The management of keratoconus has changed over the last years. We now have a variety of newer modalities that focus both on prevention of progression of the disease through corneal collagen cross-linking, and improvement of visual acuity through non-surgical and surgical methods. Contact lenses are generally the first treatment attempted, after stabilisation of the disease. We proceed to surgical options when contact lens fitting fails or the patient does not want to use a contact lens. All these surgical treatments aim to achieve a satisfactory unaided vision; however, contact lenses may still be required for further visual improvement.

Today we have multiple contact lens options to address the vision needs of our keratoconic patients. Contact lens correction for keratoconus is no longer limited to rigid corneal lenses. We now have larger diameter rigid lenses that take support from the sclera, hybrid lenses that combine rigid and soft lens materials and, finally, thick soft lenses specifically designed for keratoconus.

The main goal of fitting contact lenses is to provide the best vision possible with the maximum comfort without compromising the health of the cornea so that they can be worn for a long period of time.

Rigid corneal lenses have been the mainstay for contact lens correction of keratoconus for many decades. Due to their rigid nature, they do a wonderful job in masking corneal irregularities by allowing a tear lens to form between the contact lens and the anterior corneal surface and they provide excellent vision. They are made of high oxygen permeable material. They rest on the cornea and are fitted in alignment with the corneal curvature. In early or mild keratoconus, it is possible to obtain an ideal fit with good stability with a conventional rigid lens. But as the cone advances, the conventional corneal lenses tend to move inferiorly to the steepest part of the cornea, becomes unstable, which leads to uncomfortable wear, and frequent dislodgement of the lens. Flat fitting of these lenses may induce corneal abrasions and progressive corneal scarring over time.

Specialty rigid gas permeable corneal lenses with complex designs can attain better alignment with the highly irregular corneal surface. The design of the contact lens is selected according to the shape and position of the cone. For small to moderate cones, we prefer to use smaller diameter aspheric multi-curve designs that snugly fit the central cone. For oval sagging cones, larger diameter intralimbal or corneascleral designs that help to improve the centration of the lens are rather preferred.

In patients having problems with their habitual rigid corneal lenses like discomfort and instability, we can try piggyback fitting. In piggybacking, the rigid lens is fitted over a thin soft silicone hydrogel lens with high oxygen permeability (Dk). Advantages of this kind of fit are improved overall comfort compared with a corneal gas permeable lens being fit directly on the cornea, and potentially improved centration of the gas permeable lens. However this system also has some limitations like handling issues, the patient has to take care of two lenses and sometimes optimal centration of the rigid lens cannot be achieved.

Now we also have custom piggyback systems that consist of a soft lens with a circular, recessed depression in its centre. A rigid lens with high Dk is fitted within the central depression of the soft lens. This design creates a smooth anterior lens surface that eliminates upper lid dislodgement and also maintains better centration of the rigid lens.

Another option is soft lenses. They offer the advantage of better initial and ongoing comfort compared with a rigid lens. However, standard
soft spherical and toric lenses have a very limited place in keratoconus. Due to their draping effect they cannot mask the surface irregularities. They can be tried in cases in which corneal distortion is limited such as in early keratoconus or after intracorneal ring segments (ICRS) implantation where the central corneal topography becomes relatively regular.1,4

More advanced cases can be treated with specialty keratoconus design soft lenses.7 These lenses typically have a thick central optic zone, ranging from 0.3 to 0.6 mm. Due to its thickness, the soft lens starts to behave like a rigid lens allowing it to mask some mild to moderate irregular astigmatism. The most significant physiological concern of hypoxia has been overcome with recent high oxygen permeable silicone hydrogel materials.

Another type of combination lens is the hybrid lens. The newest generation hybrid lens consists of a high oxygen permeable rigid centre and a high oxygen permeable silicone hydrogel soft skirt edge that are covalently bonded together.8 These lenses have a reverse geometry design and are fitted according to the sagittal height of the cornea rather than its curvature. The central rigid portion vaults up the cornea with no apical touch. The soft portion of the lens lands inside limbus and extends onto the sclera. The lens can fit very steep corneas with better centration and stability independent of the location of the cone. Also they are useful for the correction residual refractive errors after ICRS and keratoplasty (KP).

Finally, we have the scleral lenses that are an excellent option in hard-to-fit highly irregular corneas like very advanced keratoconus, keratoglobus, post-KP corneas. They are quite large compared with corneal lenses, ranging from 15 mm to 24 mm. Scleral lenses are supported exclusively by the sclera, and completely vault the cornea and the limbus so they are actually non-contact lenses. Since they rest on the less-sensitive surface of the sclera, and do not touch the cornea and have no interaction with the eyelids they are much more comfortable than a corneal lens. They can vault over very irregular, distorted corneas and improve visual acuity profoundly. In a recent study, the visual outcome of eyes with advanced keratectasia fitted with a scleral lens were compared with that of those that underwent KP and it was found that visual acuity outcome was better and more rapid with scleral lenses compared with KP.9 It seems that modern scleral lenses will reduce the need for corneal transplantation and improve the prognoses for advanced keratoconus patients.

Contact lens management of patients with keratoconus is challenging. We are lucky to have a wide range of contact lens designs and materials today. There is no single lens design that is best for every stage of the disease. Appropriate selection and application of these lenses can restore vision without the need for surgery in most of the patients.