

# Laser in situ Keratomileusis for Astigmatism Greater than -3.50 D With the Nidek EC-5000 Excimer Laser

Alice Handzel, MD; Ninel Kenikstul, MD; Tim Handzel, Cand Med

## ABSTRACT

**PURPOSE:** LASIK with the Nidek EC-5000 excimer laser was used to treat high astigmatism.

**METHODS:** The Nidek EC-5000 excimer laser and ACS microkeratome were used in regular LASIK procedures. Results of 74 eyes with astigmatism of more than 3.50 D and up to 10.00 D were evaluated.

**RESULTS:** With Nidek algorithms, it was possible to eliminate refractive error completely or reduce it to a satisfactory amount, especially in difficult cases of mixed astigmatism with high astigmatic components.

**CONCLUSION:** The Nidek software for mixed and high astigmatism was efficient, predictable, and produced good results in difficult cases of high astigmatism. [*J Refract Surg* 2003;19(suppl):S241-S242]

Nidek (Gamagori, Japan) excimer laser algorithms for correction of refractive errors with low to moderate cylindrical and low to high spherical components have been proven effective and predictable. In our practice we are sometimes confronted with patients with a high cylindrical component. We present selected results of laser in situ keratomileusis (LASIK) for treatment of these patients.

## PATIENTS AND METHODS

Seventy-four eyes with cylinder from 3.75 to 10.00 diopters (D) were treated with LASIK using the ACS microkeratome and the Nidek EC-5000 excimer laser with the DOS-based software. We used Chayet's nomogram for the treatment of mixed

astigmatism and simple myopic astigmatism. The ablation zone diameter was from 5.5 mm with a transition zone to 7.5 mm.

For the treatment of compound myopic astigmatism, we used our own nomograms; 6.5-mm ablation zone to 7.0-mm transition zone depending on pachymetry and pupillometry. In some cases, we reduced these zones to 5.75 to 6.0/6.25 mm, 6.0 to 6.25/6.5 mm, or 6.0 to 6.75 mm in order to save more cornea.

In other procedures using Chayet's nomogram, we also added our own corrections: for hyperopia, -0.50 to +1.50 D correction, depending on the spherical combination, aiming for overcorrection in hyperopic procedures for presbyopia or undercorrection in the myopic component.

For high astigmatic refractive errors, we adjusted the laser settings according to our experience.

Depending on the time elapsed since the last laser maintenance or mirror replacement, we reduced the nomograms for the astigmatic component from 1.00 to 2.00 D to avoid overcorrections.

We evaluated the safety and change of best spectacle-corrected visual acuity (BSCVA), BSCVA over time (stability), and predictability.

## RESULTS

In most cases we treated amblyopic eyes, which did not have BSCVA of 20/20. The mean preoperative BSCVA was approximately 0.6 (20/32 eyes). For this reason we compared preoperative BSCVA with postoperative UCVA and BSCVA.

After 3 months, 43% of eyes had unchanged BSCVA, 8% lost 1 line, 2% lost 2 lines, 36% gained 1 line, and 11% gained 2 lines. After 6 months, 31% of eyes had unchanged BSCVA, 11% lost 1 line, 3% lost 2 lines, 46% gained 1 line, and 9% gained 2 lines. After 12 months, 45% had unchanged BSCVA, 45% gained 1 line, and 10% gained 2 lines. At 12 months after surgery, no eyes had lost lines of BSCVA.

From the Laserklinik fuer medizinische Behandlungen, Frankfurt, Germany.

Presented at the Eighth Annual Nidek International Excimer Laser Symposium, December 6-7, 2002, Shanghai, China.

Correspondence: Alice Handzel, MD, Laserklinik fuer medizinische Behandlungen, Ziegelhuettenweg 1-3, 60598 Frankfurt, Germany. Tel: 49.69.612020; 49.69.612060; Fax: 49.69.626700



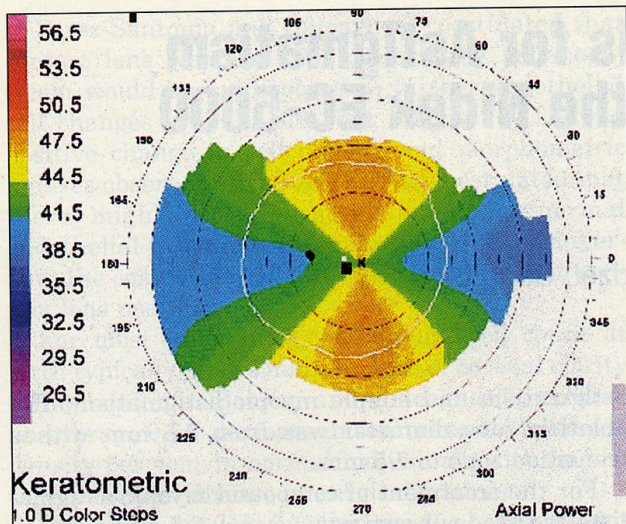


Figure 1. Preoperative corneal topography OD.

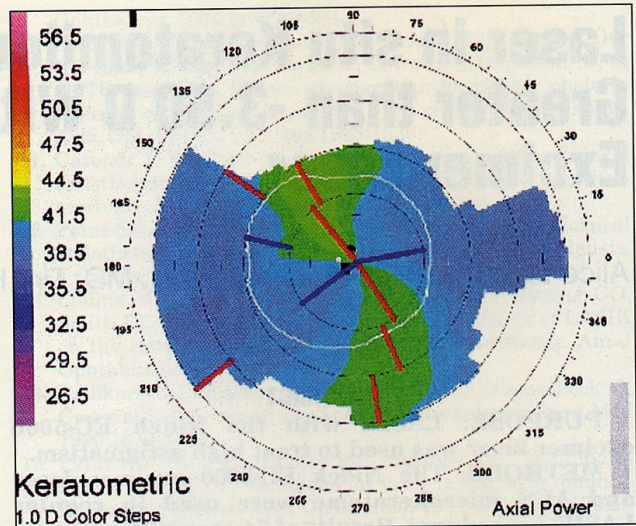


Figure 2. Postoperative corneal topography OD.

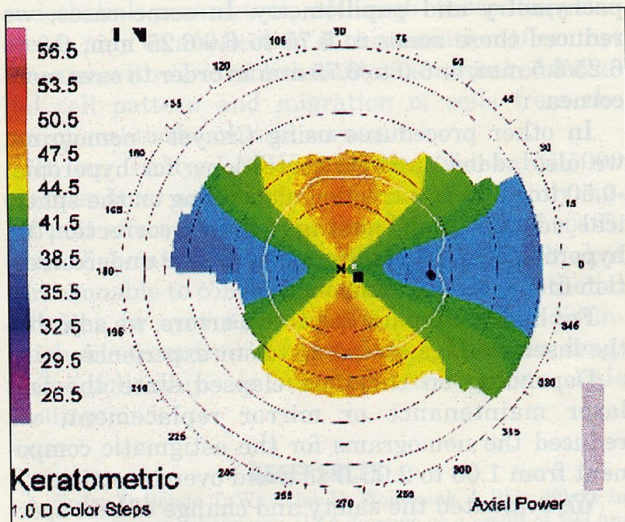


Figure 3. Preoperative corneal topography OS.

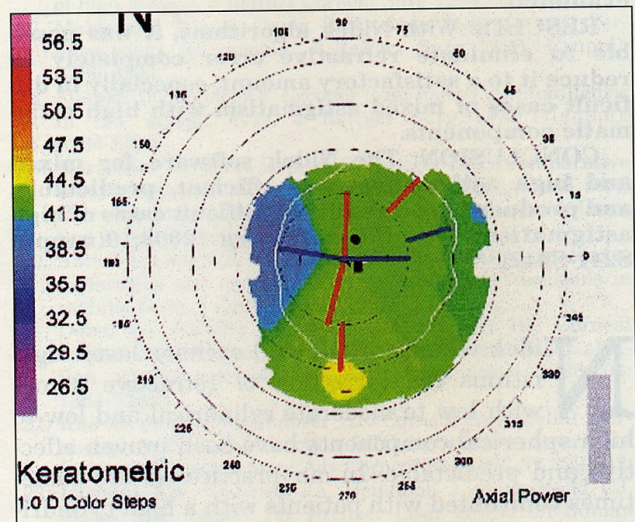


Figure 4. Postoperative corneal topography OS.

**Case Report (Patient M, 34 years old)**

Preoperative refraction was OD = +1.25 cyl -10.0 x 180° for a BSCVA of 0.5 (20/40). The laser setting OD was 0/cyl +3.6/Axis 90°; 0/cyl -6.4/Axis 180° (Fig 1). Six months after LASIK, uncorrected visual acuity was 0.5 (20/40) with plano/cyl -2.00 Axis 30° for 0.55 (0.6 pp) (20/36) (Fig 2).

Preoperative refraction was OS = +1.75 cyl -10.0 x 180° for a BSCVA of 0.5 (20/40) (Fig 3). The laser setting OS was 0/cyl +4.35/Axis 90°; 0/cyl -5.65/Axis 180°. Six months after LASIK, uncorrected visual acuity was 0.55 (0.6 pp) (20/36) with plano/cyl -0.75 Axis 165° for 0.8 (20/25) (Fig 4).

**DISCUSSION**

LASIK for correction of high astigmatism using the Nidek EC-5000 excimer laser with Chayet's nomograms proved effective, predictable, and safe. A gain in BSCVA in a large percentage of eyes, as well as a gain in UCVA in many cases was observed. This procedure is well-suited for patients with anisometropia, amblyopia, contact lens intolerance, or when correction with spectacles is not satisfactory. Considering the problems with spectacle and contact lens correction that patients such as these often experience, our surgical results were good and patient satisfaction was high. Surgical results for high astigmatic eyes stabilized slower than those for low astigmatic procedures.