Refractive outcome after myopic LASIK with a mechanical microkeratome or a femtosecond laser keratome

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No financial interests in any product
Purpose:

- An increased number of myopic enhancements were noted following Lasik with a femtosecond keratome.

- This study was undertaken to refine our nomogram; particularly to differentiate between
  - low myopia vs high myopia
    - spherical equivalent under/over -6.00 Diopters
  - younger vs older patients
    - under / over age 40
Central island and undercorrection with IntraLase
Corneal incisions can create a myopic refractive error

Corneal flattening by shallow circular trephination in human eye bank eyes.


The mean acute central keratometric flattening from the shallow trephine incision was 2.81 D (SD 2.28, P = .017)
Clinical: Edge profile

Microkeratome:
Stepped / beveled

IntraLase:
Sharp edge / steep
METHODS:

- Lasik flaps were made with a Zyoptix XP microkeratome® 140 micron blade (MK) or IntraLase® 130 micron (IL).
- VISX® wavefront guided ablations were done.
- During the study period we treated 1081 eyes in the microkeratome group and 644 eyes in the IntraLase group.
- Small target adjustments were made for age, spherical aberration and cylinder.
- IntraLase was done if preferred by the patient or when recommended by the surgeon, most commonly older patients (over 40) and patients with higher corrections.
- The Refractive Surgical Consultant® was used to analyze all available results at one, three and six months after surgery.
- Statistical analysis was done with two-tailed p value, statistical significance at p<0.05.
## Results:
### Difference between spherical equivalent (SE) outcome and predicted SE outcome with standard deviation (SD)

<table>
<thead>
<tr>
<th></th>
<th>Zyoptix XP</th>
<th>IntraLase</th>
<th>P value</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Sph Eq</td>
<td>St Dev</td>
<td>#</td>
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<tr>
<td><strong>All patients</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1 mo</td>
<td>-0.05</td>
<td>0.41</td>
<td>915</td>
</tr>
<tr>
<td>3 mo</td>
<td>-0.12</td>
<td>0.44</td>
<td>411</td>
</tr>
<tr>
<td>6 mo</td>
<td>-0.16</td>
<td>0.43</td>
<td>333</td>
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*The subsets of under/over age 40 with low myopia showed similar trends

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<tbody>
<tr>
<td></td>
<td>Sph Eq</td>
<td>St Dev</td>
<td>#</td>
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<tr>
<td><strong>High myopia &amp; under 40</strong></td>
<td></td>
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<tr>
<td>1 mo</td>
<td>+0.08</td>
<td>0.52</td>
<td>56</td>
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<tr>
<td>3 mo</td>
<td>-0.04</td>
<td>0.80</td>
<td>23</td>
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<tr>
<td>6 mo</td>
<td>-0.13</td>
<td>0.50</td>
<td>22</td>
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*There were an insufficient number of cases in the over 40/high myopia subset for clinical significance

^Borderline statistically significant
Clinical observations

Hansatome: Gutter usually only visible with manipulation

Intralase: Gutter usually visible with the microscope
IntraLase gutter: depressed scar with pooling of stain
Myopic shift: Zyoptix XP vs IntraLase

Shown are the mean SE outcome
+/- 2 standard deviations

Microkeratome  IntraLase

1 mo  3 mo  6 mo  1 mo  3 mo  6 mo
Zyoptix XP vs IntraLase: over age 40, high myopia*

Initial study with additional cases for 6 months: P=0.0071
(The initial study had an insufficient number of cases in the over 40 / high myopia subset for statistical significance)

Graphs showing:
- **Scattergram 1**:
  - Microkeratome
  - Achieved Sphere (-) Cylinder Format vs Attempted Sphere (-) Cylinder Format
  - +0.24 +/- 0.51

- **Scattergram 1**:
  - IntraLase
  - Achieved Sphere (-) Cylinder Format vs Attempted Sphere (-) Cylinder Format
  - -0.14 +/- 0.71

38 Eyes Presented
46 Eyes Presented
Conclusion:

When compared to the Zyoptix XP microkeratome, IntraLase is associated with a greater average myopic shift and a higher standard deviation. Using these results, adjustments have been made to our treatment nomogram, especially for patients with higher corrections.