Clinical & Refractive Optometry is pleased to present this continuing education (CE) article by Dr. Langis Michaud entitled **Giant Papillary Conjunctivitis Related to the Wear of a Hybrid Contact Lens.** In order to obtain 1-hour of COPE-approved CE credit, please refer to page 342 for complete instructions.

Giant Papillary Conjunctivitis Related to the Wear of a Hybrid Contact Lens

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Subjective

AC is a 27-year-old Caucasian female studying at the Université de Montréal (Masters Degree in Hydrology). I first saw her eight years ago. At that time, she consulted me after an ocular trauma caused by a hockey puck while attending a game. The impact caused her glasses to break and she received a fair amount of debris in her right eye. She was seen by an ophthalmologist and her cornea was sutured. Corrected visual acuity of her right eye was 20/20 (6/6) prior to the trauma but at a hand motion level postoperatively, with no possibility to improve it with a regular refractive correction. Her surgeon referred her to me in order to have a contact lens fitted to try to improve her outcome.

We tried several contact lens options and found that the SoftPerm hybrid contact lens was the best option available at that time. The patient was not able to tolerate a gas-permeable contact lens alone. The hybrid lens, with a rigid center and soft skirt, offered comfort, convenience and, most importantly, led us to achieve good visual acuity. In fact, the results were impressive: with the contact lens on, her visual acuity reached 20/25 (6/7.5).

The standard of care is to restore vision and minimize the impact of the contact lens. Theoretically, we would have to prescribe an appropriate lens to restore the vision on the right side, while minimizing the effect of a contact lens on the left side. A polycarbonate pair of glasses would complement the fit on the right eye, combining protection and vision correction for the remaining reliable eye. This is exactly what we did.

However, based on the patient's demands, we decided to also fit the left eye with a contact lens. It was understood by both of us that this lens would be worn only occasionally and for a short period of time (Friday night fever lens…). For practical reasons, and to alleviate multiple modalities of wear, I decided to fit her with a conventional soft lens. The care regimen prescribed for both lenses was Ultracare. Hydrogen peroxide-based solutions offer more comfort and are safer on a long-term basis (they offer the best disinfection against micro-organisms with no preservatives). Again, in order to improve compliance and for more convenience, we decided to select the same care regimen for both lenses.

From 1998 to 2004, I saw the patient yearly and she did well with the lens on her right eye. A new lens was ordered OU on average every 16 months, either due to protein/deposit adsorption or to a tear of the right lens at the junction of the rigid and the skirt, which occurs frequently with this hybrid type of contact lens. Every aspect of the examination remained stable over this time and we were both happy with the fitting and its outcome.

In April 2006, I saw her for a control exam. She had torn her right contact lens and during the case history she reported discomfort with the lens on, for the last 3 to 6 months. She complained of reduced visual acuity on the left side. She admitted to wearing her left lens often, in fact for at least 4 days a week, for more than 10 hours each day.

Objective

I was not able to perform any tests with the lens on since it was torn. Preliminary tests were non-conclusive due to the poor visual acuity of the right eye. Stereoscopy was reduced. There was no strabismus and ocular movements were full without any restrictions. The pupils showed an anisocoria secondary to the trauma but both pupils were reactive to light and accommodation.

The following results were measured:

- Visual acuity with left lens: OS 20/30 (6/9) +2 (Hydron, Zero 6, -1.25)
- Objective refraction: OD n/a; OS -1.50
- Subjective refraction: OD hand motion; OS -1.75 20/20 (6/6)
- Crossed cylinders: OD n/a; OS -1.25

Anterior Segment Evaluation

The lids of the right eye were clear and did not show any sign of blepharitis. Some mucous discharge was noticed

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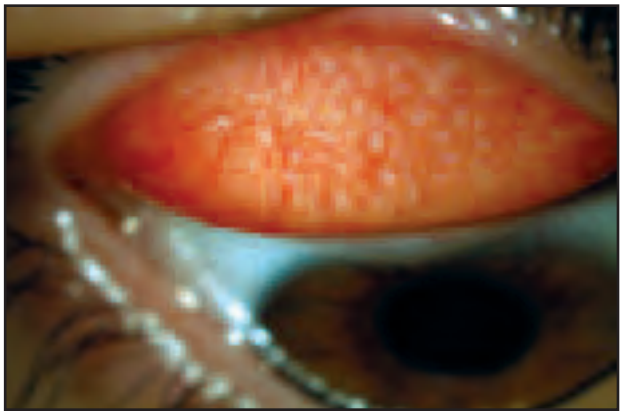

Fig. 1 Right eye shows a GPC of Grade 3+ with a hyperemia of grade 3.

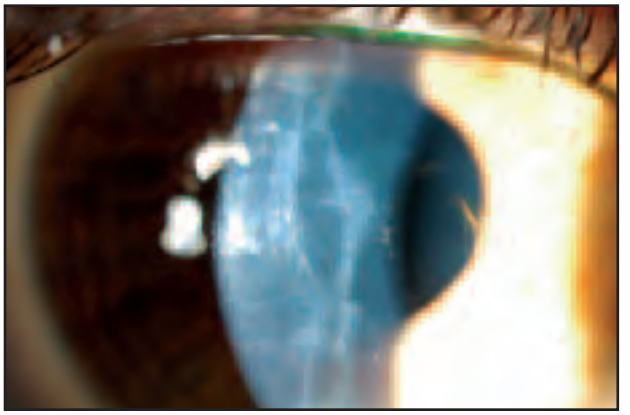

Fig. 2 Appearance of the right eye 8 years post-trauma.

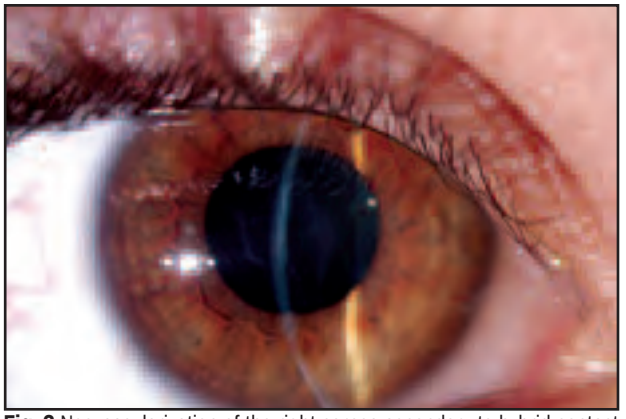

Fig. 3 Neovascularization of the right cornea secondary to hybrid contact lens wear.

Fig. 4 Upper conjunctiva of the left eye shows a normal appearance after 8 years of conventional contact lens wear.

on the inferior cul-de-sac. On the eversion of the upper lid, I noticed a giant papillary conjunctivitis (GPC) of grade 3+, with a hyperemia of grade 3 (Fig. 1).

The cornea of the right eye showed a large stromal vertical scar in the middle of the pupil area with an endothelial break (Fig. 2). There was brownish pigment accumulation on the side of the scar, secondary to iron, and hemosiderin deposits over time. Grade 1 temporal and nasal neovascularization was noticed (Fig. 3) but the bulbar conjunctiva was white. This is a normal finding since SoftPerm lenses have poor permeability to oxygen. This cornea looked similar to previous findings. Due to a torn contact lens, not worn for several days, the right cornea showed no fluorescein staining and none was found on the conjunctiva either.

The left eye was evaluated and all the findings were within normal limits. Of special note, the upper tarsal conjunctiva was free from papillae (Fig. 4). Mild staining (grade 1-) was noticed on the inferior part of the cornea.

Assessment

This monocular patient shows GPC OD, secondary to the wear of a hybrid contact lens. Symptoms of discomfort felt by the patient can be considered as consistent with this finding. The complaint of reduced visual acuity could be related to the increase in the myopic correction of the left eye, from -1.25 to -1.75.

Plan

Obviously, the treatment plan should be oriented to restoring ocular health of the right eye and maintaining the good status of the left eye. Currently, several more options could be considered compared to what was available at the time of this patient's first fitting.

GPC secondary to contact lens wear is always related to an immune response to deposits on the surface of the lens, acting like antigens, and could be generated as a mechanical response to the presence of the lens. Any contact lens invades the free space between the two conjunctivas, where no contact between tissues occurs. For this reason, the epithelial cells of the upper palpebral conjunctiva are not keratinized and therefore not really aimed to support the constant pressure and friction from a foreign body. These cells are more responsive when the thickness of the edge of the lenses is not appropriate or well designed. This has been the case with conventional

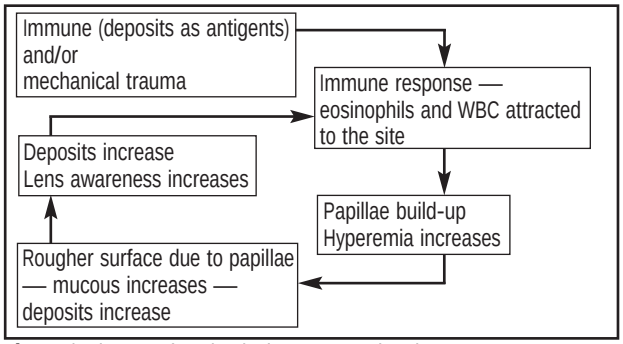

Fig. 5 The immune/mechanical response related to GPC

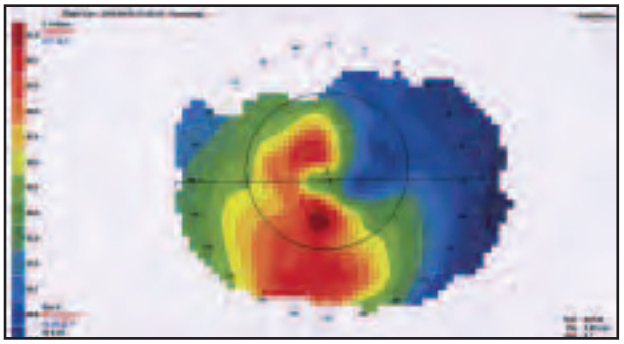

Fig. 6 Topographic map of the right cornea

soft thick lenses. The cell alteration stimulates the exudation and accumulation of white blood cells (WBC). This immune response alters the size of the cell, which is considered therefore a papilla.

When an eye feels any discomfort, this is interpreted as a lack of lubrication and mucous production is increased. At a given point, the mucous can no longer be diluted into the tear film. It remains in its solid state and generates pseudo or true membrane on a palpebral cul-de-sac. This mucous discharge can adhere to the surface of the lens itself, making it more rugous and favoring more deposits, creating a vicious circle response. If the cornea is altered, mucoid deposits attach to its surface, creating filaments and increasing patient discomfort.

With hybrid lenses, mechanical effects are also generated. The junction between the soft skirt and the rigid center of the lens creates mechanical pressure on the upper conjunctiva. This is the same phenomenon found with prosthetic eyes or with the presence of stitches on a bulbar conjunctiva. Deposits on the surface of any lenses increase the friction and therefore the mechanical response, in addition to the immune response already initiated by their presence. Treating GPC demands the breaking of the vicious cycle leading to its occurrence (Fig. 5). First, we have to find a lens that won't hurt the upper conjunctiva any further. Second, we have to alleviate the adsorption of deposits. Third, we have to maximize the oxygenation through the lens in order to maintain an as low as possible immune response. Fourth, we can ease the recovery by adding anti-allergic drops to the regimen. Regular lubrication and a moderate schedule of wear are also elements to consider. The cold turkey approach, ceasing the wear of the contact lenses, is not considered appropriate except in severe cases.

A new generation of hybrid lenses is now available. These lenses are more permeable and seem to perform very well on traumatized eyes. Unfortunately, they are not available in Canada. Therefore, the fitting of high-DK gas-permeable lenses should be considered. With time, it is possible that the patient can grow to tolerate this solution even if the response was not positive at the first trial.

In fact, this was our primary treatment plan at this time. Due to the irregular shape of the cornea (Fig. 6), an aspheric design was selected. After a few minutes of wear, the patient was not comfortable and did not want to try this lens further. We then decided to adopt a piggyback system by adding a soft lens under the gas-permeable one. Since we didn't want to compromise the corneal health, a high-DK silicone lens was selected. Using this type of system, I normally prefer to select the most permeable lens, e.g., Focus Night & Day. My parameters of choice, for piggyback purposes, are base curve 8.4 mm and power +0.50 D. This lens is stable and offers easy patient handling. The lens power, used in a piggyback system, is negligible since it is estimated that 1/6 of it can be considered effective. This means that for an over-refraction of -1.00 D, if you want to change the soft lens power instead of the rigid gas-permeable (RGP) one, the new soft lens should be -6.00 D to generate the appropriate amount of power needed.

Selection of this material opens the door to fitting the left eye with the same lens, which is more appropriate and healthier for a monocular patient. In this case, K readings indicated 42.75 x 43.50 @ 90. We selected a trial lens with a base curve of 8.4 mm and a power according to the refraction (-1.75 D). Position and movement were estimated as optimal. Over-refraction was plano 20/15 (6/4.5).

With the soft lenses on, we determined the final lens parameters considering the behaviour of the trial lens (Boston XO, base curve 7.75 mm, power -3.00 D, diameter 9.6 mm), the over-refraction (-1.50 D for 20/25 (6/7.5) +1 visual acuity) and the visible corneal diameter (11.5 mm). We then ordered:

- OD — RGP: Boston XO, base curve 7.80 mm; diameter 9.3 mm, power (adjusted for the reduced diameter) -4.25 D. Envision design (aspheric peripheries). Soft: Focus Night and Day, 8.4 mm, +0.50 D (Fig. 7)
- OS — Focus Night and Day, 8.4 mm -1.75 D

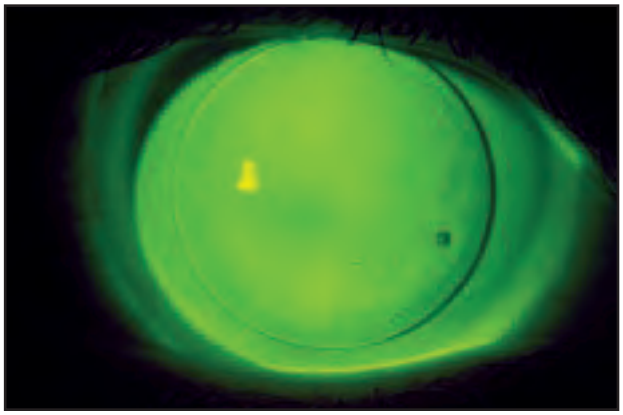

Fig. 7 Piggyback system, soft and aspheric RGP lens, showing an aligned fluorescein pattern.

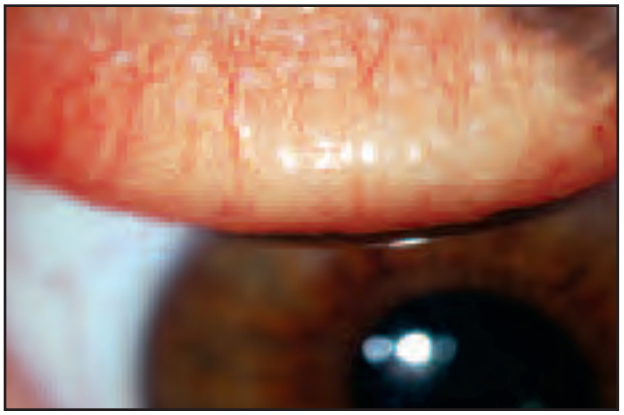

Fig. 8 Upper conjunctiva of the right eye improved to grade 2 GPC at 3 months.

These lenses are to be worn on a daily basis OU and replaced every month. They should not be worn on an extended-wear basis. The care regimen proposed included Boston Simplus for the RGP lens and Clear Care for the soft lenses. Non-preserved saline (Lens Plus), already familiar to the patient, could be used to rinse the lenses as needed.

We also prescribed olopatadine chlorhydrate (Patanol™, Alcon) b.i.d. before and after the contact lens wear, for at least 3 months.

The patient was seen at the delivery, and after 1 and 3 months. At the 3-month visit, she was very happy with her new lenses. The symptoms of lens awareness and reduced vision had disappeared since the delivery. Upper palpebral conjunctiva of the right eye showed a reduced hyperemia and the GPC reverted back to grade 2 (Fig. 8) and was continuing to improve. Clinically speaking, hyperemia is a very important sign to consider, even more important compared with the presence of papillae themselves. A hyperemic conjunctiva indicates that the eye is affected by an active process of the immune system Papillae by themselves are not indicators of an active immune response. In fact, they take days to build-up but months to years to be reduced. Therefore, clinicians have to consider hyperemia as the fire and the papillae as the ashes. Their first goal should be the elimination of the hyperemia rather than papillae disappearance. Consequently, in this case, since the upper conjunctiva was no longer hyperemic, we decided to discontinue the medication. We recommended the regular use of comfort drops (Blink™, AMO) on the right eye, and limited the patient's wear of contact lenses to 10 hours per day on both sides.

Conclusion

This interesting case illustrates how to manage GPC secondary to the mechanical effects of contact lens wear. In such cases, it is not recommended to completely discontinue the contact lens wear, but to make every possible effort to break the vicious cycle that initiates the immune/mechanical response. In this situation, practitioners must revisit every aspect of the contact lens wear: materials, mode of wear, and care regimen. In addition, anti-allergic drugs and/or soft steroids can contribute to accelerating the healing of the palpebral tissue, making the contact lens wear more comfortable.

In our case, the challenge was substantial: to refit a monocular patient, moving from a hybrid contact lens to a piggyback system. When refitting this type of patient, silicone hydrogel materials are a good option to consider these days. This material has a proven safety track record; the most permeable materials should be selected in order to restore and maintain ocular health.

In addition, the contact lens care solution is a key aspect of treatment since many adverse reactions can be associated with the use of various products, particularly in a traumatized and already inflamed eye. Hydrogen peroxide solutions are probably among the safest on the market and the addition of other solutions is compatible with their use.

This patient was happy with the refitting process and its outcome. We will definitely have to maintain regular follow-ups in order to alleviate any recurrence of the papillary response. In fact, it was established that this patient would be seen every six months. Compliance in this case was not a problem, but would have to be addressed in a different situation in which more frequent visits might be needed. ❑