

CHAPTER XI.

DISEASES OF THE RETINA, ELASTIC LAMINA, AND OPTIC NERVE.

Hyperæmia of the Retina—Retinitis—Hæmorrhage—Nephritic Retinitis—Retinitis pigmentosa—Retinitis Apoplectica—Detachment—Embolia—Ischæmia—Atrophy—Glioma of the retina—Hemeralopia—Snow blindness—Colour blindness—Hemiotopia—Scotoma—Diseases of the elastic lamina—Hyperæmia of the optic nerve—Apoplexy—Optic neuritis—Atrophy of the papilla—Amblyopia—Anæurosis.

HYPERÆMIA AND INFLAMMATION.

HYPER-
EMIA OF
RETINA:
transient.

HYPERÆMIA OF THE RETINA may be a transient affection, depending simply on over-exertion of the eye, or upon a deranged state of the stomach. Under these circumstances it passes away so rapidly, that it is not likely to attract the attention of either the surgeon or patient. But whatever the exciting cause of the hyperæmia, should it remain in force, inducing chronic congestion of the retina, serious results may follow.

We shall almost invariably find the retina more or less œdematous in cases of hyperæmia (Plate V., Fig. 1), unless the congestion be of a very transitory nature: and if congestion of the vessels and œdema co-exist, we may be sure that the bounds of health have been passed, and that disease has commenced.* In such cases, although the congestion and its consequences may entirely disappear, leaving the parts in a normal state, still it is always necessary to be on our

* The form of disease under consideration is described by some authors as serous retinitis.

guard, remembering that the effusion, though harmless in itself, has taken place in a most fragile and delicate tissue, which may readily be injured or detached from the choroid.

Ophthalmoscopic Appearances.—I have already explained why the healthy retina of the native of India appears of a uniformly bright slate colour when examined with artificial light (p. 35), except where the central artery and vein meander through it. Consequently, if in the case of a native, the retina appear of a crimson hue, however slight the tinge may be, we may be certain that there is something wrong, although the changes which have occurred in it may not amount to actual disease. For instance, if the pupil has been dilated with atropine, and the patient subsequently exposed to the glare of the sun, the excitation thus induced will cause temporary hyperæmia and redness of the retina.

Grey
fundus of
native's
eye.

A crimson
tinge
morbid;

denotes
hyperæmia.

I may take this occasion to observe, that it is advisable to delay putting atropine into a patient's eye, until just before making an ophthalmoscopic inspection; and we should never, after applying it, turn our patient out into the sun, telling him to call again for examination the next day; for it will then be impossible to judge if any alteration in the vascular condition of the retina is due to the effects of disease, or to the excitation induced by over-exposure to light. But excluding exceptional cases, the above rule holds good, and a tinge of red observed in a native's retina indicates a departure from health.

Caution as
to atropine.

What has just been said does not of course apply to the case of Europeans; nevertheless among fair-skinned races, the congested state of the vessels of the retina, in cases of hyperæmia, is generally apparent,* and should one eye only be affected, a comparison of its condition with that of the other will generally remove any doubts we may have had as to the nature of the disease. The retinal veins also, under these circumstances, become more or less turgid, and the vessels of the choroid, and its epithelial cells, are clouded over by the congested and œdematous retina. These changes are best seen if only a dim light is thrown into the eye.

Retinal
hyperæmia
in Euro-
pean.

Compare
the two
eyes.

* "Maladies des Yeux," par L. A. Desmarres, t. iii. p. 452.

Causes.

Blood poisoning.

Overwork an exciting cause.

How acting.

May end in atrophy.

Mechanical hyperæmia.

Hyperæmia from malaria.

Causes.—Hyperæmia may arise under various circumstances, but in almost all cases there is some peculiar blood dyscrasia, which is the latent cause of the mischief. This may be roused into activity by various exciting causes, as for example, overwork; and we consequently find that instances of the kind are common among embroiderers and tailors in Calcutta. These people frequently sit up at night working by the light of an oil-lamp, the flame of which is hardly equal in brilliancy to that of a farthing rushlight; their general health being at the same time impaired by malaria, want of fresh air, and low living.

The train of morbid phenomena commences with the demand for extra nutrient material, caused by the waste induced by the overwork to which the retina is exposed; and though we cannot appreciate the changes that are going on in its nervous elements, we may judge accurately of their activity by the congested appearance of the vessels. If the exciting cause of the hyperæmia continue, one of two results follows,—either the retina becomes atrophied, and the supply of blood being no longer required, the hyperæmia gradually ceases, or else, the congestion continuing, neo-plastic structures are produced, which intermingle with the delicate nervous elements of the retina, and destroy its sensibility.

Another source of retinal hyperæmia is mechanical obstruction, induced by pressure upon the orbital vessels; but I shall treat of this form of disease more fully hereafter, as well as of congestion of the retina induced by overstraining the eye, as observed in the case of hypermetropic and myopic patients.

A more frequent and important cause of this condition is to be found in the influence of malaria. This may operate immediately through the blood, producing changes in its composition, which render it unfit for the nourishment of the tissues, delaying its progress through the capillaries, and so giving rise to local congestions; or else we must suppose that the poison, after entering the circulation, acts directly on the sympathetic nerve, and so on the vascular system. We know that division of the sympathetic in the neck induces hyperæmia of the retina, and other parts which the injured nerve supplies. We may readily suppose that it is by some such paralysing influence which the malarial poison exercises over the sympa-

thetic, that local congestions, such as we are now considering, are produced. However this may be, there can be no doubt of the fact that we frequently do meet with cases of hyperæmia of the retina among persons who have imbibed a large dose of miasmatic poison.

Influence of sympathetic nerves.

We often have cases under treatment, both among Europeans and natives, which illustrate the effects of these combined influences in inducing capillary congestion of the retina, and the more carefully one studies these cases, the plainer it becomes that the capillary circulation is chiefly affected. In many instances, the overwork which the retina is called on to perform probably induces an increased demand for reparative material, the starting-point of the hyperæmia. The congestion continuing, the bounds of health are passed, the transition being marked by effusion into the retina, and an opaque condition of its nervous elements. This is a most important point to bear in mind; for when these conditions are present disease has commenced, and will surely progress to an unfavourable termination, unless stayed by appropriate treatment.

Capillary congestion.

Oedema and opacity of retina.

Pain is by no means a characteristic symptom of hyperæmia of the retina; the disease often runs its course from beginning to end, the patient only complaining from time to time of slight aching pain in the eye; in fact, gradually increasing loss of sight is the only constant symptom present, and its cause, as far as I know, can alone be determined by means of the ophthalmoscope; the outer part of the field of vision is usually first compromised, but ultimately the macula lutea loses its sensibility.

Loss of sight constant.

I have selected the following instance from those which have recently been in hospital as an illustration of the malarial form of nervous effusion and hyperæmia into the retina.

Retinal hyperæmia from malaria only.

Case.—Comol, aged thirty-five. This patient has been suffering from intermittent fever for the last three weeks; the paroxysms recurring daily at about eleven o'clock. During the last five days she has had, in addition, considerable pain in the right side of the head (hemicrania), and the sight of the right eye, which had previously been good, has become very dim. She is stout, and with the exception of these attacks

Case. Intermittent fever.

Dim vision.

offever, apparently healthy. On examination, there were no indications of her liver or spleen having been affected, nor could I discover evidence of hyperæmia existing in any of the organs of the body, excepting the retina. In the right eye, I found the tension normal, and the dioptric media healthy, the pupil contracted, and only dilating after long exclusion from light. The retina, including the optic disc, was of a rose colour, and the swollen and slightly hazy appearance of the retina induced by œdema, was well marked. The sight of this eye was considerably impaired; she could just see to count fingers held up before her face.

Capillary hyperæmia of retina.

Treatment.

Arsenic and opium.

Edema always present.

Importance of these changes.

I ordered her an emetic, followed by a full dose of opium, and the eye was carefully bandaged, so as to exclude the light from it; on the following day arsenic and opium were prescribed. After a week's treatment the pain in the head subsided; there was no return of the fever, and in the course of fourteen days the hyperæmia of the retina had disappeared, and the patient's vision was as good as it had ever been.

Even in mild cases of hyperæmia, we shall invariably find that some amount of serous effusion has taken place into the retina, which causes it to appear soft and swollen; but unless it becomes decidedly opaque, the effused serum may be rapidly absorbed, and the parts return to their normal condition.

It may perhaps appear that I have dwelt too long upon this subject; my reasons for doing so are, that hyperæmia is of common occurrence, and is likely to be overlooked. Moreover, elementary and apparently unimportant changes in the retina, and other tissues of the body, are those which it behoves us to study most minutely, for here is the point of departure for more serious disease, and here we may most successfully oppose it. A case of retinitis, like that of inflammation of the lungs or liver, must unavoidably attract the notice of the most superficial observer, whereas local congestions such as I have been describing are very apt to escape our notice. But I am by no means sure, that instances of this description which I have here given and treated over and over again for the last fifteen years in Bengal, are not many of them cases such as Dr. Clifford Allbutt in his admirable work on the ophthalmoscope, in diseases of the nervous system, designates as "Ischæmia of the disc." To my mind

it is quite certain that numerous cases described by various authors as instances of optic neuritis, have had nothing whatever to do with inflammation of the optic nerve. There is much in a name, and in no department of art, have worse effects followed a faulty nomenclature, than in medicine and surgery.

Treatment.—It only remains for me to say a few words on the treatment of hyperæmia of the retina.

The disease may generally be prevented from running on to the destruction of the eye, if observed in its early stages; but in order to succeed in arresting it, we must endeavour to form an accurate opinion of the constitutional dyscrasia which is usually the primary cause of the affection, and apply our remedies accordingly. The next point we should bear in mind is, that as light is a certain and constant stimulant of the retina, it must be excluded from the eye when in a state of irritation. If the patient be suffering from the effects of malaria, tonics and arsenic should be administered; occasional doses of quinine may be useful, if there is actual ague; or an emetic, followed by a full dose of opium at bedtime, and a mixture containing arsenic and aconite.

Look to the cause.

Correct the dyscrasia.

Tonics.

Arsenic.

There is no question as to the great importance of overcoming the hyperæmia of the retina as soon as possible; and the above remedies, according to my experience, together with change of air, if practicable, will be found the most valuable means we possess for this purpose. The arsenic, however, should be continued for some time after the actual disease has disappeared; for the malarial poison sometimes works in so insidious a manner, that it is impossible to detect its presence in the system. Nevertheless, its influence is hardly less detrimental than when present in its more developed form.

Change of air.

PARENCHYMATOUS RETINITIS occurs among people of all ages and classes; it may arise from the effects of an injury, or from idiopathic causes. If the retina be primarily affected, the inflammatory action may be confined to that part; but as a general rule, in severe cases, the choroid becomes also implicated in the disease; both eyes are often involved.*

INFLAMMATION OF RETINA.

* "Lectures on the Theory and Practice of the Ophthalmoscope." By H. Wilson, F.R.C.S. Dublin, 1868.

Pain and photophobia.	<p><i>Symptoms.</i>—Retinitis generally commences with a throbbing, aching pain in the eyeball and temple;* after a few days the pain increases, and is often very severe indeed; the patient also suffers from intolerance of light and the appearance of flashes of light in the field of vision, and from lachrymation. From the commencement of the attack he complains of more or less dimness of vision; the loss of sight, however, depends much upon the portion of the retina involved: if the inflammation be confined to its periphery, there will be less impairment of vision than if the region of the yellow spot is implicated. The tension of the eyeball is generally slightly increased. The dioptric media remain transparent throughout the early stages of uncomplicated retinitis; but in chronic cases, or when the choroid is affected, the lens and vitreous become hazy. The vessels of the sclerotic and conjunctiva are usually congested, especially in traumatic retinitis.</p> <p>I need hardly say, that the above symptoms are insufficient for the purpose of diagnosis, and we must have recourse to the ophthalmoscope; but it will sometimes require dexterity on our part to obtain a satisfactory view of the inflamed retina, on account of the inability of the patient to bear the light.</p> <p>In acute parenchymatous retinitis the fundus of the eye, including the optic disc, is of an uniform scarlet colour, unless hæmorrhage or neoplastic formations have formed in its structure. The vessels of the papilla are deeply congested—so much so that the disc cannot be distinguished from the retina; its position can only be determined by the point of entrance and exit of the large vessels. The central artery of the retina is usually of normal calibre, but the veins are sometimes remarkably tortuous, and very much congested; they may appear to coil round, so that at one turn of the spiral it seems to be larger than at another. (Plate V. Fig. 3.) A venous pulse may generally be observed in these enlarged vessels. In most cases extravasations of blood of various shapes and sizes are seen scattered over the retina. The retina itself is hazy, swollen, and œdematous; and if carefully examined, faint whitish streaks may be seen radiating in</p>
Flashes of light.	
Dim vision.	
Slight increase of tension.	
Fundus, hard to see.	
Uniformly scarlet.	
Disc not distinguished.	
Veins much congested.	
Retina swollen.	

* "Maladies des Yeux," par L. A. Desmarres, t. iii. p. 449.

all directions from the situation of the optic disc towards the ora serrata. These are formed by the nervous layers of the retina becoming puckered, in consequence of the effusion which tends to drag it from its attachments; in the same way as a cushion, inflated with air, becomes wrinkled from the point at which pressure is made upon it with the finger. These markings upon the retina are, however, very faint, and it is not essential to see them for the purpose of diagnosis, as the disease may be at once identified by the general appearance of the fundus of the eye. Patches of neo-plastic formation of various sizes, sometimes only small greyish-white dots, at other times larger spots, are frequently to be seen in the congested retina. If the inflammatory action is severe, the choroid becomes involved in most cases; but as the epithelium of the elastic lamina is entirely concealed by the inflamed retina, the fundus of the native's eye appears of precisely the same colour as the European's, when affected with retinitis.

White
creasings.

Native and
European
eyes alike.

Prognosis and Results.—This disease may terminate in resolution, or the inflammatory action may become chronic; but even then the retina may again assume a healthy appearance, provided that neither in the acute nor chronic form of the disease permanent damage has been done to its structure.

Terminations.

Among the accidents which may thus interfere with a favourable termination, hæmorrhage is the most common. Extravasation of blood may occur at any stage of the disease, and though the blood may become absorbed, still the delicate nervous tissue is generally more or less damaged. Detachment of the retina may be the direct result of retinitis, or the coats of the retinal blood-vessels may become thickened, so that the stream of blood passing through them is much diminished, and they appear like whitish bands with a central red streak of blood; the supply of nutrient material to the nervous structure being thus greatly reduced, the retina is apt to become atrophied, or undergo other degenerative changes.

Hæmorrhage.

Sclerosis
of vessels.

Neo-plastic formations are common in retinitis, and if they become organized, the functions of the retina are, of course, destroyed in the situation of the newly-formed tissue, a scotoma or dark spot in the field of vision remaining, although the inflammatory action

Neo-plastic
formations.

Suppuration.

subsides, and the other portions of the retina return to their normal condition. Lastly, suppuration may occur as a consequence of inflammation. The only cases, however, in which I have seen this accident happen, have been those in which the retina has been kept in a state of irritation by a foreign body, such as a dislocated lens moving about over its surface, or in traumatic cases.

Recovery.

If, after acute retinitis, resolution should fortunately occur before irreparable damage has been done to the retina, we notice that the appearances above described gradually disappear, the redness of the fundus of the eye subsides, and the vessels return to their normal calibre; the pain and intolerance of light grow less, and ultimately the patient regains his vision, which may in time become almost as perfect as it was before the attack. So favourable a result as this, however, is seldom met with in practice, the more so, if the region of the yellow spot has been involved in the inflammatory action, and neo-plastic formations have grown in this situation. In some rare cases after an attack of retinitis, all objects appear smaller to the patient than they actually are. This condition is called micropsia, and is due to the rods and cones of the retina having become deranged by means of the inflammatory process. Under these circumstances, a person if attempting to copy figures will always make them smaller than they really are. A man affected in this way is quite unfit for military service, and I have had more than once to invalid men suffering from micropsia, following an attack of parenchymatous retinitis.

Treatment.

Treatment.—Since, with the exception of traumatic cases, retinitis almost always depends upon constitutional dyscrasia, induced by malaria, or some such poisonous influence acting on the blood, our efforts must be primarily directed towards eradicating these deleterious agents from the system, and we shall then have to decide on the special line of treatment which may be most appropriate in the case before us.

Attack the dyscrasia.

If our patient is a weakly subject, who has suffered from frequent attacks of fever, we should order both eyes to be kept carefully closed with light pads of cotton wool, the patient being allowed to take exercise morning and evening. If he is suffering from great pain in the eye, it will be most effectually relieved by the injection

Rest.

of a solution of morphia beneath the skin of the temple. A *bhang** poultice often tends to ease the pain, and poppy-head fomentations are frequently most soothing.

Should the eyeball feel at all tense, the cornea may be punctured and the aqueous humour drawn off. We need never hesitate to pursue this plan of treatment if there be any intra-ocular pressure, and I have never seen any harm arise from it, provided care be taken to prevent the aqueous from escaping in a gush. If this occurs, the congested retinal vessels will be in danger of giving way, and extensive hæmorrhage may take place into the vitreous chamber.

If the patient's tongue is coated, and he complains of want of appetite, it will be well to order him a few doses of hyd. c. creta, with quinine and soda. A warm bath at bedtime will tend to relieve any febrile symptoms, if they should happen to exist. It is often necessary to administer bark and ammonia, together with alteratives, from the commencement of the attack, and the patient should be allowed a generous diet, and every available means be taken to improve his general health. I do not think blisters are of much use in this class of cases.

Supposing our patient be a full-blooded individual, and that his pulse indicates a general irritation, a saline purgative should be given, and three leeches applied to his temple in the morning, and the same number in the evening, fomenting the parts well after each application. The purgative will probably require to be repeated in forty-eight hours, and bicarbonate of potash and iodide of potassium should be administered in ten-grain doses three times a day, low diet being at the same time enforced. If the symptoms do not abate under this treatment, we may apply more leeches; together with the subcutaneous injection of morphia, poppy-head fomentations, and absolute rest of body and mind.

SYPHILITIC RETINITIS.—The presence of this form of inflammation of the retina is determined more from the previous history of the case than from characteristic symptoms; it is not in fact recognisable so much from peculiar appearances presented by the retina as from

* Indian hemp.

the evidence of constitutional syphilis; and, as we might naturally have expected, is frequently complicated by diseases of the choroid and iris. In the choroid, under these circumstances, we notice that the pigment cells become heaped into small masses, presenting, when examined by the ophthalmoscope, the appearance of greyish or dark dots and patches. At the same time, in consequence of these changes in the choroid, the vitreous undergoes degeneration; it becomes clouded, fluid, and occupied by dark flakes, thus shrouding the retina from our view, and rendering the changes going on in the optic disc and parts around somewhat obscure.

Complications;
Choroidal;

Vitreous.

Ophthalmoscopic appearances.

Film round vessels.

Optic disc hazy.

Patches in retina.

Neo-plastic growths organized.

Syphilitic retinitis commences with hyperæmia of the disc and venous congestion of the retina, the arteries being diminished in calibre. The course of the retinal vessels is marked by a greyish film due to sclerosis of the connective tissue elements, particularly of the vertical trabecular fibres. This greyish film frequently appears to run along the outside of the vessels, as observed with the ophthalmoscope, forming as it were a casing of neo-plastic tissue round these vascular canals, the film being most marked along the wall of the vessel and gradually shading off into the healthy retina. The optic disc is swollen and hazy, the haziness extending beyond its circumference to a variable distance over the retina. This greyish film on the retina is seldom uniform; but as in syphilitic keratitis, so in retinitis, one part of the affected structure is usually more hazy than another. This is often particularly the case near the axis of vision, where small punctiform opacities of the retina are noticed in syphilitic inflammation of this structure: and these opaque spots undergo rapid changes often disappearing in the course of a few days.

If the abnormal action continues unchecked, further changes in the retina become developed, for as the sclerosis advances the tissue involved becomes dense and opaque, and the nerve structure of the retina is not only destroyed, but it leads to occlusion of its blood-vessels; the neo-plastic formations become organized, a white glistening patch appearing in the place of the originally inflamed tissue. These changes may run their course in a particular spot, and yet the remainder of the retina present no abnormal appearance whatever. Perhaps the vessels passing to and from the

inflamed patch may be slightly congested, but this is by no means a constant appearance; and the blood-vessels can seldom be traced beyond the inflamed spot, as the tissue in the act of becoming organized, contracts and obliterates them. So far as my experience goes, hæmorrhage is not of common occurrence in this form of disease.

Hæmorrhage not common.

Syphilitic retinitis, as I have above remarked, is in many cases preceded by iritis, and irido-choroiditis, so that we may expect to meet with evidence of pre-existing mischief in these structures; nevertheless, this is not always the case, for instances undoubtedly occur in which constitutional syphilis being present, the poison selects the retina as the first structure for attack. Under any circumstances syphilitic retinitis having commenced, the patient complains principally of impairment of vision, it may be in one or both eyes; the diminution of sight may be sudden or may creep on very slowly; it not uncommonly has periods of amendment, and then becomes worse than ever again. The field of vision presents spots of almost total blindness, other parts being comparatively normal; this is evidently dependent upon the disposition of the diseased action to affect one part of the nervous tissue of the retina at one time, and in one spot, more intensely than at another, thus altering the state of the visual field from time to time. Of course when sclerosis of any one part of the retina has been completely established, the nervous and vascular tissues being destroyed, this spot remains as a black patch in the visual field. The dimness of sight is in most instances increased, by the changes already noticed as common in the vitreous in cases of this kind.

Symptoms.

Dimness of Vision.

Visual field unequally impaired.

Prognosis.—The prognosis of this form of retinitis depends very much upon the stage of the disease when first brought under our observation. If we discover no great changes in the retina or choroid our prognosis may be favourable, even to the hope of restoring sight. But the disease being a constitutional one is apt to recur, and we must caution our patient accordingly, impressing on him the necessity of applying to us the instant he discovers any retrogression in his power of sight. When once dense opaque patches have formed in the retina I need hardly say we can entertain no hope of the corresponding portion of the retina regaining its functions.

Prognosis.

Treatment. *Treatment.*—I would refer the reader to the remarks I have already made, regarding the treatment of syphilitic iritis; a long continued and carefully managed course of mercury is, I am convinced, the correct treatment for cases of this description. Like most other practitioners I have had my seasons of doubt as to the necessity for administering mercury for the relief of syphilis, and although I still believe it is impossible in all cases to cure syphilis, nevertheless I am equally sure we may generally destroy the manifest effect of syphilis on the tissues of the body, by means of mercury, and in few instances are the curative effects of this drug more marked than in cases of syphilitic retinitis.

INHERITED SYPHILITIC RETINITIS generally comes on in infancy, and, unfortunately, there are no external symptoms to mark the progress, or even the existence, of this formidable disease; and it is only as the child grows older that his vision is discovered to be defective.*

Often not recognised.

He is then perhaps supposed to be short-sighted, or to have some affection of the eyes depending on dentition, which it is hoped he will outgrow; whereas the disease, if its real nature were recognised and judiciously treated, might very possibly be alleviated, and the sight saved. The importance of making an ophthalmoscopic examination, in the case of imperfect vision among young children, cannot be too strongly enforced. Should patches of syphilitic inflammation exist in the eye, we must at once resort to the treatment I have recommended in cases of similar affections of the iris—namely, mercurial inunction, together with tonics or alteratives, as may seem most necessary.

RETINAL HÆMORRHAGE.
From injuries.
From mechanical obstructions.

EFFUSION OF BLOOD INTO THE RETINA has been observed after injuries, through concussion, or direct wounds; or in the course of those changes which tend to impede the passage of blood through the optic disc (as glaucoma, inflammation of the optic disc, and the adjoining retina), or through the orbit, especially when the cause is situated close behind the eyeball, or at the fissura orbitalis superior. Sudden closure of the jugular veins on both sides has occasioned hæmorrhage into

* J. Hutchinson on "Syphilitic Diseases of the Eye and Ear," p. 130.

the retina or effusion of blood may occur in the course of changes within the eye (as tumours, retinitis, myopia), which give rise to hyperæmia of the retina and choroid, with atrophy.*

Extravasation of blood, as a result of retinitis, or mechanical congestion of the vessels, generally takes place in the deeper layers of the retina. The hæmorrhage is not usually very extensive, nor does it always appear to injure the nervous tissue; a patient may regain his eyesight perfectly after the inflammatory process has passed off, and the blood has become absorbed.† But as I have before observed, if the hæmorrhage, whether from inflammation or any other cause, has been extensive, and has occurred in the substance of the retina, either in or near the macula lutea, our prognosis, as to the patient's ultimate recovery, must be guarded.

It is hardly possible to mistake extravasated blood in the retina for any other condition of the parts. If examined soon after the hæmorrhage has occurred, its colour is quite characteristic. Subsequently this alters, and the hæmorrhagic effusions become darker, and are broken up into small patches. The larger extravasations gradually soften down, and are converted into a yellowish fatty substance, which may ultimately become absorbed.

The depth at which the clots of blood are situated in the retina may be determined by the position they hold with regard to its vessels: the extravasation, if anterior, will of course hide the vessels; but if posterior, the central artery or some of its branches, can be traced in front of the clot. Virchow describes these spots of extravasated blood as being precisely similar to those noticed in the brain. He says:—"The corpuscles within the mass may be either completely unchanged, or partly studded with fine granules. In the interior of these red masses, as well as at their circumference, may be seen fat corpuscles and conglomerate granules, that are either collected into firmly cohering masses, or sometimes appear united into a network. The retinal

* C. Bader on "Diseases of the Retina;" *Guy's Hospital Reports*, vol. xii. p. 602.

† Dr. Pagenstecher's Report of the Wiesbaden Eye Infirmary: *Ophthalmic Review*, vol. i. p. 195.

elements themselves, in this condition, appeared either wholly unchanged, or the granular layer and the ganglion cells somewhat opaque; the latter, although not enlarged, presenting a more granular and yellowish aspect than natural, over which the bacillary layer was not easily discernible. Also, the capillaries of the retinal vessels, which often form an interwoven net, showed changes both in their walls and their channels; the former, in retained permeability of the vessels, being sometimes thickly set with fat granules; the latter occluded by capillary obstructions (embolia).*

**NEPHRITIC
RETINITIS.**

Appear-
ances.

Causes:

renal
disease,
malaria,

and blood
poisoning.

NEPHRITIC RETINITIS.—Stellwag von Carion remarks that this form of disease is characterized by collections of a cloudy substance in the posterior half of the retina, which subsequently unite to a large patch, forming a prominence around the optic papilla. This is accompanied by numerous hæmorrhagic extravasations, great local congestion, and decrease of vision. In fact, this form of retinitis is accompanied by sclerosis of the connective tissue of the retina and fatty degeneration of its nerve elements, with effusion of blood into the part; it has been described as occurring in cases of albuminuria† and disease of the kidneys. Pathological changes of the kind are not, however, confined to cases of Bright's disease; the peculiar dyscrasia induced by malaria may produce the same result, and I would warn the medical practitioner from coming to the conclusion that because he discovers evidence of retinitis albuminuria in a patient's eye; that the individual is therefore suffering from Bright's disease. Surgeons practising in the tropics very well know how often chronic albuminuria is met with, which is quite curable, and does not in any way depend on Bright's disease. I have watched instances of the so-called retinitis albuminuria for some years past, and always considered them analogous to the fatty degeneration of the muscular or secreting organs of the body, which we sometimes notice in persons exposed to malarious influences; and which may run their course either with or without the presence of albumen in the urine; sugar, in fact, often takes the place of albumen in the urine under

* Carter's *Zander*, p. 146.

† "Atlas d'Ophthalmoscopie," par Dr. Liebreich, p. 25.

these circumstances. We also meet with a similar morbid condition of the retina in alcoholic poisoning, the alteration being brought about, no doubt, in the same way in each case—namely, by changes in the blood and the walls of the capillaries, which render the former unfit to supply healthy nutrient material to the tissues, and the latter calculated to hinder osmosis, and to impair still further the nutrition of the parts around them, so that disease of the retina is the result.

Mr. Hulke states that sclerosis and fatty degeneration thus induced take place in the connective-tissue elements of the retina (glioma).* But this degenerated tissue is not the only source of the glistening white spots seen in the retina affected with this form of disease; they partly arise from the disintegration of the extravasated blood, and also from fatty changes taking place in the fibrillated coagula formed from the liquor sanguinis which is effused into the part. The larger vessels of the retina are seldom involved; it is the capillaries which are diseased, their walls being thickened by amyloid deposits. The circulation of blood is retarded through these narrowed vessels, and effusion of serum takes place into the structures around. But more than this: many of these diseased vessels give way, and small hæmorrhagic spots occur in the retina. Changes have also been noticed in the vitreous in cases of neuro-retinitis; it is apt to become hazy and granular; blood-corpuscles and small coagula from the retina have also been discovered in it.

Symptoms.—The patient seldom if ever complains of pain in the eyes (both are commonly affected), but he notices dimness of vision, usually coming on gradually. The impairment of sight, however, progresses, though it may be much more strongly marked in one part of the field of vision than in another, and ultimately the patient may be able to recognise only the largest-sized print. In the early stages of the disease he may complain of hypermetropia, the diseased retina bulging forwards into the vitreous chamber, and therefore lying within the focal

Walls of
vessels
altered.

Degenera-
tion of con-
nective
tissue;

and of
extravasa-
tions of
blood and
serum.

Symptoms.

Dimness
of vision
increasing.

Hyper-
metropia.

* Hulke on Neuro-Retinitis: *Ophthalmic Hospital Reports*, vol. v. p. 17.