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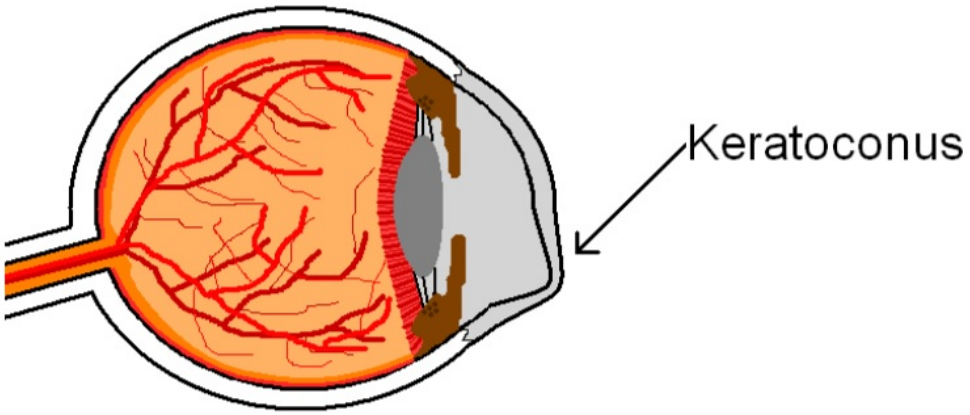
Keratoconus

Overview

Keratoconus is a progressive disease that results in a thinning and conical shape of the bottom portion of the cornea. The cornea is the clear front part of the eye. The conical shape causes scattered and distorted light entering the eye, even with a good eyeglass prescription, leading to poor vision. Soft contact lenses usually don't correct well for advanced keratoconus because they conform to the shape of the cornea. This means that rigid or rigid gas permeable (RGP) lenses are needed because they hold their smooth and proper shape over the cone resulting in better vision. Hybrid lenses are also available which have a hard center lens and a soft skirt. Progressive cases of keratoconus are now treated with corneal cross-linking. In advanced cases of keratoconus surgery and or a corneal transplant may be required to provide better vision.

Keratoconus may occur in one or both eyes and frequently begins during an individual's teens or early 20s. It may progress through middle-age (35-40 years old). Beyond 40 years-old keratoconus changes are unlikely.



Signs and Symptoms

Patients with keratoconus may experience reduced vision, glare & halos when looking at lights, shadowing and distortion. Prescriptions often have high amounts of myopia and astigmatism. If the keratoconus is progressing, eyeglass and contact lens prescriptions will change more frequently.

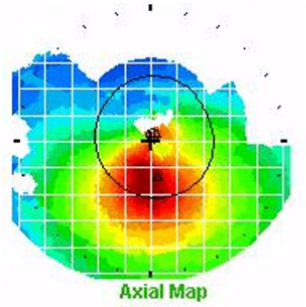
Clinically your doctor may note irregular astigmatism, corneal steepening and thinning. When looking at the cornea with a biomicroscope your doctor may notice scarring, iron deposits, vertical striae (wrinkles) and the bulging cone itself (as shown in the image above).

Causes

Theories as to the cause vary and there are no known definitive causes of keratoconus. There is likely some genetic component. It is seen more frequently in patients that rub their eyes. Patients with keratoconus have less cross linking between the fibers in the cornea and this leads to the thinning and irregular shapes that are seen.

Testing & Evaluation

Keratoconus is best diagnosed with the use of a corneal topographer. It will show a topographic map of the cornea with a bulge at the bottom.
Without a topographer the eye will show distorted circular mires and typically very high eyeglass prescriptions.



Classic keratoconus with inferior steepening on corneal topography

Management

Spectacle Correction and Contact Lenses

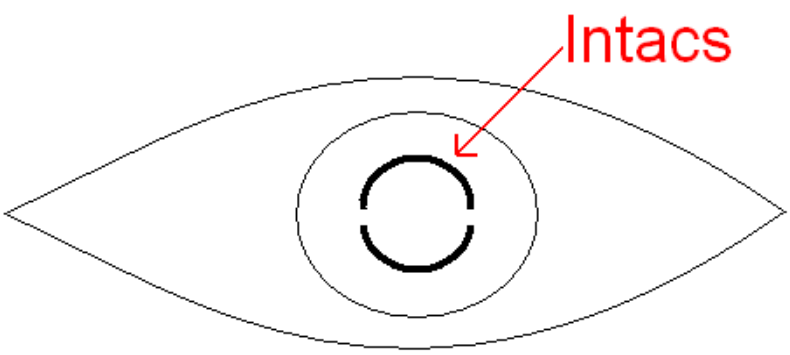
Mild and non-progressive forms of keratoconus may be able to be corrected well with just an eyeglass or standard contact lens prescription. Mild to severe forms of keratoconus may require specialized contact lenses. These types of lenses include a rigid gas permeable (RGP) lens, larger scleral lenses, piggy-back contacts (hard lens is put over a soft lens), specialty soft contacts or hybrid lenses that combine a hard and soft contact lens.

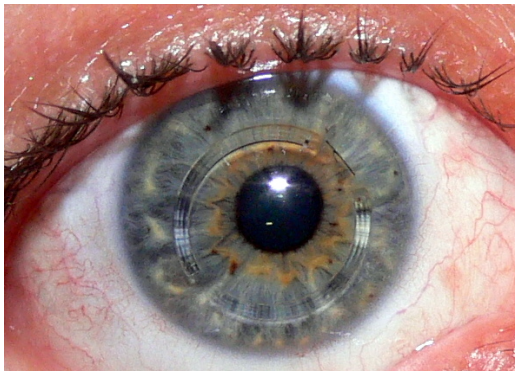
Collagen Cross Linking

Corneal collagen cross linking is used to stop the progression of keratoconus. In this procedure, the corneal epithelium is removed and the cornea is saturated with a yellow riboflavin fluid. After saturation, an ultraviolet light is applied to the cornea which causes collagen fibers to cross link and form tighter bonds. By creating more covalent cross bonds in the cornea the progression of keratoconus is stopped. In some cases the amount of corneal curvature is also reduced.

Intacs

In advance cases that don't correct well with contacts Intacs may be done. With Intacs semi-circular plastic pieces are placed in the cornea to help flatten the cone.

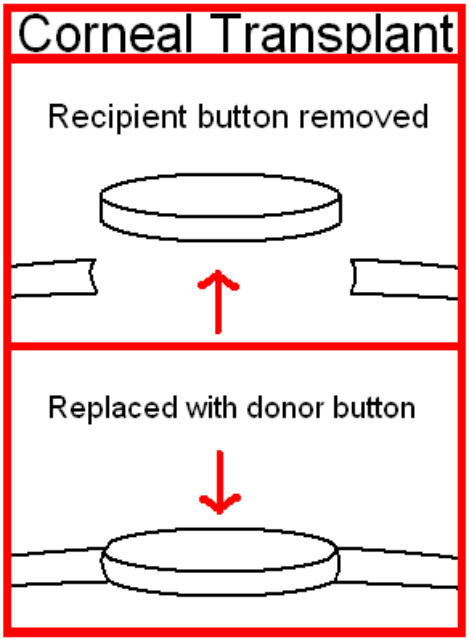


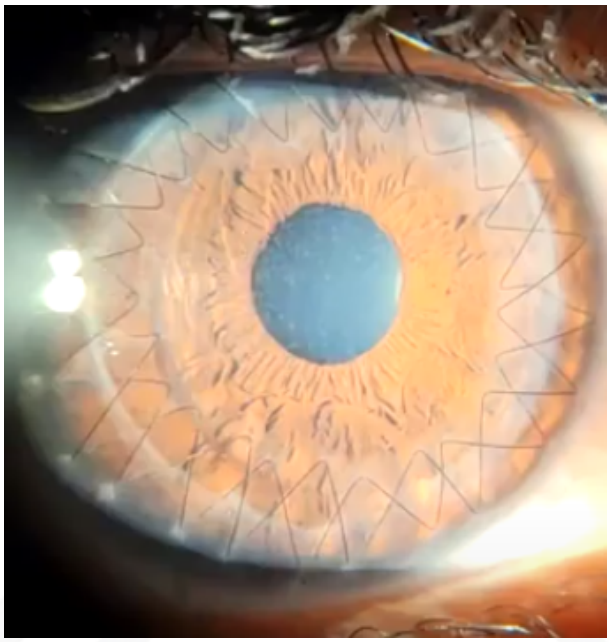


(Photo courtesy of: https://commons.wikimedia.org/wiki/File:IntacsAfterInsertion.jpg)

Corneal Transplant

In very advanced cases a full or partial cornea transplant may be required. With this a full or partial portion or "button" of the recipient's cornea is removed and is then replaced with a healthy donor corneal "button."





Oftentimes after the surgeries shown above glasses and contact lenses are still required for best vision.

Websites

All About Vision: http://www.allaboutvision.com/conditions/keratoconus.htm

American Optometric Association: https://www.aoa.org/healthy-eyes/eye-and-vision-conditions/keratoconus?sso=y

National Keratoconus Foundation: http://www.nkcf.org

The Keratoconus Center: http://www.keratoconus.com