ARTIFICIAL LENS AND METHOD OF LOCATING ON THE CORNEA

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an artificial lens for eyes and a method of locating the lens on the cornea, and particularly to a lens and method for fixation of the lens to the eyeball.

2. Description of the Prior Art

Contact lens adapted to fit over the cornea of the eye are well known in the prior art. They are made from so-called "hard" materials which are generally inflexible and typically 8½ to 9 millimeters in diameter. The relatively large diameter of the lens results in eye irritation after prolonged periods of wearing. The cornea requires continuous oxygen replenishment and continuous removal of carbon dioxide concentrations. The tear film washing over the corneal surface normally accomplishes this. However, the relatively large contact lens covering the cornea interferes with this function of the tear film. Various attempts have been made to reduce the amount of the lens in actual contact with the cornea, such as by cutting openings or fenestrating the lens, or by undercutting the margins of the lens. This has been successful only to a limited extent.

So-called "soft" are made of a material generally conformable to the curvature of the individual cornea. They are therefore characterized by less irritation. In addition, the lens material is relatively porous and provides a degree of lubrication and tearing not possible with a hard lens. The gas permeable character of the lens material also promotes oxygenation of the corneal surface and removal of carbon dioxide concentrations. However, such soft lenses tend to harbor and promote growth of undesirable bacteria, and scrupulous care must be exercised to maintain the soft lens in a sterile condition to avoid eye irritation.

The foregoing lens types are typical of prior art attempts to provide a lens large enough to utilize the spherical surface of the cornea for self-centering adjacent the pupillary zone of the cornea, and with provision for tear film access to the corneal surface underlying the lens. Enlargement of the lens surface to enhance self-centering of the lens usually results in eye irritation, while any significant reduction of the lens surface area achieves improved tearing of the corneal surface at the expense of proper optical positioning of the lens.

Neither soft nor hard lenses are normally designed to maintain a fixed rotative position relative to the eye. Consequently, it is difficult to grind the lens to correct for astigmatism along a diametral axis of the lens. Various means have been attempted which tend to prevent a lens from rotating, such as by having the lower margin of the lens ground to provide a chord adapted to ride against the lower eyelid, or by weighting of the lens so that a particular portion is always oriented downwardly, but such lenses have met with only limited success.

SUMMARY OF THE INVENTION

According to the present invention, an artificial lens is provided which is sufficiently small that the limited corneal surface covered by the lens can be adequately oxygenated by lateral diffusion, and accumulations of carbon dioxide similarly carried away. The lens is attached in position by fastening means which permanently secure the lens to the eyeball. More particularly, the present lens comprises a lens or optical portion configured for placement upon a relatively small section of the central anterior corneal surface. The lens includes a marginal or haptic portion which extends from the optical portion and includes a means enabling fixation of the haptic portion to the eyeball.

In certain embodiments the haptic portion comprises a plurality of radially outwardly extending ribbons or tabs which can be stapled or sutured to the cornea, or which are made long enough that they can be superiorly and inferiorly attached to the episclera.

The haptic portion in certain embodiments is provided with openings through which sutures can be disposed. In other embodiments the haptic portion is notched to provide suitable anchorages for sutures or like fastener elements.

The area of the optical portion of the lens approximates the area of the maximum pupillary opening, which is considerably less than the area of prior art hard or soft contact lenses. The width of the haptic portion of the lens is preferably the same as or less than the width of the optical portion to minimize the corneal surface covered by the complete lens structure.

The method of the invention contemplates suturing, stapling, or like attachment means for securing the lens to adjacent structure of the eyeball so that the lens moves with the eyeball.

Other objects and features of the invention will become apparent from consideration of the following description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of a human eye, illustrating the present lens in position upon the cornea;

FIG. 2 is an enlarged view taken along the line 2—2 of FIG. 1;

FIG. 3 is a front elevational view of the cornea, illustrating the present artificial lens in position;

FIG. 4 is a view similar to FIG. 3, but illustrating a second embodiment of the artificial lens;

FIG. 5 is a view similar to FIG. 3, but illustrating a third embodiment of the artificial lens;

FIG. 6 is a view similar to FIG. 3, but illustrating a fourth embodiment of the artificial lens;

FIG. 7 is a view similar to FIG. 3, but illustrating a fifth embodiment of the artificial lens which is characterized by tab or ribbon portions sufficiently long to enable attachment of their extremities to the episclera adjacent the cornea;

FIG. 8 is a view similar to FIG. 3, but illustrating a sixth embodiment of the artificial lens;

FIG. 9 is a view similar to FIG. 3, but illustrating a seventh embodiment of the artificial lens; and

FIG. 10 is a view similar to FIG. 3, but illustrating an eighth embodiment of the artificial lens.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and particularly to FIGS. 1 through 3, there is illustrated an artificial lens 10 for eyes. The lens 10 is illustrated in position upon the cornea 12 of the eyeball 14. The outer margin or limbus of the corneal area is generally designated by the numeral 16, beyond which is located the white sclera 18.