

Studies indicate that cystoid macular edema, or papilledema, may be present in patients whose vision fails to improve or suddenly decreases after cataract surgery. This is another problem to meet, if sight is to be saved.

Disorders of the Cornea

The cornea is a transparent membrane covering the iris or colored portion of the eye. Similar in size and structure to the crystal of a wristwatch, it acts as a protective window through which light rays pass on their way to the retina. The cornea also helps to bend and focus light rays.

Scarring produced by injury and disease causes 10 percent of the blindness in the United States and much more of the blindness in the Near and Far East. However, new drugs and improved treatments are helping to reduce the amount of this type of blindness.

Viruses.—In this country the most common cause of corneal ulcers and blindness is infection with a virus called herpes simplex, which also causes the common cold sore. One of the most significant advances in therapeutics was the discovery several years ago that herpes simplex could be cured by the drug 5-iodo-2-deoxyuridine (IDU). This was the first drug to be proved effective against any virus, and has opened up new approaches into the broader study of antiviral drugs.

Corneal Transplants.—When corneal diseases are not treated promptly, they may destroy the cornea's transparency, and cause poor vision or blindness. Fortunately it has been found possible to substitute a healthy cornea for a diseased one.

Some successful corneal transplants have been made for almost 20 years. They are usually performed with corneas taken posthumously from persons who have previously signed statements donating their eyes to eye banks. Recent Institute studies have led to improvement in transplants and in freezing and dehydrating corneas for long-range storage and shipment. This year an improved technique was developed for transplanting which may mean that some cases previously considered hopeless will regain vision.

One of the big problems with conventional transplants is that the cellular layer on the back side of the cornea—the endothelium—easily becomes damaged by a transplantation immune reaction. This results in the accumulation of fluid (edema) in the endothelium of the cornea. Such edema is rarely reversible and usually results in a cloudy graft so that the eye remains blind.

With the new procedure, a thin transparent membrane, made of silicone rubber, is sutured in back of the corneal graft. This serves as a barrier to the influx of fluid from the anterior chamber of the eye. With the insertion of the "fluid barrier," the corneal edema is reduced or eliminated and the graft has a much better chance of surviving.

The silicone rubber membrane adds support and distributes pressure from the sutures evenly over the graft, ensuring smoothness. The transparency of the silicone membrane permits inspection of the wound to observe progress of healing and formation of the anterior chamber. Local medication can be given with normal effectiveness.

While still in the experimental stage, plastic corneal implants have proved their value for a number of persons for periods of time up to 5 years.

Recent improvements in surgical techniques have greatly enhanced the prospects of success in corneal transplant operations, but graft rejection due to auto-antibodies has remained a serious problem. Certain drugs inhibit the induction and production of antibodies, but to determine which are the best drugs and what are the most desirable dosages, it is necessary to have a baseline in relation to which their powers may be tested. Until the mechanism of rejection is known, the choice of drugs must be empirical.

In a series of animal experiments, NINDB scientists augmented the intensity of the corneal graft rejections with simultaneous skin implantations from donor animals to recipients. Such recipient animals uniformly showed graft reactions with complete and sudden clouding of the grafted corneas on an average of 12 days postoperatively. This represented an earlier and more uniform reaction than had been achieved in previous efforts to establish a baseline.

Now it was possible, through a series of controlled experiments, for the investigators to demonstrate that three immuno-suppressive chemicals, namely 6-mercaptopurine—examined in a previous study—azathioprine, and corticosteroids, could delay or even suppress graft rejection in animals. The latter appeared to be the safest and most effective.