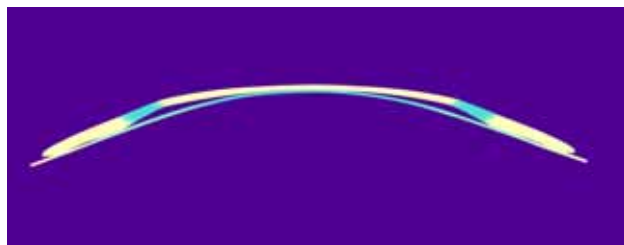


**DAVID THOMAS**

*"an eye for excellence"*



***Rinehart-Reeves Ortho-K Lenses***

**Fitting and Understanding  
the Rinehart-Reeves Lens design for  
Orthokeratology**

by

**John M. Rinehart, O.D., FIOS**

**&**

**James W. Reeves, O.D., FIOS**

## Introduction

*Orthokeratology* is a non-surgical application of rigid contact lenses for the purpose of controlling the progression or temporarily reducing or eliminating myopia and astigmatism. OrthoK is a therapeutic application of specially designed rigid contact lenses to produce a temporary improvement in unaided visual acuity. Once maximum improvement has occurred, retainer lenses are worn part-time during the day or while sleeping, then removed for waking hours.

The earliest forms of orthokeratology came from corneal contact lenses being fit slightly flatter than K. This resulted in flattening of the cornea and doctors of the late 50's and early 60's noticed patients were becoming slightly less nearsighted upon removing their lenses.

In the early 1960's several optometrists developed orthokeratology techniques of their own. I believe the most prominent to be Dr's. Charles May and Stuart Grant. Their methods used large, flat lenses with large optical zones. Their only choice of material was PMMA.

The 1970's gave us the birth of new rigid materials, which are gas permeable. This development has greatly improved safety and efficacy for conventional contact lens wear and orthokeratology. Gas permeable OrthoK lenses allow large diameter lenses to be fit; this aids centration and, therefore, yields better results. The 1970's gave birth to reverse geometry lenses for Orthokeratology. Alfred A. Fontana, O.D., FAAO first described the use of such lenses and began personally using this design in the early 70's.

The 1980's produced the first marketed reverse geometry lenses. Dr. Richard Wlodya conceived the OK 3 design, and Mr. Nick Stoyan was the first to fabricate this design in his lab.

So far in the 1990's we have reverse geometry lenses with multiple curves steeper than the base curve and reverse geometry lenses with aspheric base curves.

Orthokeratology has been a consistently changing science and will continue to evolve as long as bright imaginative doctors strive to improve their patient's vision.

## Getting Started in Orthokeratology

Practitioners interested in developing an Orthokeratology practice will require virtually the same equipment as is needed for the fitting of traditional gas permeable lenses.

- **Corneal Topography (DO NOT PERFORM ORTHOKERATOLOGY WITHOUT A TOPOGRAPHER)** to:
  - Rule out pathological corneal disorders such as keratoconus or pellucid marginal degeneration.
  - Possibly provide a value for corneal eccentricity.
  - Monitor corneal changes, and determine the location and size of the treatment zone.

Other useful equipment (optional only) higher quality manufacturing standards should make these unnecessary.

- **Lens Diameter Gauge**, to verify lens diameter.
- **Hand-held Magnifier with Reticule**, to measure the widths of the various zones on the lens.
- **Thickness Gauge**, to measure centre and edge thickness.
- **Focimeter**, to verify the lens power and assess the quality of the lens optics.
- **Radiuscope**, to verify the base curve radius and assess the quality of the optics of the base curve.
- **Edge Analyzer**, to assess the contour of the lens edge.
- **Yellow Wratten Filter**, to enhance fluorescein pattern evaluation.
- **Lens Modification Equipment** to:
  - to resurface (polish) the front and back surfaces of the lenses
  - to make power adjustments
  - to recontour edges
  - to modify the lens fit by making changes in or near the peripheral curve

## STAFF TRAINING

All staff members need a working knowledge of orthokeratology and how best to present it to the patients in your office. Everyone must be able to answer inquiries regarding fees, office policy concerning refunds, appointment scheduling. This can be done both with written communications and/or in staff meetings.

Staff members should be enthusiastic about OrthoK. They also need to convey that excitement to the patients. Patients love to hear comments about how well the procedure is working for them. This reinforces the practitioner's comments.

## **PATIENT & FAMILY COMMUNICATIONS**

It is beneficial to have informational pamphlets and/or handouts to enhance our presentation of Orthokeratology as a treatment option. This reinforces my comments and may stimulate questions and additional interest.

The International Orthokeratology Section of National Eye Research Foundation has established guidelines for the advertising of Orthokeratology. We recommend that you study whatever national guidelines exist regarding your promotion of Orthokeratology in your practice.

## **CONTRACTS**

It is generally best to put your policies concerning orthokeratology in writing. They should state the length of the treatment period that is included in the original fee. Include a statement about the cost to replace lost or damaged lenses. State very clearly your refund policy and that it is impossible to guarantee a specific result.

## **WHO BENEFITS FROM ORTHOKERATOLOGY**

The number one group of people that benefit most from Orthokeratology are young progressive myopes. We hate the idea of standing idly by and watching a 2.00D myope become a -3.00 and -4.00. Parents who are myopic usually understand and are most often receptive to the idea of OrthoK when it is presented as a therapeutic option for their child.

If the parents aren't willing to have the procedure performed at this time, suggest fitting the child with rigid gas permeable lenses to at least slow the progression.

Another group that will want OrthoK are those whose careers require unaided acuity better than they currently have, such as pilots, policemen and firemen. There are some careers that may specifically exclude people who have had refractive surgery or orthokeratology. Do your best to make the patient aware that this could be a problem.

Some patients want Orthokeratology so they can be somewhat less dependent on our glasses and contact lenses, examples, the weekend athlete who finds dust irritating with his contact lenses on, or the swimmer who wants to be able to see the timing clock. Sometimes it's just nice to be able to watch TV in bed knowing you can fall asleep without having to remove your lenses or risk bending your glasses

## PATIENT SELECTION

First it is imperative that the patient is in good health, both general and ocular. Medications that have a drying effect on the eyes may reduce lens comfort and if dry enough could compromise corneal health. Be sure to clear up any ocular surface disease and meibomian gland dysfunction prior to beginning Orthokeratology on any patient.

Age is seldom a consideration for Orthokeratology. The patient must have the dexterity to handle lenses and the commitment to properly maintain the lenses.

Patients up to -4.50 D of myopia and up to 1.50 D WTR astigmatism are good candidates for Orthokeratology. It is best if topography shows the astigmatism is confined to the central 2.0-2.5 mm of the cornea. You can expect to reduce approximately 50-60% of the astigmatism. Patients with ATR astigmatism greater than 0.75 D must be informed that their vision may not be as good as they desire. Also consider the potential for residual astigmatism. This can be very annoying for many patients and you must counsel the patient prior to therapy.

Evaluate the pupil diameter in dim illumination. Those with large pupils should be discouraged because they will very likely suffer from ghost images at night.

Corneal eccentricity may be a factor in predicting the amount of change that can be expected. In general, the greater the eccentricity, the greater the amount of refractive change. One estimate is that for each dioptre of refractive change there must be 0.21 eccentricity.

Perhaps the most difficult criteria to evaluate are patient motivation and expectations. Considerable time must be devoted to informing the patient of the positives as well as the limitations of Orthokeratology. The limitations should be presented in a positive light. The fact that Orthokeratology is not permanent is not a negative, think of it as Orthokeratology is reversible.

## **ORTHOKERATOLOGY EXAMINATION**

1. **Case History**
  - A. Includes ocular and medical history.
  - B. Inquire as to the patient's reasons for wanting OrthoK.
2. **Visual Acuities**
  - A. Aided
  - B. Unaided
  - C. Best corrected
3. **Biomicroscopy**
  - A. Inspect the cornea for signs of trauma, dry eye syndrome and limbal staining.
  - B. Assess the tears both quantity and quality.
  - C. Look for abnormal lid structures that may interfere with blinking and/or tear exchange.
  - D. Determine the rate of the patient's blink and its quality.  
Too slow a rate or incomplete closure will likely yield poor contact lens wear.
  - E. Inspect the endothelial layer of the cornea for defects.
  - F. Look for corneal elevations and neovascularization.
4. **Ophthalmoscopy**
5. **Keratometry and Corneal Topography**
6. **Tonometry**
7. **Visual Analysis**
8. **Patient/Parent Consultation**, this includes in depth discussion of the pros and cons of OrthoK for this patient.
9. **Assess the Patient's Motivation**
  - A. Are their goals realistic for their correction?
  - B. Do they have a positive attitude, are they enthusiastic?
  - C. Does their schedule allow them to keep the appointments?  
(This can be a time consuming procedure for the first three Weeks)
10. **Discuss Fees with Patient/Parents**
  - A. Total Fee and How it is to be Paid
  - B. Refund Policy
  - C. Guarantee Policy  
Do Not Make Any Guarantees Beyond You Will Always Attempt to Get the Best Possible Results.

## Follow up Visits

When the patient is fit with the more aggressive reverse geometry designs, whether for day or night wear, the patient must be seen the very next day. The subsequent evaluations will be at the end of one week; at the end of 2 weeks of wear, at the end of 1 month of wear, then every month until the result is stable. Expect stability within the first month on most patients.

Each time a new lens design is dispensed, see the patient the next day. You do not want the patient wearing a lens that has become too tight. A tight lens will cause deleterious consequences.

The typical follow up visit will include:

1. Questioning the patient about their comfort and improvement of unaided visual acuity.
2. Measuring and recording acuity with and without the lenses.
3. Performing an over refraction
4. Evaluating the fluorescein pattern.
5. Evaluating corneal health.
6. Doing a subjective refraction
7. Taking keratometric readings and/or topography
8. Inspecting the lenses, including verification of all lens parameters
9. Cleaning the lenses as necessary
10. Modifying or ordering new lenses as necessary to maintain the desired fitting characteristics.
11. Reviewing, as necessary, their progress and the intended wearing schedule.

## Wearing Schedule

Patient using the nightwear orthokeratology lenses, should remove the lenses prior to leaving the office. He/She should put the lenses on 10 to 15 minutes before retiring for the evening and should remove the lenses 15-30 minutes after they rise in the morning. If necessary to maintain good acuity, have the patient wear the lenses about 1 hour in the mid-afternoon.

For patients wearing the lenses during their waking hours, you may check them at the end of one day's wear. If all is fine at that time, see them on the same follow up schedule as your nightwear patients.

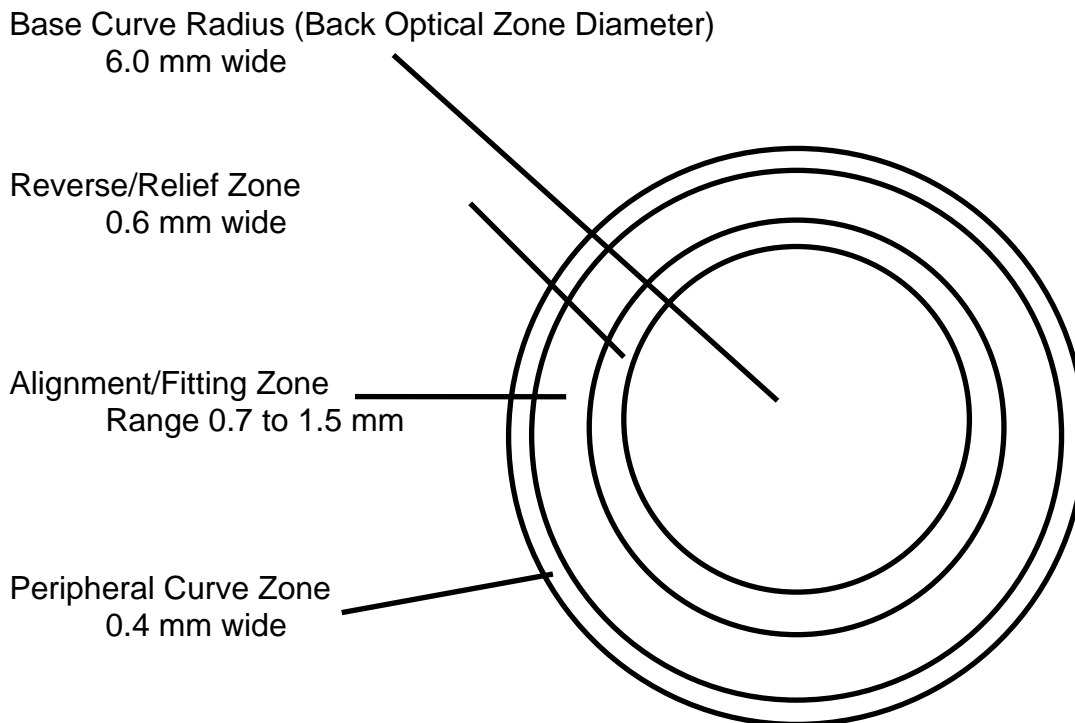
Any time the fit is less than ideal, you **MUST** make a change to restore optimal fitting characteristics. If you do not make changes, problems will arise which will prolong the process and reduce the success rate

## Materials

If the lenses are to be used as night wears; be sure to use a material that is approved for extended wear. This will provide the best possible oxygen supply to the cornea during sleep. High Dk materials are ideal for Orthokeratology.

New information is appearing that seems to indicate that the very high Dk lenses reduce the occurrence of lens adhesions on overnight wear lenses.

The approved material for the Rinehart-Reeves Orthokeratology lens design is Boston XO by Polymer Technology Corporation.



Schematic Drawing of a 4 Curve Reverse Geometry Lens

## Rinehart-Reeves Lens Design for Orthokeratology

### **Reverse Geometry Lenses (4 and 5 Curve Designs)**

This lens design will frequently reduce up to 3.50 to 4.25 D of myopia. This is going to be your lens of choice for most of your patients. With this fitting technique your initial lens is expected to be your final lens.

The base curve will generally be a 6.0 mm diameter. The first steep curve (reverse/relief curve) will be the steepest portion of the lens. This curve is most frequently 0.6 mm wide. The next curve (alignment/fitting curve) will range from 0.7 to 1.5 mm wide. Diagnostic fitting is the best method to determine the ideal alignment/fitting curve radius. This will be described later in the manual. The peripheral curve is typically .4 mm wide with a radius of 10.50 to 12.25 mm.

The initial base curve will be 0.75 D flatter than the amount of myopia you are planning to reduce. For example, a 2.50 D myope will be fit 3.25 D flatter than the flattest K-reading. It is recommended to go no more than 5.00 D flatter than flat K.

There are many methods to determine the radius of the reverse/relief curve. The exact method used to determine the radius of this steepest curve is to calculate a curve that results in a lens with a sagittal depth equal to the sagittal depth of the ideal diagnostic lens. Diagnostic fitting procedures are discussed later in the manual.

The alignment/fitting curve is designed to aid in lens centration. It is best to fit this curve in alignment with the midperipheral cornea. This is the curve you will most likely modify if you have problems with the lens centering. Diagnostic fitting must be used to determine the exact configuration of this zone.

The peripheral curve is again .4 mm wide with a radius of 10.50 to 12.25 mm.

The overall diameter of the lens will be either 10.0 mm to 11.0 mm.

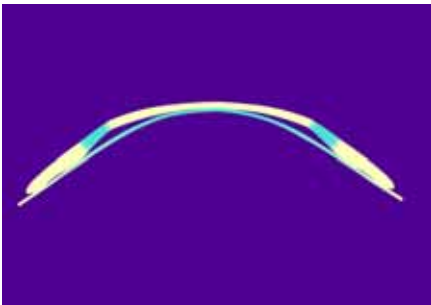
Fluorescein pattern of this design should show a significant central touch (which is not actually apical touch), followed by a narrow area of clearance, then a wide zone of mid peripheral alignment and lastly peripheral clearance.



Typical R & R Fluorescein Pattern

The area of central touch (which does not actually touch the cornea) must centre over the pupil. The alignment/fitting curve is manipulated to position the lens as near to centre as possible. This can be done by either changing the radius and/or changing the width of the zone.

Once the “ideal” relationships are determined, the alignment/fitting curve remains the same. When the base curve is changed, the reverse/relief curve must be changed such that the sagittal depth remains the same as the diagnostic lens. With a constant sagittal depth and no changes in the alignment/fitting zone, any new lens will centre and move the same as the previous lens.



### Estimating the Amount of Myopia Reduction

There are a multitude of theories and estimates used to determine the amount of myopia that can be reduced on any given patient. This estimate is important because it gives guidance when consulting with a potential orthokeratology patient.

One of the most aggressive formulas is from Dr. Richard Wlodyga; Myopia reduction =  $2(CK - TK) + 1.00$  D. CK = central keratometer reading  
TK = temporal keratometer reading.

At the other end of the spectrum is the theory that for every 1.00 D of myopia reduction the cornea must have an eccentricity of 0.21. Therefore, to reduce a 3.00 D myope there must be a corneal eccentricity of at least 0.63.

These various theories demonstrate one of the problems we have as Orthokeratologists. There does not seem to be a method we can use to accurately and consistently determine the amount of myopia reduction for any given patient. I would expect that over the next few years this area would be given a lot of attention.

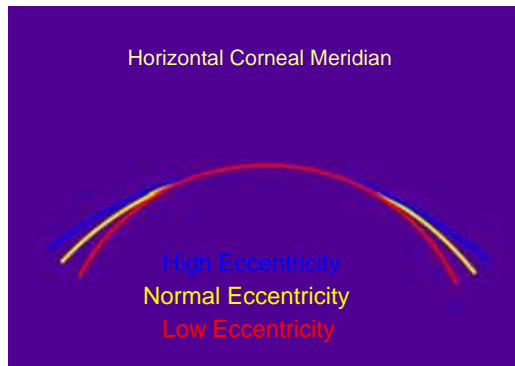
## Diagnostic Lens Fitting

The best method to arrive at the initial lens for the patient is through a combination of diagnostic lens fitting and post fit topography. No other method will yield the highly reproducible fitting characteristics necessary for this type of contact lens fitting. Topography alone does not provide enough exact information for the purpose of lens designing. Using only K readings and subjective refraction to design lenses is even less adequate. Diagnostic fitting will account for all variables, such as, corneal eccentricity, lid pressures and tear viscosity.

When performing the diagnostic fitting, it is important to direct **all** of your attention towards lens centration and movement. The goal is to achieve centration with approximately 1.0 – 1.5mm movement. The area beneath the optical zone and reverse/relief curve are not factors in lens centration and movement when you are using the Rinehart-Reeves Fitting Philosophy. The alignment/fitting zone is the controlling factor for lens centration and movement.

### Diagnostic Lens Fitting Procedure

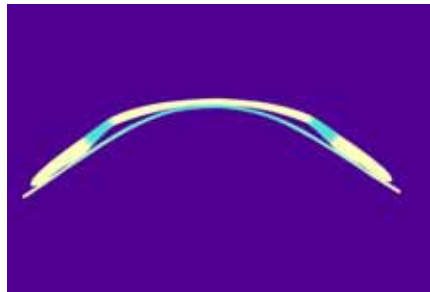
1. The initial diagnostic lens is selected based on the eccentricity of the cornea.
  - Low eccentricity (0.0 to 0.3) - select an alignment/fitting curve that is 0.50 D flatter than K.
  - Normal eccentricity (0.31 to 0.55) - select an alignment/fitting curve that is 0.75 D flatter than flat K.
  - High eccentricity (0.56 to 0.70) – select an alignment/fitting curve that is 1.00 D flatter than flat K.



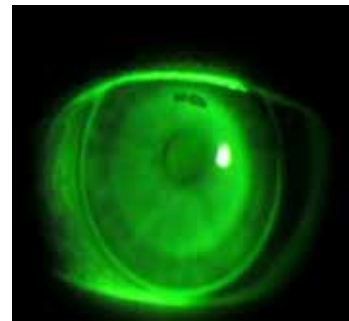
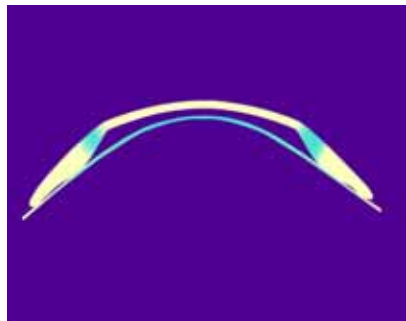
2. Verify the base curve radius and power of the diagnostic lens prior to placing it on the patient's eye.
3. Allow the lens to settle on the eye for 10 to 15 minutes before you evaluate the performance.
4. Instil a very small amount of fluorescein.
5. Evaluate the lens positioning and movement using the Yellow Wratten Filter to enhance the fluorescein pattern

6. Determine the ideal lens which will be the flattest Alignment Curve radius that centres.
  - If the lens positions too high or moves excessively—steepen the Alignment Curve radius.
  - If the lens positions too low or does not move—flatten the Alignment Curve radius.
  - It is preferable to have the lens position slightly low as opposed to slightly high.
  
7. Perform an over-refraction. Use this value to do a calculated central K and verify the necessary lens power.

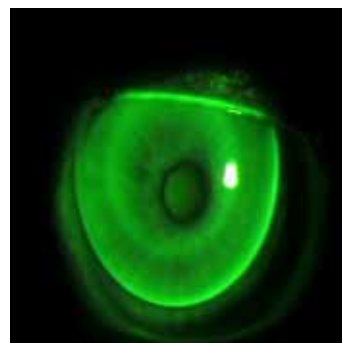
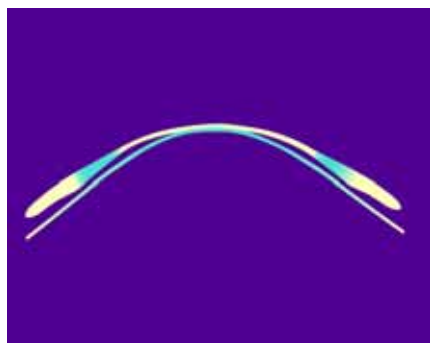
Once you have determined the best fitting Alignment/Fitting Curve, you have completed the diagnostic fitting.



Ideal Lens Cornea Relationship (perfect Sagittal Depth)



Reverse/Relief Curve Too Steep (Sagittal Depth too great)



Reverse/Relief Curve Too Flat (Sagittal Depth too low)

## Myopia Reduction

There are times when your patient will not be able to go through the complete orthokeratology program but has a desire for a reduction of their myopia. The obstacle may be time, money or some other reason. Under these circumstances you may want to consider an instalment program, where the therapy takes place in a series of smaller steps.

This will take more time on your part and you will incur additional lab bills; therefore, your overall fee will be higher. The advantage to your patient is they get to pay as they go, but they always pay for the next step in advance.

The program used breaks the therapy into 5 steps; the fee for each step is  $\frac{1}{4}$  of the usual global fee. Each step will include care for a finite period of 2 to 3 months. The first step needs to show the patient significant improvement and each subsequent step will be smaller. Generally reduce about 35% to 40% of the myopia in step one leaving about 15% to be reduced in each of the later steps.

This program will not work with a 1.00 D myope; you do not have enough correction available to reduce it in small steps. You might consider offering these patients a 2 - step program, with each step costing the patient 60% of your usual global fee. There are a lot of options available; always put the program in writing. The patient can cease treatment at any time and resume therapy later at their discretion.

The lens designs principles are the same, only less aggressive. Adjust your target correction based on the number of steps the patient is planning to use to complete therapy. The 3.00 D myope may begin with a lens that is 1.25 D flatter than K; this will give immediate noticeable improvement in vision. Each step after that will be about 0.50 D flatter than the previous lens. The remaining curves are designed using the usual formulas.

These patients seldom have difficulties because you are performing the therapy in such a slow, controlled fashion. Consider offering a program of this type to your patients. It will increase the number of cases you are able to initiate. It can be mutually beneficial to both doctor and patient.

## Night Wear

Nightwear works well when the patient has clear vision for their waking hours. If vision decreases significantly too early in the day, it may be necessary for the patient to wear the lens for 1 to 2 hours to fine tune their vision. Your patients should be instructed to NOT remove the lens immediately upon waking. Lubrication and lens wear of about 15 to 30 minutes in the morning will improve acuity.

It will be impractical for the higher myopes to rely solely on nightwear. They will not be visually functional. These patients will be able to remove their lenses late in the day and be more functional than prior to orthokeratology.

## Retainer Wear

Retainer wear should be dictated by the patient's acuity. Every attempt should be made to minimize large fluctuations in corneal curvature. If the patient is wearing the lenses only at night and acuity is good in the evening, this is the proper amount of lens wear. If acuity drops by the end of the day, have the patient put the lenses on 1-2 hours before retiring for the evening. Some people will only need a few hours of wear to maintain acuity. For them retainer wear should be in the early morning so as to provide the best possible acuity for their workday.

It is recommended that you not decrease retainer wear more frequently than every 2 months. The key for long-term success is to maintain stability. A well-informed patient will be able to monitor and modify their retainer wear safely.

## Trouble Shooting the Rinehart-Reeves 4 Curve Reverse Geometry Lens Design

When the patient has results that are not what we expected it is necessary for us to solve the problems in a timely fashion. Troubleshooting requires very careful analysis of the lens and eye prior to making lens changes or modifications. The following information must be gathered:

- **Topography**- this will show the size and location of the treatment zone, as well as show central islands.
- **Lens Verification**- You must know exactly what lens you have on the eye NOW in order to solve a problem. Never assume the lens is as ordered, measure the base curve and power. If either has changed you now do not know the parameters of the rest of the lens.
- **Fluorescein Pattern Evaluation**- This allows you to assess the lens movement and centration in an open eye situation.
- **Slit Lamp Evaluation of Cornea**- You are looking for evidence of physiological problems.
- **Refraction**- this provides information as to the amount of improvement as well as the quality of the corneal optics.

Armed with the above information as well as input from your patient interview you can now systematically approach any problem and have a high probability of solving the problem.

Troubleshooting in Orthokeratology involves three main areas:

- **Lens Positioning Problems**
- **Vision Related Problems**
- **Physiological Problems**

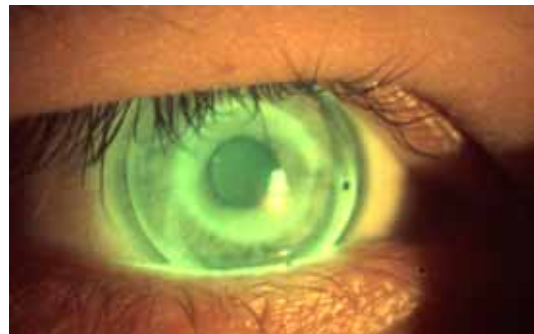
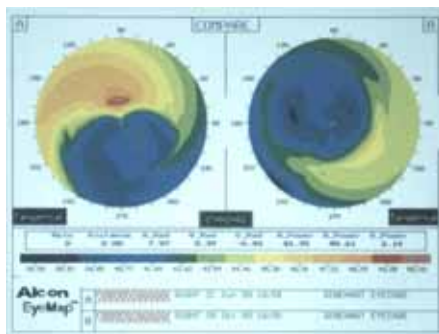
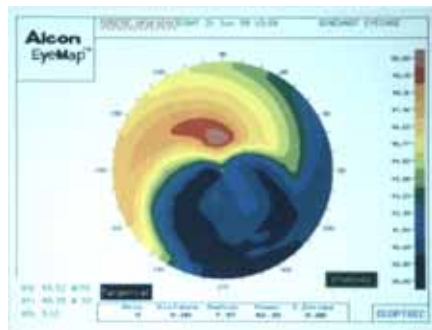
### 1. Lens Positioning Problems:

First and foremost it is necessary to evaluate the fluorescein pattern. Most of your attention should be given to the area of the alignment/fitting curve. This is the region of the lens that most influences the lens position.

### Low Riding Lenses:

This is generally not a significant problem, unless the lens is fixed low or if the patient experiences ghost vision. Because the peripheral cornea is flatter than the central cornea the lens may exhibit a heavy touch in the superior quadrant of the alignment zone. **Solution:** Flatten the alignment curve by 0.25 to 0.50 D. It will be necessary to change the reverse/relief curve to keep the new alignment/fitting in the desired relationship to the cornea. This magnitude of change will result in a 5 to 11 micron decrease in sagittal depth of the lens.

If the lens can be moved up with only a slight pressure on the lower lids the **Solution** is to redesign a lenticular flange to allow the lid to pull the lens to a more centred position. This is done by decreasing the centre thickness and/or increasing the edge thickness.



### High Riding Lenses:

This is an uncommon problem if the lenses are designed with a lenticular flange which will cause the lids to push the lens down not up.

Careful attention to the fluorescein pattern will tell you the source of the problem. Most commonly you will find the alignment/fitting zone is flatter than the cornea in the superior quadrant, that is, the overall sagittal depth of the lens is too low. This allows the lens to move up without resistance. **Solution:** Steepen the alignment curve by 0.25 to 0.50 D and make the appropriate change in reverse/relief curve so the desired effects are achieved (this increases the sagittal depth of the lens by approximately 5 to 10 microns).

If the fluorescein pattern and movement look *perfect* other option is to increase the centre thickness while decreasing the edge thickness. In rare cases it may be necessary to utilize prism to pull the lens down to a more centered position.



### Lateral Decentration (Nasal & Temporal):

This may be the most difficult problem to solve. In this case, observe the fluorescein pattern in the nasal and temporal quadrant. Too much pressure at the alignment/fitting zone nasally will push the lens temporal and visa versa. If the fluorescein pattern has the desired appearance when the lens is moved to a centred position the **Solution** is to increase the lens diameter. If the patient is fit with a 10.0 mm lens use a 10.6 mm diameter; if the patient is wearing a 10.6 go to an 11.0 mm lens diameter.

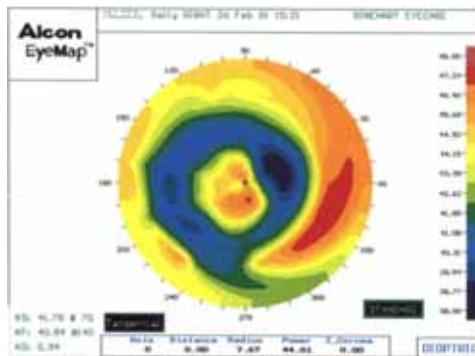
## 2. Vision Related Problems:

### Central Islands:

Central islands are small areas of incomplete treatment at or near the visual axis. The result is decreased acuity and/or ghosts.

If the cause is poor lens centration the **Solution** is to make the changes necessary to achieve centration (see the previous section).

If the lens centres and moves in the proper fashion, one **Solution** is to increase applanation by modifying the lens in the area between the alignment/fitting curve and the peripheral curve. If this does not solve the problem flatten the alignment curve by approximately 0.25 to 0.50 D and make the necessary changes in relief/reverse curve to keep the proper lens-cornea relationship. This will decrease the sagittal depth of the lens by approximately 5 to 10 microns.



### Under Responders:

Some patients respond slower and to a lesser degree than we expect.

If the fluorescein pattern looks perfect and topography shows a centered treatment zone with no central islands, **Solution** is to wait. Time is your best weapon. Re-evaluate the patient in 2-3 weeks.

If the fluorescein pattern shows insufficient apical touch, **Solution** is to flatten the alignment/fitting curve by 0.50 to 0.75 D the lab will make the proper changes in reverse/relief curve so the alignment/fitting curve remains in the ideal relationship to the cornea.

If topography is satisfactory, flatten the base curve while maintaining the same lens-to-cornea fitting characteristics. This will increase the forces applied to the cornea thus creating more change.

Verify that the patient is compliant with your instructions on wearing time and lens care.

Finally, remember some patients do not change as much as we anticipate. This is most likely related to individual tissue factors that are not well understood at this time.

### **Poor Retention:**

When the unaided acuity does not hold for a satisfactory length of time, consider the amount of change the cornea has undergone.

Observe the centering characteristics of the lens, using subtractive topography plots. If topography shows less than ideal centration of the treatment zone then the **Solution** is to improve lens center.

If there is not sufficient applanation of the cornea, flatten the base curve and keep the sagittal depth the same. This is the solution if corneal topography shows good centration and no central islands.

If topography reveals a central island, flatten the alignment curve in order to eliminate the central island.

### **Ghosting at Night:**

If the lens does not center, redesign the lens to achieve centration.

Confirm, with topography, that there are no central islands.

If all optical considerations are considered and fixed, the patient's pupils may be significantly larger than the area of the cornea that has been treated.

### 3. Physiological Problems:

#### Central Corneal Staining:

This is due to either mechanical irritation or problems with corneal physiology.

If the inside of the lens is soiled, the **Solution** is to resurface the lens. Also reinforce to the patient the importance of proper care of the lenses.

A lens that is too flat, that is, too low of a sagittal depth will result in mechanical irritation to the cornea. The **Solution** is to increase the sagittal depth by steepening the alignment/fitting curve by at least 0.50 D.

If none of the above is the cause, change to a higher Dk material.

#### Lens Imprint on the Cornea:

For this to occur either the lens is decentred or the alignment curve is too tight. The **Solution** is to first make the lens center.

Be sure the lens is clean.

If centration is adequate flatten the alignment/fitting curve by 0.25 to 0.50 D

#### Fixed Centered Lens:

This is when the lens centres but does not move. If this is not remedied the cornea will eventually suffer physiological problems.

First be sure the lens is clean. Very careful inspection will often reveal a build up of debris on the inside surfaces of the lens. The **Solution** is to resurface the lens and review the importance of proper lens care.

If the lens is clean and the lens is only slightly tight, you may be able to perform a modification to the area just outside alignment/fitting zone to loosen the fit slightly. A 0.2 mm wide zone with a 9.00 to 9.50 mm diamond will loosen the lens fit. Evaluate the peripheral tear reservoir, if it is insufficient widen and/or flatten the peripheral curve.

If after the lens is modified it still remains fixed, order a new lens with alignment/fitting curve being flattened by 0.25 to 0.50 D, this will create a reduction in sagittal depth of 5 to 10 microns.