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Correction of Vision by Intrastromal Corneal Ring Segments

Essay

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List of abbreviations

BCVA	Best Corrected Visual Acuity
bid	bis in die(Take medication twice a day)
BSCVA	Best Spectacle Corrected Visual Acuity
CE	Conformite Europeene
CH	Corneal Hysteresis
CQ	Clinical Quality
D	Diopters
FDA	Food and drug administration
HDA	Humanitarian Device Approval
ICR	Intrastromal Corneal Ring
ICRS	Intrastromal Corneal Ring Segments
IOLs	Intra Ocular Lenses
K	Keratometry
KC	Keratoconus
LASIK	Laser assisted In situ Keratomileusis
mmHg	millimeters of mercury
mo	month
NSAID	Nonsteroidal Anti-inflamatory Drugs
ORA	Ocular Response Analyzer
P	Pressure
PKP	Penetrating Keratoplasty
PMD	Pellucid Marginal Degeneration
PMMA	Poly Methyl Meth Acrylate
PMNs	Polymorph Nuclear Leucocytes
qid	quarter in die(Take medication four times a day).
SE	Spherical Equivalent
SK	Severe Keratoconus or Steep Keratometry
UCVA	Uncorrected Visual Acuity
US	United State
UV- CXL	Ultraviolet Collagen Crosslinking
VCG	Vacuum Centering Guide
yr	year

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INTRODUCTION

Intrastromal corneal ring segments (ICRS) are small semicircular plastic segments that are inserted, usually under topical anesthesia, into stromal channels outside the central visual axis of the eye to reinforce the corneal stroma. The segments act as passive spacing elements that cause local separation of the corneal lamellae and shorten the arc length of the anterior corneal surface, thus flattening the central cornea.[١-٣] The degree of shortening of the arc length has been found to be proportional to the thickness of the inserts and ICRS are manufactured in various sizes that are combined to suit the characteristics of each patient's corneal disease.[٢,٤]

The aim of ICRS implantation is to improve visual acuity without removing any corneal tissue or touching the central cornea. Advantages of ICRS over other incisional, excisional or ablative refractive surgical techniques include faster and more predictable wound healing, a simpler surgical procedure, the ability to adjust refractive outcome and reversibility.[٢,٥]

ICRS are manufactured by two medical device companies and marketed under the names Intacs® prescription inserts (Addition Technology Inc.) and Ferrara® intrastromal corneal ring segments (Mediphacos).

Intacs®

Intacs® prescription inserts are poly methyl methacrylate segments with hexagonal cross section and thicknesses between ٠,٢٥ mm and ٠,٤٥ mm and an arc length of ١٥٠ degrees. Only ٠,٢٥ mm, ٠,٣٠ mm and ٠,٣٥ mm segments are available in the United States.[١]

Ferrara®

Ferrara® ring segments are made from Perspex CQ (Clinical Quality) Acrylic. They have a triangular cross-section, inner radius of curvature of ٢,٥ mm and flat base with fixed width of ٦٠٠ μm.[٦,٧] Segments are available in thicknesses ranging from ٠,١٥ mm to ٠,٣٥ mm with an apical diameter of ٥ mm and an arc length ranging from ١٢٠ degrees to ١٦٠ degrees.[٨] Ferrara® ICRS have a prism format such that the flat posterior surface faces the corneal endothelium when implanted.[٦]

There are two significant differences between Ferrara® ICRS and Intacs® ICRS. Ferrara® ring segments have a fixed radius of curvature of ٢,٥ mm and a triangular anterior surface, while Intacs® inserts have a variable curvature (٢,٥ mm to ٣,٥ mm) and a flat anterior surface.[٤,٨]

ICRS were originally developed for treating myopia in non-diseased eyes.[٢,٤] Their use was then extended to patients with keratoconus, iatrogenic corneal ectasia resulting from refractive surgery and non-iatrogenic corneal ectasia such as pellucid marginal degeneration(PMD).[١]

Aim of the work

The purpose of this study is to highlight the use of Intrastromal Corneal Ring Segments (ICRS) in correction of vision and ectatic corneal disorders.

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