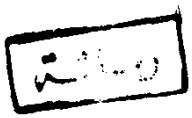
Astigmatic Keratotomies



Essay

Submitted for partial fulfillment of
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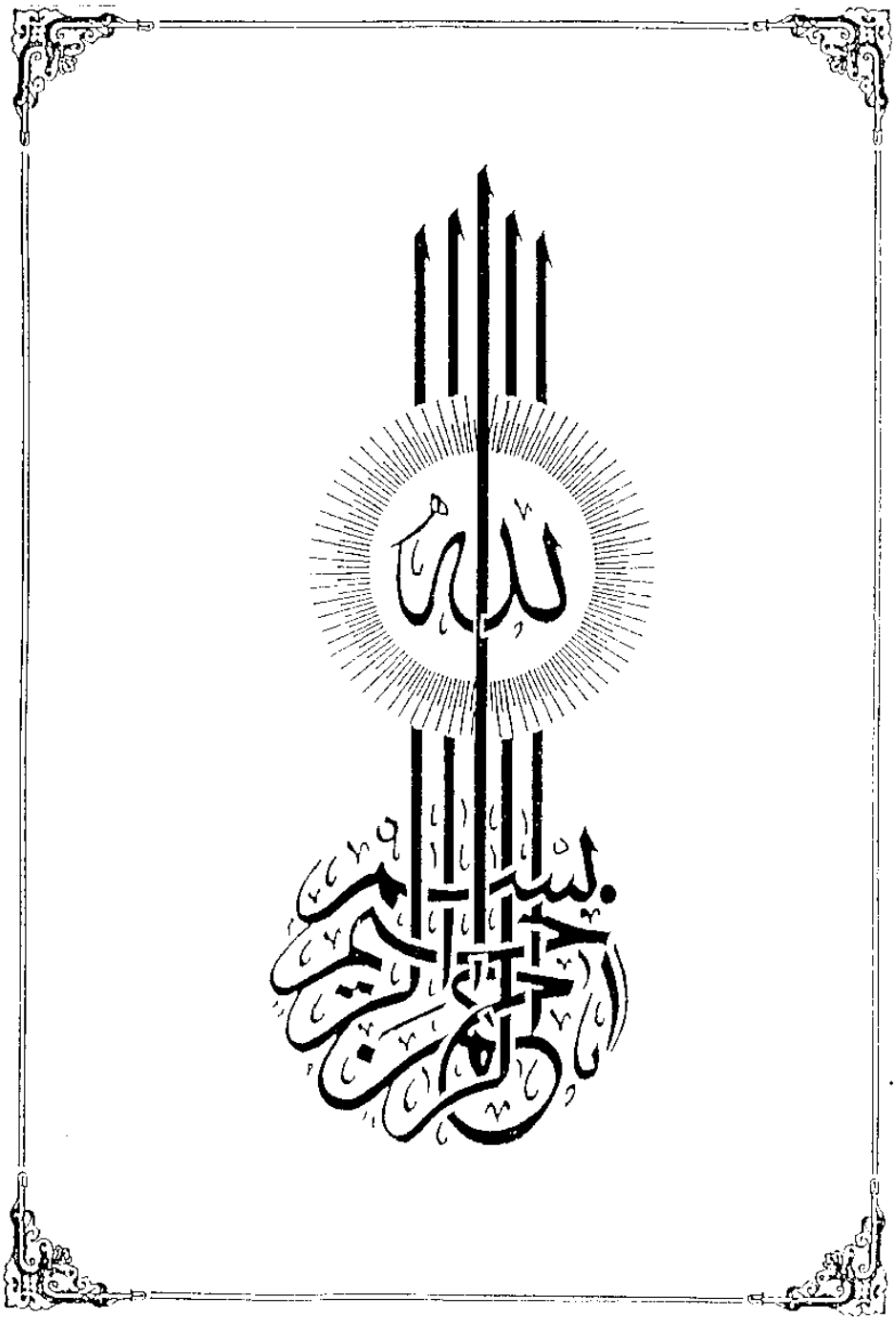
بسم الله الرحمن الرحيم

(وقل رب زدنى علماً)

"صدق الله العظيم"

"سورة طه آيه رقم (١١٤)



TO...

My Family

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Visually significant astigmatism requiring treatment may occur in various clinical situations e.g. dystrophic and degenerative disorders of the cornea, postkeratoplasty patient, post-cataract surgery patient, and after trauma *(Agapitos, and Lindstrom, 1992).*

Naturally occuring astigmatism is quite common with up to 95% of eyes having some detectable astigmatic refractive errors. The incidence of clinically significant astigmatism reported varies between 7.5% and 75%. Between 3% and 15% of the general population may have an astigmatic refractive error of greater than 2.0D. *(Duke-Elder and Abrams, 1970).*

Post-operative astigmatism (post-cataract, post-keratoplasty, and post-refractive surgery) forms one of the major problems in visual rehabilitation for those patients. The incidence of post-operative astigmatism greater than 2.0D is approximately 25% to 30% *(Jampel, et al., 1986) and (Axt, 1987).*

The major symptoms of astigmatism is decreased uncorrected visual acuity and distortion from meridional magnification which is rarely present in the uncorrected

astigmatism, and more significant with spectacle correction. In refractive errors such as simple myopia and simple hyperopia, patients are able to see clearly to some degree at near and at distance, respectively. In contrast, patinets with compound astigmatism may not see objects in clear focus at any distance *(Agapitos et al., 1989).*

Astigmatic keratotomies are referring to operations on the cornea which are intended to alter the refractive state of the eye (flatten the steep meridian and steepen the unincised meridian 90° away) *(Bores et al., 1993).*

ANATOMY OF THE CORNEA

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Macroscopically:

The cornea forms the transparent anterior one-sixth of the eye ball. It is the main structure responsible for the refraction of light entering the eye. It is responsible for 2/3 of total refraction of the eye in non-accommodative state *(Snell and Lemp, 1989)*.

Seen from the front, the cornea is convex and somewhat elliptical in shape. The approximate measurements are about 12mm vertically but about 11mm horizontally. Posteriorly the cornea is concave and circular, measuring about 11.5mm in diameter. The radius of curvature of the anterior surface of the cornea is about 7.8mm; that of the postrior surface, is 6.5mm. However, it should be pointed out that it is frequently more curved in the vertical than in the horizontal planes (astigmatism with the rule) *(Warwick, 1976)*.

Structure of the cornea :

Microscopically, the cornea consists of five layers from without inwards. The epithelium, the Bowman's membrane, the substantia propria, the Descemet's membrane, and the endothelium.

A. Corneal epithelium :

The corneal epithelium is a five-to-seven layer (30 to 50μm thick) stratified squamous epithelium non-keratinized that is organized in a more orderly fashion than similar epithelia elsewhere in the body, a prerequisite for the formation of a smooth transparent optical surface *(Waring, 1992).*

The epithelium contains three morphologic types of cells - a single layer of columnar basal cells, standing in a palisade like manner, in perfect alignment. They are responsible for mitotic activity . Each has a slightly oval nucleus whose long axis is that of the cell and placed near the head of the cell *(Kenyon, 1987).*

These basal cells accumulate iron in disorders that produce depression in the corneal surface. This iron forms the stellate iron line seen in the vast majority of cases after keratotomy. Also melanocytes are present within the epithelium which is responsible for striate melanosis seen in keratotomy incisions *(Steinberg, et al., 1984).*

The middle zone of cells in the corneal epithelium is the wing cells or umbrella cells, in which nuclei are oval or rounded