Introduction:

Options to measure decentration of eye structures and contact lens positions are required especially in toric and presbyopic CL fitting. Mostly, measuring eye-pieces are used for this task. A disadvantage of this method is the dependence of correct alignment to the investigators refractive error. Furthermore, the scales show the correct value for only one magnification directly. Decenterations are also measurable with Placido ring topographers or Scheimpflug cameras. Structures which are located inside the corneal area could be determined very precisely with these devices. Structures outer the limbal region, e.g. SCL-edge, cannot be located. Brücker developed a procedure for measuring decentrations of soft concentric multifocal CL to pupil center. He used contact lenses with central circle engraving. By a virtual measuring tool horizontal and vertical differences between pupil center and CL center could be measured on slit lamp pictures. A problem is the precise definition of the near optic zone and the pupil center.

A novel measuring method was developed, which enables to measure the pupillary decentration and contact lens decentration.

Purpose:

Development of a novel tool to measure the distance between the corneal and the pupillary center as well as between the pupillary and contact lens center based on a photograph of the anterior eye captured with a conventional slit lamp.

Methods:

The novel tool to measure the distances was developed as a double-triangle. To evaluate the center of the pupil, the cornea or the CL, a photograph of the eye was taken with a conventional video slit lamp. Then, the double-triangle was masked on the photograph of the eye. To find the position at least three out of four edges of the double-triangle must touch the edge of the pupil, the cornea and the CL. To determine the difference between the centers, the distance between the double-triangle centers were measured. To evaluate the tool a prospective study by means of a conventional video slit lamp and a SIRIUS - 3D Rotating Scheimpflug Camera & Topography System (Ron Optic) in 20 subjects (50% male; aged 54.9±6.3 years with a range of 45 to 71 years) was conducted. The differences between the pupillary center and the corneal vertex were measured with both devices.

Results:

The pupil decentration by means of the novel tool was measured by OD (0.24±0.13)mm and OS (0.33±0.14)mm and by means of the Rotating Scheimpflug Camera by OD (0.18±0.11)mm and OS (0.21±0.12)mm. Comparing both methods the mean differences were OD (0.06±0.02)mm and OS (0.12±0.02)mm.

Conclusion:

The novel measuring tool combines the advantages of the conventional reticule and software based analyzing tools of modern video topographers. Especially for fitting simultaneous presbyopic contact lenses, the difference between the CL center and pupil center can be visualized and measured more easily. Furthermore, the tool could be used for similar tasks, e.g. measuring intra ocular lens decentration.

References:


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