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A TRIPLET AS AN INTRAOCULAR LENS FOR HIGH MYOPIA

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SUMMARY

In this paper we propose the use of triplets as corrective anterior chamber intraocular lenses. We show that it is possible to decrease the thickness and weight of these lens and at the same time design a system that will improve the image quality achieved with the systems currently being used. For lenses between -10 and -30 diopters, thickness can be reduced to an axial length of 0.5 mm.

INTRODUCTION

The correction of high myopia in eyes having great axial length has been achieved by implanting anterior chamber lenses and more recently by treating the cornea with high potency lasers. In this paper we will introduce the possibility of using a triplet as an anterior chamber lens which improves the optical properties of the intraocular lenses that are currently being used (1).

DESCRIPTION OF THE SYSTEM

As can be seen in Figure 1, the intraocular lens used is a triplet in which the central zone is left empty. Both the first and the last lens are made of P.M.M.A. It is possible to combine different materials in order to achieve spherochromatic corrections. The central zone is empty and this allows us to obtain high powers because when calculating the focal point of the intraocular lens, the index difference that exists between the central zone and the material that surrounds it is a factor.

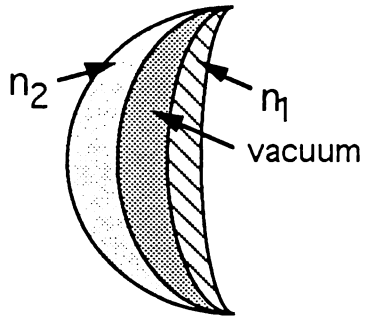

Figure 1

The power is calculated by computer using a program in which the characteristic parameters of the eye that needs to be corrected can be introduced. These parameters are obtained using biometry. We used matrix calculus in the mathematical design to obtain the power of the intraocular lens (2). In Figure 2 we show all of the parameters and constants that play a part in the calculation of the power of the I.O.L. (t_i = thickness, n_i = refraction index and r_i = curvature radii).

One very important aspect is the fact that we can calculate the set of radii corresponding to each of the surfaces of the triplet so that all of the configurations produce the same power. By doing this we can choose those radius values and thicknesses for each element that will give us a system that improves image quality.

One of the advantages of the configuration we propose is that the triplet is thinner than the lenses that are currently being used given that the calculated curvature radii are greater than those for the intraocular lenses being produced today. This is due to the index difference introduced by leaving the central zone of the triplet empty.

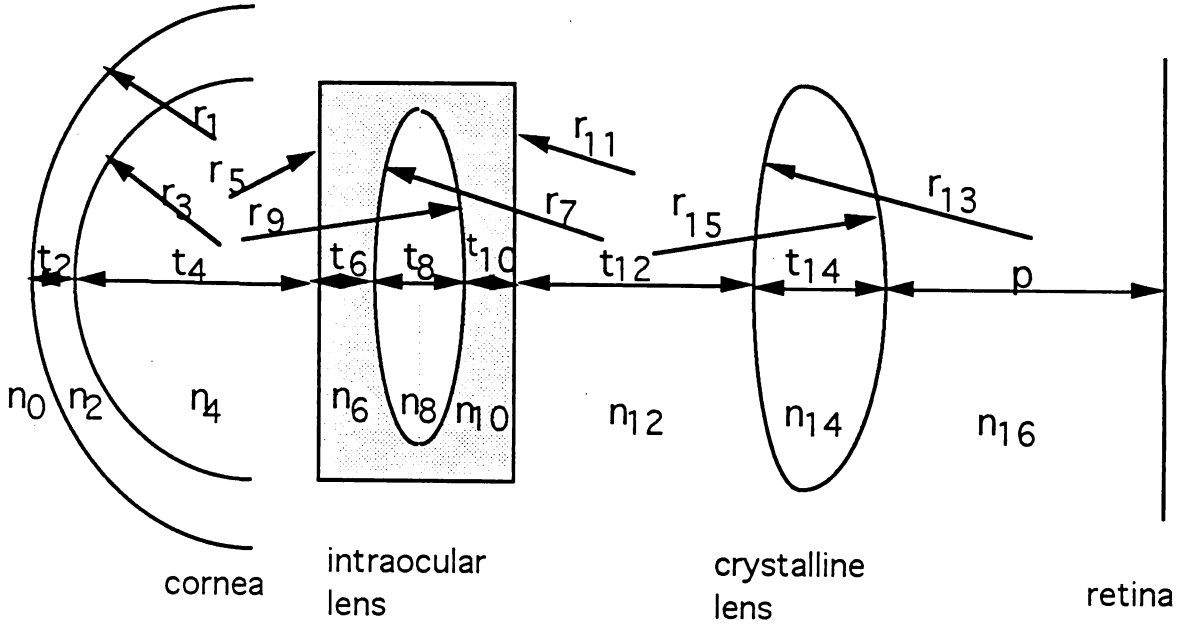

Figure 2

References

[1] Spanish Patent nº P9201253, June 17,1992.

[2] A.Fimia, J.L. Alió, I.Pascual, A. Beléndez, " New theoretical matrix formula for intraocular lens calculation using the optimal bending factor",*Journal of Cataract and Refractive Surgery, (In press).*