TOOL FOR SURGICAL IMPLANTATION OF AN INTRAOCULAR LENS

BACKGROUND OF THE INVENTION

The present invention relates to ophthalmology, and more particularly to a novel construction of an intraocular lens and a method for surgically implating the intraocular lens in the eye.

Various diseases or conditions of the human eye may require removal of the eye's natural lens. For instance, a serious eye disease, known as a cataract, results in an opaque condition in the lens or its capsule causing partial or total blindness. The opaque condition may be corrected by surgically removing the entire lens or by removing the nucleus material within the capsule. Removal of nucleus material may be accomplished by emulsification of the material and then vacuum withdrawing same. In either case, it has previously been necessary to provide the patient with an exterior contact lens.

However, many post-operative patients, and especially those of advanced age, find it extremely difficult if not impossible to become accustomed to the inconvenience of wearing contact lenses. Accordingly, recent surgical advances have been directed toward implanting artificial intraocular lenses as replacements for removed lenses or lenses in which the nucleus material has been removed. However, there are several significant problems in surgically implanting an intraocular lens. Additionally, it has proved difficult to ensure that the intraocular lens maintains a relatively stable relationship with respect to the iris after implantation.

An example of a prior art intraocular lens is one which includes posterior loops which extend from a rear surface of the lens. Extending outwardly from a peripheral edge of the lens, adjacent one of the loops, is an elongate clip which is deformable for positioning within an adjacent loop. During surgical implantation, the loops are positioned behind the iris in the posterior chamber with the lens being oriented in the anterior chamber. The clip is then manipulated and deformed by the surgeon using a suitable tool so that the clip extends through the iris and is retained by bearing against the loop. The iris is thereby attached to the lens.

Because the clip must be deformed for locking behind the posteriorly positioned loop, it can be appreciated that a continual force will be applied to the loop tending to rotate or twist the loop and possibly the lens in a forward direction. Of course, it may be appreciated that such action could irritate the iris as well as prevent proper optical correction to the patient.

In addition, it must be appreciated that surgical implantation of an intraocular lens is an extremely delicate procedure, involving substantial surgical skill and dexterity. For instance, the overall diameter of the lens body of an intraocular lens may be in the range of five millimeters and the distance between the loops may be in the range of eight millimeters. In order for the surgeon to grip the lens body with forceps and retain any degree of control requires extreme care during insertion of the intraocular lens in the eye. For instance, as the loops are being positioned in the posterior chamber, any inadvertent movement of the surgeon's hand or a repositioning of the forceps may result in the outer surface of the lens body contacting the inner surface or endothelium of the cornea. If such contact occurs, the cornea may become foggy and the implantation of the intraocular lens will not result in achieving satisfactory vision.

Further, it may be appreciated that deforming the clip through the iris to a locking position behind the posterior loop also increases the likelihood that the lens body will shift or twist and contact the endothelium. The important point to be kept in mind in that surgical implantation of an intraocular lens is fraught with difficulties.

Accordingly, it is a general object of the present invention to provide an intraocular lens having a retaining means such as a resilient member formed as a clip which normally assumes a predetermined, nonstressed condition when it is extended into the iris in attaching the iris to the lens body. It is contemplated that the clip must be flexed and elastically deformed to a stressed condition prior to the lens body being positioned in the eye's anterior chamber and then released, whereupon it will return or "spring back" to its nonstressed condition.

Another object of the present invention is to provide a surgical tool adapted for simultaneously holding the lens body and the clip with the clip flexed in its stressed condition. Thus, upon insertion of the lens body in the eye's anterior chamber with the loops being positioned in the posterior chamber, the tool may be removed and the clip will return or "spring back" through an iridectomy (previously provided in the iris) to its nonstressed condition for attaching the iris to the lens body.

Still another object of the present invention is to provide an intraocular lens as described above, which utilizes a clip for locking the iris to the lens body in a nonstressed condition so that no resulting forces are applied on the lens body and consequently to the iris. This substantially stabilizes the lens and prevents it from reorienting in the eye.

These and additional objects and advantages of the present invention will be more clearly understood from a consideration of the drawings and the detailed description of the preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top plan view of a conventional intraocular lens having posterior loops and a clip for locking or attaching the iris to the lens;

FIG. **2** is a side elevation view of the intraocular lens of FIG. **1**;

FIG. **3** is a top plan view of an intraocular lens according to the present invention prior to surgical implantation in the eye, a clip being shown in its normally nonstressed condition;

FIG. **4** is a side elevation view of the intraocular lens of FIG. **3**;

FIG. **5** is a top plan view of the intraocular lens of the present invention illustrating positioning of a detachable tool for holding the lens body and the clip during surgical implantation in the eye;

FIG. **6** is a side elevation view of the lens and tool illustrated in FIG. **5**;

FIG. **7** is a side cross-sectional view, greatly enlarged, taken through a patient's eye (assuming the patient is lying down) illustrating insertion of the intraocular lens of the present invention into the eye;

FIG. **8** is a side cross-sectional view, similar to FIG. **7**, illustrating positioning of the posterior loops within the posterior chamber prior to positioning of the stabilizing clip through an iridectomy in the iris; and