Central Corneal Thickness in Indian Patients Undergoing LASIK for Myopia

To the Editor:

Measurement of corneal thickness is essential prior to laser in situ keratomileusis (LASIK); it helps in determining the thickness of the central cornea and the amount of corneal tissue available for a safe and effective corneal stromal ablation.1

We measured central corneal thickness of patients who had come to us for LASIK for myopia. Patients were 18 years of age or older with spherical myopia up to -20.00 diopters (D) with cylinder of 3.00 D or less, and a stable refraction for at least 1 year. Ultrasound pachymetry was evaluated using the Corneal Scan II (Storz Instruments Company, St. Louis, MO). After instillation of a drop of 0.5% proparacaine, the Corneoscan probe was placed perpendicularly on the central cornea. Three readings were obtained and averaged. Computerized pachymetry and automated keratometry data presented in this report were obtained from the videokeratography performed with the Orbscan scanning-slit topography/pachymetry instrument (Orbtek Inc., Salt Lake City, UT). The central pachymetry value depicted on the thickness map of the Orbscan was noted.

The eyes were divided into three groups according to preoperative spherical equivalent refraction. Group I contained eyes from -0.50 to -4.90 D; group II, -5.00 to -9.90 D; and group III, -10.00 D and greater. Double data entry and verification of data were performed. Calculated descriptive statistics were tabulated by mean and standard deviation (SD). Analysis was performed for all eyes included in this report, as well as a separate analysis of central corneal thickness. One-way analysis of variance followed by Scheffe’s multiple range test were applied to evaluate differences in distribution of central corneal thickness in the three groups.

One thousand two hundred and fourteen eyes of 615 patients, all of Indian origin, were evaluated. There were 415 females (67.5%) and 200 males (32.5%) with a mean age of 25 ± 5.8 years. The mean central corneal thickness (pachymetry) was 519.92 ± 33.36 μm with a range of 420 to 640 μm for all eyes using the ultrasound method and 518.23 ± 31.03 μm with a range of 428 to 607 μm using the computerized method (Orbscan) (Table). Lower thickness readings were observed in group I when compared to eyes in groups II and III (P<.05) for both pachymetric methods. The mean keratometric power measurements were 44.16 ± 1.46 D (range 39.87 to 48.62 D) for the manual method and 43.48 ± 1.52 D (range 36.9 to 48.35 D) for the computerized method for the overall patient population. Both keratometric measurements negatively correlated with the central pachymetric measurement (r=0.10; P<.05).

Our major finding was a lower mean corneal thickness of 518.23 to 520 μm in Indian patients compared to that reported in the literature in different populations. The largest reported series on corneal thickness in North American patients by Price and colleagues showed an average corneal thickness of 550 μm in 896 eyes undergoing LASIK for myopia and myopic astigmatism.2 Kawesch and Kezirian mention a mean central thickness of 548 μm, evaluating 290 eyes of North American high myopia patients (−9 to −22 D) who underwent LASIK.3 Similarly, Copt and colleagues presented a mean thickness of 556 μm in a relatively homogeneous group of normal eyes in European Caucasians.4 A meta-analysis of data on central corneal thickness reported a group average of 534 μm in normal eyes.5 All the aforementioned studies report pachymetry readings that were higher by 20 to 38 μm for caucasion when compared to our population of Indian patients.

Previous studies comparing ultrasound pachymetry and Orbscan pachymetry have reported higher values than the ultrasonic method, unlike ours that did not show any significant difference.6 This may be attributed to the fact that our Orbscan was set at default, to correct for pre-corneal tear film thickness.

Lower corneal thickness values in Indians could be a limitation for full correction of higher myopia.

| Table |
| Central Corneal Thickness (μm) in Indian Myopes |

<table>
<thead>
<tr>
<th></th>
<th>All Eyes</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
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<tbody>
<tr>
<td>Ultrasound</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>519.92</td>
<td>516.02</td>
<td>521.55</td>
<td>522.11</td>
</tr>
<tr>
<td>SD</td>
<td>33.36</td>
<td>32.90</td>
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<tr>
<td>Min</td>
<td>420</td>
<td>420</td>
<td>445</td>
<td>464</td>
</tr>
<tr>
<td>Max</td>
<td>640</td>
<td>589</td>
<td>640</td>
<td>586</td>
</tr>
<tr>
<td>Orbscan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>518.23</td>
<td>516.41</td>
<td>519.29</td>
<td>523.09</td>
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<tr>
<td>SD</td>
<td>31.03</td>
<td>31.34</td>
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<td>Min</td>
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<tr>
<td>Max</td>
<td>607</td>
<td>605</td>
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<td>596</td>
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*P<.05 (Analysis of variance followed by Scheffe’s multiple range test)
and therefore we may have only partially corrected a number of patients with high myopia. We limited laser ablation to leave a residual stromal thickness of at least 250 μm. Using a 160-μm flap, we were left with approximately 110 μm of tissue to ablate. This allowed us to fully correct myopia of less than -9.00 D with an ablation zone of 5 mm. At present, we aim to leave at least 300 μm of residual corneal bed after ablation to avoid keratectasia after LASIK, which has been reported even when 250 μm of stromal bed remains. Redefined treatment algorithms and upgrades of laser technology may help to overcome this limitation in the future.

REFERENCES

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Bilateral Mycobacterium chelonae Keratitis Following LASIK

To the Editor:
A 30-year-old woman underwent bilateral LASIK for myopia. Her best spectacle-corrected visual acuity was 6/6 with OD -6.50 -1.50 x 130° and OS -6.50 -1.50 x 30°. A 1x2-mm white infiltrate was noted at the flap-stromal interface of the right eye at her routine 2-week postoperative examination. She was asymptomatic with a visual acuity of 6/5 in each eye. Ofloxacin drops were increased and topical PredForte reduced. Two days later she developed pain and photophobia in her right eye together with a flap melt over the infiltrate. A 1x1-mm white infiltrate was noted at the left eye flap-stromal interface. Management included bilateral flap lift, corneal scrape, irrigation with 0.1% vancomycin followed by hourly topical vancomycin and fusidic acid ointment. Scrapes from both eyes revealed pus cells and Gram-positive bacilli. Two days later she presented with reduced vision in both eyes, bilateral infiltrates, fibrinous exudates, and hypopyon.

She was referred to Moorfields Eye Hospital with visual acuity of count fingers in the right eye and hand movements in the left. Epithelial defects, multiple branching subepithelial infiltrates extending into the stroma, keratic precipitates, and hypopyon were noted in both eyes. She was in severe pain and was extremely photophobic. Her medication included topical PredForte hourly, ofloxacin every 4 hours, fusidic daily, tobramycin daily, cyclopentolate twice daily, and oral cyclosporin 300 mg daily. In the presence of high dose topical corticosteroids and antibiotics, the clinical appearance appeared consistent with the initial diagnosis of infectious crystalline keratopathy.1

Treatment was stopped for 24 hours and corneal scrapings were taken. She was started on hourly topical cefuroxime, topical gentamicin forte, topical econazole, and oral fluconazole 200 mg daily. Gram stain from both eyes showed large numbers of beaded gram-positive rods that were initially reported as corynebacteria, but re-examination with an auramine stain 2 days later demonstrated mycobacteria. Both LASIK flaps were removed under topical anesthetic and sent for microbiology and histopathology. Her symptoms improved after flap removal.

Mycobacterium chelonae was isolated from all specimens and was sensitive to amikacin and ciprofloxacin. Hourly topical amikacin and topical ciprofloxacin led to a dramatic resolution of the hypopyon and reduction in the number of infiltrates. Full epithelialization occurred over 8 days. At 2-month follow-up, visual acuity was at 1/36 in her right eye and 1/60 in her left.

Infection after LASIK is rare, with a reported incidence of 1 in 5,000 to 10,000 procedures.2 Nonmicrobial diffuse lamellar keratitis (DLK), however, is not uncommon and resolves with frequent topical corticosteroids. This patient initially