In vitro comparative optical bench analysis of a spherical and aspheric optic design of the same IOL model.

Abstract:
To analyse objective optical properties of the spherical and aspheric design of the same intraocular lens (IOL) model using optical bench analysis. This study entailed a comparative analysis of 10 spherical C-flex 570 C and 10 aspheric C-flex 970 C IOLs (Rayner Intraocular Lenses Ltd., Hove, UK) of 26 diopters [D] using an optical bench (OptiSpheric, Trioptics, Germany). In all lenses, we evaluated the modulation transfer function (MTF) at 50 lp/mm and 100 lp/mm and the Strehl Ratio using a 3-mm (photopic) and 4.5-mm (mesopic) aperture. At 50 lp/mm, the MTF values were 0.713/0.805 (C-flex 570 C/C-flex 970 C) for a 3-mm aperture and 0.294/0.591 for a 4.5-mm aperture. At 100 lp/mm, the MTF values were 0.524/0.634 for a 3-mm aperture and 0.198/0.344 for a 4.5-mm aperture. The Strehl Ratio was 0.806/0.925 and 0.237/0.479 for a 3-mm and 4.5-mm aperture respectively. A Mann-Whitney U test revealed all intergroup differences to be statistically significant (p < 0.01). The aspheric IOL design achieved higher MTF values than the spherical design of the same IOL for both apertures. Moreover, the differences between the two designs of the IOL were more prominent for larger apertures. This suggests that the evaluated IOL provides enhanced optical quality to patients with larger pupils or working under mesopic conditions.