

METHOD OF REPLACING AN EYE LENS

FIELD OF THE INVENTION

The present invention relates to intraocular lenses and more particularly to a new system for surgically removing a damaged lens and replacing it with a new lens. The present invention also relates to a new tool for use in such procedure as well as a new variable focus lens which can be implanted in an eye.

BACKGROUND OF THE INVENTION

There has long been a need for a satisfactory method of replacing the lens of a human or animal eye which has been damaged, through cataracts or other disease or accident. There have been numerous attempts to develop a procedure which is relatively safe and simple, which minimizes trauma to the eye, and which results in materially improved vision under a variety of conditions.

For example, U.S. Pat. No. 4,253,199 to Anton Banko discloses various methods and apparatus for eye implants within the posterior chamber of the eye. In the procedure taught by Banko, the entire anterior portion of the lens capsule is apparently removed and, in some cases, the posterior portion of the lens capsule was also removed. An implant of the capsule is attached to the ciliary body by means of sutures. In the Banko procedure, there is considerable trauma to the eye, in that essentially the entire lens capsule is destroyed and removed.

Another prior approach is illustrated in U.S. Pat. Nos. 4,254,509 and 4,261,065 to Jerald L. Tennant. These patents disclose a lens implant which is positioned in the anterior chamber of the eye and not within the location previously occupied by the natural lens. In both of these patents, it appears that the natural lens as well as the entire lens capsule have been totally removed.

U.S. Pat. No. 4,242,762, also in the name of Jerald L. Tennant discloses an implant within the lens capsule, whereby a triangular opening is formed in the anterior capsule. Similarly, in U.S. Pat. No. 4,243,510, also in the name of Jerald L. Tennant, the jagged margins represent an opening made in the lens capsule for fragmentation and removal of the lens. In both of these patents, at least part of the anterior portion of the lens capsule is destroyed in the process of replacing the lens.

U.S. Pat. No. 4,251,887 in the name of Aziz Y. Anis discloses an intracapsular implant in which a triangular capsulectomy (that is, a removal of a portion of the capsule) is performed and there is inserted within the eye a lens with two side loops, each of which forms the shape of a kidney. Here again, a portion of the capsule is irrevocably removed and destroyed and, additionally, foreign substances are placed in the eye.

In U.S. Pat. No. 4,002,169, there is disclosed a surgical method whereby a tool is inserted into the lens and probes are used to "masticate" the contents of the lens capsule. Suction is then used to withdraw the contents of the capsule. The interior of the capsule is then flushed and cleaned and a lens filler such as silicone is then inserted through the tool. All of this is accomplished through a thin needle. This procedure, while retaining the lens capsule, does not lend itself to the insertion of a new lens having a predetermined shape and most certainly could not be used to insert a live lens transplant.

Russian Inventor's Certificate No. 572,267 to Alekseev appears to disclose a method of implanting an artificial crystalline lens. It appears that, through an unspecified special device, a capsulectomy (that is, removal of a portion of a capsule) is performed in the anterior area. The nucleus and crystalline masses are removed through a "round orifice" in the anterior capsule, and an intraocular lens of up to five millimeters in diameter is implanted into the crystalline bursa. Since a natural lens is substantially larger, it appears that Alekseev only removes the central five millimeters of the lens and replaces it with an implant. This essentially only replaces that portion of the lens which is aligned with the pupil. This procedure, like the others, poses certain disadvantages, including the fact that if a lens is diseased, removal of only a portion of the lens could result in continued problems after the surgical procedure.

Accordingly, it is an object of the present invention to provide a new technique for a lens implant.

It is a further object of the present invention to provide such a lens implant which minimizes trauma to the eye.

It is another object of the present invention to provide such a lens implant which leaves the lens capsule substantially intact.

It is an additional object of the present invention to provide such a lens implant which replaces a diseased lens with a lens having substantially identical optical characteristics.

It is still another object of the present invention to provide such a lens implant which responds to the natural muscular movement of the eye to vary the focus of the lens under different conditions.

It is still a further object of the present invention to provide a lens implant in which the entire diseased lens is removed and replaced.

It is an additional object of the present invention to provide such a lens implant in which the newly implanted lens is positioned in substantially the same position as the lens which has been removed.

It is yet a further object of the present invention to provide such a lens implant procedure which can be used for implanting lenses of varying types, sizes and shapes, including human and animal lenses.

It is yet another object of the present invention to provide a lens implant procedure which avoids the use of sutures and which minimizes the number and types of foreign substances implanted within the eye.

It is still a further object of the present invention to provide a variable focus lens for use with the aforesaid procedure.

It is still an additional object of the present invention to provide an instrument for use with such a procedure which facilitates the removal of the diseased lens and the insertion of the new lens.

Various other objects and advantages of the present invention will become clear from the following detailed description of several exemplary embodiments thereof, and the novel features will be particularly pointed out in conjunction with the claims appended hereto.

SUMMARY OF THE INVENTION

In accordance with the teachings of the present invention, a method of replacing a lens has, as a first step, the displacement of the cornea and conjunctiva to provide access to the iris. The iris is then positioned to provide access to the anterior lens capsule. A generally