Cheyenne and Xavier 05/29/13

Cornea Part 1

Description of the Cornea

The cornea is the transparent front part of the eye that covers the iris, pupil, and the anterior chamber. The cornea, with the anterior chamber and lens, refracts light, with the cornea accounting for approximately two-thirds of the eye's total optical power. In humans, the refractive power of the cornea is approximately 43 dioptres (a unit of measure of the refractive power of a lens, having the dimension of the reciprocal of length and a unit equal to the reciprocal of one meter). While the cornea contributes most of the eye's focusing power, its focus is fixed. The curvature of the lens, on the other hand, can be adjusted to "tune" the focus depending upon the object's distance.

Cornea Function/Development

Acting as the outermost lens, the cornea helps to shield the rest of the eye from germs, dust, and other harmful matter. It functions like a window that controls and focuses the entry of light into the eye, it contributes between 65%-75% of the eye's total focusing power. When light strikes the cornea, it refracts it onto the lens. The lens adjusts the focus of light further onto the retina, a layer of light-sensing cells lining the back of the eye that converts the light into vision. To be able to see clearly, light rays must be focused by the cornea and lens to fall precisely on the retina. The retina then converts the rays into impulses sent through the optic nerve to the brain, which interprets them as images.

The development of the cornea as a tissue, initiates as early as five weeks in the human embryo. This development continues gradually until the time of eyelid opening, which is associated with major development changes.

Corneal Transplant History

The first transplant were done in the late 1800s and routinely done since the 1960s. Now, it is done over 44,000 done a year worldwide. The first eye banks established in Russia more than 83 years ago in the 1930s. In 1905, when Eduard Konrad Zirm, MD, performed the first successful corneal transplant, a

long line of corneal transplantation, research and techniques began. During its existence, Zirm's eye bank, located in a rural area of Austria, treated over 47,000 patients. Not many years later in 1914, Anton Elschnig, MD, also of Austria, performed the second successful corneal transplant and over the next two decades, he would make various contributions to the study of peri-operative infection and pre-operative preparation. The 1920s and 1930s would find Russian ophthalmologist Vladimir Filatov refining lamellar keratoplasty and developing a new method for full thickness keratoplasty. He also used a donor cornea from a cadaver for a penetrating keratoplasty in the 1930s.

Ramon Castroviejo, a Spanish ophthalmologist, was an influential figure in both European and American developments in corneal transplantation, particularly from the 1920s through the 1940s. During his research fellowship at the Mayo Clinic, he developed a double-bladed knife for square grafts and conducted research that culminated in the development of new keratoplasty techniques.

Requirements/Average age for corneal transplants

To be a candidate for donation a card must be signed, family must be notified, and there can be no diseases such as HIV, AIDS, Sepsis, Hepatitis or such. Not only are these diseases a risk for the recipient, it is also a risk for the doctors if it is contagious.This could cause a great deal of trouble. The reason the family must be alerted is because they will be witnesses that aren a donor and there will be no misconceptions. The average age for the transplant can not specifically be pinpointed. Though the transplant usually occurs in patients that are really young or really old, but most people who donate are older.

Candidate for Procedure

The patient must have a disease, scar or active infection involving the cornea. If none of these reasons are the case then there is no point in having the transplant. There cases are extremely scarce where people can donate their cornea alive. In these rare cases people donate corneas alive usually when the patient has an ocular tumor, glaucoma & corneal condition, corneal diseases, and keratinous (a disease involving a fibrous protein that occurs in the outer layer of body cells).

Success rate for corneal donation

The success rate is usually decided in 1,2, and 5 years of donation. This is because the corneal can become cloudy over a period of time and the procedure must be redone. So, it is very hard to determine, it could work for a year, then mess up in the second or fifth year. For example the success rate for a year would be around 98%, but for 5 years it is around 90%. That is why it is hard to identify the success rate of a corneal transplant.

Risk of transplant

During the surgery the risk are infection, bleeding and leaking of the wound making the eye become too soft, and more. The most common risk of the procedure is that it fails to work and a rejection incident.A failure can consist of anything from the cornea becoming foggy to the eye becoming too soft. Now, the rejection scene happens when the body recognizes tissue that does not belong. This will cause the body to try and destroy it, but the way this is prevented with special medications along with steroids.

Diseases/Treatments

There are many diseases that occur in the cornea. One I found was Keratoconus. Keratoconus is a disease where the cornea becomes cone shaped. there are some cases where the cornea is not only cone shaped but also atypical. This causes the image received from the eye to the brain to be jumbled. Since the corneal surface is out of its norm glasses can not correct the problem. The patient will actually have to have a rigid contact lens to adequately correct the vision. Recently, there have been some new surgical choices to look at for those who can't benefit from the lenses.One of these surgeries is called Corneal Cross Linking Treatment, C3R for short. This is where a B-complex vitamin (a critical assortment of water-soluble vitamins consisting of vitamins B1 and more) called riboflavin solution is joined with UVA (ultraviolet light with a rather long wavelength, capable to access the broad layers of the skin) exposure. this was created in 1993 in Germany, but is now used done mostly in New Zealand.

Resources

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