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شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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VISUAL OUTCOME AFTER MACULAR SURGERY

THESIS

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By

Moustafa Abd El-latif Abou El-Enin

M.Sc. Ophthalmology

Supervisors

Prof. Dr.

Bothaina Hasan Bondok

Prof. And head of Ophthalmol.dept.

Faculty of medicine

Tanta university

Prof. Dr.

Abd El-Baset El-Nagar

Prof. of Ophthalmology.

Faculty of medicine

Tanta university

Faculty of medicine

Tanta university

2000


بسم الله الرحمن الرحيم

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Abbreviations

AMD	Age-related macular degeneration
CNV	Choroidal neovascular membrane
EM	Electeon microscope
Hge	Hemorrhage
HRA	Heidelberg retinal angiography
HRT	Heidelberg retinal tomography
POHS	Presumed ocular histoplasma syndrome
PVC	Posterior vitreous cortex
PVD	Posterior vitreous detachment
RPE	Retinal pigment epithelium
SLO	Scanning laser ophthalmoscopy
SRF	Subretinal fluid
TGF	Tissue growth factor
TPA	Tissue plasminogen activator

INTRODUCTION

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ANATOMICAL CONSIDERATIONS.

THE MACULA LUTEA. (Fig 1)

The anatomical macula is defined as the area of the posterior retina containing xanthophyll and at least two layers of nuclei in the ganglion cell layer[1,2a]. Clinically, this area is five mm in diameter and its center is located four-mm temporal and 0.8 mm inferior to the center of the optic nerve[3]. It occupies most of the area between the vascular arcades[1].the macula can be subdivided into several zones,

The fovea centralis:

This is a depression in the inner retinal surface at the center of the macula. Its diameter is the same as that of an average disc (1.5mm). Ophthalmoscopically, the fovea can be recognized by an oval light reflex arising from the increased thickness of the retina and internal limiting membrane in the parafoveal area[3]. The average thickness of the fovea is about o.25 mm, roughly half that of the adjacent posterior retina[4]. In the portion of the fovea surrounding the foveola, the nerve fiber, ganglion cell and plexiform layers are present[5].

The Foveola:

Is the central floor of the fovea. It measures 0.35 mm in diameter and lies within the capillary free zone[2a]. It is the thinnest part of the retina and is devoid of ganglion cells and its entire thickness consists only of cones and their nuclei. It subserves the most acute vision. The umbo is a tiny depression in the center of the foveola[3].

Foveal avascular zone:

It measures about 0.5mm and therefore surrounds the foveola[4]. It is a very important landmark that can be determined only by fluorescein angiography[3].

The specialized structure in the macular region accounts for the predilection of certain disease processes to involve this area and for the variety of ophthalmoscopic changes peculiar to this area. In the macula, we find the thickest portion of the retina surrounds the thinnest portion, the foveolar area [2a]. In order to optimize light transmission to the foveal area, all retinal elements have to be displaced laterally out of the light pass. The nerve fibers in the outer plexiform layer (Henle's layer) therefore have to run almost parallel with the retinal surface before reaching points of synapse with the processes of cells in the inner nuclear layer. However this lateral displacement of the retinal layers also disturb the normal reticular architecture of the supporting Müller cells and consequently the retina in this region loses its compact nature and becomes very susciptible to deposition of large amounts of extracellular fluid[3]. The basal cell processes of Müller cells constitute the so called internal limiting membrane (I.L.M.) which is relatively thick in the macular region except in the area of the foveola [2a]. The I.L.M. thickness increases from the vitreous base posteriorly to where it reaches maximal thickness at the crest of the foveolar clivus. From there it rapidly becomes thinner, reaching a thickness of 200Å or less in the foveal center. At the margin of the optic disc, the basal lamina abruptly thins to approximately 450Å, where it covers the disc surface[6]. There is a distinct

radial peripapillary capillary network that arises at the optic disc and extends along an arcuate course within the nerve fiber layer. This network richly interconnects with the inner retinal capillary layer. In the perifoveal area, the capillary network is reduced to a single layer of capillaries that surround a capillary free zone, which varies in size but which usually measures 0.4 to 0.5 mm in diameter[7].

If the central macular area of a fresh human retina is viewed in cross section, the concentration of the xanthophyll appears to be maximal in the outer nuclear and outer plexiform layers. Xanthophyll is also present, however, within the inner plexiform layer inside the foveal area[8]. Stereochemical analysis has demonstrated evidence that xanthophyll comprises two carotenoids with properties identical to those of zeaxanthine and lutein[9].

VITREOUS AND VITREORETINAL INTERFACE:

The vitreous body occupies four-fifth of the globe. It has an average volume in the adult eye of 4 cc and an average weight of 4 g. The anterior vitreous border is a concavity centrally. The concavity is occupied by the lens and is called the patellar fossa. At the periphery of the concavity, the vitreous surface is attached to the posterior capsule of the crystalline lens along a roughly circular zone approximately 1mm in width and 8 to 9 mm in diameter. This zone of attachment is known as the hyaloideocapsular ligament. The attachment is strong in children and young adults but weakens with advancing age. It encloses a potential space centrally between the lens and vitreous, the retrolental space of Berger[1].

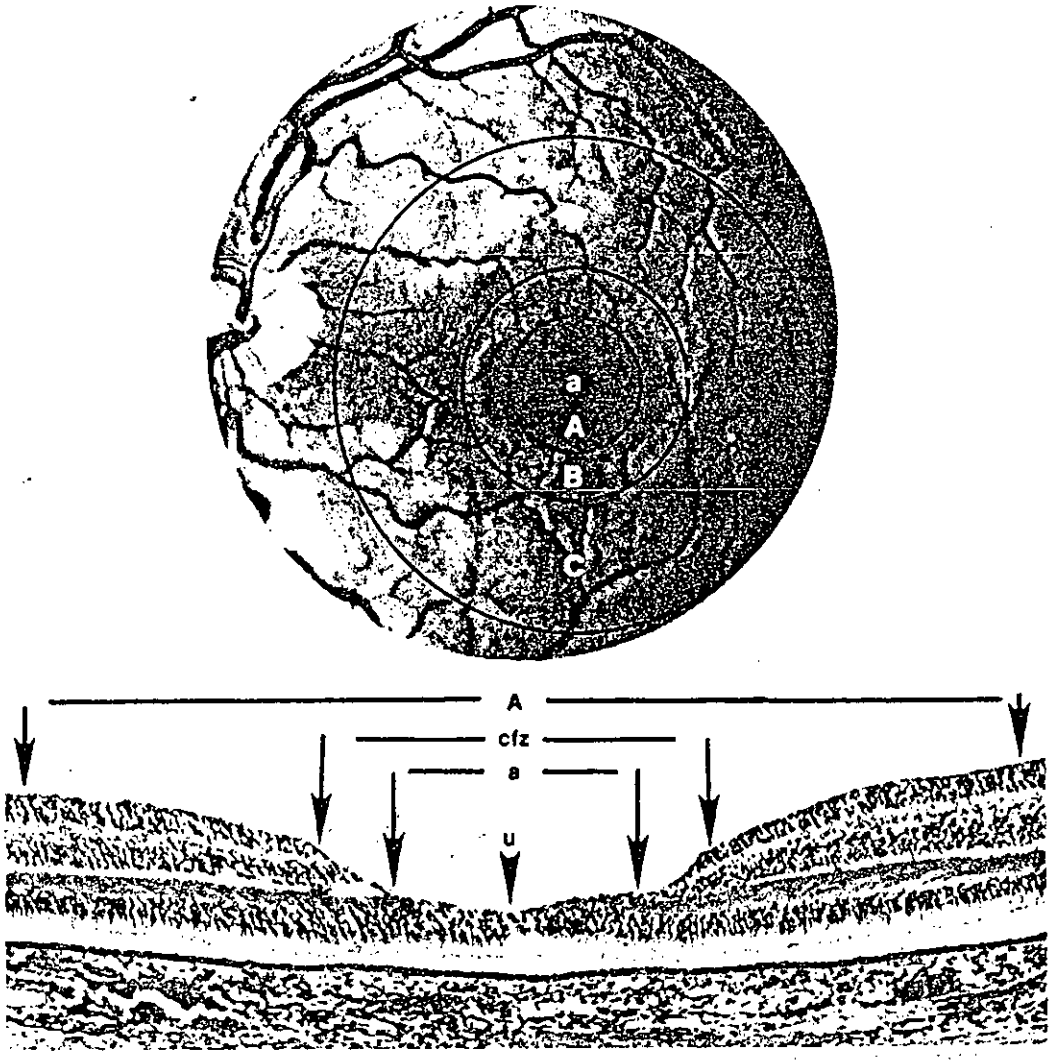

Fig (1) Normal macula

Topographic anatomy (above) and histopathology (below) of the macula.

A. Fovea containing the foveola (a), capillary free zone (cfz), and the umbo (u).

B. Parafovea.

C. Perifovea.

From Gass Stereoscopic atlas of macular diseases, diagnosis and treatment. 1997. Vol. I page 3.

The vitreous is a semisolid gel containing a hyaluronic acid network interspersed in a framework of randomly spaced collagen fibrils. The framework is most apparent histologically in the region of pars plana, where it is strongly anchored to the ciliary epithelium in an area referred to as the vitreous base. Posterior to the pars plana the concentration of collagen and hyaluronic acid is greatest in the ill-defined outer part of the vitreous gel, referred to as the vitreous cortex, that lies along the inner retinal surface. The collagen fibrils, which are condensed to form an outer layer of the vitreous cortex, are adherent to the internal limiting membrane (basement membrane or basal lamina of the Müller's cells) of the retina[2b].

The degree of vitreoretinal adherence varies with the age as well as location in the eye. Generally the adherence decreases with age. The attachment of the vitreous to the retina is greatest at those sites where the internal limiting membrane of the retina is the thinnest. These sites include the vitreous base, the major retinal vessels, the optic nerve head, the 1500-μm-diameter rim surrounding the fovea, and the 500-μm-diameter foveola. The latter two sites of attachment are probably important in the development of idiopathic age related macular holes[2b, 3]. Progressive liquefaction of the posterior vitreous occurs with aging, giving rise to a large optically empty cavity of liquefied vitreous in the premacular area, referred to as the premacular bursa, or the prefoveolar pocket[10].

Forces generated by movement of the vitreous and the premacular bursa as the eye moves also may play a role in the pathogenesis of posterior