ARTIFICIAL INTRAOCULAR LENS

The present invention relates to an artificial intraocular lens comprising an optical medial body means (optical part), and a supporting peripheral body means (haptic part) in the shape of at least two loop means which are integral with the optical part and project from the latter. The optical part is provided with two or more peripheral first apertures, and each of said loops at the root thereof is provided with one of said first apertures, and said loops are each provided with a second aperture each at a distance from or at the outer end of the loop.

The invention especially concerns artificial lenses for the human eye which are produced from acrylic (PMMA). It is, however, not intended to limit the invention to production of lenses from this material.

An artificial eye lens (IOL) is used to replace the human eye lens when the latter is removed due to vision impaired by darkening. Such darkening is called cataract. The cause of cataract may be "age", disease, or injury.

The medical term for an artificial lens of the mentioned kind is an artificial intraocular lens. The popular international medical term is IOL. Consequently, the term IOL will be used below.

IOL means produced for PMMA are used in eye surgery since 1949. In recent years a rather explosive development in all industrial countries has been experienced.

IOL means are in principle ranged in two main groups, i.e.:

(1) camera anterior-IOL, and

(2) camera posterior-IOL.

Camera posterior-IOL means comprise two kinds:

(2a) with loops to be fastened in the sulcus proper, and

(2b) with loops to be fastened inside the lens capsule.

The natural anatomic position of an IOL means is inside the lens bag after removal of the lens nuclens and cortex. The lens bag or lens capsule is, in fact, transparent and does not represent an optical obstruction. By the very fact that the lens bag is not removed the eye retains its natural partition between the anterior and posterior regions of the eye. This will cause less complications than is the case when the cataract is completely removed with the lens bag. The natural barrier between the anterior and posterior regions of the eye would then be broken.

The invention especially concerns IOL means intended to be placed in the lens bag proper, i.e. the above mentioned group 2b. When IOL is mentioned below it should, thus, be understood to be related to the above group 2b.

Today, there is a plurality of different models of IOL means. It is common to them all that they comprise a optical medial body means (optical part), and a supporting peripheral body means (haptic part) in the shape of loops.

In connection with implanting an IOL means the great problem is to have the haptic part inserted into the lens bag. Post examinations in several examination materials show that one of the loops often stays outside the lens bag proper. This is undesirable for various reasons, probably especially because the optical body will then have an asymmetric position in relation to the optical axis of the eye. Also, a loop or loops remaining outside the lens bag will contact iris tissue and, at worst, cause injury or irritation.

A series of special instruments and techniques are developed to aid the surgeon in placing IOL means in the lens bag. In most IOL means small apertures are provided both in the optical part and in the haptic body. By the aid of instruments the surgeon can engage these apertures to adjust the lens position inside the lens bag.

Also, IOL means were developed the loops of which can be locked mechanically to the optical part during implantation, and can then be released inside the lens bag. Coburn ®, model 75 is an example of such means. Mechanical locking of the loops before the lens is inserted does not involve special problems, but there will be difficulties when the locking mechanism is to be released inside the lens bag. Research is continued at Coburn in this field.

In all kinds of eye surgery needle and thread constitute an essential and obvious aid. The wound in the eye is, thus, sewn together by the aid of a thread that is barely visible to the naked eye (nylon 10 - 0). In fact, nothing could be more natural than utilizing needle and thread, below called suture, to join the loops (the haptic part) before implantation, and then to cut the suture when the IOL is in place in the lens bag.

In order to be able to do so, it is necessary that the suture aperture in the loop or haptic part is located at a rather fixed place in relation to the suture aperture in the optical body means.

For the loops to be squeezed together as much as possible, the suture aperture in the haptic part must be placed in a position that is determined by the suture aperture in the optical part when the haptic part is close to the optical part. The suture apertures then must correspond, and the distance between them must be minimal. Said two suture apertures may, thus, be termed corresponding apertures. In case of an IOL having two symmetrical loops there will, thus, be two pairs of corresponding apertures, i.e. four suture apertures totally.

With more than two loops there would have to be more than two pairs of suture apertures.

In order to achieve a lever that is as long as possible, to thereby the moment of force, it is necessary to place the aperture in the loop as close to the periphery as possible.

According to the invention the above mentioned intraocular lens is characterized in that the portion of the root of each loop facing away from the loop is provided with a concavity being substantially complementary to a portion of another loop located opposite and in which said second hole is located, each loop having such extent that its said portion will touch directly against said concavity upon flexing of the loop toward the optical part of the lens. The concavity and complementary portion of the loop are shaped and dimensioned for non-capture engagement when touched directly together in response to loop flexing.

In order to achieve a lever of maximum length when the said parts are pulled together so as to reduce the moment of force the aperture in the loop must be placed as peripheral as possible. Its position will, thus, be determined by the localization of said lateral portion. When said second loop is close to the optical part of the configuration of the loop with said one suture aperture will be adapted to the loop root toward which the loop is flexed. When the loop is, thus, flexed towards the optical part said portion of the loop will get into contact