TK4[°] fitting system: a new kind of (R)GP approach in keratoconus management

Davide Brambilla Optometrist, Marco Tovaqlia Contact Lens Optician - IACLE Industry Member, TSLAC owner Giovanni Tinti

Objective:

In ophthalmological bibliography "keratoconus" definitions are described with terms and clinical aspects often similar in different publications; charatheristics are, often, well known. Who is affected by keratoconus is, in large part, a man with a big frustration, that depends by visual handicap that pathology can produce.

Necessity is to transmit to that persons much serenity, through many kind of things that fell them in being in good hands of someone that knows how can give an optical solution respecting corneal shape and health.

TS LaC started from this standpoint in developing a product that, for it's performant charatheristics, based on special contact lens shape, permits a very high professional approach and let infond new hope to final wearer.



this situation, often, create a frustrating feeling in wearer.

Method:

Particularity of TK4 philosophy is to follow the cornea very well due to a tetra-konical geometry, giving in this way, maximum morphological respect and, conseguently, a very high comfort rate for wearer.

The project, in wich were developed all TK4 fitting system lenses, is a consequence of a specific morphological analysis of keratoconic cornea started in 2007 and based on over 700 topographical maps and clinical approach on 300 eves.

All collected data were processed in mathematical way to describe complex shape of an ectasic cornea in all his evolutive steps.

Elements that are being considered in choosing right lens are based on topographical condition: Chromatical Gradient (CG) and Apex Location (AL). Computerized Corneal Topography (CCT) represents a very important diagnostic element to make a complete cornea evaluation in shape, particularly in keratoconus.

Chromatic Gradient (CG) indicates a chromatic topographical variation between ectasic area and corneal periphery; a drasthical chromatic variation from red apex to deep blue peripheric means that keratoconus can be acute, in other way a more distributed chromatic pattern indicates a mild keratoconus.

CG is classified in stage numbers, associated with a specific TK4 fitting system lens, for example a 2nd stage can require a TK4 2 level.

All TK4 lenses, in every level can be choosen with A or B module, that represents less (A) or more (B) asphericity, respectively for less evolute or severe keratoconus.





Apex Location (AL) is a foundamental condition to make a right TK4 selection; in ordinary contactology a central kone may request a small total diameter lens but in decentered keratoconus choice is oriented in large diameter lenses

Following apex location with a large total diameter lens risk is to see upper part of the lens, in landing area, making an impingement with peripheric cornea; it's important to measure apex location offset from middle cornea axis.



After Chromatical Gradient and Apex Location evaluation has done, TK4 fitting system flow-chart is useful to choose right lens, as follows



TK4 fitting system flow-chart

Case Report:

Female, 45 years old with a keratoconus classified in an early stage. Sim-K values are: Kf 7,31 mm @ 32°/ Ks 7,04 mm @122° Manifest Refraction is: sph -4,25 cyl -3,25 @ 20° VA 20/32 Apex Location: can be considered a central apex keratoconus. Chromatic Gradient pattern: can be classified as a 1st stage.



Tangential or instantaneous map in absolute scale. It's important to refer always to the same kind of topographical setup to make a good evaluation in every topographer we use or consider.

Action:

TK4 fitting system require a chromatic evaluation of the topographical map, actuated in absolute scale and with curvature algorithm. A specific software, realized by TS LaC for this important evaluation, permits

to compare the chromatic pattern of the topography with a simulated one where it's possible to reproduce the same figure and making a direct association to a TK4 trial set lens.

In this evaluation it's relatively important to consider kind of ectasia (Nipple or Oval) but the Chromatic Gradient and Apex Location. Apex Location can estabilish only the possibility to fit a lens with more asphericity, due to the rapid change in profile from apex to periphery and/or to fit a lens with an asymmetric geometry, where in 270° emi-meridian area peripheral curves are steeper than others all around.

This particular condition makes the lens very comfortable, with more respect for the cornea and less interaction with eyelids and/or meybomian glands.



TK4 lens with a 270° flat fit periphery

The same cornea with an asymmetric profile, closest in 270° emi-meridiar



Next step in evaluating right kind of lens to be adopted, starts from virtual fitting software of most diffused topographers in wich TS LaC have considered a special virtual trial set.

With a simulated TK4 lens on the ectasic cornea it's possible to directly measure the apical and peripheric clearance in 270° area, location where, often, keratoconus fits presents a deep tear reserve.



Conclusions:

When we manage a keratoconus patient we haven't to consider it as an interesting challenge, but we have to be careful in choosing the right fitting approach and procedure. If we choose an (R)GP fit we must consider to don't create any traumathic stress to the cornea. Only in this way we can obtain maximum cornea respect and patient satisfaction.









TK4 lens in vivo Na-Fl fit; it's interesting to see how ectasic area isn't touched and the lens shape doesn't create any peripheric impinaement or wrinklina. TK4 fitted lens narameters

Lens type: TK4 1A Ro: 7,40 mm TD: 10,20 mm F'v: -4,00 D VA 20/1

One of most important focal point in verifing a fluoresceinical pattern is the total cornea respect, making a check from original to final topographical man

This procedure can be considered one of the most important in fitting philosophy, in order to be sure of morphological cornea respect and comfort.



Topoaraphical map after i month of a TK4 lens fit

Topographical map of a keratoconic cornea. before an (R)GP lens fit

Results:

Due to a particular tetra-konical geometry, TK4 lenses fits with high cornea respect and, as a consequence of this, patient feels the lens more comfortable than a traditional (R)GP geometry. The total absence of corneal wrinkling. due to some steep peripheral geometries, have been observed with a check on two different topographic maps, before lens fit and after lens removing. It isn't be observed any kind of warpage or impingement. Final result has been to obtain a total comfort by wearer in maximum cornea respect, giving also a very good visual acuity.

T.S. Lenti a Contatto srl Vittuone Italv www.tslac.it

Marco Tovaglia

Optometrist

Milan, Italy

Marco Tovaglia graduated from the Galileo Galilei Institute in Milan to become an Optometrist. His professional experience started in 1987 as Professional Service Manager for several contact lens companies in Italy. He has also been fitting contact lenses since 1989 as a contact lens consultant and in his private practice. He writes for many Italian optometry magazines and is working on a company protocol about keratoconus fitting approaches. Actually works for TS LAC contact Lens manufatto ring company. At the same time he teach to optometrist how to fit Contact lenses in particolar conditions like keratoconus.