

## Original article

# CONTACT LENS MANAGEMENT ON IRREGULAR CORNEA. EFFECT OF CONTACT LENSES ON CORNEA.

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### Abstract:

Purpose: Irregular astigmatism due to epithelial irregularities, epithelial and stromal dystrophies or corneal degenerations and ectasias cannot be sufficiently corrected with spectacles, and rigid gas permeable (RGP) contact lenses have become the mainstay of the treatment. This study was designed to find out Relation between lens wear and corneal surface changes, longstanding management of corneal irregularity with contact lenses without disturbing the corneal health.

Method: Study design Retrospective case evaluation which was approved by NHL Institutional Review Board. The study was conducted according to tenets of Declaration of Helsinki. Considering proportion of subjects with positive changes in follow-up visits to be 60% for study power of 80% we need sample size of 100 subjects. Total 121 eyes of 98 subjects enrolled in the study. where 54%(53) were male and 46%(45) were females, among all 55 keratoconus, 5 keratoglobus, 14 PMD, 17 Post LASIK, Post trauma, 18 Post PK and 3 Epithelial irregular corneal astigmatic eyes were fitted with suitable different types of contact lenses. Among keratoconus total 42(76.36%) and all 5(100%) keratoglobus subjects underwent corneal collagen cross linking with riboflavin at least one year before lens trials. Among post LASIK ectasia subjects all diagnosed with corneal irregularities at least 12 month before lens trials, 12(70%) of them underwent post LASIK corneal collagen cross linking with riboflavin at least before 6 months of lens trials. Post trauma corneal repair and in post penetrating keratoplasty lenses were tried only after 1 year post surgery.

Conclusion: As per the findings, contact lenses do not produce much of alterations on corneal structure if fitted well.

### Introduction:

Irregular astigmatism due to epithelial irregularities, epithelial and stromal dystrophies or corneal degenerations and ectasias cannot be sufficiently corrected with spectacles, and rigid gas permeable (RGP) contact lenses have become the mainstay of the treatment [1], sometimes in early stage of the irregularities are possible to correct with soft lenses<sup>6</sup>. None of the study gives clear idea about effect of contact lens correction on such corneas for Indian population. In separate studies evidence of change in corneal thickness and curvatures were reported during early nineties. Now we have wide range of lenses to select for different corneal irregularities.

This study was designed to find out

- 1) Relation between lens wear and corneal surface changes.
- 2) To find out longstanding management of corneal irregularity with contact lenses without disturbing the corneal health.

### Methodology:

**Study Design:** Study design Retrospective case evaluation which was approved by NHL Institutional Review Board. The study was conducted according to tenets of Declaration of Helsinki. Considering proportion of subjects with positive changes in follow-up visits to be 60% for study power of 80% we need sample size of 100 subjects.

Telephonic **questionnaire survey** was conducted to evaluate subjective visual outcomes of contact lens management in irregular cornea. Clinical data of first visit and follow-up visits of 1, 3 and 6 month are considered. Tear film, corneal curvature, anterior and posterior ocular health records are considered for correlation.

## **Participants**

### **Inclusion criteria:**

Contact lens users for Irregular corneal astigmatism, caused due to degeneration, traumatic injury or secondary to corneal surgery. Included subjects were between 10 to 35 years of age group.

### **Exclusion criteria:**

Any ocular pathology except corneal irregularities

Total 121 eyes of 98 subjects enrolled in the study. where 54%(53) were male and 46%(45) were females, among all 55 keratoconus, 5 keratoglobus, 14 PMD, 17 Post LASIK, Post trauma, 18 Post PK and 3 Epithelial irregular corneal astigmatic eyes were fitted with suitable different types of contact lenses. Among keratoconus total 42(76.36%) and all 5(100%) keratoglobus subjects underwent corneal collagen cross linking with riboflavin at least one year before lens trials. Among post LASIK ectasia subjects all diagnosed with corneal irregularities at least 12 month before lens trials, 12(70%) of them underwent post LASIK corneal collagen cross linking with riboflavin at least before 6 months of lens trials. Post trauma corneal repair and in post penetrating keratoplasty lenses were tried only after 1 year post surgery.

All enrolled subjects in the study were informed over telephone during questionnaire survey and written consents were taken on regular follow up visits.

### **Dispensed contact lenses**

33(27.27%) eyes were fitted with Bi-curve corneal RGP lenses, 27(25.61%) eyes were fitted with tri-curve corneal RGP lenses, 20(16.5%) were fitted with rose k2 for keratoconus corneal RGP lenses, 5(4.1%) eyes were fitted with corneal Rose K2 Post graft RGP lenses. 10(8.2%) eyes were fitted with corneal Rose K2 Irregular Cornea RGP lenses, 2(1.65%) eyes were fitted with corneal Rose K2 nipple cone RGP lenses, 12(9.9%) eyes were fitted with mini scleral Rose K2 XL RGP lenses, 2(1.65%) eyes were fitted with Chandra K mini scleral RGP lenses and 6(4.95) eyes were fitted with Soft toric lens.

The RGP and soft lenses used in this study had one base curve and different peripheral curves. Lenses were made from High Dk [60 to 163 ISO /189 Fatt (cm/sec) (mL O<sub>2</sub>/mL . mm Hg)] materials.

### **Study procedure:**

**Study Design:** Study design Retrospective case evaluation which was approved by NHL Institutional Review Board. The study was conducted according to tenets of Declaration of Helsinki. Considering proportion of subjects with positive changes in follow-up visits to be 60% for study power of 80% we need sample size of 100 subjects. Total 121 eyes of 98 subjects enrolled in the study.

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slit lamp biomicroscopy of the anterior segment (lids, cornea, and conjunctiva) was conducted. During this examination, Bulbar and limbal conjunctiva, lid margins and corneal surface analysis was done.

After the slit lamp biomicroscopy examination, tear production rates and/or tear volume were determined with Schirmer test. Tear film breakup time was assessed using fluorescein dye under cobalt blue filter.

Corneal RGP lenses were fitted based on the topographic findings and the examination of fluorescein patterns using slit lamp bio-microscopy. Three-point touch with light apical touch was applied. If there was persistent punctate staining, apical clearance was employed. The guidelines for multicurve RGP lens fitting previously described by Lee and Kim<sup>1</sup>

There are three general "philosophies" to fit GP contact lenses in keratoconus: apical bearing, which may have minimal peripheral stabilization, three point touch and the apical clearance. Most contact lens practitioners use the first two techniques. The Collaborative Longitudinal Evaluation of Keratoconus (CLEK)<sup>2</sup> Study found that 88 percent of the patients were fit this way.

In epithelial and stromal irregularities back toric and bitoric lenses were fitted with optimum movement and adequate vault to avoid scarring of corneal epithelial cells.

In post surgical irregularities prolate corneal shapes are easy to fit with standard (or keratoconic) lens designs since prolates may closely resemble normal corneal asphericity. Oblate corneal shapes often require reverse geometry lenses, which have "plateau" posterior surfaces with secondary curves 2.00D to 8.00D steeper than the base curve to better align with the oblate corneal contour. Due to the asymmetry of the steep to flat pattern as well as the asymmetric pattern, RGP corneal lenses are sometimes very difficult to centre. Therefore, large overall and optical zone diameters were better option for centraion.<sup>3</sup>

Corneal curvatures were analysed from topography maps of oculus keratographer 5M.

### **Statistical Analysis:**

All data were entered into a spreadsheet statistical analyses were performed with the Microsoft excel software. One way Analysis of Variance (ANOVA) statistical method used to test differences between two or more means. P values less than or equal to 0.05 is considered statistic significance.

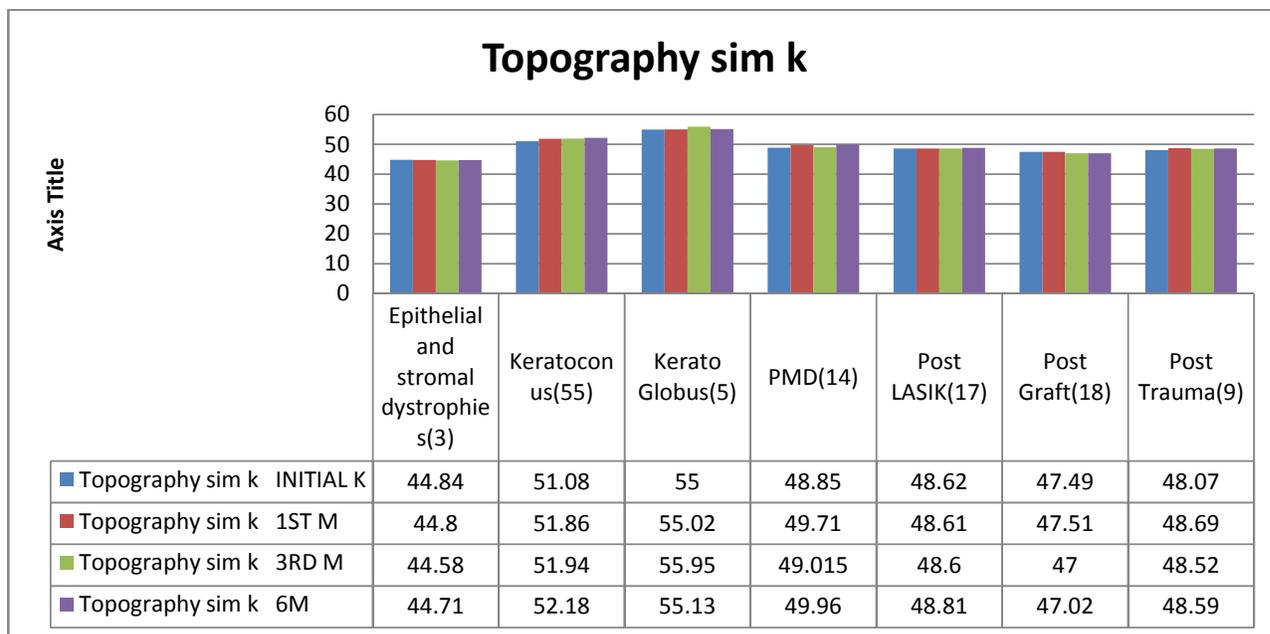
T test was conducted for inter follow up visit data to find out correlation of changes in variables at different stages post lens fitting.

### **Results and Discussion:**

The incidences of punctate corneal staining was found in 4 eyes in keratoconus (7.27%), 1 in keratoglobus (20%)1 in PMD (7.14%). One (1.8%) keratoconic eye, corrected with soft toric lens show lower corneal neovascularisation in 3month visit. It was found stable once shifted to RGP high DK material.

### **Corneal curvature:**

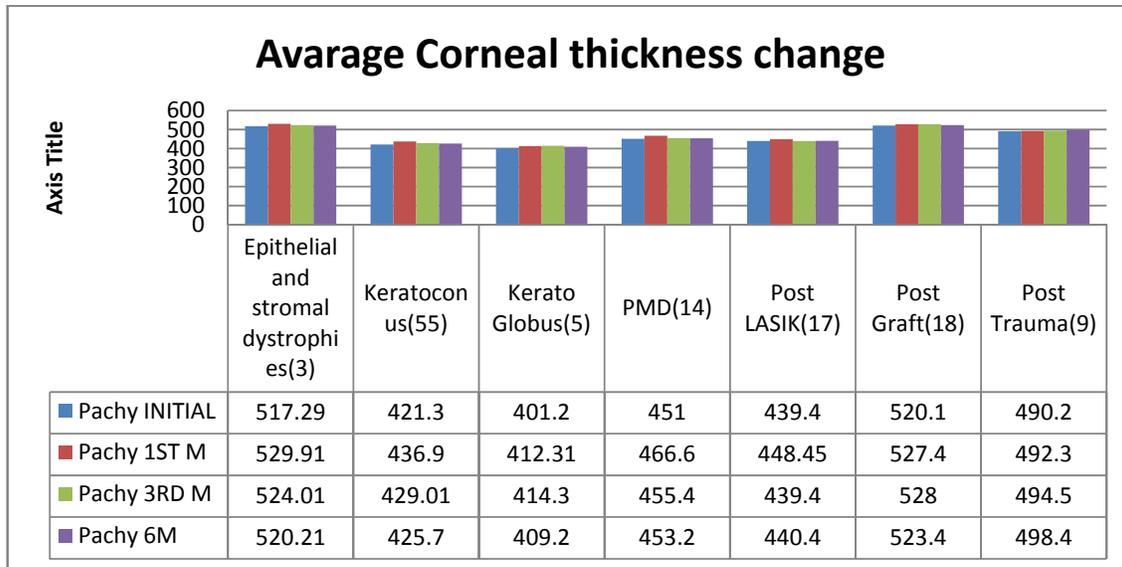
Hypoxic corneal oedemas and oedema related flattening in contact lens users was during common earlier time, but with advancement of materials it has reduced to acceptable levels (materials were selected as per Holden and Mertz, 1984 criteria)<sup>2</sup>. In present study corneal curvature changes in same group in successive follow-ups are statistically non significant as  $P > 0.05$  in all different irregular corneal astigmatisms.



As per best of our knowledge this is the first study assessments of corneal changes with Contact lens uses are assessed in all different types of cornea irregularities as per the previous reports in different fitting philosophy

It has been reported that apical-touch fitting causes central corneal flattening in keratoconus,<sup>7</sup> whereas apical clearance fitting causes central corneal steepening,<sup>8</sup> In the three-point-touch group, although these changes were not statistically significant, the steepest corneal meridian flattened and the flattest meridian steepened<sup>5,6</sup> in present study none of the sub categories of corneal irregularities are showing statistically significant changes.

**Corneal thickness:** In general Soft contact lenses and rigid gas-permeable contact lenses of low DK values used to cause corneal thickening and corneal flattening during lens use. RGP lenses are now available in improved DK values which are more than the basic requirement guidelines for healthy contact lens wear. In present study corneal thickness changes were measured to find out the long term effects of different lens materials on irregular corneas. Which is similar like Braun DA, Anderson Penno EE. Effect of contact lens wear on central corneal thickness measurements. *J Cataract Refract Surg*<sup>5</sup>



As per findings statistically significant changes in corneal thickness are not noticeable in present study which is supported by previous report on keratoconic cornea<sup>7</sup>

**Conclusion:**

As per the findings, contact lenses do not produce much of alterations on corneal structure if fitted well.

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