Aim: To report the clinical experience of Rose-K lenses in Keratoconus

Methods: In this retrospective observational study medical records of 51 eyes of 43 patients with keratoconus who underwent Rose-K lens trial between September 2009 to September 2010 at the contact lens clinic of Little Flower Hospital, Angamaly were studied. Unaided visual acuity, objective and subjective refraction, best spectacle corrected visual acuity, slit lamp bio-microscopy, corneal topography and dilated fundus evaluation were done for all cases.

Results: 51 eyes of 43 patients with Keratoconus were included in the study. The group included 16 female and 35 male patients with mean age 25.02 ± 8.36 years ranged from 15 to 48 years. Mean K1 was 53.34±8.29 and K2 56.73±8.70. Refractive cylinder in the group ranged from one to 9.5 diopters (mean -3.66 ± 2.79D). The mean visual acuity with prior refractive correction was logMAR 0.45 ± 0.5. Average number of trials in contact lens fitting 1.26 ± 0.52. All patients were fitted with the standard Rose K lens with diameter 8.7 mm.

Visual acuity improved in 100% of the cases. Follow-up period ranged from 3 to 12 months (average 7 ± 3.5 months) Contact lens wear comfort, as recorded on the rating scale, documented a score of eight or more in 92% of eyes at final follow up. Average time of contact lens wear in these eyes was 12-16 hours. In 2 prior RGP wearers, deterioration in comfort was reported and they shifted back to RGP lenses.

Conclusion: Rose-K lens is an effective option for visual rehabilitation in irregular corneas such as keratoconus. Better patient adherence due to the increased comfort when compared to the conventional lenses for keratoconus and less complications may prolong the need for penetrating keratoplasty in such patients.

Key words: Keratoconus, Rose-K Lens

Introduction

Keratoconus is a noninflammatory progressive condition of the cornea characterized by corneal ectasia and thinning, which results in irregular astigmatism and decrease in vision. The incidence and severity of keratoconus were found to be more in Asians compared with whites.

The management of keratoconus varies depending on the state of progression of the disease. In the very early cases, spectacles may provide adequate visual correction. But spectacles do not conform to the unusual shape of the cornea and the resultant irregular astigmatism is not fully neutralized by spectacles. Contacts lenses are the mainstay of therapy in keratoconus. The contact lens resurfaces the irregular cornea and the intervening fluid lens corrects the irregular astigmatism. Fitting RGP lenses in keratoconus is challenging and becomes more challenging and less successful especially as the severity of the cone increases, which necessitates special designs and more chair time.

Contact lens (CL)-fitting techniques in keratoconus: Apical clearance, apical bearing, and three-point touch, the latter being the most widely accepted. Rose K lens is a proprietary lens design introduced by Paul Rose from New Zealand. The Rose K lens design has up to six different curves across the back surface and a decreasing optic zone as the base curve (BC) steepens, so as to align the back surface of the lens as accurately as possible with the shape of the keratoconic cornea. It has been reported that Rose K lenses improve the quality of vision and CL-wear comfort in patients with keratoconus. The success rate of Rose K lens fitting in patients with keratoconus was shown to be greater than 90%, and this can delay the need for penetrating keratoplasty.

We started dispensing Rose K lenses since 2009 and we studied our series of patients who under went with Rose K fitting in Keratoconus.

Aim

To report the clinical experience of Rose-K contact lenses in keratoconus

Study design

Retrospective observational study

Materials and Methods

A retrospective review of medical records of 51 eyes of 43 patients with keratoconus who underwent Rose-K lens trial between September 2009 to September 2010 at the contact lens clinic of Little Flower Hospital, Angamaly.

Inclusion criteria

All the patients who were successfully fitted and dispensed with Rose-K lens during the period, with at least 3 months follow up were included in the study.
**Exclusion criteria**

Eyes with active disease like active vernal keratoconjunctivitis, hydrops of cornea or any ocular inflammation.

Unaided visual acuity, objective and subjective refraction, best spectacle corrected visual acuity, slit lamp bio-microscopy, corneal topography and dilated fundus evaluation were done for all cases.

Keratoconus was diagnosed based on clinical signs of irregular keratometric mires, astigmatic refraction, scissoring of the retinoscopic reflex or irregularity in the red reflex with the direct ophthalmoscope and slit lamp bio-microscopic signs such as stromal thinning, Fleischer's ring, Vogt's striae, or and apical corneal scarring.

Corneal topographic data were quantitatively analyzed by using the modified Rabinowitz-McDonnell criteria; i.e. patients with average simulated keratometry of more than 46 D, central corneal power of more than 47.3 D or infero-superior asymmetry (I-S) higher than 1.4 D were considered to have keratoconus. Subjects with keratoconus were classified into three categories of mild (<45 D), moderate (45-52 D) and severe (>52 D) on the basis of steep keratometric readings.

A follow up record of 3 months or longer contact lens wear was available for each eye included in this analysis.

Objective refraction followed by subjective refraction, slit lamp evaluation, keratometry, and topography (Nidek OPD-Scan, ARK 10000 Model) was performed for each eye. Topography analysis was performed using NIDEK ARK 10000 corneal analyzer. The central corneal power, the corneal apex, and the simulated keratometry values in the two major axes were noted from the selected axial map and instantaneous maps.

The average of simulated keratometry [axial] values (average Sim K) was used to categorize Keratoconus eyes into severity grades of mild (average Sim K < 45D), moderate (average Sim K 45-52D), and severe (average K > 52D).

The Rose-K diagnostic lens set and fitting procedure were followed. The diagnostic lens set consists of 26 lenses with base curves ranging from 5.1 to 7.6 mm in 0.1 mm increments with a standard lens diameter of 8.7 mm. The trial sets are fabricated in Boston ES non-UV light blue material. The base curve of initial lens applied was 0.2 mm [steeper] more than the average corneal radius of curvature calculated from the average Sim K values on axial topography map.

After giving an adaptation period of 30 minutes, the dynamic and static fit was assessed. In dynamic fit assessment, the lens fit was considered to be acceptable when the lens was centered adequately on the cornea with good post blink movement, with good stability on different gaze movements, and provide comfortable wearing period. In static fit, the goal was to achieve a “light feather touch” in the centre with mid-peripheral bearing and peripheral clearance.

The trial was repeated until we achieved an acceptable dynamic and static fit. After finding the optimal lens fit, the final power was calculated after performing a spherical over refraction over the trial lens.

After the ordered Rose-K lenses were procured, the patient was called to the clinic and fitted with the lens. If the fit was acceptable to the patient, a return visit was scheduled at one week when fitting relationship, contact lens wear comfort, and daily contact lens wear duration were recorded. Subsequent clinic visits were scheduled at 3 months and then every 6 months. At each visit, contact lens comfort was graded on a ten-point scale. At every visit patients had access to the wear comfort score achieved at an earlier evaluation.

The data collected included patient demography, unaided and best spectacle corrected logMAR visual acuity, subjective refraction, corneal topography, number of trials performed to initialise the final contact lens parameters, the final Rose K lens specifications and the contact lens corrected visual acuity with the Rose K lens that was dispensed to the patient.

**Results**

Study included 51 eyes of 43 keratoconus patients. There were 16 female and 27 male patients. Their age ranged from 15 to 48 (mean 25.02 ± 8.36) years. There were 16 female and 35 male patients. Their age ranged from 15 to 48 (mean 25.02 ± 8.36) years.

Based on axial keratometric values (average Sim K), 2 eyes had mild Keratoconus (3.9%), 12 eyes (23.5%) demonstrated moderate keratoconus (average Sim K 48.61 ± 1.24D) and 37 eyes (71.58%) demonstrated severe keratoconus (average Sim K 60.88 ± 5.31D).

The refractive cylinder ranged from one to 9.5 diopters (mean -3.66 ± 2.79D). The mean visual acuity with prior refractive correction was logMAR 0.45 ± 0.5

Mean K1 was 53.34±8.29 and K2 56.73±8.70.
Majority of these patients (37 eyes, 74.50%) were dependent upon rigid gas permeable lenses. 10 eyes (19.6%) used spectacles only. 4 eyes (7.8%) did not have any vision correction prescribed.

3 patients were post optical Penetrating Keratoplasty, 6 patients had corneal scar due to prior episode of acute hydrops, 18 patients were post corneal collagen cross-linking. Visual acuity improved in 100% of the cases. Visual acuity achieved with the Rose-K lens was 6/6 in 23 eyes, 6/9 in 21 eyes, 6/12 in 3 eyes, 6/18 in 3 eyes. Rose K Contact lens power ranged from -3 to -21.5 diopters (-10.40 ± 9.1 D), base curve 6.23 ± 0.68, diameter 8.7

Average number of trials in contact lens fitting 1.26 ± 0.52. Follow-up period ranged from 3 to 12 months (average 7 ± 3.5 months).

Contact lens wear comfort, as recorded on the rating scale, documented a score of eight or more in 92% of eyes at final follow up. Average time of contact lens wear in these eyes was 12-16 hours. In 2 prior RGP wearers, deterioration in comfort was reported and they shifted back to RGP lenses.

**Discussion**

Rose K lenses are an effective way of visual rehabilitation in keratoconus, especially in severe disease with irregular corneas.

In this study, 96.07% of users reported successful visual rehabilitation and adherence to Rose K lens use. 3.9% of mild keratoconus, 23.5% of moderate keratoconus, 71.6% of severe keratoconus patients reported successful visual rehabilitation.

Also, 63.21% of prior RGP users reported that Rose-K lens provided better comfort, less of foreign body sensation, longer duration of continuous use.

2 patients reported discontinuing Rose-K lens and switching back to their RGPs. This was probably related to their inadequate fitting trial/adaptation to wear.

The results of this study are comparable to the earlier reported success with Rose-K lenses. 

Rose K lenses were initially claimed to have 80% to 90% first-fit success rate initially, but further clinical studies showed that on average, three diagnostic lenses were required per eye to get the optimal Rose K fit in keratoconic eyes. The success rate of Rose K lens fitting in keratoconus was reported to be more than 90%.

In our series, we could fit Rose K lenses in all grades of keratoconus. The average number of trials taken to finalize Rose K lens parameters was 1.26 ± 0.52. (range: 1–5), and in 95% of cases, the final fit was achieved within first three trials, which was similar to the previously reported data.

**Conclusion**

Rose-K lens is an effective option for visual rehabilitation in irregular corneas such as keratoconus. Better patient adherence due to the increased comfort when compared to the conventional lenses for keratoconus and less complications may prolong the need for penetrating keratoplasty in such patients.

**References**