aberrometric Data



Post Operative Aberrometric Data



Pre and Post Operative HOA



Diff of	FA-Custom LASIK	Custom LASEK	P Value
Vertical coma- Z311	-0.11	-0.26	0.025
Horizontal coma- Z310	0.002	0.012	0.910
4th order spherical aberration- Z400	0.28	0.41	0.002



- ♦ **Discussion:** There were no any statistically significant differences in term of UCVA  $P=0.35$ , DCVA  $P=1.0$ , Defocus  $p=0.16$ , Cylinder  $p=0.99$ D, HOA changes  $p=0.22$ , safety index  $p=0.35$ , efficacy index  $p=0.13$ , and gained 1 line or more of DCVA in all post operation visits between groups. Spherical aberration was increased significantly in LASEK group  $p=0.03$ .
- ♦ Visual recovery is faster following femtolasar assisted laser-assisted in-situ keratomileusis (LASIK) than LASEK. There were no visually significant corneal haze in LASEK group and flap related complication.
- ♦ **Conclusion:** Both customized FA-LASIK and LASEK were safe and effectively treated eyes with high myopia and astigmatism.