RETINAL DETACHMENT IN CHILDREN

ESSAY

Submitted For Partial Fulfilment Of The Master Degree

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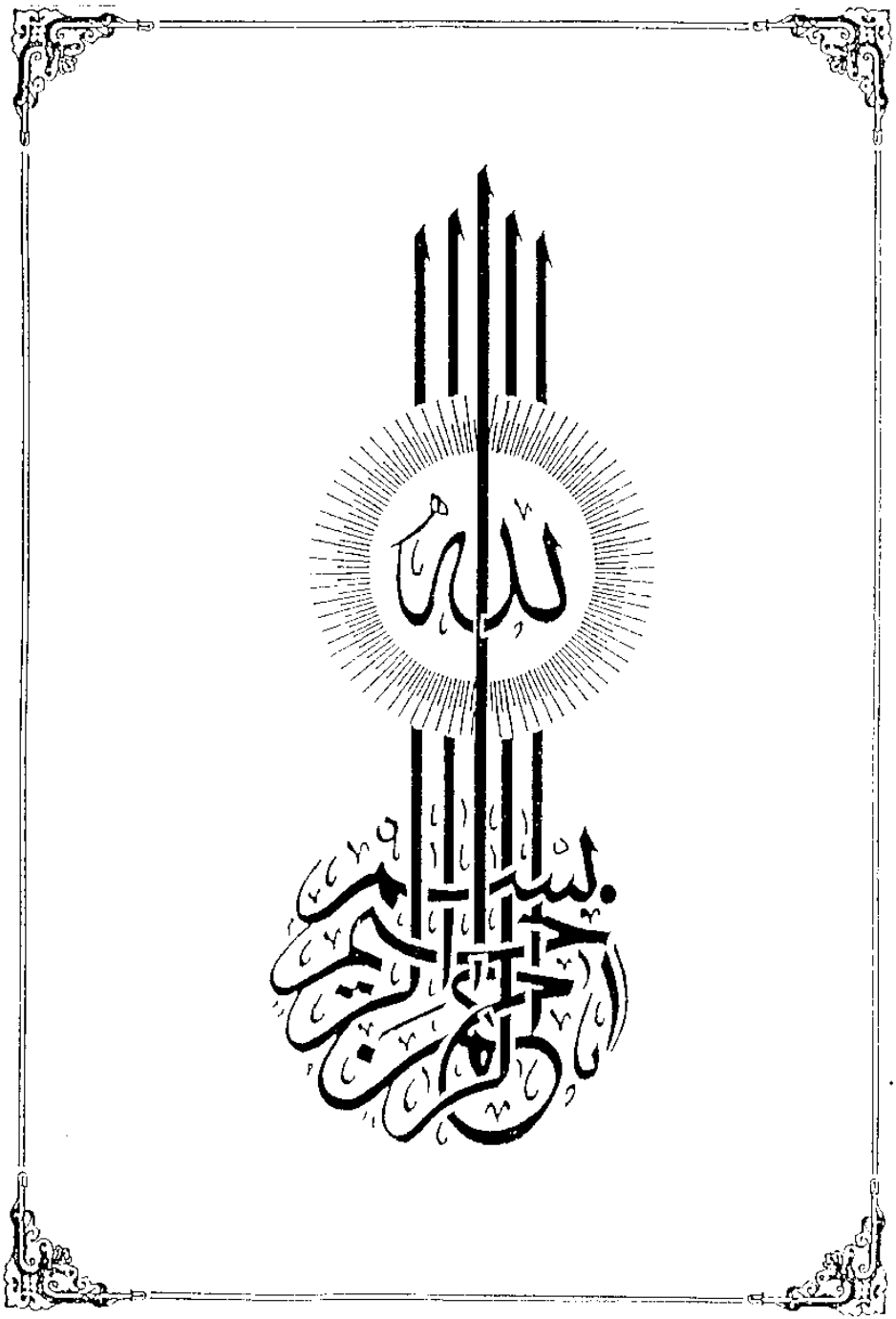

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LIST OF ABBREVIATION

R.P.E.	: Retinal Pigment Epithleum.
R.D	: Retinal Detachment.
VEP	: Visual Evok Potential.
R.O.P	: Retinopathy of Prematurity.
C.M.V	: Cytomegalovirus.

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Mechanism of normal retinal adhesion

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MECHANISM OF NORMAL RETINAL ADHESION

The retina remains attached even in the presence of retinal breaks by many factors which are :

1- ACID MUCOPOLYSACCHARIDE :

It was Suggested that the acid mucopolysaccharide found between sensory Retina and R.P.E, acts as a biological glue, binding these surfaces together. Another postulation is that this viscous polymer prevents the liquid vitreous from gaining access to the potential subretinal space, and it was noted that some of physical factors, that affect adhesiveness such as temperature, pH and calcium concentration may act and play a role, by altering the physicochemical properties of acid-mucopolysaccharide. *(Zauberman and De Giullbon 1972).*

2- RETINAL PIGMENT EPITHELIAL CELL SHEATH AND MECHANICAL INTERDIGITATION :

(Kain 1984) Observed that R.P.E. microvilli interdigitate mechanically around the tips of the outer segments, and this connection is strong enough to allow for daily phagocytosis of outer segment fragments as the photoreceptors renew their disc material, and this can be confirmed experimentally when the N_a pump is poisoned with Ouabain or cold temperature causing increased adhesion as a result of cellular swelling that lighten these interdigitations.

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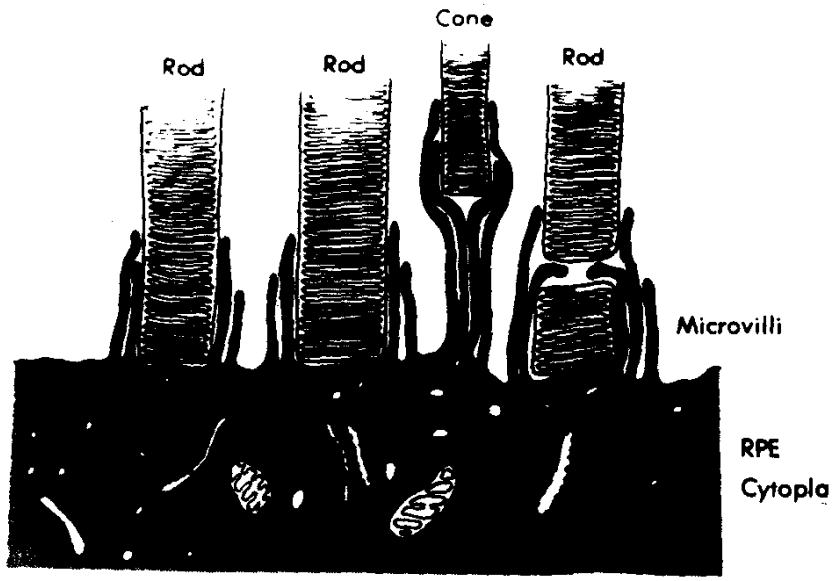
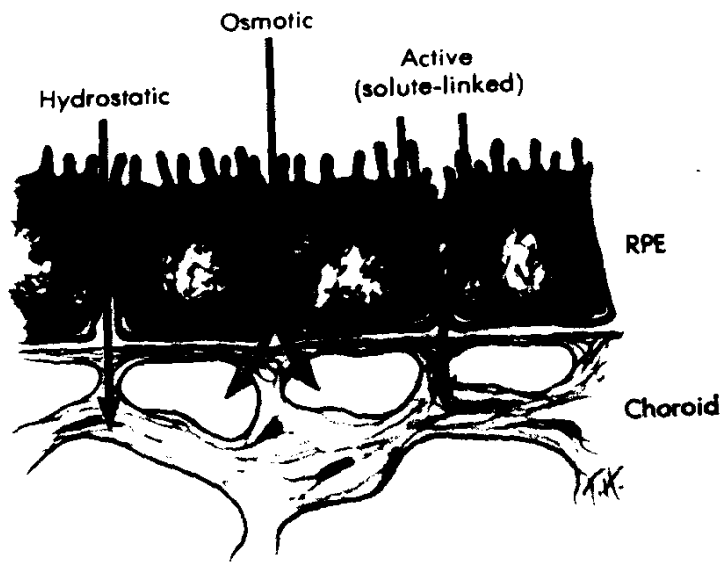


- Fig. 1: Retinal pigment epithelium microvilli.



- Fig. 2: Osmotic gradient of chorioretinal adhesion.

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The mechanism by which interdigitation could produce adhesion are a fractional resistance to withdrawal, and electrostatic forces that oppose separation of the membranes *(Ryan et al 1991).*

3- HYDROSTATIC PRESSURE :

There are two forces acting continuously to drive fluid from the vitreous to the choriod: the intraocular pressure, and osmotic pressure difference between the sub retinal space and the choriod, by the proteinaceous extracellular fluid of the choroid, so the outward fluid passage will push the retina and R.P.E. against the wall of the eye, and lead to retinal attachment *(Maurice 1987).*

In nondrainage procedure of retinal reattachment surgery once the retinal break is closed, the subretinal fluid is absorbed by osmotic pressure of the protein rich choroid *(Orr et al 1986).*

4- ACTIVE ION TRANSPORTATION :

Retinal pigment epithelial cells are capable of absorbing fluid from the subretinal space, and transferring it into the choroid in absence of hydrostatic pressure gradient. At least 70% of subretinal fluid transport can be

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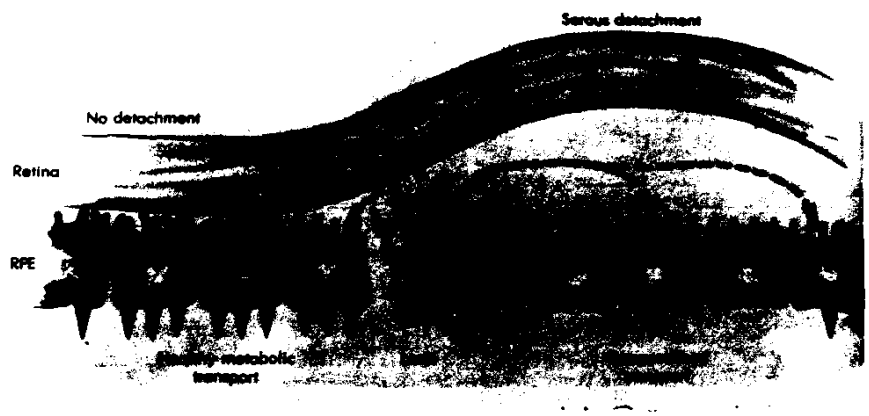

- Fig. 3: Transport capabilities of the R.P.E .

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blocked by inhibiting metabolic activity with dinitrophenol, indicating that hydrostatic forces play only a minor role in removing subretinal fluid from eyes with intact retinal pigment epithelium. The net effect is removal of fluid from the subretinal space, and flattening of outer retina against pigment epithelium. ***(Michels et al 1990).***

When defects occur in retinal pigment epithelium the fluid can enter the subretinal space, causing non rhegmatogenous detachment, but the ability of active metabolic transport of retinal pigment epithelium surrounding the leak will determine whether the detachment will occur or not, and its Maximal extension ability ***(Machemer 1984).***

5- VITREOUS SUPPORT :

Vitreous is considered as one of the mechanical forces outside the subretinal space that keep the retina in place. Vitreous gel has a physical structure that may help to keep the retina in place. A thin cortical layer of vitreous might remain in place after vitreous detachment and serve as a seal or tamponade for retinal holes thus aiding the action of fluid pressure in keeping the retina opposed ***(Machemer and Naton 1968).***

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The role of vitreous in attachment may be preventing pathological fluid access to subretinal space than providing a direct adhesive support or face ***(Ryan et al 1991)***.

6- HYDRAULIC FORCE :

Another force that may contribute to contact between the retina and the pigment epithelium in the normal eye is hydraulic drag. This force results from diffusion of fluid across the intact retina, in response to the hydrostatic pressure difference between the vitreous cavity (the intraocular pressure) and the orbital tissue pressure surrounding the globe. A study of autopsy eyes showed that choroid and sclera were significantly more permeable to fluid flow than was the retina, thus the retina may be forced against the choroid and sclera by hydraulic drag, because of relatively greater resistance to fluid flow across the retina than across the other tissues ***(Foulds 1985)***

Experiments involving injection of tritiated water into the vitreous cavity of rabbit eyes showed, that the retina is less permeable to diffusion of water than is the pigment epithelium. This differential permeability may generate a small pressure difference, that also contributes to the apposition of the retina to the pigment epithelium ***(Orr et al 1986)***.

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Heriditary retinal Detachment

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RETINAL DETACHMENT IN CHILDREN

CAUSES OF RETINAL DETACHMENT IN CHILDREN

I- HEREDITARY RETINAL DETACHMENT AND DETACHMENT IN MALFORMATION SYNDROMES :

Any condition associated with an increased prevalence of vitreous liquifaction, and posterior vitreous detachment, or with an increased number or extent of vitreoretinal adhesion is likely to be associated with a higher incidence of retinal tears, and retinal detachment ***(Michels et al 1990)***.

Predisposing factors :

The most common hereditary ocular conditions associated with retinal detachment are axial myopia, lattice degeneration of the retina, and conginital cataract.

A- Axial Myopia :

The incidence of retinal detachment is directly related to the degree of myopia. Myopia with a refractive error more than 8 diopters accounts for 10% of all retinal detachment despite the fact that they comprise only 1% of the general population. ***(Karlin and Curtin 1976).***

In patients with unilateral high myopia, 84% of detachment occurs in the myopic eye and in patients with

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