



## WHAT IS KERATOPROSTHESIS?

Keratoprosthesis (artificial corneal transplant) is an innovative surgical procedure that brings new hope to those who are affected by corneal blindness by restoring vision.

A team at the University of Rochester Eye Institute (UREI) under the supervision of James V. Aquavella, MD, has been involved in research and development of keratoprosthesis for over 40 years and probably has a longer experience with this surgery than any other group in the United States. This technique is suitable in cases where previous traditional corneal transplants have failed or where, because of special circumstances, the chance of success with a traditional corneal transplant would be very poor. Currently, UREI uses two different models of the keratoprosthesis.

# WITH RECENT DEVELOPMENTS, KERATOPROSTHESIS SURGERY HAS BECOME SAFER AND, THEREFORE, CAN BE OFFERED TO A WIDER RANGE OF PATIENTS.

## INDICATIONS

Keratoprosthesis is indicated in cases of severe corneal opacity where donor-tissue transplants might have a high probability of failure or where best visual acuity is quickly desired. Keratoprosthesis may be an option in the following pathologies:

- Infants with Peter's Anomaly
- Patients with aggressive immune systems
- Multiple tissue graft failures
- Best visual acuity needed quickly

## TYPES OF KERATOPROSTHESIS

There are two models of keratoprosthesis. The Argus model is a piece of soft plastic, much like a soft contact lens, which can be placed within the patient's own cornea. Openings allow light to pass through any scarring and into the eye clearly. The second model used is the Boston device, which resembles a hard contact lens. This device is constructed so that a cylinder extends into the eye, helping to project light images. The device implanted is determined by a number of technical considerations related to each particular patient. The Boston device is most frequently used.

## LIVING WITH AN ARTIFICIAL CORNEA

With the keratoprosthesis the best possible vision is restored more quickly and patients often achieve their best possible visual levels within a few weeks after surgery. However, because the plastic that is used never becomes totally incorporated in the body, drops to prevent infection must be used indefinitely. In addition, in the early months following the surgery anti-inflammatory drops are usually required four times a day. Patients who have the plastic corneal transplant surgery must also wear a special protective shield while they sleep at night.

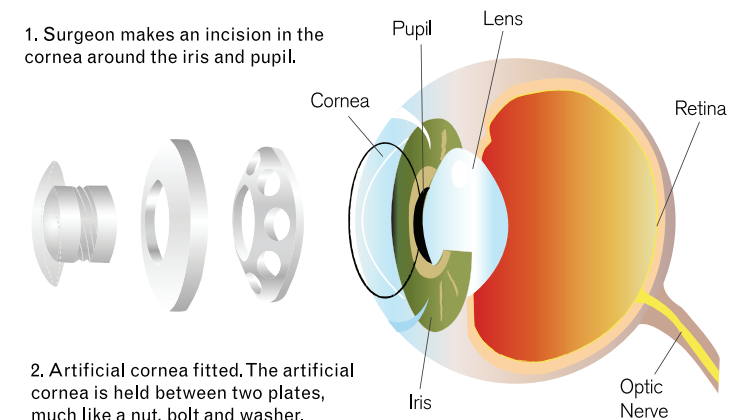
## THE SURGICAL PROCEDURE

The actual surgical procedure, performed on an outpatient basis, takes approximately one hour to an hour and 20 minutes. There is an additional half hour or so of preparation time before surgery and an additional half hour of recovery after surgery. Patients who undergo this type of surgery can be expected to be in the operating room area for at least three hours before being discharged.

In all cases, the patient is reevaluated on the morning following surgery, when the necessary prescriptions for special eye drops are given and instructions are provided. Follow-up examinations are usually made in one week, in one month, and then every three months throughout the first year. Special soft contact lenses are inserted over the plastic cornea at the time of surgery and are allowed to remain in the eye indefinitely. These lenses can be changed and can help to supply any necessary visual correction.

In the course of keratoprosthesis surgery, if a cataract is present, it will be removed and an intraocular lens will be implanted into the eye. If glaucoma is threatening or has not been controlled, a special shunt valve may be implanted into the eye prior to or, in some instances, at the same time as the keratoprosthesis surgery.

1. Surgeon makes an incision in the cornea around the iris and pupil.



2. Artificial cornea fitted. The artificial cornea is held between two plates, much like a nut, bolt and washer.

# KERATOPROSTHESIS

## ABOUT CORNEAL TRANSPLANTATION

It is always preferable to use a human cornea for purposes of transplantation. Traditional corneal transplantation involves suturing in a human cornea and allowing the cornea to heal for periods of a year, or sometimes as long as 18 months, prior to removing the sutures. Consequently, the postoperative period until the best vision has been restored is protracted and lasts well over a year.

Once the sutures have been removed, in most individuals who have had traditional corneal transplantation, no further eye drops are necessary or at the very least drops may need to be instilled only infrequently. These human tissue transplants are often associated with astigmatism and other types of refractive error, many requiring special contact lenses or spectacles.

## RISKS AND DISCOMFORTS

For patients with severe dryness, inflammation, or auto-immune disorders, keratoprosthesis can give excellent results but has a higher risk. In some instances, a membrane can develop behind the keratoprosthesis and interfere with vision. This membrane can be opened using a laser without requiring additional surgery.

In extremely rare instances, a long term concern is the disintegration of tissue around the stem of the prosthesis which can lead to leakage of fluid, infection and even loss of vision. If this complication threatens the eye, the operation may have to be repeated.

Most candidates for keratoprosthesis do not have inflammation and the prognosis is much better. The majority of such patients do well for the long run and the vision, as a rule, becomes much improved.

## NEW HOPE FOR PEDIATRIC PATIENTS

Eleven-year-old Destiny Diaz's whole world is coming into view since her keratoprosthesis in September 2005. Legally blind since birth, her vision was limited—she could barely make out images if she held a picture book an inch from her eye. Today Destiny is able to see so much more, including the faces of her family and her school work. UREI is one of just two international keratoprosthesis centers performing this surgery on children and infants. To date, dozens of successful surgeries have been performed with children, opening eyes to the joy of sight and helping them make their ways into the visual world.



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UNIVERSITY OF ROCHESTER  
EYE INSTITUTE

## FOR MORE INFORMATION

For additional information or to schedule an appointment, please contact us by:

Phone: (585) 273-EYES (3937)  
E-mail: [kim\\_catalino@urmc.rochester.edu](mailto:kim_catalino@urmc.rochester.edu)  
Web: [www.stronghealth.com/eyeinstitute](http://www.stronghealth.com/eyeinstitute)

The University of Rochester Eye Institute  
601 Elmwood Ave. Box 659  
Rochester, NY 14642



## DR. JAMES V. AQUAVELLA

Dr. Aquavella was the first fellowship trained corneal surgeon in the U.S. when he established practice in Rochester in the mid 1960s. Today, as a specialist in cornea and external diseases, he continues to be a leader in the area of cornea and anterior segment conditions of the eye.



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