Dr Geoffrey Ryan

Keratoconus

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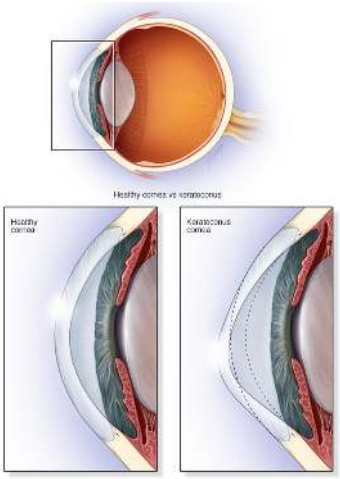
What is a Keratoconus?

Keratoconus is an eye condition that causes the clear front surface of the eye (the cornea) to thin and bulge, and in some cases scar. The bulging cornea affects the way light hits the retina at the back of the eye, causing distorted vision. If the cornea is scarred, this can also inhibits light entering the eye.

The exact cause is unknown. It is believed that genetics and environmental factors play a role. It is not generally considered an inherited disease, although rarely in some families more than one individual can be affected. A history of eye rubbing is common among Keratoconus patients and this is suspected to be associated with allergies (hayfever, asthma and eczema). It affects about 1 in 2000 people. It is often diagnosed in the teenage years and classically progresses between 15 to 25 years old. In the thirties the condition tends to stabilise and rarely progresses after 35 years old.



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What are the symptoms?

If detected early there are often no symptoms. As the disease progresses a patient may report:

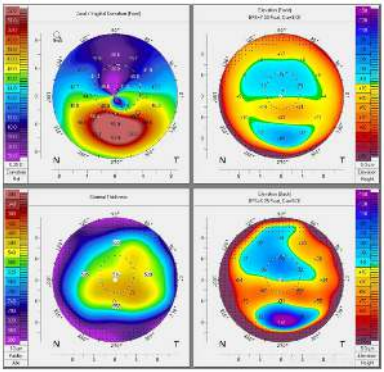
· blurred vision and distortion

· glare

· frequent changes in glasses or contact lens prescriptions with increase in myopia (short sightedness) and astigmatism (corneal irregularity).

Occasionally, rapid progression of keratoconus can lead to sudden swelling and 'whitening' of the cornea leading to a sudden reduction in vision, light sensitivity and a red eye. This is called 'hydrops' and is caused by a tiny break in one of the layers in the cornea allowing the cornea to swell. It gradually heals over several months and leaves a scar on the cornea.

Diagnosis often requires specialised imaging of the cornea called corneal topography.



Imaging of the cornea demonstrating keratoconus

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Treatment

There are three priorities when treating keratoconus:

1. Avoid eye rubbing.
2. Optimise the clarity of vision.
3. Halt progression of the disease via Corneal Cross-linking.

Eye rubbing is associated with progression of keratoconus. It is therefore critical for patients to avoid this action. The predisposition to eye rubbing is suspected to be related to underlying allergy and hayfever. In order to alleviate the desire to rub the eyes the following treatments are recommended:

1. Lubricants eye drops.
2. Anti-histamine eye drops.
3. Allergy avoidance
4. Cool compresses
5. In severe cases a short term steroid eye drop is warranted or a long-term immunosuppressive eye drop e.g. cyclosporin is used.

In order to improve vision there is a traditional step-wise approach:

1. Glasses - this may be sufficient to achieve adequate vision in the early stages of disease.
2. Contact lenses - a contact lens is the next step if glasses no longer provide clear vision. Many patients will require a rigid gas permeable (RGP) lens if the cornea has a high level of astigmatism and has an irregular shape.
3. Corneal graft - For patients whom become intolerant of contact lenses or develop central corneal scarring, a corneal graft may be indicated.

Other treatments for improving vision include intra-corneal ring segments (ICRS), combined topography guided laser/ cross-linking and targeted cross-linking treatments. Dr Ryan can further discuss these treatment with you and whether you are suitable.

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Corneal Cross-linking

The cornea is made up of many overlapping long strands, termed lamellae, of collagen molecules. These act like multiple criss-crossing support ropes across the cornea. Collagen is a normal and important part of the structure of many tissues in the body, especially skin. Corneal collagen cross-linking (CXL) uses chemicals to form connections, or cross-links, between adjoining strands of collagen. This is currently performed using riboflavin (vitamin B2) and ultraviolet light (UVA). The aim of the procedure is to strengthen and stiffen the cornea. This prevents the progressive change in shape associated with this condition and is aimed at halting a further decline in vision. An improvement in vision is not an expected outcome and is not a reason to have the treatment.

Who is not eligible?

1. If the cornea is too thin (usually thickness less than 400 µm at the thinnest point), Dr Ryan will advise you on this.
2. If there is an active ocular disease other than keratoectasia.
3. People with Herpes Simplex Keratitis, a corneal infection caused by the cold sore virus (herpes simplex).
4. Women who are pregnant.
5. People who have active uncontrolled eye allergies or an autoimmune disease such as rheumatoid arthritis.
6. People with central corneal scars that significantly affect their vision.

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What does the procedure involve?

Anaesthetic drops will be applied to the affected eye whilst you are lying flat on a surgical table. A small clip will hold the eye open. The eye is then saturated with Riboflavin eye drops. Once enough time has lapsed and Dr Ryan is satisfied the cornea has had sufficient Riboflavin treatment, a UV light is applied to the cornea. The procedure itself is not painful although there is expected discomfort in the first two days following the procedure. Pain relief medication will be provided post-operatively and a soft contact lens is placed on the eye for comfort.

Cross-linking machine which produces UV light

Riboflavin solution

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Risks of corneal cross-linking

This is a relatively safe procedure which has dramatically reduced the number of patients requiring corneal transplants long-term. No procedure is risk free and the following is a list of potential complications:

- Allergy to medications leading to a red swollen eye. This usually does not cause any long-term problems.
- Postoperative corneal haze (generally temporary and not enough to affect vision)
- Fluctuating and/or decreased vision (generally reported to improve after the first 3-4 months)
- Discomfort wearing contact lenses in the treated eye for up to 8 weeks
- UV damage to the internal structures of the eye (not yet seen in the Australian trials but reported overseas, if severe could lead to corneal swelling requiring a corneal transplant)
- An increase in eye pressure due to post-treatment drops, this usually resolves spontaneously with discontinuation of the drops.
- An infection of the cornea is very unlikely but could occur in the first week after the surgery. This can usually be treated but could lead to scarring of the cornea and permanently lead to blurred vision.

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