TRAUMATIC FUNDUS LESIONS IN THE EYE

THESIS

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in Ophthalmology

BY

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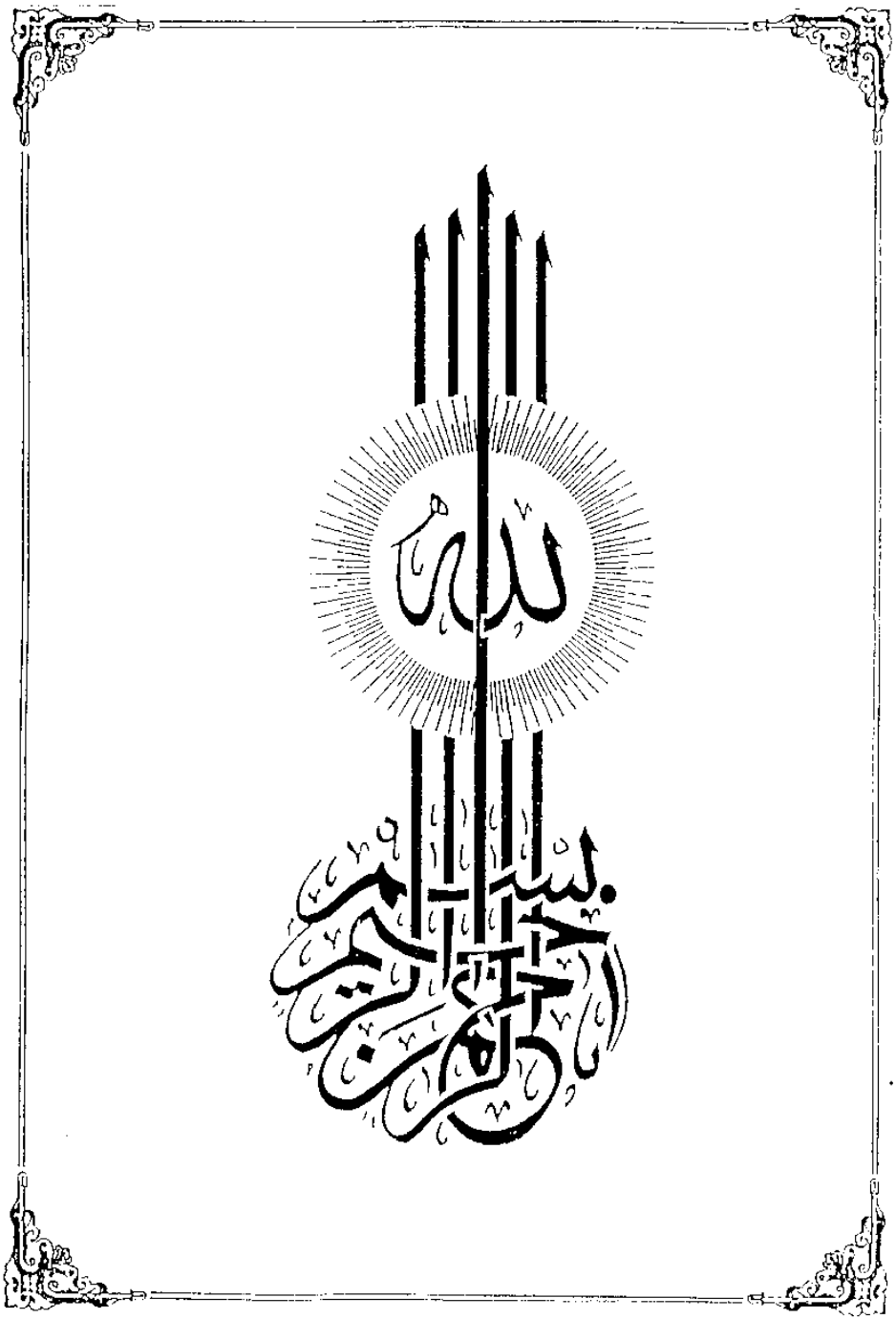

C O N T E N T S

"THE PICTURE OF NORMAL FUNDUS"

When the fundus is seen by the ophthalmoscope it appears a bright red in colour, this is due to the blood circulating in the choroid. This concept is present since Liebreich (1858). An agreement to the role of the choroidal blood in producing the fundus colour is afforded by pallor of the fundus present in severe anaemia, and by the return of the rich red normal colour after transfusion of blood.

Also the amount of pigment in pigment epithelium of the retina and in the choroid plays a part in determining the colour of the fundus, the colour is lighter in fair people and darker in dark people. Due to these pigments the fundus has a finely granular or stippled texture whose absence indicates some pathological changes. In and around the macular area the pigmentation, both in the choroid and in the retina is at its denset and most uniform, so that the granularity of the fundus is not well marked; while at the periphery towards the ora serrata, the stippling becomes looser and coarser.

In the normal adult eye the most characteristic picture of the fundus oculi is the pattern, other than the granularity or stippling, this pattern when present is chiefly that of the choroidal vessels. Two factors

serve to render the choroidal vessels invisible, the density of pigmentation in the pigment epithelium and the closeness of the choriocapillary network. These are probably at their maximum in the central areas. If the pigment in the pigment epithelium is less marked and that of the choroid is profuse a tesselated fundus is produced. This consistsof dark areas surrounded by red, apparently anastomosing bands, produced by the choroidal vessels, mainly the veins. These bands are not sharply defined as they are to a certain extent obscured by the pigment. In very fair people, and more so in albinos, in whome there is little or no pigment, the choroidal vessels can be seen distinctly. The vessels are broader and less sharply defined than the retinal vessels which run superficial to them. Moreover they appear flat and ribbon-like and show no light reflex. Also the retinal vessels, which branch dendritically and do not anastomose, the choroidal vessels appear to form a dense network, except anteriorly where the straight vessels pass towards the ora serrata.

The nerve fibre pattern :

In the course of routine ophthalmoscopy it is usual to see in the circumpapillary area a pattern of

fine striae radiating in all directions from the disc margin. These striae represent the nerve fibres of the retina converging on the disc to form the optic nerve. It will be possible to trace this pattern up, down and to the nasal side for a distance of about 7 mm from the disc. A similar striation passes from the temporal margin of the disc to the macula (the papillo macular bundle).

The optic disc :

The disc massures about 1.5 mm in diameter and its usual form is round or vertically oval. In colour it has a pale red or yellowish-red tint, with wide variety in the complexion of the normal disc. The light-red tint which gives the disc its complexion is due to the presence of a capillary plaxus derived from the vessels of the circle of zinn and central retinal artery. The relative pallor of the disc is due to the reflection of light from the myeline sheaths of the optic nerve bundles behined the lamina cribrosa, as well as from the connective and glial tissues which occupy and lie in front of the sclerochoroidal aperture.

If the retinal pigment layer is thickened before it impinges on the optic nerve it gives the appearance of a pigmented ring outside the optic disc.

If the retinal pigment layer and the choroid cease at a little distance from the disc, the ophthlmoscopic appearance is that of a pale crescent in which traces of choroidal vessels and pigment may be distinguishable. These variations in the optic disc are all recognised as within the limits of the normals.

In the majority of normal eyes the papilla has at its centre a short funnel-shaped depression from which the retinal vessels appear to emerge. The form of this depression varies a good deel in depth. It is often decentered towards the nasal part of the disc, its nasal border having a steeper and its temporal border a more gradual slope.

The retinal vessels :

Broadly speaking the retinal vessels form 4 groups to four quadrants of the fundus.

Variations in their grouping as they leave the disc depend upon the point at which the primary bifurcation of C.R.A. and vein takes place.- behined or in front of the lamina cribrosa.

The four principal divisions of the retinal vessels proceed to their respective quadrants, pursuing

a sinous course and dividing dichotomously.

As the vessels pass out into the retina the nasal vessels run a more or less direct through sinous course, while the temporal ones are arcuate. From the temporal half of the disc and from the superior and inferior temporal vessels small branches pass towards the macula where they terminate. The fovea shows a completely avascular area varying from 0.4 to 0.5 mm in diameter.

The arteries are easily distinguishable from the veins, by being narrower, brighter red colour and have a well marked light streak or reflex among their axes.

There are many congenital aberrations which appear in the normal eyes and can not be described as pathological. These include the cilioretinal artery which is derived from the circle of zinn and passes through the periphery of the optic nerve usually in it's temporal half into the retina.

Arterial pulsations can not be observed by the ophthalmoscope, while venous pulsations are normally visible.

The arterio venous crossings :

As the vessels pursue their course across the fundus, arteries and veins cross each other at many points. The relation between artery and vein of the crossing varies a good deal, even in different parts of the same fundus, and apparently becomes more intimate in the adult than in the child. As a rule the arteries run at their own level, while the veins must dip to avoid them and in doing so many reach the rods and cones. Occasionally veins passes in front of an artery and form a "hump bridge", as a general rule arteries do not cross arteries nor do veins cross veins.

The macula :

It is situated 1.5 disc diameter from the temporal side of the disc, at a point corresponding with the posterior pole of the eye ball, It appears as a circular depression about the same size as the disc, it is deeper red than the surrounding fundus and in its centre there is nearly always a foveal reflex which is due to reflection of light from the walls of the foveal depression. This is most frequently seen as a silvery ring of light hidding every thing behined it. It may be circular or oval according to the incidence of light and the refraction of the eye.

" THE NATURE AND INCIDENCE OF OCULAR INJURIES "

Ocular injuries began when one primitive man fought with another, when he first walked through the undergrowth of the forest or first chipped a piece of flint to make his primitive tool.

At a much later date one was depicted on the tomb built by Ramses II at Thebes about the year 1200 B.C wherein the artist printed the picture of the removal of a foreign body from the eye of a workman.

Ramazzini (1633 - 1714) (the father of industrial medicine) found that the chief risk to workman was from flying particles, and his main difficulty lay in the impossibility of persuading the workers to take the simplest precautions to protect themselves.

Despite the protection afforded the eye by nature- anatomically by its situation in the elastic fatty tissues of the orbital cavity on all aspects except downwards and outwards by the bony projections of the orbital rim and the nose, and physiologically by the vigilance excercised by the blink reflex and the head - turning reflex on the approach of objects which can be seen, and the copious lacrimation which follows the intrusion of any irritant material - injuries to the eyes are common and may involve

any tissue. Moreover the effects of such injuries are much more severe than in any other part of the body, partly because of the delicacy of the ocular tissues and partly because a trauma which elsewhere would cause little and temorary inconvenience can readily result in permanent blindness.

General incidence :

In studies from many different countries, the figures of statistics denoting the incidence of ocular injuries varied according to the degree of industrialization of the area under the review and whether the incidence of superficial foreign bodies was included in the estimates.

In the industrialized community of modern london, Hinton (1949) found that 30 % of all acute ocular cases attending hospital were due to injury. Holland (1965) found that industrial injuries accounted for 53 % of 2,309 cases of ocular injuries in kiel between 1950 and 1963.

Large numbers of cases have been reported by many writers including : Lambah (1968), 1017; Remky and his colleagues (1967) over 1,000 cases of penetrating wounds representing 7.2 % of hospital admission in Munich.

The sex incidence :

Owing to the great preponderance of industrial injuries also war injuries, the sex incidence is heavily weighted on the male side. Statistics show that approximately 85 to 90 % of such cases occur in men

The age incidence :

This is highest in adult life, but it is interesting that the frequency of injuries among children is remarkably high-and important, for in them the damage is frequently of a serious nature. Numerous reports have stressed the large numbers of eye injuries in children, the high incidence of penetrating wounds, and the frequently serious nature of the resulting ocular damage which may lead to enucleation.