Radial Keratotomy

Essay

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تكوين لجنة المناقشة :   توقيع اللجنة

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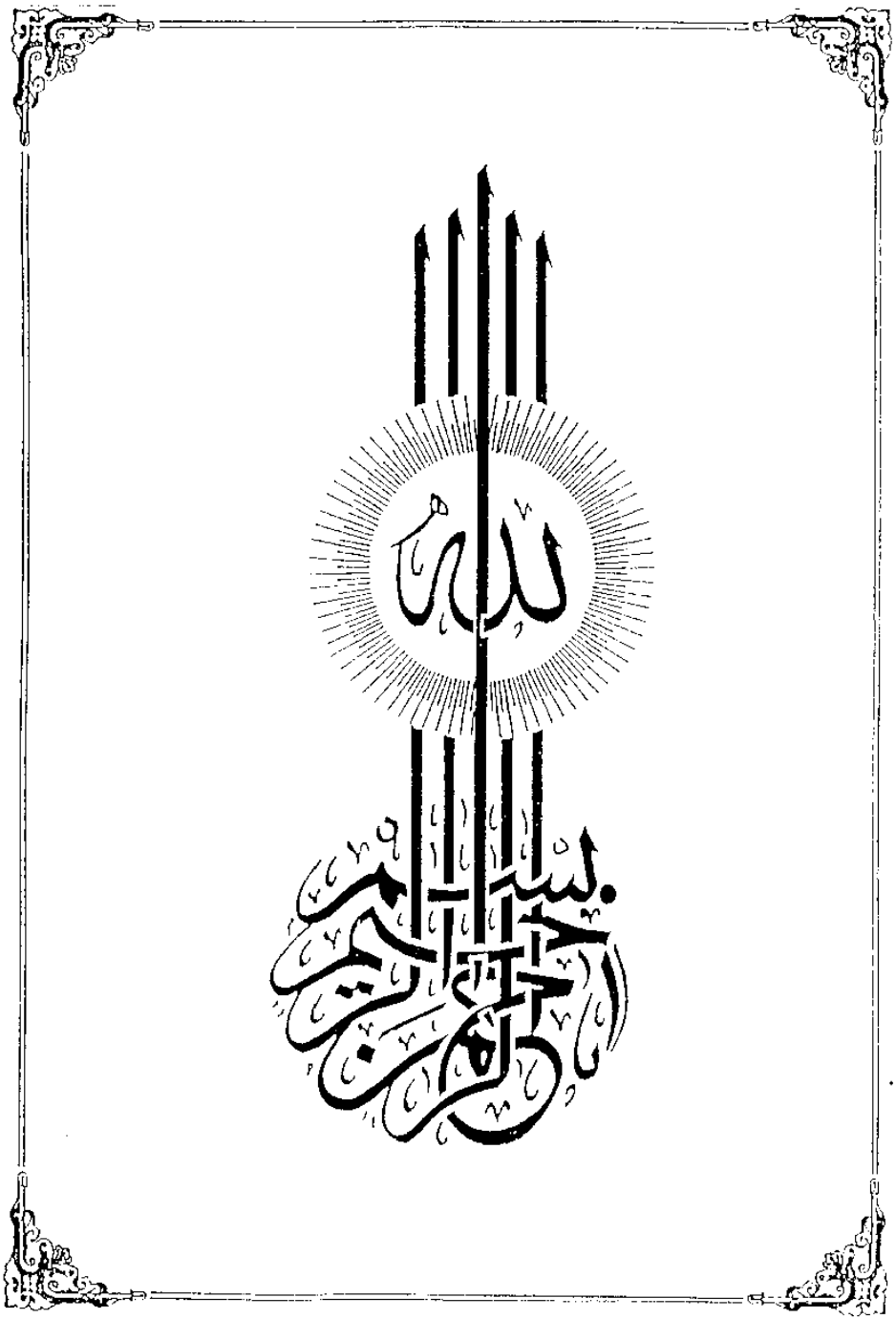

بسم الله الرحمن الرحيم

«وقل رب زدني علماً»

«صدق الله العظيم»

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To .....

My Parents

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INTRODUCTION

Introduction

Radial keratotomy, as a surgical procedure for correction of myopia instead of spectacles and contact lenses, has taken much attention in the last few years.

Millions of people wear contact lenses, which if improperly used may lead to severe complications (**Gloor; 1991**).

The indications of radial keratotomy are still controversial because it is a surgical procedure that modifies the visual function of an apparently healthy eye (**Luttrull et al.; 1982, Jester et al; 1983; Saragoussi; 1990**).

The ophthalmic community has been cautious in judging the safety and efficacy of radial keratotomy since its introduction in the United States in 1978. Radial keratotomy surgeons have presented opinions that range from its being apparently effective for reducing mild myopia, but unpredictable with possible complications months or years after surgery (**Arrowsmith et al.; 1983, Lynn et al.; 1987, Arrowsmith and Marks; 1987, Gloor; 1991**).

Because of its unpredictability and its possible complications, it may not be considered a true alternative to the use of optical aids (**Seiler and Wollensak; 1991**).

Radial keratotomy is no longer considered experimental or investigational by several state ophthalmologic societies like the

International Society of Refractive Keratoplasty and the American Academy of Ophthalmology. (Cowden; 1990).

ANATOMY

Anatomy

The cornea is the main structure responsible for the refraction of light entering the eye. It is transparent and forms the anterior one sixth of the eyeball.

Seen from the front, the cornea is convex and somewhat elliptical in shape. The approximate measurements are 12mm. horizontally and 11mm vertically. Posteriorly, the cornea is concave circular measuring about 11.5mm in diameter. The radius of curvature of the anterior surface is about 7.8mm, while that of the posterior surface is about 6.5mm. The cornea is thinnest at its center, measuring about 0.5 to 0.6mm and thicker at the periphery, measuring about 1.2mm. Astigmatism with the rule is common as the vertical planes are more curved than the horizontal planes **(Warwick; 1976, Snell and Lemp; 1989)**.

Structure of the cornea:

Microscopically, the cornea consists of 5 layers, as shown in Figure 1.

From front to back, they are:

1. The epithelium.

2. Bowman's membrane.

3. Substantia propria (stroma).

4. Descemet's membrane.

5. The endothelium.

Epithelium:

The corneal stratified epithelium is formed of 5 layers of cells and is about 50 μm to 60 μm in thickness. The superficial cells are two to three cells thick, non-keratinized, flattened, squamous cells and attached to one another by desmosomes. The outer surfaces of the cells show microvilli and microplicae which assist in retaining the tearfilm, thus keeping the cells moist **(Snell and Lemp; 1989)**.

The next layer is the wing or umbrella cell layer. It consists of polyhedral cells whose rounded heads are directed anteriorly and whose concave bases fit the heads of the underlying basal cells and send processes, the wing cells, between them. Each cell contains an oval nucleus, the long axis of which is parallel to the surface of the cornea **(Warwick; 1976, Klyce and Beuerman; 1988)**.

The deepest layer is formed of basal cells arranged in a palisade-like manner. They are columnar with rounded heads and flat bases. Their nuclei are slighthy oval and with their long axis

is that of the cells and placed near the head of the cell (**Warwick; 1976**). The cells represent the germinal layer and are responsible for mitotic activity (**Kenyon; 1987**).

Restoration of the epithelium occurs by epithelial slide, which is a horizontal migration of epithelial cells surrounding the denuded area to cover the defect, and by multiplication of the divided epithelial cells by mitosis (**Girard; 1981**).

Bowman's membrane:

This layer is also called the anterior limiting lamina or the anterior "elastic" lamina. It is a thin homogenous sheet about 8 - 14 μm in thickness. It does not consist of elastic tissue. The membrane is sharply separated from the epithelium and its anterior surface is absolutely parallel with the surface of the cornea. Posteriorly it may be regarded as a modified portion of the stroma. Peripherally it ends abruptly in a rounded border. This lamina shows good resistance to injury or infection (**Warwick; 1976, Klyce and Beuerman; 1988**).

Bowman's membrane does not heal by regeneration. Healing of destroyed Bowman's membrane results in scar formation. The permanency of the scars is directly related to the extent of damage to Bowman's membrane and underlying stroma (**Girard; 1981**).

Substantia propria = Stroma:

The stroma is transparent, fibrous, compact and forms about 90% of the corneal thickness. It consists of about 200 to 250 flattened lamellae, each of which being about 2 µm thick. The lamellae are composed of collagen fibres, the direction of which is the same in any given lamellae, but which run at right angle to those of adjacent lamellae. Fibres bind the lamellae together. The collagen fibres, measure between 21 and 65 nm and are imbedded in glycosaminoglycans (**Snell and Lemp; 1989**). In between the lamellae are a number of "fixed cells", the corneal fibroblasts or keratocytes. Wandering macrophages, lymphocytes and PNL may also be seen (**Warwick; 1976**). (Figure 2 shows the stromal lamellae).