Lens file: a new hybrid

Katie Harrop describes UltraHealth, the latest hybrid lens from SynergEyes, which is designed to give greater comfort and longer wearing times

UltraHealth is the latest hybrid contact lens from SynergEyes and is exclusively distributed in the UK by No7 Contact Lenses. It has been designed to provide excellent comfort, visual outcomes and safety for patients with keratoconus and irregular corneas.

Keratoconus is a corneal dystrophy characterised by stromal thinning, leading to a bowing forward of the affected cornea. Onset is generally at around the second or third decade of life, and tends to progress through the teens and 20s, usually stabilising by the 30s. The resultant 'cone-shaped' cornea induces irregular myopic astigmatism, which is often difficult to correct with spectacles alone, particularly in cases where there is significant asymmetry between the two eyes. There is an association of this disease with atopic conditions and excessive eye rubbing. It can also be hereditary.

The condition is usually bilateral although there may be marked asymmetry. There are several clinical signs in keratoconus, including Vogt's striae, Munson's sign and Fleischer's ring.

There is a great deal of variety in the size, shape and position of the cone from patient to patient. The best way to see this is with corneal topography. The most common types are central, steep 'nipple' cones, more oval-shaped cones which are usually decentred inferiorly and temporally, and large globus cones where the affected area involves most of the cornea. In extreme cases or when contact lenses have been fitted too flat, scarring may be seen at the apex of the cone.

When presented with a patient with keratoconus or highly irregular astigmatism, eye care professionals know that they face a challenge. Such cases can test the limits of training and experience, but in the hands of a skilled practitioner can provide the potential for immediate visual improvement and a rewarding outcome.

The 'gold standard' when fitting keratoconic eyes has long been considered to be a corneal RGP lens. While these lenses can be customised to fit most eyes, careful corneal assessment and fitting is required to ensure the lens matches the eye for which it was manufactured. Factors such as a brief patient learning curve for insertion/removal, relatively low cost, and the familiarity to practitioners make RGP designs a viable choice.

If centration or comfort with corneal GP lenses is not acceptable then a piggy-back system can be used. Piggy-back systems, however, reduce the oxygen reaching the cornea and the patient needs to handle and care for two different lens types.

Scleral lenses are also an option, especially for patients who cannot tolerate RGP lens wear. They are designed to vault over the entire cornea and the resultant lacrimal lens produces excellent visual results. Properly fitted, scleral lenses are generally more comfortable than RGP lenses, but many patients find it difficult to master the insertion/removal technique, which limits acceptance.

Many new products have been developed over recent years and have all been aimed at addressing the balancing act of providing good comfort for the patient while maintaining good vision and ocular health.

In 2008 SynergEyes introduced ClearKone, a hybrid contact lens that provided excellent centration and stability regardless of cone location. UltraHealth is a natural progression from ClearKone, keeping the features that made ClearKone so popular with patients and practitioners, while introducing material and features designed to provide even better wearability, patient comfort and ocular health.

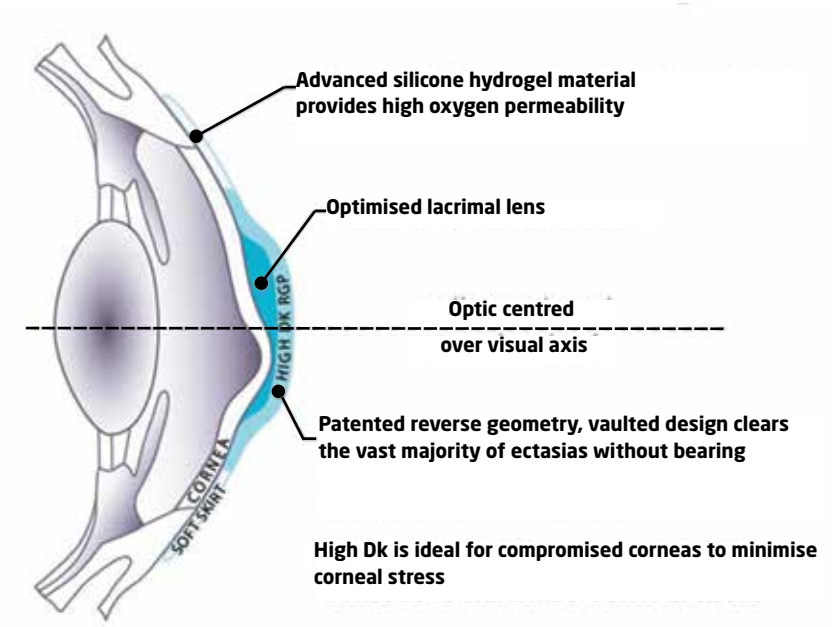

Figure 1 UltraHealth vaulted lens design

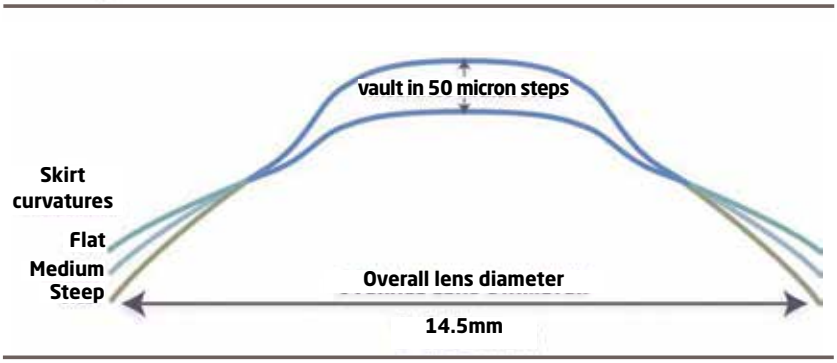

Figure 2 Profile of the UltraHealth lens

UltraHealth design

Rather than attempting to fit the corneal shape and aiming for three-point touch, as found in corneal GP lens fitting for keratoconus, UltraHealth is designed to completely clear the corneal irregularity. It does this with a

reverse geometry design.

The reverse geometry design allows for a flatter front surface than corneal GP lenses. This gives the practitioner the ability to prescribe a reduced lens power in the contact lens, reducing the potential for ocular aberrations. The vault in the UltraHealth lens is designed to minimise the potential for scarring and maximises comfort, allowing for several hours per day of wearing time. For UltraHealth's target population this is vitally important to these visually debilitated patients who need to be able to count on correction that restores their quality of life and gives them all-day comfort.

In many instances, the decentred apex of the ectasia will result in displacement of the lens optics from the visual axis. A hybrid lens has the benefit of realigning the optics of the lens with the visual axis resulting in a significant improvement in quality of vision.

The base curve of UltraHealth lenses varies differentially with vault so the silicone hydrogel (SiH) skirt doesn't have to do all of the 'heavy lifting' to achieve apical clearance. The design of the SiH skirt therefore ensures excellent visual outcomes while ensuring patient comfort.

The soft lift curve of the UltraHealth lens (a part of the peripheral lift curve found in reverse geometry lenses) ensures apical clearance without the need for a hard corneal or scleral landing zone which can lead to discomfort and/or excessive tightening of the lens. This softer landing zone reduces the possibility of the lens settling back and sealing off and also allows an increased chord length so the UltraHealth can easily be fitted on a wider range of irregular corneas and ectasias.

Materials

UltraHealth combines an ultra-high Dk (130) RGP centre with a high (84) Dk SiH skirt. Earlier hybrid lenses for keratoconus had low Dk hydrogel skirts and practitioners quite understandably had concerns about ocular health, particularly with the long wearing times needed for these patients. The greatly improved oxygen transmission of the UltraHealth SiH skirt reduces the potential for corneal neovascularisation and maintains long-term corneal health.

Fitting

Patient candidates

UltraHealth is ideal for patients with:

- Keratoconus
- Ectasia
- Intacs
- Post-corneal cross-linking

Patients with early, mid and advanced cones can be fitted with UltraHealth. Although the increased chord length allows UltraHealth to be fitted on a wider range of corneas, very large or peripheral cones may be difficult to fit.

UltraHealth is particularly useful for patients who suffer from tolerance issues with corneal RGPs. For newly diagnosed keratoconics there is no longer the need to suffer an extended period of discomfort during the adaptation period.

Diagnostic fitting set

UltraHealth is fitted from a 26-lens diagnostic fitting set. Fitting from a fitting set allows the patient to experience the comfort of the lens during the process and the influence of the skirt on the rigid portion can be assessed. The lenses in the set have vaults from 50 microns to 550 microns in 50 micron steps. There are lenses with each of the three skirt curves – flat, medium and steep – for vaults from 300 to 500 microns. For ▶

vaults from 100 to 250 microns the set has medium and flat skirts only but steep skirts are available to order. A 50-micron lens with a flat skirt is included as are 550-micron lenses with flat and medium skirts. These lenses have been selected following analysis of the lenses most frequently needed by practitioners during fitting.

The determination of the fit is a three-step process: vault determination, skirt assessment and lens power.

Lens handling

The bowl of the lens should be filled completely to the top with non-preserved saline. One drop of fluorescein should be added to the empty bowl before filling or a fluorescein strip should be dipped into the saline to allow assessment of the clearance of the lens. High molecular weight fluorescein is not required as standard NaFL will not be absorbed into the SiH skirt.

Have the patient lean forward and tuck their chin to chest, nose perpendicular to the floor. Retract the upper and lower lids and gently place the lens on the cornea. Check for bubbles under the lens using blue light. Bubbles cannot be displaced by lens manipulation– remove and re-insert.

Vault determination

The first stage of the fitting is to establish the correct vault for the patient. The rigid portion of the lens should completely clear the cornea and the correct amount of vault is 100 microns above first bearing. The first diagnostic lens inserted should be the 250µ lens with the flat skirt. As the lens is fitted by vault the central corneal keratometry readings do not provide useful information for trial lens selection. The lens should be allowed to settle for 3-4 minutes before the central clearance is assessed. This allows excess fluorescein to drain away from the tear film.

If pooling (clearance) is noted (Figure 3):
- Decrease the vault in 100µ increments until the first bearing is observed
- Next increase the vault by 50µ (defining step)
  - If bearing is seen, add an additional 100µ – this will be the vault to order
  - If pooling is seen, add an additional 50µ – this will be the vault to order.

If bearing is noted (Figure 4):
- Increase the vault by 100µ increments until you see first pooling (clearance)
- Next decrease the vault by 50µ (defining step):
  - If bearing is seen, add an additional 100µ – this will be the vault to order
  - If pooling is seen, add an additional 50µ – this will be the vault to order.

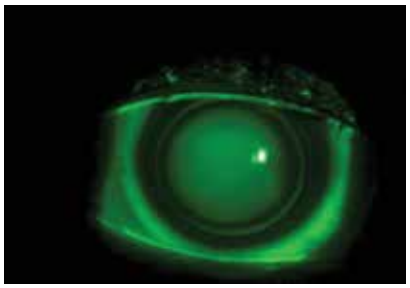

Figure 3 Vault determination: clearance

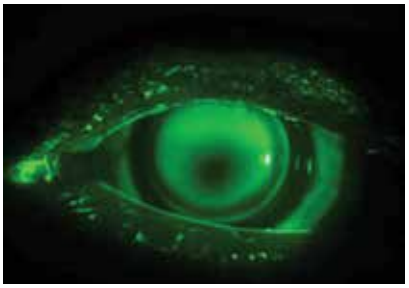

Figure 4 Vault determination: bearing

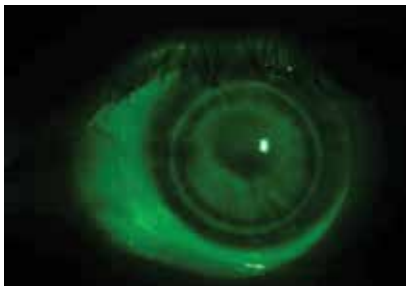

Figure 5 Skirt determination: ILZ bearing

Figure 6 Skirt determination: ILZ clearance

Skirt determination

To determine the correct skirt, evaluate the current flat skirt in the final diagnostic lens as discussed under vault selection. Examine the corneal clearance of the inner landing zone (ILZ) 3-4 minutes after insertion. If bearing of the ILZ is noted (Figure 5), remove and insert the same vault with a medium skirt, using NaFl/saline. Monitor for bearing of the ILZ. When clearance of the ILZ first remains visible (Figure 6) (NaFl thinning without heavy bearing), you have reached the correct skirt.

Fitting note: There should be movement on blink when fitting the lens. However, movement after a few hours wear is not mandatory for an adequate level of oxygen due to the high Dk.

TABLE 1

UltraHealth vault power chart

Vault (µ)	Rx(D)
050	Plano
100	-2.00
150	-4.00
200	-6.50
250	-9.00
300	-6.50
350	-8.00
400	-9.00
450	-10.50
500	-12.00
550	-14.00

Flat, medium and steep skirt curves included in set

Lens power determination

Determine power by over-refraction. Begin using 1.00D steps and refine with 0.50D and 0.25D steps once the approximate power has been found.

The powers of the UltraHealth diagnostic lenses have been adjusted to allow the over-refraction to remain constant regardless of vault. Therefore practitioners can over-refract using the last lens used in the fitting process even when this is not the vault that the practitioner will order. It also allows changing to higher or lower vaults without the need to repeat the over-refraction if lens exchanges are needed. The power changes are not linear so a table is provided in the fitting set specifying the powers of the diagnostic lenses (Table 1). UltraHealth is ordered by specifying vault/skirt/power, for example 450 flat -4.00.

Summary

UltraHealth retains all the positive attributes of previous hybrid lenses for irregular corneas while overcoming some of the limitations that they presented. UltraHealth can provide patients with outstanding vision, comfort and ocular health and therefore is able to be worn for long wearing times and gives the patient improved quality of life.

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