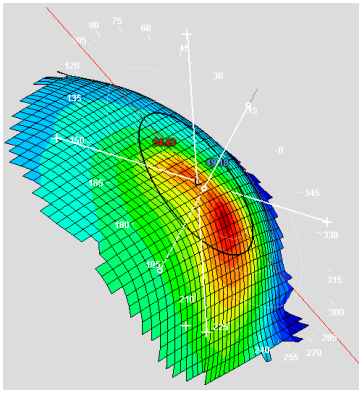
BUCK & TODD OPTOMETRIST

Keratoconus

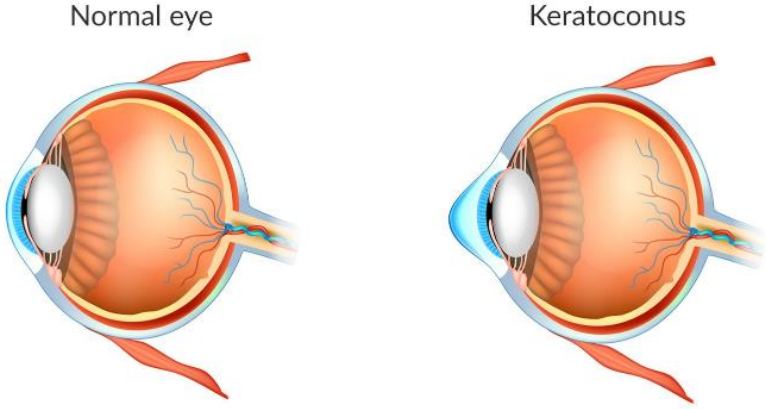
What is Keratoconus?



Keratoconus generally involves thinning and steepening of the cornea inferior nasal to the central cornea. The cornea is the clear domed window on the front of your eye; it provides ²/₃rds of the refractive power of the eye and needs to be symmetrical in shape to provide clear vision. Corneal thinning results in warpage to the cornea and it tends to bulge forward due to normal eye pressure.

Initially, this may induce myopia (near-sightedness), or astigmatism and glasses alone may provide reasonable vision. However, as the condition progresses; usually exacerbated by eye rubbing, vision quality deteriorates, and glasses become less effective. Consequently, most individuals with keratoconus rely on contact lenses for vision correction. Hard lenses are used to create a 'tear lens' between the back of the lens and the cornea, which in turn cancels out the warpage effect allowing the front surface of the contact lens to refract light without subsequent deviation. Unfortunately, soft contact lenses (commonly worn for most refractive error correction) tend to conform to the irregular corneal shape rather than correcting it.

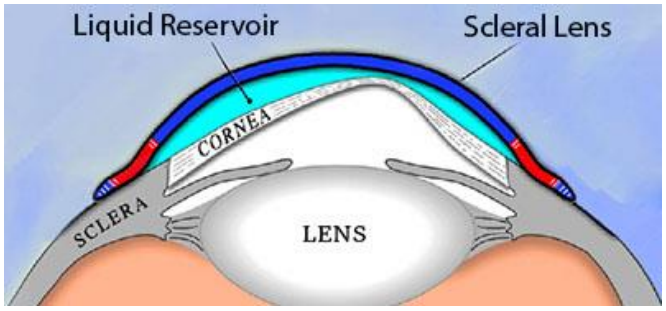
Keratoconus tends to be an inherited dystrophy associated with allergy issues, eye rubbing and some connective tissue issues. It typically manifests between the ages of 10 and 25 years. Frequent associations include allergies, infantile eczema, asthma, reduced night vision, double-jointedness, and occasionally minor chest pain. Keratoconus isn't linked to learning abilities, as evidenced by 60% of individuals with keratoconus pursuing tertiary education compared to 12% of the general population. While keratoconus doesn't lead to blindness, untreated cases can result in significant vision loss.



Our optometrists specialize in fitting patients with keratoconus with both rigid gas permeable (RGP) contact lenses and scleral lenses to correct their vision. Even individuals with corneal scarring due to keratoconus can achieve improved visual acuity, enabling them to meet legal driving requirements and perform daily tasks. Scleral contact lenses are also effective for patients who have undergone corneal grafts due to progressive keratoconus.

How do contact lenses help?

The goal of contact lens fitting is to match the shape of the lens's interior surface to the cornea's shape and then vault across the top of the thinner conical area. Previously light applanation with the peak of the cone was thought to help retard progression, however we are now aware this causes increased central scarring and is ineffective in reducing progression. Excessive pressure on the cone's peak can lead to permanent scarring within a few months. A well fitted contact lens clears the cone providing a stable tear lens. Keratoconic corneas are generally slowly changing and often require changes in contact lenses every 6-12 months. Follow-up visits are advisable every six months, or sooner if discomfort or visual problems arise.



Refitting or lens modification may be necessary if advised by your optometrist or if you experience discomfort, intolerance, or vision loss. In some cases, refitting may slightly reduce vision because a cone that has moved forward and is in contact with the back of the lens becomes "moulded" into a regular shape.

It's important to recognize that while contact lenses can significantly enhance your vision, achieving the same level of vision as a person with normal eyesight may not always be possible. Issues may arise in situations of glare and poor lighting due to refraction at the irregular corneal surface beneath the contact lens. Therefore, keratoconus patients are encouraged to have spectacles for emergency use. It's essential to understand that spectacles typically offer only 25-50% of the vision improvement achieved with contact lenses.

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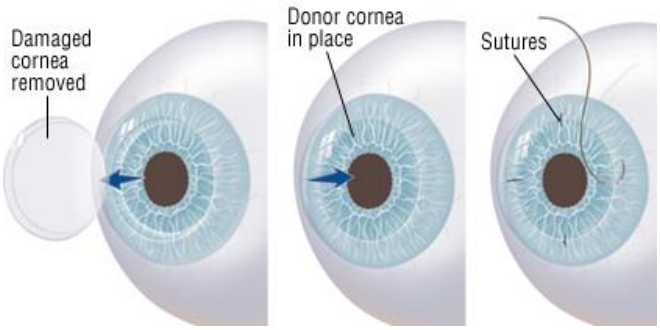
Can't I just have surgery help?

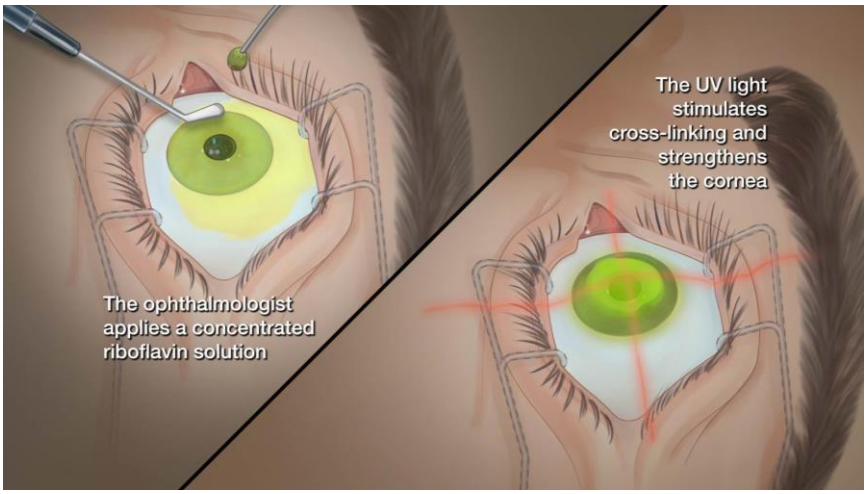
Approximately 85% of keratoconus cases stabilize by the age of 35, but in the remaining 15%, the condition may progress, leading to worsening tolerance to contact lenses and deteriorating vision.

For this group, a corneal graft may be necessary. That means a donated cornea, usually taken from someone who has passed away, is used to replace your cornea which is surgically removed. Although the success rate for corneal grafting is generally high rejection of the cornea can occur, particularly in the early stages, and the average corneal graft lasts 15 years, meaning you will need a series of grafts during your lifetime.

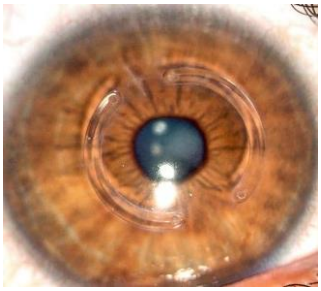


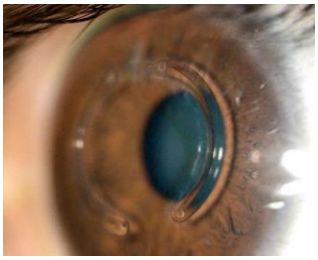
Surgery is improving and other options which preserve the back layers of your cornea and transplant donor tissue over this can result in more stable, longer lasting visual outcomes. These procedures have limitations which are best discussed with the cornea surgeon. Surgery should be considered carefully and only after exploring all other options. Typically, the average hospital stay for corneal graft surgery is 3-5 days, followed by a week of recovery at home. Vision takes up to a year to stabilise and frequent drops, sometimes ongoing drops, regular reviews with the surgeon and progressive stitch removal over 6 months or more is required. Recovery is not fun.

To help prevent progression to the point where a corneal graft is required, a procedure known as Corneal Cross-Linking is recommended in the early years when documented progression is recorded. This procedure strengthens the bonds between the collagen fibres in the anterior 200 microns of the cornea, improving corneal rigidity and preventing further change. This rarely improves the current warpage, but rather stops progression to more warpage and corneal scarring with resultant penetrating keratoplasty (corneal graft). Cross-linking often results in mild irreversible central corneal haze which reduces acuity. This is much less dramatic that the scarring and grafting required if the keratoconus is allowed to progress.



More recently a modification to a previously relatively unsuccessful technique (ICRS Intracorneal ring segments or Kerarings) has been developed. Known as Corneal Allogenic Intrastromal Ring Segments or "CAIRS" this significant advancement overcomes the pitfalls experienced with Kerarings by replacing artificial implants with donated corneal tissue and using topographically guided and wavefront technology to accurately predict changes in corneal topography.





CAIRS is the next progression of intracorneal ring segment surgery and was first described in 2017. The procedure begins with harvesting a ring of corneal tissue from a donor graft. Channels are then formed in the patient's cornea with a laser and the stromal ring segments are then threaded into the channels.

Advantages include:

- Increased biocompatibility reducing reactions that may lead to scarring.
- Stability as the corneal tissue is better integrated and remains stable.
- Greater effect due to implantation at a shallower depth of 50%.
- Less concern of extrusion allows patients with more severe disease and thinner corneas to be candidates for CAIRS.
- Customisation as the corneal tissue implants are laser cut with complete control over the dimensions which can be customised to the patient's needs.

While in its infancy the early results with CAIRS are very promising.

Keratoconus usually affects one eye more than the other. The resultant imbalance in visual acuity frequently leads to misalignment of the visual axes, with resultant binocular vision issues regularly discovered once best vision correction is achieved. It is not uncommon for the Keratoconic patient to have reduced stereoacuity and to suppress the vision in one eye. Anti-suppression therapy and vision therapy to help improve binocular vision is often required.

In summary, Keratoconus is an inherited condition characterised by slight thinning and distortion of the corneal surface of the eye. Untreated Keratoconus can lead to significant vision impairment. Fortunately, modern technology allows for the fitting of contact lenses that can provide good or reasonable vision for many individuals. For cases not effectively corrected or controlled by contact lenses, corneal grafting surgery is an option. Contact lenses are often still required following surgery to gain functional vision outcomes. If you have concerns about your eyes and wish to discuss Keratoconus further, call our friendly team at Buck and Todd Optometrists to book a consultation today.