The War against Corneal Warpage

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Introduction

There is no question that corneal deformity or warpage may result from wearing any type of contact lens - soft, hard or (R)GP. In discussing corneal warpage, we are referring to corneal changes, as detected with keratometry or corneal topography, which occur after a lens has been fit. There are various indices that may be used to quantify this, but they are not in general usage.

Warpage causes a number of changes that may or may not be noticed by patients. Patients may notice spectacle blur (poor vision with spectacles after a period of contact lens wear), they may experience discomfort or they may have decreased vision with their contact lenses. The fitter may find a change in vision and/or refraction as compared to previous examinations.

Keratometry and/or topography are the most important tests for diagnosing corneal warpage. In severe cases you may see fluorescein pattern changes during the slit lamp evaluation.

However, I have always maintained, and still do, that corneal warpage should be a rarity in any contact lens practice. In our practice we insist, and always have, that no corneal deformity should be tolerated. We tell all patients that there should be no spectacle blur with any type of lens material that we fit. We expect patients to be able to remove their contacts and immediately see clearly. If not, they are to return to us so we can solve the problem and eliminate it. It is rare that we can't alter the fit to achieve our objectives.

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Spectacle Blur

Basically, spectacle blur occurs when the lens-cornea relationship is not adequate, leading to a distortion of the corneal surface. This may occur from a poor fitting lens, from a lens whose parameters have
changed over time or from a cornea that no longer tolerates the lens which originally fit correctly.

Even with excellent fitting and follow-up, there will be some cases of corneal deformity with spectacle blur. If patients are followed correctly and know how to recognize it and to call the office immediately, you can keep spectacle blur to a minimum and treat it quickly if it occurs.

During the exam, it is necessary to ask questions regarding the vision after removing the contact lenses, wearing schedule and whether there are any other symptoms. With every patient, take a careful history. If the patient is a contact lens wearer, ask if there is, or has been, any spectacle blur after removing the lenses at the end of the day and how long it lasts. Obtain the previous records, especially the original refraction, keratometry and, if possible, the topography record as well as the type of lenses with their specifications.

After the history, our routine is to check the vision with the contacts, refract over the contacts and then have patients remove their lenses at the time of their annual exams. We check their vision immediately and refract if necessary. We tell patients to call us if spectacle blur occurs so that we may re-evaluate the fit of their lenses and correct the situation.

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However, it is not unusual to see new patients who have been wearing contact lenses and have significant spectacle blur. Their fitters usually tell them that this is normal and often do not prescribe glasses.

**Lens Fit**

We may see distortion in any patients who overwear their lenses, do not wear them correctly or who do not return for follow-up appointments and do not recognize that they have a problem.
They often do not have glasses that would allow them to recognize their problem early because the glasses serve as a somewhat limited check on the fit of the contact lenses. Some corneas are more “sensitive” and may not tolerate a lens or may periodically decompensate, even with a well-fit lens.

Distortion may also occur when lenses are refit before the cornea has returned to a stable surface. Corneal topography has minimized this because it shows distortion before the patient notices problems.

Spectacle blur due to corneal distortion may be minimized by taking several precautions. Explore why the patient wants to wear contact lenses and choose lenses that have the greatest chance of providing good vision with safety. Examine them carefully, fit lenses carefully and follow up on how they fit. This is especially important with patients who have been fit elsewhere. Refract the patient after removing the lenses (note how long the lenses have been on the eyes). If these measurements are available, note any changes. Ideally it is best to see these patients at the end of the day when the lenses have been on their eyes for an extended period of time.

Topography is essential because it will pick up some problems before the patient notices them or before it shows up on slit lamp evaluation.

‘Do not leave lenses “at the window” for patients to pick up.’

When lenses are ordered and delivered to the patient, they should be evaluated on the eye before the patient leaves the office. Except for soft lenses, every patient must be seen to evaluate how the new or replacement lenses fit on the eye. Do not leave lenses “at the window” for patients to pick up.

Fig 2a + b: Same eye directly after lens removal (2a), marked as ‘corneal distortion’ and weeks after cessation of lens wear (2b) marked as ‘normal’
Evaluation and Education

We cannot avoid spectacle blur in all patients. We must have good records with initial refraction and corneal measurements for comparison. There are patients who apparently have more “sensitive” corneas and will develop corneal molding periodically. This type of molding is easily reversible and controlled with refitting the lenses. By educating patients about the possibility of spectacle blur, they can come to the office if they notice it at a time when it can be handled easily and efficiently. By performing refractions and keratometry and/or topography as soon as the lenses are removed and comparing these findings to those of the original contact lens fitting, you will find the molding early, at a time when refitting may be done easily.

Recognizing instrument and performer variation, it is not possible to have absolute numbers. Obviously, we are most concerned with any subjective complaints of decreased vision and keratometry changes greater than -1.00D when removing the contact lenses with any decrease of vision from the original pre-contact lens vision. Poor fitting lenses, corneal staining or poor fluorescein patterns are red flags which should "sound an alarm" and should raise our concerns. Topography changes are the most important diagnostic findings. It is important to individualize these findings for each patient. We do not use irregularity indices. With new patients who have been fit elsewhere, it is helpful to obtain their previous records.

Summary:

Corneal warpage is an entity that all practitioners will see. To minimize it, we must educate patients as to its unacceptability and carefully fit and follow patients.

Scleral contact lenses are typically used to fit the most difficult irregular cornea patients or as a therapeutic device to manage severe ocular surface disease. The bearing force of these lenses rests on the scleral conjunctiva, which allows them to vault completely over the corneal surface. Scleral lenses are unique in that they semi-seal to the eye, and so a well fit lens does not move with blinking. This unique characteristic allows them to hold a large liquid reservoir that can mask extreme amounts of astigmatism for the irregular corneal patient or act as a liquid bandage to manage ocular surface disease. Blinking over the contact lens causes some flexure, which allows tear exchange as the lens acts like a diaphragm pump.

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