Practical Tips: Clinical estimation of optic disc size

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Core concepts

• Estimation of optic disc size is an integral part of the clinical examination of glaucoma.
• Without consideration of optic disc size, cup size and cup/disc ratio are not clinically meaningful parameters.
• There are four methods for estimating optic disc size.
• Measurement of the vertical diameter of the optic disc by means of a continuously adjustable beam of the slit lamp and a magnifying lens provides a rapid and easy estimation of optic disc size.

The degree of optic disc cupping in normal eyes is strongly related to optic disc size. Some large cups within big-sized discs tend to be mistaken as abnormal. On the other hand, some minute cups in small discs may be wrongly considered normal. Estimation of optic disc size is, therefore, an important part of optic nerve examination.

Measurements of the optic disc size made with parametric imaging methods or by planimetry are less subjective (and, consequently, less prone to errors) than clinical examination. Also, these imaging methods and ophthalmoscopic examinations are not interchangeable clinically. Usually it suffices to know whether a given optic disk is abnormally large, medium or abnormally small; this can be achieved relatively simply.

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1. Comparison with illumination area of direct ophthalmoscope. The small illumination area of the Welch Allyn ophthalmoscope (5 degrees) or the medium spot size of a direct ophthalmoscope with three aperture sizes may be used to obtain a rough idea of optic disc size. This circle is placed on the optic nerve head surface: discs contained inside the limits of the illumination area are small (figure 1), whereas discs exceeding them are large.

2. Distance (in disc diameters) between the disc and the fovea. In normal sized eyes, the distance between the disc and the fovea should approximate two and a half disc diameters. The shorter the distance, the larger the disc and vice versa.

3. Area calculation with a slit lamp and a magnifying lens. Use a slit lamp with a continuously adjustable vertical light beam and a scale calibrated in millimetres. Examine with any magnifying fundoscopy lens. Place the slit beam coaxial with the observation axis. Then adjust a narrow beam to the vertical and horizontal diameters of the optic disc using the inner margin of the white Elschnig’s ring. Make at least three measurements. Then multiply the average of these three measurements by the magnification correction of the lens being used. The correction factor for the 60D Volk lens is 1, for the 78 D, 1.11 and for the 90 D, 1.33. Then use a modified formula of the ellipse (area: \( \pi X \text{horizontal diameter} X \text{vertical diameter} \)) to calculate the area of the disc.

References

4. Using the vertical diameter only: to simplify the latter method, the vertical diameter may be used as the only measurement to estimate optic disc size (Figure 2). The European Glaucoma Society guidelines provides a useful table giving measurement ranges of the vertical diameter of the disc for each of the most used lens types and divides those ranges into the three clinically relevant optic disc sizes: small, medium and large (Table 1).

The first two methods are quick but subject to considerable inaccuracy. The third one is perhaps too complex for daily practice. Although any of them may be used at one time or another according to the circumstances, the fourth one (vertical diameter measurement plus table correction) seems to be suitable for standard clinical examination.

REFERENCES

Table 1. Measured vertical diameter of optic disc

<table>
<thead>
<tr>
<th>Disc area</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
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</thead>
<tbody>
<tr>
<td>Disc area</td>
<td>&lt;1.6 mm²</td>
<td>1.6 to 2.8 mm²</td>
<td>&gt;2.8 mm²</td>
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<td>Volk 60 D</td>
<td>&lt;1.65 mm</td>
<td>1.65 to 2.2 mm</td>
<td>&gt;2.2 mm</td>
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<td>78D</td>
<td>&lt;1.3 mm</td>
<td>1.3 to 1.75 mm</td>
<td>&gt;1.75 mm</td>
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<tr>
<td>90D</td>
<td>&lt;1.1 mm</td>
<td>1.1 to 1.45 mm</td>
<td>&gt;1.45 mm</td>
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<td>&lt;1.15 mm</td>
<td>1.15 to 1.50 mm</td>
<td>&gt;1.5 mm</td>
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<tr>
<td>Digital 1.0x</td>
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<tr>
<td>Superfield</td>
<td>&lt;1.45 mm</td>
<td>1.45 to 1.9 mm</td>
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<tr>
<td>Haag Streit Goldmann</td>
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