

Cross cylinder Challenging cases and their resultswith Nidek Quest (EC-5000)

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Abstract: Introduction: In the past, refractive surgeons were not able to correct cylinder above 3 diopters with LASIK (Unsmooth ablation pattern, Unpredicted results and Under correction Cross cylinder was used years ago to smoothen the ablation patternn by splitting the cylinder correction into (central myopic and peripheral hyperopic). **Aim of The Work:** To asses optical result of cross cylinder correction based on final fit software using nidek quest excimer laser machine. **Materials and Methods:** A 50 eyes of 30 patients, 17 males, 13 females Age (22 – 40) yrs old Sphere (-0.25D to -7.50D) Cylinder (-3.0 D to -5.50D) with stable refractionhaving moderate-to-highastigmatism to undergo LASIK by cross-cylindermethodusing a NIDEK EC-5000 (NIDEK Co, Ltd, Gamagori, Japan) excimer laser with repetition rate of 40 HZ (v 1.26 w). All surgeriesnwereperformed at the EYE CARE CENTER maadi cairo Egypt. **Results:** The postoperative UCVA 32 eyes (64%) 6/6, 12 eyes (24%) 6/9, 4 eyes (8%) 6/12, 2 eyes (4%) 6/1838 eyes reached their pre-op BCVA 8 eyes gained 1 line, 2 eye deteriorated 1 line, 2 eye deteriorated 2 lines. Mean preoperative cylinder was -4.69+/-0.90 diopters (D) (range: -3.00 to -5.50 D), which decreased to -0.30+/-0.40 D (range: 0.00 to -1.20 D) at last follow-up (P<.001). No cases of post-operative astigmatic regression or corneal haze were observed. **Conclusion:** Correcting high astigmatism with cross cylinder technique with NIDEK Excimer Laser system is safe, predictable, and improving quality of vision. [Gamal Mostafa Abo El Maaty, Mohamed Elmoddather, Mahmoud Ibrahim Ghazy, Mohamed Al-Taher. **Cross cylinderChallenging cases and theirresults with Nidek Quest (EC-5000).** *Life Sci J* 2014;11(9):904-909]. (ISSN:1097-8135). <http://www.lifesciencesite.com>. 134

Key words: Cross cylinder, Nidek Quest (EC-500), Excimer Laser, High Astigmatism.

1. Introduction

Astigmatism treatment has always been a challenge with experience in several surgical procedures. Since the approval of the excimer laser in 1995 significant developments in treating refractive diseases like myopia, hyperopia, and astigmatism have been achieved⁽¹⁾. Cross-cylinder is another technique of interest in astigmatism surgery⁽²⁾. Cross-cylinder flattens the steepest meridian with central cylindrical ablation and steepens the fattened meridian with paracentral ablation⁽³⁾. Subsequently the edge profile and the effective optical

zone are improved⁽⁴⁾. It may result in symmetrical corneal shape, better visual acuity, and less regression⁽⁵⁾. Although there are many studies of the efficacy and safety of cross-cylinder lasik, there are few studies on moderate-to-high astigmatism cases⁽⁶⁾.

In the past, refractive surgeons were not able to correct cylinder above 3 diopters with LASIK because of Un smooth ablation pattern and Unpredicted results⁽⁷⁾.

➤ Cross cylinder was used years ago to smoothen the ablation pattern.

➤ By splitting the cylinder correction into (central myopic and peripheral hyperopic).

➤ So, decreasing excessive ablation in the axis of the cylinder in the central corneal zone, which leads to increasing HOAs.

➤ Proven corneal stability⁽⁸⁾

For example 0.0 / -4.0 x 90=0.0 / -2.0 x 90 & -2.0 / +2.0 x 180

The cross cylinder is divided in to three stages:

1st:hyperopiccylinder, 2nd: Myopic cylinder,3rd: sphere (+ or -)

This can be applied on conventional ttt and OPDCAT ttt, Can be calculated automatically by Finalfit software.

What's new withNidek?

➤ TED (torsion error detection), OTE (online torsion error detection)

➤ TEC (torsion error correction), Cross cylinder associated with OPDCAT (Customized aspherical transitional zone), Offset function of the ablation according to the visual axis, Perfect tracking system, Sparing stromal tissue. By spreading the ablation over a larger corneal area, less tissue is removed. Depending on the correction, up to approximately 60% of corneal tissue can be saved in compariso nwith standard astigmatic correction programs⁽⁹⁾.

➤ there is less regression in cross-cylinder eyes.

➤ The prolate corneal shape produced (without mid peripheral multifocality) explains why these eyes do not lose even one line of best-corrected visual acuity and are free from functional disturbances at night

➤ The symmetric ablation achieved by the cross-cylinder strategy cuts short the extended healing process induced by the sharp transition edges of commonly used ablation patterns⁽¹⁰⁾.

Final Fit - Shot Data Information

Patient Information
 ID: 001463 Sex: M
 Name: Abdel3al, Sayed MO.

Exam Information
 ExamNo: 5 Eye: L
 Measured: 13/2/2010 14:39:17
 Created on: 13/02/2010 15:18:05
 by the Ver 1.13 (build 1.13.0.0)
 (07E7-00FD03-FE80-1110-1111-0102)

Ablation Mode: Spherical (Manual Setting)

Pre Op.
 K1/K2: 43.32D / 47.14D
 Pachymetry: 534 µm
 PDist(x,y): (0.06mm, 0.17mm)
 MDist(x,y): (0.14mm, 0.15mm)

Refractive Powers
 VD: 12.00 mm Sph.(D) Cyl.(D) Axis(deg)
 Manifest Ref. n/a n/a n/a
 Objective Ref. -4.947 -5.750 19

Offset ShotData
 Ratio of tracking offset to PDist: 80%
 Use MultiPoint ----- CPA On

Stage Settings
 1. Myopia, S: -6.500, C: -3.000, A: 15, O: 6.00, T: 7.00
 2. Hyperopia, S: 0.000, C: +3.000, A: 105, O: 6.00, T: 9.00

Refractive Powers
 Attempt Correction: -6.500 -3.000 15
 Laser Setting: -6.500 -3.000 15

Nomogram
 Physician's ID: (None)
 Nomogram ID: (None)

OZ/TZ(mm)

	Oz	Tz
Sph. Flat	6.00	7.00
Cyl. Steep	6.00	7.00

Result

	Sph.	Cyl.
Number of Scans	161	68
Ablation Depth(µm)	96.6	40.8
Axis(deg)		15
Number of Groups	2	1

Multi Shot Conditions
 Number of Groups: 2
 Area Sizes: 7.00 7.00

ShotData Folder: H:
 ShotData File: Abdel3al_Sayed_001463_0005_L.FFD
 Pupil Image File: Abdel3al_Sayed_001463_0005_L.DAT

pre TED Result: OK Version: 2, 0, 1, 6

NIDEK Final Fit Ver.1.13 OK PRINT

Fig., (1): final fit software of Nidek Quest (E5000).

Cross cylinder Versus Bitoric Ablation

The bitoric ablation does not create the symmetry necessary for obtaining a prolate (and more physiological) cornea. An asymmetric postoperative corneal shape produces optical aberrations. Also, the bitoric ablation pattern is variable and, thus, different for different patients, depending on the magnitude of the sphere and cylinder. This makes it difficult to compare results. Moreover, it is not certain that a bitoric ablation nomogram developed for one excimer laser can achieve equal results when used with another laser⁽¹¹⁾.

Aim of The Work

To assess optical result of cross cylinder correction based on final fit software using Nidek quest excimer laser machine.

2. Materials and Methods

A 50 eyes of 30 patients, 17 males, 13 females. Age (22 – 40) yrs old Sphere (-0.25D to -7.50D) Cylinder (-3.0 D to -5.50D) with stable refraction having moderate-to-high astigmatism to undergo LASIK by cross-cylinder method using a NIDEK EC-5000 (NIDEK Co, Ltd, Gamagori, Japan) excimer laser with repetition rate of 40 HZ (v 1.26 w). All surgeries were performed at the EYE CARE CENTER Maadi, Cairo, Egypt.

The Inclusion Criteria

were stable refraction; astigmatism above 1.50 D; and age between 20–50 years.

Exclusion Criteria

Ocular pathologies; pachymetry less than 470 µm; connective tissue disease; asymmetric astigmatism; and tear film abnormality.

The range of cylinder was from 1.5 D to 5.5 D.

Lasik Parameters

Hyperopic cylinder with 6.5–9.0 mm zone; myopic cylinder with 6.5–7.5 mm zone; and spherical equivalent treated at 6.5–7.0 mm. Under topical anesthesia (benoxinate hydrochloride 0.5%), the flap was created by MORIA N2 microkeratome 8.0 or 9.0 mm optical zone and the laser was used and a bandage contact lens was placed at the end of the procedure after tobradex eye drops was instilled.

Postoperative Care and Data

The outcome in our study was the amount of astigmatism corrected during a 6-month period after surgery. visual acuity measured using a Snellen chart. Topical combination of fluroquonolones and dexamethazone instilled for one week postoperatively and sodium hyaluronate artificial tears eye drops 4 times daily for 3 months.

Results

These are the results for:

- 30 patients, 50eyes
- 17 males, 13females
- Age (22 – 40)yrsold
- Sphere (-0.25D to -7.50D)
- Cylinder (-3.0 D to -5.50D)

The preoperative BCVA was (figure, 2)

- 28 eyes (56%) 6/6
- 16 eyes (32%) 6/9
- 4 eyes (8%) 6/12
- 2 eyes (4%) 6/18

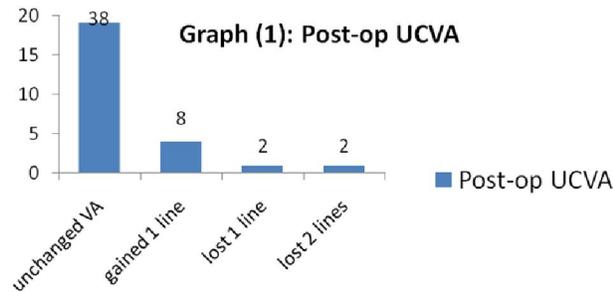
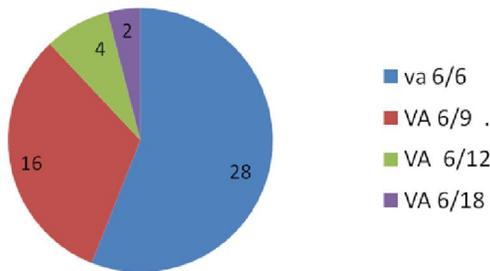


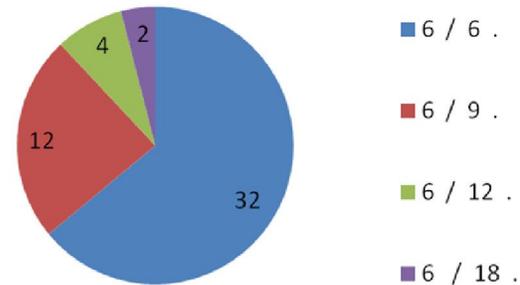
Fig., (2): Pre-op BCVA



The Postoperative UCVA (Figure, 3)

32 eyes (64%) 6/6, 12 eyes (24%) 6/9, 4 eyes (8%) 6/12, 2 eyes (4%) 6/18

Fig., (3): Post-op UCVA

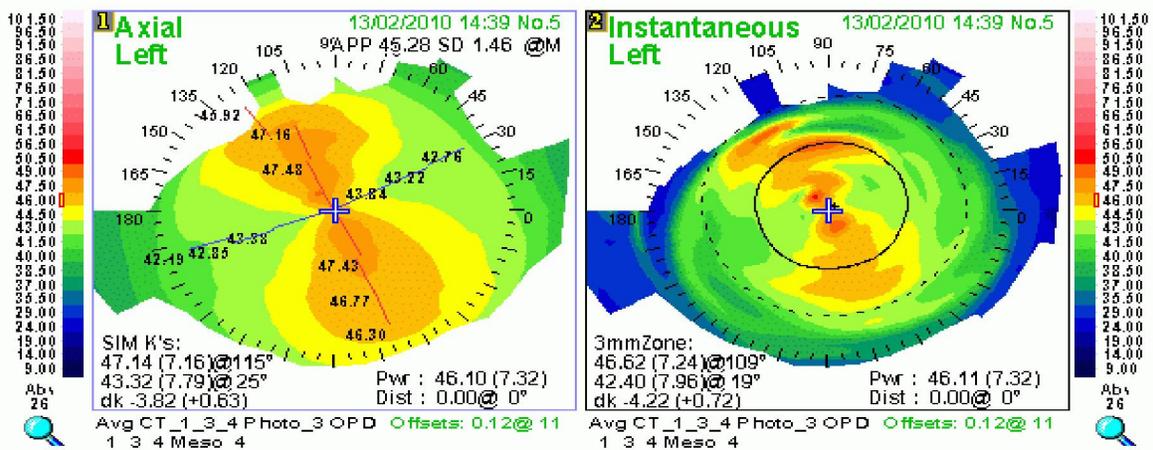


38 Eyes Reached Their Pre-Op Bcva (Graph 1)

8 eyes gained 1 line, 2eye deteriorated 1 line, 2 eye deteriorated 2 lines

Degree of Postoperative Astigmatism

Mean preoperative cylinder was -4.69+/-0.90 diopters (D) (range: -3.00 to -5.50 D), which decreased to -0.30+/-0.40 D (range: 0.00 to -1.20 D) at last follow-up (P<.001).No cases of post-operative astigmatic regression or corneal haze were observed.



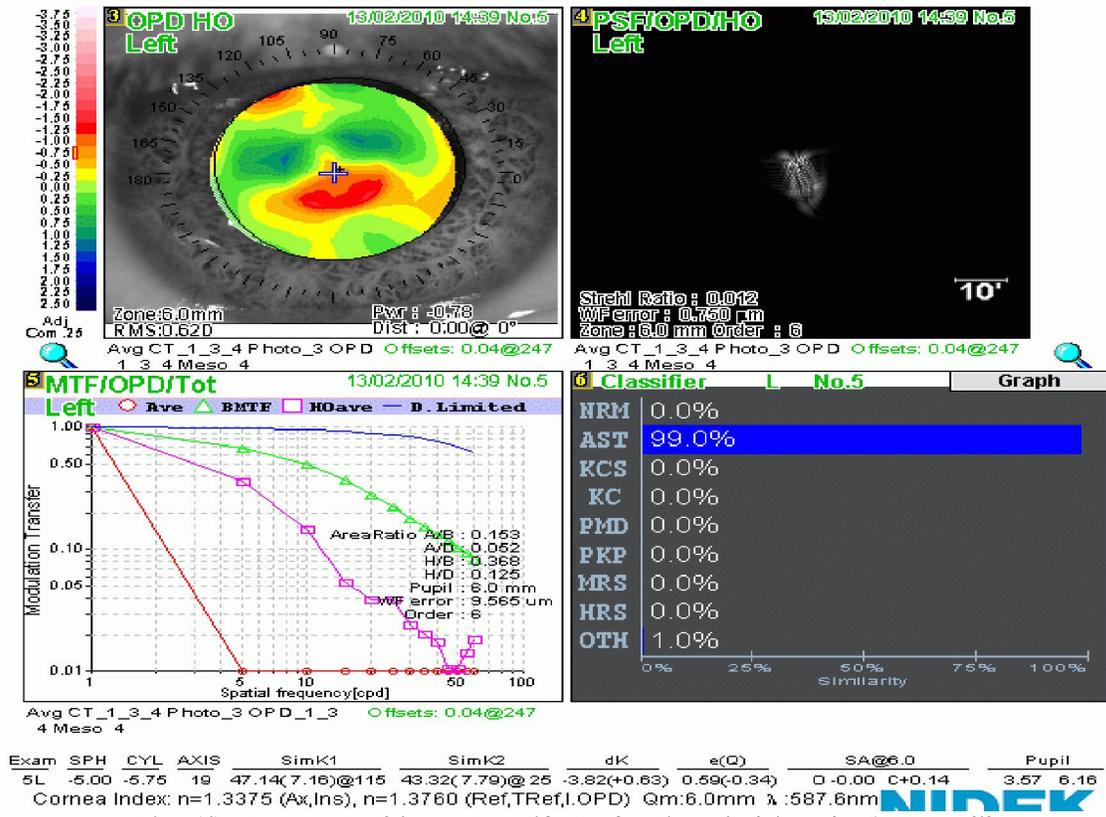


Fig., (4): It eye, male, 34 yrsold manifest refraction: -4.50 / -5.50 x 15bcva: 6/9

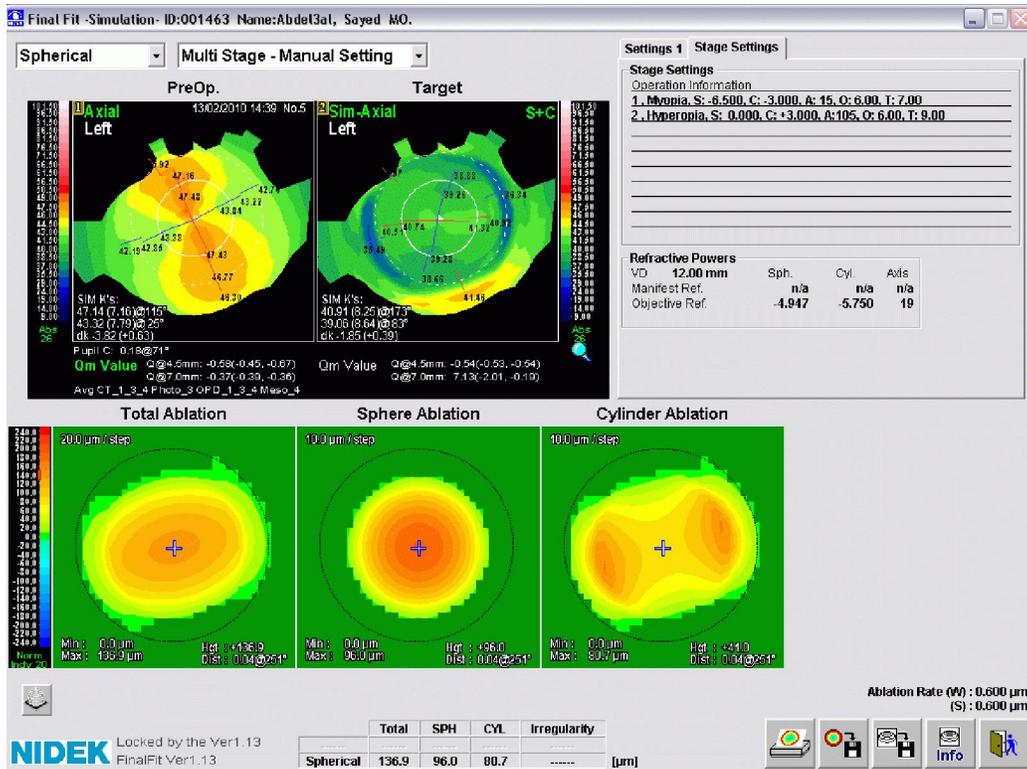


Fig.,(5): final fit treatment parameters of case in figure (4).

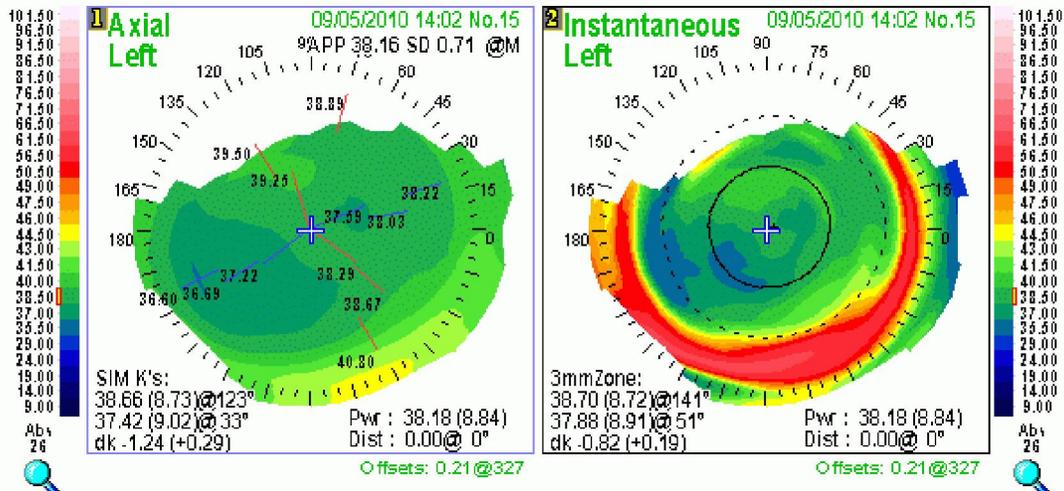


Fig. (6): 1 month post-op ucva 6/6 for case in figure(4).

3. Conclusion

Correcting high astigmatism with cross cylinder technique with NIDEK Excimer Laser system is safe, predictable, and improving quality of vision.

4. Discussion

All authors agree that cross cylinder correction by Nidek E5000 is safe and effective as follows:

Cross cylinder LASIK with the NIDEK EC-5000 excimer laser is a successful procedure for correcting high astigmatism and improving vision⁽¹²⁾.

LASIK with the cross-cylinder technique with NIDEK is safe and predictable for the treatment of patients with astigmatism up to 4.25 D⁽¹³⁾. Cross cylinder LASIK with the Nidek EC-5000 is a successful procedure for correction of high astigmatism. It seems to be clinically safe, effective and predictable⁽¹⁴⁾.

Cross cylinder LASIK with the NIDEK EC-5000 excimer laser is a successful procedure for correcting high astigmatism and improving vision⁽²⁾.

LASIK with OATz and the cross-cylinder technique is safe and predictable for the treatment of patients with astigmatism up to 4.25 D⁽¹⁵⁾.

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