Ectasia Risk Factors: Lessons Learned

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No financial interests

Post-Laser Vision Correction Ectasia: Comparison of Patients With Normal Preoperative Topography and Patients With Abnormal Topography

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Purpose:
To examine and analyze the characteristics of a large series of unpublished post-laser vision correction ectasia patients, and compare those with normal preoperative topography in both eyes to those with abnormal topography in one or both eyes

Methods:
- Retrospective chart review: multi-center, multi-surgeon
- 50 ectasia eyes of 36 unpublished patients, complete records available
- Data collected and analyzed:
  - patient age and medical history
  - pre-op refractive error
  - pre-op Orbscan topography
  - pre-op pachymetry
  - surgical procedure performed
- Each patient scored with Randleman and Groden ectasia risk score systems

Control group: no ectasia
- 59 consecutive patients presenting for enhancement surgery
- s/p mechanical microkeratome lasik, 5-12 years

Results

<table>
<thead>
<tr>
<th></th>
<th>Ectasia</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (pts)</td>
<td>36</td>
<td>59</td>
</tr>
</tbody>
</table>
| Age (yrs, µ)     | 30.8    | 38.1    | p<0.0001
| (myopes 30.6)    |         | NS      |
| SE (µ)           | -2.99   | -3.07   |
| Preop pach (µ)   | 515     | 546     | p<0.0001
| Pach < 500       | 11/36   | 10/59   | NS p=0.13
Results: Ectasia Patients

- 36 patients (ectasia in 50 eyes)
- Age at time of surgery: 21-56 years (mean: 30.8 years)
- Male: 20  Female: 16
- Preop refractive error: myopia, 35 patients
  hyperopia, 1 patient
- Lasik: 33 (4 IntraLase, 29 mechanical microkeratome) patients
  PRK: 3 patients
- Unilateral ectasia: 22 /36 patients
- Bilateral ectasia: 14 /36 patients
- Preop keratometry (K’s) > 47 D: 0 patients

Ectasia Patients: Topography

- Normal topography, OU: 15 patients (42%)
  ectasia in 1 eye: 12 patients
  ectasia OU: 3 patients
- Abnormal topography, 1 or both eyes: 21 patients
  8 patients: abnormal topo in 1 eye only
  ectasia in abnormal topo eye: 5 patients
  ectasia OU: 3 patients
  ectasia in “contralateral” eye: 6 patients
  13 patients: abnormal topo OU
  ectasia OU: 8 patients
  ectasia in 1 eye only: 5 patients

Normal Topo        Abnormal Topo

Ectasia OU         3 /15 patients   11/21 patients

p = 0.04

“When correctly viewed every thing is lewd…”

Smut
Tom Lehrer
Normal Topo | Abnormal Topo
---|---
Age, preop (yrs, μ) | 31 | 31
PRK (pts) | 1 | 2
Preop pach (μ) | 501 | 524, p=0.0058
Pach < 500 | 6/15 (40%) | 5/21 (24%), p=0.46
Orbscan pach pattern | ns | ns
RSB adequate | 100% | 100% of measured
RSB inadequate | 100% | 100% of calculated
No RSB measured | 67% | 77%

Flap thickness in eyes with ectasia after laser in situ keratomileusis.
Randleman JB, Heibson CB, Larson PM.
"Measured central flap thickness was not thicker than estimated in most eyes developing ectasia after LASIK. Thus, excessively thick flaps do not appear to be a major contributing factor to the pathogenesis of ectasia after LASIK."
### Refractive error

<table>
<thead>
<tr>
<th>SE (D)</th>
<th>Normal Topo</th>
<th>Abnormal topo</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3</td>
<td>15/30 eyes (50%)</td>
<td>19/42 (45%)</td>
<td>0.81</td>
</tr>
<tr>
<td>-3 - 6</td>
<td>8/30 (27%)</td>
<td>17/42 (40%)</td>
<td>0.32</td>
</tr>
<tr>
<td>-6 - 8</td>
<td>4/30 (13%)</td>
<td>6/42 (14%)</td>
<td>1.00</td>
</tr>
<tr>
<td>&gt; 8</td>
<td>2/30 (7%)</td>
<td>2/42 (5%)</td>
<td>1.00</td>
</tr>
<tr>
<td>&lt; -6</td>
<td>23/30 (77%)</td>
<td>36/42 (86%)</td>
<td>0.36</td>
</tr>
<tr>
<td>&gt; -6</td>
<td>6/30 (20%)</td>
<td>8/42 (19%)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

### Conclusions

- Corneal ectasia occurs in eyes with normal preop topography. 42% of ectasia patients in this series had normal topography in both eyes.

- Ectasia patients with normal preop topography compared to ectasia patients with abnormal topography in one or both eyes did not differ with respect to age, refractive error, or preop pachymetry < 500 microns, but their average preop pachymetry was significantly less.

### Analysis of the Groden Strike Point System and Randleman Ectasia Risk Score System: Review of 50 Post-Laser Vision Correction Ectasia Cases

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2. University of South Florida Dept of Ophthalmology Tampa, FL

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### Control Group (no ectasia, s/p lasik 5-12 years): Risk Scores

<table>
<thead>
<tr>
<th>Risk</th>
<th>Groden</th>
<th>Randleman</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>49/59 pts</td>
<td>41/59 pts</td>
<td>0.13</td>
</tr>
<tr>
<td>moderate</td>
<td>8/59</td>
<td>6/59</td>
<td>0.78</td>
</tr>
<tr>
<td>high</td>
<td>2/59</td>
<td>12/59</td>
<td>0.008</td>
</tr>
</tbody>
</table>

Randleman vs Groden high risk scores due to age and pachymetry criteria

### Ectasia Patients (Total): Risk Scores

<table>
<thead>
<tr>
<th>Risk</th>
<th>Groden</th>
<th>Randleman</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>9/36 pts</td>
<td>9/36 pts</td>
<td>1.00</td>
</tr>
<tr>
<td>moderate</td>
<td>7/36</td>
<td>3/36</td>
<td>0.30</td>
</tr>
<tr>
<td>high</td>
<td>20/36</td>
<td>24/36</td>
<td>0.47</td>
</tr>
</tbody>
</table>

### Ectasia Patients (Normal Topography): Risk Scores

<table>
<thead>
<tr>
<th>Risk</th>
<th>Groden</th>
<th>Randleman</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>9/15 pts</td>
<td>9/15 pts</td>
<td>1.00</td>
</tr>
<tr>
<td>moderate</td>
<td>1/15</td>
<td>0/15</td>
<td>1.00</td>
</tr>
<tr>
<td>high</td>
<td>5/15</td>
<td>6/15</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Ectasia Patients (Abnormal Topography): Risk Scores

<table>
<thead>
<tr>
<th>Risk</th>
<th>Groden</th>
<th>Randleman</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0/21 pts</td>
<td>0/21 pts</td>
<td>1.00</td>
</tr>
<tr>
<td>Moderate</td>
<td>6/21</td>
<td>3/21</td>
<td>0.45</td>
</tr>
<tr>
<td>High</td>
<td>15/21</td>
<td>18/21</td>
<td>0.45</td>
</tr>
</tbody>
</table>

Conclusions

- The Groden and Randleman ectasia risk score systems are in good agreement and are useful in evaluating patients for laser vision correction.
- Ectasia occurs in patients with bilateral normal topography. 60% of these patients had a low risk score in each system.
- Both systems may underestimate the risk of post-laser vision correction ectasia in patients with bilateral normal preoperative topography.

Eye Rubbing in Refractive Surgery Patients: Prevalence and Relationship to Corneal Topography

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AAO 2012

Methods

- Retrospective chart review of 214 consecutive laser vision correction patients
- Data collected included age, sex, Orbscan corneal topography, and answer to questions: are you an eye rubber? how often do you rub your eyes?
- Prevalence of eye rubbing and its relationship to normal versus abnormal topography were analyzed.

Results

- Of 214 refractive surgery patients, 81 (38%) rubbed their eyes at least daily
- Of these 81 patients, 72 (89%) had normal topography, 9 (11%) had abnormal topography
- Of 133 non-eye rubbing patients, 120 (90%) had normal topography, 13 (10%) had abnormal topography
- The incidence of abnormal topography in these two cohorts of patients is not significantly different, p=0.81 (Fisher’s exact test).

Conclusions

- A history of eye rubbing is common in refractive surgery patients, occurring in 38% of patients.
- A positive history of eye rubbing is not associated with abnormal topography.

Conclusion

Eye rubbing is common in refractive surgery patients, occurring in 38% of patients. A history of eye rubbing is not associated with abnormal topography.
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- There is still much to be learned about the risk factors for the development of post-laser vision correction ectasia.

- Current risk factors do not completely predict the biomechanical response of the cornea to lvc.

- “Abnormal” topography is an accepted risk factor, but is “in the eye of the beholder.”

- ? Value of tomography (Pentacam/ Belin Ambrosio Display), epithelial mapping (Artemis), corneal hysteresis (ORA, Corvis), OCT, etc.