Original article:

Corneal densitometry using Pentacam based scheimpflug imaging system: Indian rural population

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Abstract:

Introduction: New Pentacam® / Pentacam® HR software allows customizable and standardized evaluation of corneal densitometry. The main purpose of this study was to measure CSD using Visante™ OCT and its effect on the sSCL selection. The second purpose was to assess the effect of the fitting characteristics of sSCL on the cornea, and how VA is impacted by the choice of fit.

Methodology: 50 random normal participants recruited for assessment (100 eyes). Left and right eyes considered separately. Assessment using corneal densitometry analysis add-on to standard software of Oculus Pentacam Densitometry measurements obtained and expressed in standardized grayscale units (GSU).

Results: For local densitometry analysis, 12-mm diameter area subdivided into four concentric radial zones.

Conclusion: Add-on to standard imaging software allows rapid and objective assessment of corneal densitometry.

Introduction:

Detailed evaluation of cataract density is essential in surgery planning in order to improve visual outcomes and to avoid possible intraoperative and postoperative complications. The Lens Opacities Classification System III (LOCS III) is a subjective evaluation method based on slit-lamp examination. Although this is a cost-effective grading system, interobserver and intraobserver variations influence the reproducibility of the evaluations. The main purpose of this study was to measure CSD using Visante™ OCT and its effect on the sSCL selection. The second purpose was to assess the effect of the fitting characteristics of sSCL on the cornea, and how VA is impacted by the choice of fit.

Materials & methods:

50 random normal participants recruited for assessment (100 eyes). Left and right eyes considered separately. Assessment using corneal densitometry analysis add-on to standard software of Oculus Pentacam Densitometry measurements obtained and expressed in standardized grayscale units (GSU).

Inclusion Criteria:

All patients of both sexes of age group, ≥5 years

Exclusion criteria

- Patients who have undergone any intraocular surgery and/or corneal surgery
- Patients diagnosed with corneal scarring pathology such as infections, dystrophies, trauma, and ectatic conditions like keratoconus
- Contact lens wearers
- Pregnant females
- Systemic conditions
  Diabetes mellitus, multiple sclerosis, uncontrolled hypertension

Results:

Mean Age = 26.32 years
Range = 5 - 70 years

Output expressed in grayscale units (GSU)
GSU scale calibrated by proprietary software, which defines
- minimum light scatter of 0 (maximum transparency)
For local densitometry analysis, 12-mm diameter area subdivided into four concentric radial zones:

- First, central zone 2mm diameter and centered on apex
- Second zone extending from 2mm to 6mm diameter circle
- Third zone annulus extends from 6mm to 10mm diameter circle
- Final zone extending 10mm to 12mm diameter circle

Area Wise Densitometry

**Gray Scale Units (GSU)**

- 0-2 mm: 14.42
- 2-6 mm: 13.02
- 6-10 mm: 13.51
- 10-12 mm: 20.72

Maximum light scatter of 100 (minimum transparency)
### Our Study vs. Belgium Study

<table>
<thead>
<tr>
<th></th>
<th>OUR STUDY</th>
<th>BELGIUM STUDY</th>
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</thead>
<tbody>
<tr>
<td>Total Densitometry</td>
<td>14.54 ± 3.11</td>
<td>19.64 ± 3.82</td>
</tr>
<tr>
<td>Total Anterior Densitometry</td>
<td>17.46 ± 4.27</td>
<td>25.79 ± 5.08</td>
</tr>
<tr>
<td>Total Posterior Densitometry</td>
<td>7.47 ± 2.22</td>
<td>21.91 ± 5.65</td>
</tr>
<tr>
<td>Total Densitometry (0-2 mm)</td>
<td>14.42 ± 2.57</td>
<td>16.73 ± 1.85</td>
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<tr>
<td>Total Densitometry (2-6 mm)</td>
<td>13.02 ± 2.21</td>
<td>15.72 ± 1.91</td>
</tr>
<tr>
<td>Total Densitometry (6-10 mm)</td>
<td>13.51 ± 5.02</td>
<td>21.10 ± 6.75</td>
</tr>
<tr>
<td>Total Densitometry (10-12 mm)</td>
<td>20.72 ± 6.05</td>
<td>27.70 ± 7.49</td>
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### Discussion:

Advances in diagnostic capabilities have been critical to the evolution of refractive surgery, which emerged as a new subspecialty in the early 1980s. Improving imaging methods of the cornea and the anterior segment is related to the continuous need to increase the safety and effectiveness of surgical procedures. Linked to a better selection of candidates for refractive surgery, the development of diagnostic technologies dramatically favored surgical planning capabilities, including personalization of laser ablation treatment and the evaluation of results and complications of these procedures. This knowledge also had an impact on the selection of the type and power of the intraocular lens to be implanted in the cataract surgery. In addition, the treatment of complex cases such as keratoconus, corneal dystrophies and other causes of irregular astigmatism also has developed due to advances in the imaging of the cornea and anterior segment. One of the most important applications of corneal computed tomography relates to the diagnosis of keratoconus and other ectasia diseases of the cornea.

### Conclusion

- Add-on to standard imaging software allows rapid and objective assessment of corneal densitometry
- Values for corneal densitometry measurements
- Standardized platform for further studies and greater use of this analysis in clinical practice and disease conditions
- Significant increase in corneal densitometry with age, was confined to peripheral cornea
- However, need to include larger cohort necessary as more finer details and conclusions can be inferred through large data.

### References:
