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Topographic Patterns in Corneas with Keratoconus and Intracorneal Segments Implanted

Institute of Vision, Department of Ophthalmology, Paulista School of Medicine, Federal University of São Paulo, São Paulo, Brazil Carlos G. Arce, Marta Sartori, Mauro S.Q. Campos, Caroline Ferraz, Iane Stilitrano Purpose: Evaluate topographic patterns of curvature and elevation in eyes with keratoconus that underwent intracorneal segments implantation. Methods: With the Orbscan II (B&L, Salt Lake City, USA) statistic area analysis device we assessed the average dioptric profile (quantitative area topography) by measuring the average anterior-mean curvature (in diopters) from the central point and 9 concentric 0.5-mm-width rings with progressively larger diameter in maps centered to the fixation line before and after Kera-Rings (Mediphacos, Belo Horizonte, Brazil) were implanted in eyes with keratoconus. We also used preoperative and postoperative differential maps and differential dioptric profiles in main meridians to study anterior-elevation, anterior-mean, total-mean, keratometric-axial, total-tangential, and total-optical maps.

Results: Findings suggest that changes observed after surgery should not be interpreted as a simple reduction of the cone. Surgery induced a compensation of anterior surface elevation, a flattening of central anterior curvature with relative preservation of its asymmetry, a reduction of the true total corneal power inside a small optical zone, and a steepening of an annular zone around it. Average and meridional dioptric profiles showed a consistent topographic pattern that looks like a central island. All curvature (power) maps showed images that resembled a central dome surrounded by an annular hill just where intracorneal segments were located. Conclusions: Asymmetry of meridians should also be considered together with curvature to plan the surgery. Orbscan II topographic patterns support the theoretic model of a pin-hole-like effect to explain why BCVA improves after intracorneal segments implantation and guide the rationale for modifications proposed to improve surgical results.