The diagnosis of intra-ocular growths / by A. Hill Griffith.

THE DIAGNOSIS

OF

INTRA-OCULAR GROWTHS.

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THE DIAGNOSIS OF INTRA-OCULAR GROWTHS.*

In this paper I purpose commenting only on such cases as have come under my own personal observation, either among my own patients or in the practice of my colleagues, whose kind permission I have obtained to make use of this material, and I take the occasion to thank them, not only for this, but for many opportunities of seeing and examining cases which they knew would be of interest to me.

We shall not discuss the diagnosis of growths in the iris, but only such as occur behind this position. Hence our attention will be chiefly occupied with glioma of the retina and sarcoma of the choroid, which are by far the most common tumours met with in this situation—indeed, with the exception of tubercular tumours of the choroid, no other variety of new growth is of any clinical importance.

The chief point we shall have to decide in any case is—are we dealing with an intra-ocular growth or some condition simulating this? for the particular variety other than glioma or sarcoma cannot be diagnosed clinically, and these differ so widely in appearance, and especially in the age at which they occur, that they cannot be mistaken one for the other.

Glioma.

In glioma of the retina the diagnosis is, as a rule, free from difficulty, the "cat's eye" appearance being quite characteristic, especially as the age at which the disease occurs is, in the great majority of cases, limited to the first twelve months of life. The physical conditions necessary for the production of a "cat's eye" are, that the growth be well within the principal focus of the eye, and present a rounded, smooth, light-coloured, and highly-reflecting surface. These conditions are fulfilled in the majority of cases, as the gliomatous mass affects the posterior layers of the retina, and rapidly extends towards the centre of the vitreous, where it forms a round lobulated tumour, closely invested by the smooth limiting membrane of the retina.

* Paper read on March 2nd, at the Manchester Medical Society, illustrated by specimens, drawings, and lantern projections. The woodcuts are from drawings by Mr. Walter Tomlinson, of jelly preparations enlarged two diameters.

The characteristic glancing appearance is usually at once evident, as the child is held in its mother's arms facing a good daylight. Focal illumination, by the aid of a convex lens and good artificial light in a dark room, will be required to enable us to examine the surface of the tumour minutely. Ophthalmoscopic examination by the direct method will rarely be found necessary, and only in early cases, where the growth is confined to the posterior segment of the eye.

Apart from the presence of the growth, the eye is usually free from any change; there is no injection of the conjunctiva; the cornea, the aqueous, and the lens are clear; the pupil is often wide, but round, and free from adhesions; and the iris tissue is healthy.

The little patients, often unusually fine chubby infants, are bright and happy, and evidently free from pain or discomfort. They are brought to us by the mother simply because the eye "flashes like fire."

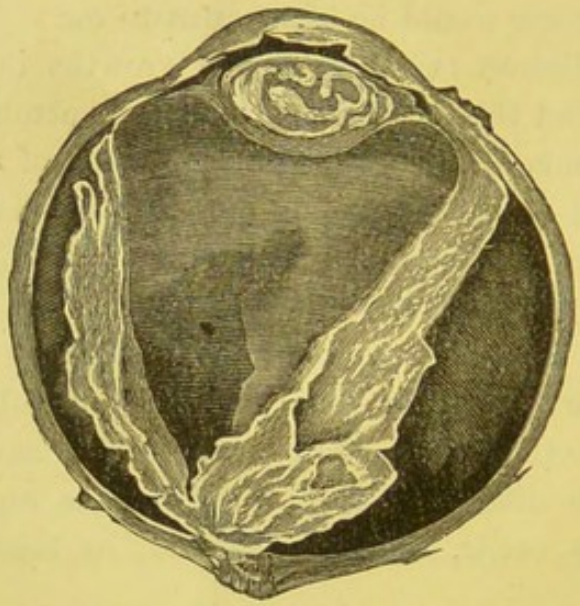

FIG. 1.—Ann Bailey, aged $5\frac{4}{12}$ years. Glioma of retina. Unusual form, spreading as a layer along the interior of the eye. Gliomatous nodules in anterior chamber not represented.

If the child is not brought under our notice till the disease is far advanced, we may have the eye in a state of great distension, with florid injection of the globe, and opacity of the media, but this has not often been the case in my experience.

Difficulties may arise under the following, amongst other, conditions, which I shall illustrate by cases and by specimens from our Hospital Museum :—

The disease may spread along the interior of the eye, instead of, as usual, making for the centre of the vitreous.

Case 1.—Ann Bailey, aged five years and four months, was a healthy little country girl, under the care of Dr. Glascott. Left eye had no perception of light, T + 3. Some blood-vessels were noted in the iris. Three translucent little nodules, half the size of

Cup-like form.

a pin's head, were wedged in at the lowest part of the anterior chamber between the iris and the cornea, and one similar but smaller nodule occurred in the iris at either side of these, but at some little distance from them. The interior of the eye was lined by a thick, yellowish, shaggy-looking layer, and some vitreous opacities, and apparently small blood clots were noted. The diagnosis of glioma was made, and the eye was removed. The little nodules were easily lifted out on the point of a needle, and when examined microscopically were found to be similar in structure to the elements in the retinal growth, and to consist of rounded cells with granular contents, some of which had processes extending from them. The specimen (Fig. 1) shows that the retinal growth has an unusual cup-shaped form, and that the hollow surface

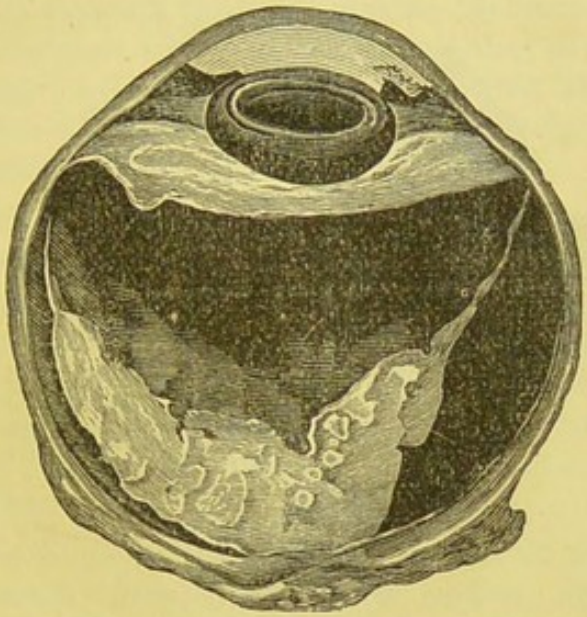

FIG. 2.—Bertha Clayton, aged $2\frac{7}{12}$ years. Real glioma, together with pseudo-glioma.

presented to the vitreous is shaggy and rough. The absence of the cat's-eye appearance is thus fully accounted for.

With inflammatory exudation.

Extensive inflammatory exudation into the vitreous is rare in glioma, but I have seen a case which was completely masked by this condition.

Case 2.—Bertha Clayton, aged two years and seven months (Dr. Little). The diagnosis made was "exudation in vitreous *not* glioma." Some time afterwards the eye became glaucomatous and was enucleated. The specimen (Fig. 2) shows real glioma, but also a thick continuous layer of lymph behind the lens completely concealing the former.

At later periods of life.

The affection may occur at a later period of life than usual, when we may easily be put off our guard, as in the following case, which was also remarkable in respect of the occurrence of amaurosis of the other eye :—

Case 3.—John Macdermott (Dr. Little), aged 10, had a blow on the left eye, twelve months ago, and the sight is said to have gone at once in this eye. When we saw him he had no perception of light in the left eye, and there was increase of tension, with yellow exudation in the vitreous. The other eye had normal vision. Some little time after enucleation, a few nodules appeared in the socket, and sudden and total amaurosis took place in the other eye, without change in the fundus. We lost sight of the boy shortly after this.

Case with amaurosis of other eye.

The globe (Fig. 3) measures 24mm. in diameter. The angle of the anterior chamber is closed all round by adhesion of the root of the iris to the cornea. There is total separation of the retina, which seems thickened and covered by lymph-like exudation. The optic nerve is opaque and grey, and the sheath is filled up with greyish material.

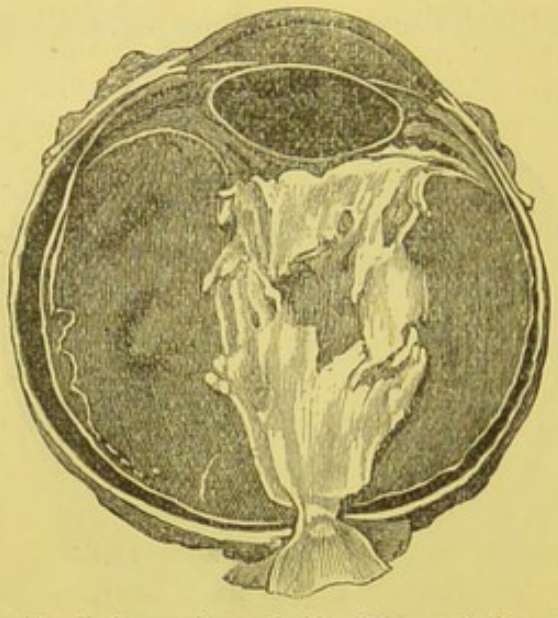

FIG. 3.—Jno Macdermott. Left eye, lower half. Glioma of the retina, which has undergone early detachment from the choroid, leaving, however, at the temporal side, traces of its former position.

The choroid is normal and in position. Microscopic sections of the long axis of the nerve, including the retina, leave no room for doubt that the case is one of glioma. No trace of retinal elements is to be made out, only large areas of round cells with single nuclei, which stain deeply with logwood, and are separated in places by delicate strands of fibrous tissue. The nerve is atrophied, and its structure completely lost. The sheath is distended by round staining cells.

The following case may here be described, for the clinical features pointed rather strongly to glioma; but, as will be seen, the pathological examination of the bulb does not substantiate this.

Case 4.—Frances Foster, aged 21 (Dr. Glascott), married four years, had one child and one miscarriage. Blind of the left eye 15 months, T + 3, the pupil dilated ad max., with pigment encroaching on its anterior surface. Almost total separation of the retina, which was studded, near the ciliary region, with white chalky-looking patches and some hæmorrhages. The

Case of angioma of ciliary body.

retina did not wave about during movements of the eye, probably from being rendered stiff by the gliomatous (?) degeneration it had undergone. A maternal aunt died of cancer of the uterus. The diagnosis of glioma having been apparently justified the globe was enucleated.

The lower half of the globe measures 23mm. in the transverse, by 24mm. in the sagittal diameter. The angle of the anterior chamber is closed by advance of the root of the iris. There is total separation of the retina, which has become detached from the optic disc, but in front spreads out over the posterior surface of the lens and base of ciliary body. The folds of the retina seem agglutinated together, forming a round stalk, which runs from behind forwards, and about the middle of this, one finds a light yellow nodule about the size of a pin's head. A quantity of bluish-grey flocculent substance escaped, and was lost on opening the globe, but some of it adheres to the ciliary region. The choroid appears quite normal, and is in position. There is no cupping of the optic disc, and the nerve appears healthy. On clearing away the remaining flocculent substance one came on a circumscribed wedge-shaped tumour, of a lightish brown colour, arising from the ciliary region at the nasal side, and projecting into the eye; it measured 5·5mm. in thickness by 9mm. in length, and its minute structure will be described below.

Microscopical sections of different portions of the upper half of the eye give the following results: The pigment layer of the iris is turned over the edge of the pupil, and invests the anterior surface of the iris for some distance. The angle of the anterior chamber is closed by adhesion of the root of the iris to the margin of the cornea, but the canal of Schlemm is quite patent. The substance hanging about the ciliary region, and filling the space between the choroid and detached retina, seems to be composed partly of inflammatory products and partly of changed vitreous. It is certainly not gliomatous.

The ciliary processes are enormously engorged with blood, and blood corpuscles are found in great quantity adherent to the inner surface. On part of the anterior surface of the iris, and all the posterior surface of the same, and the internal aspect of the ciliary body, is found a quantity of fibrinous material, with blood corpuscles, and some large round pigment cells. The optic nerve is atrophic, but shows no appearance of invasion by glioma; the inner surfaces of opposite halves of the retina are in apposition; the rods and cones are wholly absent; several of the other layers can be fairly well made out; but all are much thickened, and show numerous extravasations of blood corpuscles, with clumps of round, single-nucleated cells, which stain well with logwood, and give very much the appearance I have seen in undoubted cases of glioma. The light yellow nodule, which I have mentioned before, is situated in the outer layers of the retina, and bears under the high power some resemblance to a "giant cell," being a large oval body of finely granular appearance, surrounded by a cell-lined network, but it is probably only some coagulated serum filling up a large cavity in the tissues, for the nuclei certainly belong to the adjacent cells, and not to the granular mass itself.

Longitudinal sections of the swelling at the ciliary region show that it is bounded on the outer aspect by the fibres of the ciliary muscle, with which its structure seems continuous, and behind it is joined by the anterior termination of the retina. The tumour consists of a framework like a sponge, the cavities of which are filled with blood corpuscles, and the fibrous meshwork is covered by numerous and distinct nuclei. At the hinder part the spaces are very wide, and quite packed with blood corpuscles, and

the septa are very slender, but in the main bulk of the tumour the spongelike structure is very close, and the cavities much more numerous, but smaller, and many of them quite empty.

The view which I have adopted of this case is, that the ciliary growth, which I take to be a non-malignant angioma, was the starting point, and gave rise to all the other changes—the increased tension, the detachment of the retina, and the inflammatory (?) changes in and around the latter.

Another case in which the eye was removed for supposed glioma, at an unusual age, will now be described.

Case of chronic localised choroiditis with deposit of bone.

Case 5.—Jane Wilson, aged 14 years and 11 months (Dr. Little), had lost the sight of the left eye certainly for six months, and probably it had been failing for about eighteen months. At the date of enucleation there was no perception of light, T + 3, cornea hazy, pupil dilated ad max., only a very narrow rim of iris to be seen, covered with pigment on its anterior surface. There was total, or nearly total separation of the retina, forming a funnel-shaped cavity extending from the disc to the ciliary attachment. The detached retina was thickened and discoloured, and did not wave about; splatches of blood were seen in places. During the few days the case was under observation, the haziness of the media increased, and the diagnosis of intra-ocular growth having been arrived at, the eye was removed.

The globe was divided into an upper and a lower half. The sagittal diameter measures 25mm., the transverse 24·5mm. The angle of the anterior chamber is closed by advance of the root of the iris, otherwise the anterior parts of the eye are normal. The detached retina appears as a rounded cord, running straight forward from the optic disc. It is evidently much thickened, especially at its posterior attachment, where it forms a pinkish-grey fusiform swelling, whose base is closely adherent to the choroid at the temporal side of the disc.

Longitudinal sections of the optic nerve, with the retina and other parts at the back of the eye, show the following points: The optic nerve is normal, or practically normal; the choroid is normal, except at the temporal side of the disc, where it is much thickened and engorged with blood, and shows embedded in its substance several plates of young bone. Its structure is here quite continuous with the fusiform swelling formed by the detached retina.

In the posterior part of the swelling one can readily enough make out the thickened nerve fibre layers of the opposed halves of the retina, and trace these backwards to the lamina cribrosa, which is distinctly depressed. The other layers of the retina cannot be made out separately, but are all much prolificated, and contain a good number of blood vessels and a moderate amount of pigment, which, being confined to the parts adjacent to the choroid, is evidently derived entirely from the hexagonal pigment cells. My friends, Mr. A. H. Young and Dr. Arthur Robinson, who kindly examined the sections, unhesitatingly agree with me that we have here no new growth, in the usual acceptation of the term, but a localised chronic inflammation of the choroid and retina. Mr. Young also considers I am correct in designating Case 4 an angioma.

As regards these two cases, it is interesting to note that in Case 5, relying on the occurrence of amaurosis, detachment of retina, and increased tension, our diagnosis of intra-ocular growth was altogether wrong; and that in Case 4, where, from the addition of the presence of white chalky-looking patches, and hæmorrhages on the retina, we felt justified in giving the more exact diagnosis of glioma, we were not quite correct. Increased tension in detached retina does not always imply tumour, as we shall later on have further opportunity of observing.

Pseudo-glioma.

The distinctive characters of the so-called pseudo-glioma ought to be sufficient to prevent error in diagnosis, except perhaps in a few cases, notably the case I have mentioned of the coincident occurrence of both conditions. In pseudo-glioma we have a history of some acute febrile disturbance, followed by inflammation of the eye, which we find on examination is somewhat diminished in size, and of lowered tension, although the shape is well retained. The pupil is narrow and irregular from adhesions, the iris tissue is muddy and opaque, the pupillary portion is advanced towards the cornea, while the ciliary zone is retracted, and shows a circular furrow, the whole iris forming a truncated cone, with the narrower end at the pupil. In these cases the reflex from the exudation in the anterior part of the vitreous is of a dirty yellow colour, and never like the beautiful pure white or pinkish-white lustre of real glioma.

Attention to these points will render any mistake in diagnosis exceedingly unlikely, but I have known it to occur with a competent observer, in the case of a child aged 3 years and 10 months, in which was made the diagnosis of "exudation in the vitreous." There was no increase of tension, and it was, after a careful examination, considered *not* to be glioma. In the course of four months the eye had to be removed for severe pain, with great increase of tension, when it was found we had to deal with real glioma of the retina.

I do not recollect ever finding increased tension in the pseudo-glioma of children, the almost, if not quite, universal condition being, of course, diminution of tension, so that I should certainly advise enucleation in any case of supposed pseudo-glioma where the tension rose. (Compare also Case 2.)

Dislocation of lens.

In the rare condition of spontaneous dislocation of the lens with secondary glaucoma, I have known the eye to be removed for supposed glioma, the bright metallic reflex from the edge of the lens, with the iris behind acting as a foil, causing a close resemblance to the cat's eye.

On opening the eye in this case the vitreous was found quite clear and healthy. There was no glioma or even plastic exudation at the ciliary region. The iris was abruptly bent back on itself by the forward displacement of the lens.

The child was brought to the hospital some years later with spontaneous partial dislocation of the lens of the other eye, but fortunately, so far, no dangerous symptoms have arisen.

Gliomatous nodules in the anterior chamber.

The presence of separate nodules free in the anterior chamber, as in Case 1, being unusual, might raise doubts as to the gliomatous nature of the case, but having seen three such cases, I should myself regard these nodules as confirmatory evidence. I have elsewhere (*Trans. Ophthal. Soc.*, Vol. VII.) endeavoured to show, from cases of descemetitis with solitary patches of choroido-retinitis, and from the cases of gliomatous nodules in the anterior chamber, that the suspensory ligament is traversed by microscopic particles.

Early detachment of retina.

Extensive detachment of the retina may rarely occur before the growth has attained any great size, but in such cases the detached membrane, being stiff and often studded with little patches of glioma, does not wave about, and could not be mistaken for idiopathic detachment, which we shall see is so common an error in sarcoma of the choroid.

Non-vascular glioma.

At one of the meetings of the Ophthalmological Society I had an opportunity of examining a case, which Mr. Lang showed, of glioma that was quite free from vessels. The other eye had been removed for glioma some time before, otherwise I should imagine it would have been quite impossible to give a positive opinion.

Glioma endophytum.

The gliomatous infiltration sometimes starts in the *internal* layers of the retina, "glioma endophytum," destroying the internal limiting membrane, as in Figs. 1 and 2, and in such circumstances we can have no cat's eye, as the surface of the growth is shaggy, and not smooth, as when invested by the intact limiting membrane.

My experience shows that complications, exceptional cases, and consequently difficulties in diagnosis, are most apt to occur in patients over the age of two years.

I have in three cases only seen the second eye become affected, and have been struck with the early period at which the mother has noted the characteristic reflex, her former sad experience rendering her keenly alive to its melancholy importance.

We have so far chiefly considered the diagnosis of tumours in infants

and young children, a period of life in which we very rarely meet with any other variety of new growth than glioma. We shall now pass on to the consideration of tumours (or suspected tumours) occurring in adults, in whom we have mostly to deal with sarcoma of the choroid.

Sarcoma of the choroid.

This variety of tumour occurs within a much wider range of age than glioma of the retina, from the age of 20 (or even less) to old age, usually between the ages of 40 and 50. It is hence much more likely than glioma to be mistaken for other conditions. It is always primary, always single, and generally deeply pigmented. It arises by a broad base from the choroid at any part of the fundus, and terminates in a single rounded knob-like process, usually separated from the base by a more or less distinct neck.

Occurs in three stages.

In the early period of growth the tension is normal or subnormal, and the eye is free from inflammation or opacity of the media. In the second stage the tension is increased, and injection of the bulb with opacity of the media takes place, and lastly the growth enters upon the third stage by bursting through the capsule of the eye, as evidenced by sudden reduction of tension and, if the site of rupture be not too far back, the appearance of a dark mass outside.

When it occurs at the posterior pole of the eye, or near the ciliary region, the growth is closely invested by the retina, no serum intervening, and direct inspection of the growth with its vessels renders the diagnosis unmistakable.

Serum.

In all other situations there is almost always the presence of more or less serum between the growth and the overlying retina, a condition which may render a positive diagnosis very difficult or impossible. In fact, this constitutes by far the commonest obstacle to a correct diagnosis in the first stage, as it is liable to be mistaken for simple detachment of the retina.

The serous effusion has by some been looked upon as an exudation from the surface of the tumour itself, but it is generally regarded, and I think rightly, as caused by pressure of the tumour on the large emergent veins, which also explains its absence when the growth arises at the posterior pole of the eye or far forward, in both of which positions, as we know, there are no emergent vessels, and further, the ciliary part of the retina is strongly adherent to the uveal layer, while elsewhere the attachment is but slight.

This serous effusion is certainly the rule, and is by some regarded as a constant and invariable accompaniment of choroidal sarcoma. I think, however, that this is only true of growths occurring about the equator, and when they have attained some considerable size. I have certainly

seen two central sarcomas at an early stage in which there was an entire absence of subretinal effusion. As for tumours about the equator, I cannot say, as they are never seen by us in the early stage.

Retina adherent to tumour.

I have seen several examples of large intra-ocular sarcomas growing from the equatorial region in which there was a most intimate union between the growth and the overlying retina, probably due to slight adhesive inflammation, the attachment being so complete that even in microscopic sections it was not freed (see Figs. 8 and 11). In such cases the diagnosis would not be very difficult, even although the retina were elsewhere extensively detached.

Simulating simple detachment of retina.

In any case of suspicious detachment of the retina, and by suspicious I mean occurring in one eye only, in the absence of high myopia, severe blow on the eye, or wound of the sclerotic, and especially if occurring in an adult, one must recollect that a choroidal sarcoma may be present, and examine by means of the ophthalmoscope, very carefully, from time to time, with a well-dilated pupil, and the strongest possible illumination. If there be only a small amount of serum under the portion of retina covering the tumour, the usual knob-like character may be well marked, and the diagnosis may be in consequence quite easy; this is especially likely to be the case if the tumour arise in the upper segment of the eye, for the subretinal effusion will gravitate to the lower part, and leave the tumour open to our inspection.

It must, however, be confessed that, in some cases, if the retinal detachment be large, it may be quite impossible to give a positive opinion. I select the following, as it affords a good example of the difficulty we are discussing, and it is of interest in other respects.

With rupture of retina.

Case 6.—Job Atkins (Dr. Glascott), aged 31, painter, when first seen had lost the sight of the left eye for eighteen days, at least he found out the defect then; there was no history of injury to the eye, and the sight was perfect in the other eye. We found in the affected eye a large retinal detachment at the inner and lower part; there was no increase of tension, and all perception of light was lost. The patient had several times suffered from lead colic and rheumatism in the shoulders and feet, but his general state of health was good, urine and heart normal.

At the second visit, one week later, the vision of the good eye had sunk to 16 Jäger, but the fundus was absolutely normal. The field of vision for white, red, and green was normal, and there was no central scotoma for colour. On examination, three months later, it was found that the detached retina had ruptured, the ragged edges of

the tear being plainly visible, and disclosing a black knob-like growth at the nasal side just behind the lens. The eye was enucleated shortly after this, and the pathological examination confirmed the diagnosis of melanotic sarcoma of the choroid. This is the only occasion in which I have known rupture of the retina to take place, and the presence of the tumour to be thus made manifest.

The vision of the right eye commenced to improve soon after enucleation, reaching 10 Jäger and $\frac{6}{36}$ in one month, 4 and $\frac{6}{36}$ three months later, and 1 and $\frac{6}{6}$ shortly afterwards. The above testing demonstrates the presence of some paralysis of accommodation. I am unable to say what was the nature of this transient form of amblyopia, but I am strongly inclined to regard it as dependent in some way on the presence of the growth in the other eye. The sight was perfect seven years later, and there had been no attack of dimness of sight. Compare with Case 3.

Increase of tension.

When increase of tension occurs in a case of retinal detachment, even if the eye be not in a state of acute glaucoma, and the globe be still free from general injection, the case is no longer one merely of suspicious detachment, but is almost certainly a case of choroidal sarcoma. It would be easy to multiply cases in which choroidal sarcoma has been correctly diagnosed on this evidence alone, but the following case will suffice.

Increase of tension with tumour.

Case 7.—Esther Breakell (Dr. Little) aged 20. Sight in left eye gone for three months, defective for nine months with attacks of dimness. The retina was totally detached, and crowded against the back of the clear lens; it did not wave about on movements of the eye, the tension was very high, and no illumination could be obtained.

On excision we found a melanotic sarcoma, the size of a filbert, arising from the posterior segment of the eye, surrounding the disc for some distance on every side, and enclosing in its substance the retina, which could easily be traced from behind forwards.

I consider that one is perfectly justified in enucleating an eye in which the sight is lost with detachment of the retina and increase of tension, and have again and again seen the diagnosis confirmed on excision, indeed the next case I record is the only one (in an adult) in which under such circumstances we found no tumour.

Increase of tension without tumour.

Case 8.—Elizabeth Walmsley, aged 33, gave a history of gradual failure of vision in the right eye for eight months, commencing on the third day after her confinement; there had been no pain till the day before she came under my care.

We found faint injection of the eye, the pupil was bound down to the lens capsule by numerous adhesions at the lower part, the iris was slightly discoloured, there was but slight illumination at the outer side, not sufficient to enable one to make out any details in the fundus; at the nasal side I thought I could detect some detachment of the retina far forward, the tension was normal.

I regarded the case as one of those forms of septic inflammation, in this case an irido-cyclitis, which in rare instances come on after confinement, and ordered iodide of potassium internally, and atropine to be applied to the eye.

One month later I found the tension increased to a high extent, and just behind the lens at the nasal side one could see a rounded buff-coloured surface with vessels coursing over it. I felt compelled to change my opinion of the nature of the case, for the presence of retinal detachment, increase of tension, and vascular mass, pointed with irresistible force to sarcoma of the choroid, and further, the loss of sight, preceding for a period of several months the occurrence of pain and injection of the eye, was quite in accordance with this view of the case.

On section of the excised bulb, we did not find a tumour, as we anticipated, but only detachment of the retina, a fold of which was adherent to the posterior surface of the lens, and had given rise to the appearance of a solid growth. This case shows that second thoughts are not always the best, for had I adhered to my first view of the case I should not have excised the eye.

As for the increase of tension, I can only say that it appears to have been dependent on the use of atropine in an eye which was possibly disposed to, or on the brink of, this state from the previous occurrence of iritis and adhesions. As I have before stated, I consider that the occurrence of increased tension in retinal detachment is alone sufficient evidence of intra-ocular growth, but in the above case there were posterior synechiæ, and the increased tension followed the use of atropine, which may teach us in future cases of such a nature to hesitate before pronouncing a positive opinion.

Simulating acute glaucoma.

Choroidal sarcoma often comes under our notice with all the appearances of an acute inflammatory glaucoma—that is, with increased tension, total or nearly total loss of sight, severe shooting pains, general injection of the eye, a dilated and fixed pupil, haziness of the cornea, a shallow anterior chamber, and opacity of the media. It is of the first importance in this, the second stage of sarcoma, to make an accurate diagnosis, as iridectomy is just as strongly indicated in glaucoma as it is contra-indicated in choroidal sarcoma; in the former condition curing the disease, and, if done in time, restoring the sight permanently, while

in the latter condition, such a procedure could only do harm by delaying the enucleation, and in all probability hastening the fatal issue, by giving rise to infection of the neighbouring tissues.

On closely questioning the patient, we will find that, in the glaucomatous stage of intra-ocular growth, the sight has been lost for some considerable period before the onset of inflammation, and further, that the premonitory symptoms, usual in primary glaucoma, *i.e.*, transient attacks of pain, dimness of vision, and coloured rings, coming on at night and disappearing after a sleep, have not been observed.

If all perception of light be gone, and the eye be painful, we would enucleate without regard to the diagnosis, as iridectomy is seldom of any use in glaucoma which has reached this stage; but if some little sight remains, it is very desirable to make a diagnosis, and I have found the estimation of the visual field by the candle of some service, the retention of the nasal side being against glaucoma, in which disease, as we know, this portion of the field is always the first to go. In spite of all care, however, in the history and objective examination, sarcoma has frequently been found in eyes enucleated for glaucoma, and iridectomy has been done in eyes containing sarcoma. So perhaps this mistake cannot be altogether avoided.

Bulgings of the sclerotic.

Localised bulgings of the sclerotic occasionally take place in choroidal sarcoma, and, in fact, are the rule in sarcoma at the posterior pole of the eye, as in a case of mine, published in the *Archives of Ophthalmology*, Vol. XVII., Part 2. Here, as in one or two others of my specimens of sarcoma at other parts of the choroid, the bulging corresponds with the site of the growth; but this is not always the case, as I shall show; and lastly, such bulgings occur, perhaps, more frequently from other conditions than intra-ocular sarcoma, as in the following:—

Case 9.—James Mackie (Dr. Glascott), aged 19. Left eye blind for four years; no accident; no pain or inflammation at any time. There was a large ciliary staphyloma upwards and outwards, which had been noticed by the patient for a fortnight. There was only slight local injection; no pain or tenderness on pressure; the tension was very high; the lens was partially opaque, preventing an ophthalmoscopic examination. On enucleation, no tumour was found, but only the staphyloma formed by the expansion of the sclerotic and ciliary portion of the uveal tract.

I should mention here that Dr. Mules suggested throwing a strong light on the outer surface of the bulging, to see if the pupil could thus be illuminated from behind, and he satisfied himself from this test that there was no solid growth.

This is, no doubt, a test worth remembering, and is very valuable, as evidence of a tumour situated at the thinned portion of the sclerotic

(when palpation with the fingers might also be of service), but where, as in the next case, the tumour did not correspond with the staphyloma, we would not be safe to negative the existence of a growth by this test.

Case 10.—Mary Gradwell (Dr. Little), aged 33. Vision bad in left eye three months; read No. 19 Jäger. There was a large separation of the retina *below*, T—1. Patient returned in two months with T +, and

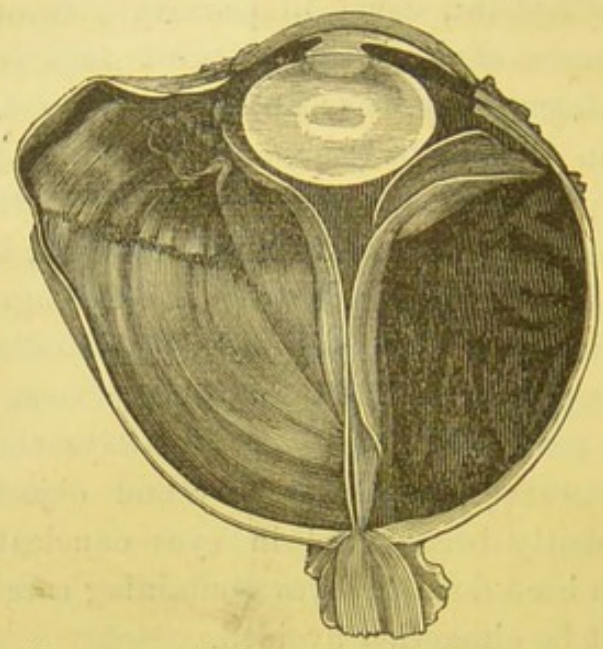

Fig. 4.—Melanotic sarcoma with large ciliary staphyloma away from growth.

ciliary staphyloma *above*. On enucleation, the lower half of the eye was found to be occupied by a melanotic sarcoma, and the staphyloma above was quite free of the growth; there was complete detachment of the retina (Fig. 4).

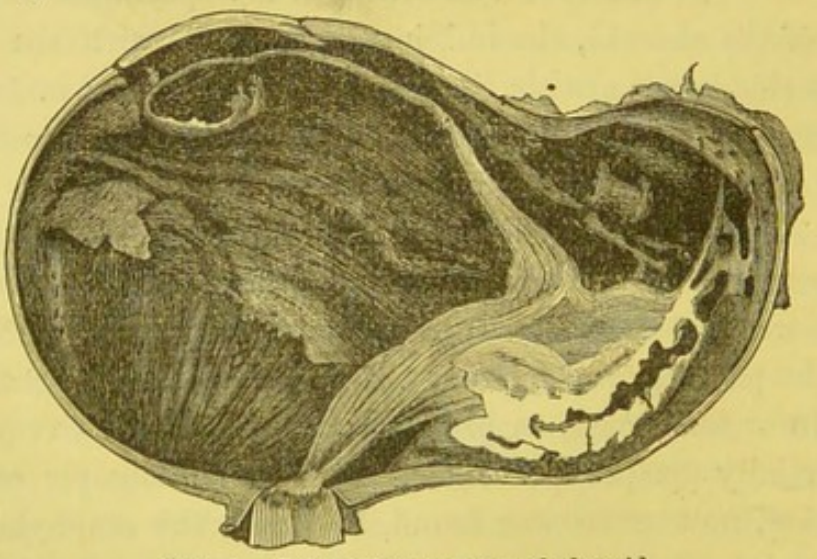

Fig. 5.—Tubercular tumour of choroid.

As another example of staphyloma, apart from sarcoma, let me mention the following very rare case of conglomerate tubercle of the choroid :—

Tubercular tumour of choroid.

Case 11.—W. Hindle (Dr. Glascott), aged 2 years. The left eye, which showed general conjunctival injection, was the site of a scleral staphyloma at the outer and lower part. This

had been present for one week, and followed an inflammation of six weeks' standing.

As the eye was certainly lost, and there was no reflex, and apparently no perception of light, the globe was removed. As seen in the specimen (Fig. 5, p. 16), the posterior half of the staphyloma is occupied by a non-vascular, grey exudation, breaking down in the centre, and apparently continuous with the sclerotic. The rest of the eye, with the anterior half of the staphyloma, is filled with stratified blood-clot, through which can be traced portions of the detached retina. Microscopic sections of the entire mass gave convincing proof of its tubercular nature, numerous well marked giant cells, with nuclei arranged round the periphery; surrounded by a fine network of fibrous tissue; caseating centres in abundance, and an absence of blood vessels. No examination was made for bacilli.

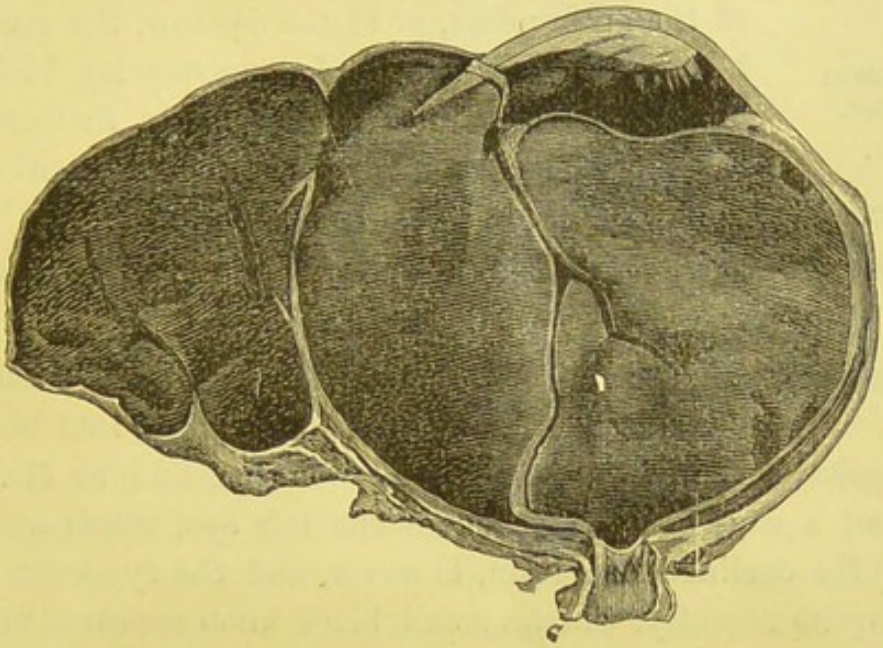

Fig. 6.—Melanotic sarcoma in third stage.

I have never seen with the ophthalmoscope a case of conglomerate tubercle of the choroid, but it appears from the observations of others that it might be mistaken for a non-pigmented choroidal sarcoma or a retinal glioma; the presence of inflammation and injection of the eye, and especially the early occurrence of a scleral staphyloma, would be useful in a differential diagnosis.

Rupture of capsule of eye.

The capsule of the eye seems to soften and melt away before tubercular growths, whereas in glioma, and especially in sarcoma, it is very resistent, in the latter only giving way after a period of at least twelve months, or even several years, and then apparently more by the mechanical effect of the increasing tension than by a process of disorganisation and softening. Fig. 6 is a fine example of this in a case of pigmented

sarcoma which has reached the third stage, the portion of growth outside the sclerotic being nearly as large as that within the eye.

The patient was a woman, aged 50, and at the time of the operation the tension was normal, the lens was opaque and calcareous, there was no anterior chamber, the iris was adherent at several points to the lens capsule; she had been seen by a competent observer six years before, who had diagnosed the condition as "old irido-choroiditis, with ciliary staphyloma."

It has been pointed out to me that this great power of resistance which the sclerotic possesses has an interesting parallel in the case of another fibrous structure, the large blood vessels of the limbs, which may often be seen on the operating table, running uninjured through a huge sarcomatous growth which has extensively involved the other tissues.

Epi-scleral nodules.

When epi-scleral nodules are present they occur near the entrance of the optic nerve, or at the equator, the path of exit being along the track of a perforating blood vessel, but as these nodules do not occur further forward, their presence is only recognised on excision of the globe, hence they cannot be used as aids to diagnosis.

Protracted cases.

The course of sarcoma is sometimes very protracted, as is well illustrated in the following case:—

Case 12.—Jeremiah Turner (Dr. Glascott), aged 48, stated, without being questioned, that he had been at this hospital seventeen years ago, and was then told by Mr. Windsor that he had a cancer at the back of the left eye, which ought to be removed. He declined operation, however, and the eye kept free from pain until quite recently, when a small black knob appeared through an aperture in the anterior part of the shrunken globe. Fig. 7 (p. 19) represents an antero-posterior section of the eye, and shows a melanotic sarcoma with a spicule of bone.

One frequently reads accounts of sarcoma occurring in lost and shrunken eyes, which are hence supposed to be especially liable to this affection, but I feel pretty sure that these have been really examples of sarcoma, causing phthisis bulbi, as in the above case. Such a case, with the correct explanation, is recorded by Guttmann (*Deut. med. Woch.*, 1888, No. 52), in which the growth had been present for thirty years.

Irido-dialysis.

Separation of the iris at its ciliary attachment often occurs in sarcoma of the ciliary body, from direct implication of the base of the iris, and is of great diagnostic importance in this condition. I am not aware that it ever takes place in sarcoma confined to the choroid proper, even when the tension

is very high, nor do I recall its occurrence in primary glaucoma; hence, I believe that simple increase of tension has no place in its production, and, further, the tension has been normal or sub-normal in the cases I have seen.

Simulating chronic iritis.

In very exceptional cases a sarcoma may come before us with the appearances of a simple chronic form of iritis or irido-cyclitis, with closure of the pupil and opacity of the media, unattended by increase of tension, pain, or injection of the eye. The following case, which I published in a paper on "The Prognosis of Choroidal Sarcoma," in the *Ophthalmic Review*, December, 1891, is the only example that has come under my observation:—

Case 13.—W. V., aged 60, consulted me on account of loss of

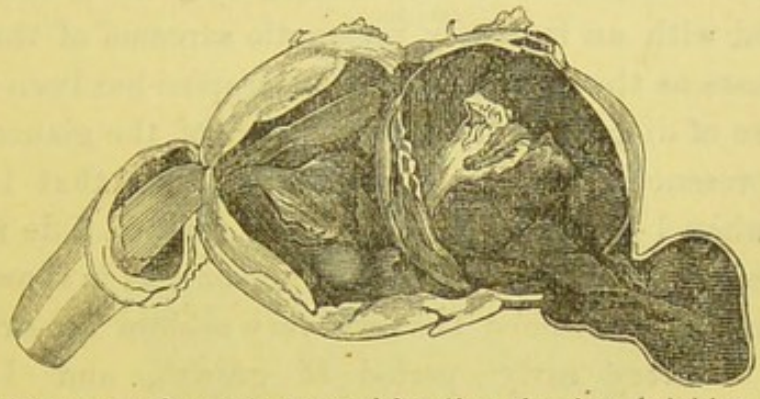

Fig 7.—Melanotic sarcoma of seventeen years' duration, showing shrinking and perforation of globe, and the presence of a bony spicule.

sight in the left eye, which had been failing for about eight months, and was unattended by pain or inflammation. There was no perception of light, the tension was normal, there was just a trace of injection of the eye, the pupil was of moderate size, but bound down to the lens capsule by several adhesions; the iris was somewhat degenerated, reddish-brown in colour, and bulging in places; the cornea and apparently the lens were transparent, but no reflex whatever could be obtained by the ophthalmoscope.

I had seen the patient seventeen months before for serous chemosis of the same eye, which got perfectly well in a few days by the use of warm lead lotion and freely snipping the ocular conjunctiva. He attributed the attack to catching cold while bathing in the sea shortly before, an explanation which seemed quite satisfactory, for, according to his own account, both eyes were at first affected—indeed the right was worse than the left—and further, he had had a "chalk stone" removed from his eye by a medical man.

I ordered him to use atropine, and see me again shortly, hoping that I should then be able to illuminate the eye, and arrive at a diagnosis.

I was called to see him three days later, and found the eye of stony

hardness, much injected, and excessively painful; the pupil was very slightly dilated, and, as before, no reflex was obtainable. The atropine was at once stopped, and eserine substituted; a hypodermic injection of morphia was given each night, and iced compresses, and afterwards hot fomentations were used. In spite of all these measures, the eye remained glaucomatous, and the pain did not in the least abate.

On thinking over the features of the case, it appeared to me untenable that a chronic and painless iritis could utterly destroy the sight without any shrinking, or even diminution, of tension of the globe; and on closely questioning the patient, it was ascertained that the dulness of sight began as an opaque black shade from *above* (not from the nasal side, as in glaucoma), which kept gradually extending in a downward direction, and I felt convinced from this that I had to deal with an intra-ocular growth. On section of the excised eye, we found it was more than half filled with an intensely melanotic sarcoma of the choroid.

In such cases as the above, the use of atropine has been recommended for the purpose of diagnosis, the supervention of the glaucomatous stage showing the presence of a growth; but I must say that I had no such idea in view when I ordered this agent, and further, I do not think this test is reliable, when iritic adhesions are present, as is shown in Case 8.

Early stage of sarcoma.

I have already mentioned that we very seldom see sarcoma in the very early period of growth, and I have often wished for such an opportunity. Well, I had a case of this nature under my care about a year ago, and utterly failed to diagnose it.

Case 14.—Sam. Done, aged 39, complained of dimness of the right eye for three weeks; the vision was $\frac{6}{36}$; the field of vision, by the hand test, showed that the movements of the hand were only seen in the centre; the eye was externally quite normal. A little above, and to the inner side of the entrance of the optic nerve, was seen a circular greyish-white patch about the size of the disc, over which could be seen coursing the retinal vessels; it seemed level with the choroid, and its edge was sharply defined. With the exception of some slight pigmentary disturbance in the immediate neighbourhood of the patch, there were no other ophthalmoscopic changes. I diagnosed choroido-retinitis, and ordered iodide of potassium in ten grain doses three times a day.

The case was examined from time to time for a period of one or two months, but no further changes took place, except that on one occasion I noted that the patch seemed slightly raised. At my request, Dr. Little, and I believe others of my colleagues, examined the eye, but they merely confirmed my opinion of the case.

Six months after the first visit, and some considerable period subsequent to my last ophthalmoscopic examination, we found that an

enormous separation of the retina had taken place, the detachment reaching right up to the disc all round, and being easily seen by oblique illumination; fingers could be counted with difficulty, and only at the centre of the field, the tension was diminished. With the object of curing the detachment, the sclerotic was tapped below, and after the escape of some clear straw-coloured fluid, one minim of tincture of iodine was injected. No inflammatory action of any moment took place, and the patient was discharged from the hospital with the eye in the same condition as before the operation. It was not till nearly two months after the tapping that acute iritis and increase of tension supervened, with severe pain and ciliary injection; the iris was discoloured, but the pupil was round and widely dilated with atropine there was bare perception of light.

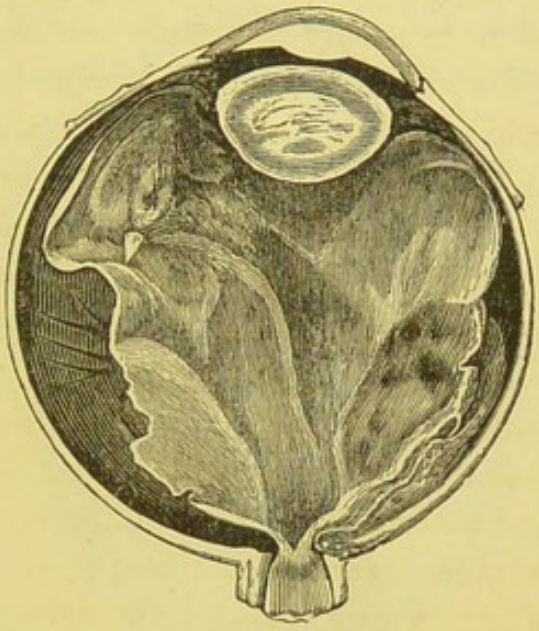

FIG. 8.—Unusual cake-like form of choroidal sarcoma, with overlying retina quite adherent.

The eye was excised four days later, and on being divided into an upper and lower half it was found that there was an enormous choroidal sarcoma, which filled the posterior half of the globe, and was for the most part moderately pigmented, but close to the sclerotic behind, and for a little distance forward, it had a grey colour.

On looking back on the features of the above case, I feel that my diagnosis of choroido-retinitis was perhaps excusable in the first instance, but that the non-appearance, after several weeks, of any atrophy of the choroid and pigmentation, ought to have shown me that the pathological changes were not of this nature. I will say that I thought it was in many respects a very strange case of choroido-retinitis, but its true nature never crossed my mind for an instant. This case shows, as well as a single example can, that the early stage of the affection is not accompanied by detachment of the retina.

The next case is recorded on account of the very unusual shape of the growth. It could not be seen ophthalmoscopically, but if it had, I think it very likely that the diagnosis would not have been correct. I am indebted to our house surgeon, Dr. Ramage, for notes of the condition of the eye before enucleation.

Unusual shape.

Case 15.—Betsy Fletcher (Dr. Little), 41 years of age. Left eye defective for nearly two years, painful and bloodshot about four months. Episcleral vessels injected, shallow anterior chamber, pupil semi-dilated and motionless, media hazy, details invisible, tension increased, bare perception of light. The diagnosis of intra-ocular growth was made, and the globe was enucleated. Fig. 8 (p. 21) represents the upper half of the eye, with a flat cake-like sarcoma reaching from the disc to the anterior

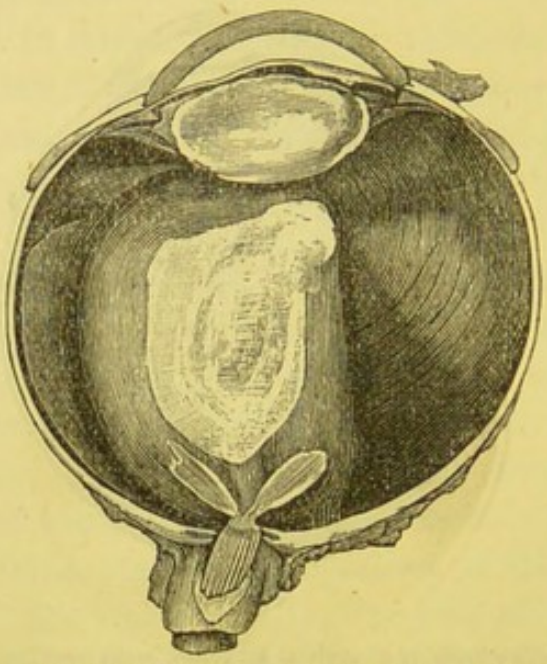

Fig. 9.—Leuco-sarcoma, free surface entirely invested by hexagonal pigment layer.

part of the choroid; its surface is only slightly raised above the level of the rest of the choroid, and the retina is closely applied to its entire surface, and so adherent that even in microscopic sections there was no separation. I have not seen another example of sarcoma with this unusual shape, but it appears that carcinoma of the choroid, which is exceedingly rare and, unlike sarcoma, is always secondary, takes this form.

I have only seen two specimens of leuco-sarcoma, the cut surface in one case being almost as white as this paper. The patient, a man, aged 32, came under my care with a large yellowish-brown tumour, at the upper part of the fundus of the left eye. The vision was reduced to fingers, the tension was slightly diminished. The pigment layer of the retina, the proliferation of which is the cause of the pigmented appearance of most sarcomas, was in this case (see Fig. 9) free from any such change, and

Leuco-sarcoma.

invested the entire free surface of the growth, so that it was only on slicing off a piece of the tumour that we became aware it was a leuco-sarcoma. The other specimen, of which Fig. 10 is a representation, was from a patient of Dr. Little's, whom I was afforded an opportunity of seeing, and, as in the other case, the ophthalmoscopic appearance was by no means so striking as the pathological preparation. I should imagine that an ophthalmoscopic diagnosis of leuco-sarcoma, in distinction to melanotic sarcoma, could only be made either when the pigment of the hexagonal pigment layer was absent, as in an albino, or where this layer had been broken through by the growth.

Cysticercus.

Cysticercus in the eye is very rare in this country, and when it occurs in the vitreous, before the onset of inflammation and opacity of the media, could hardly be mistaken for a growth. I have seen two well-marked examples—the first in Dr. Glascott's and the second in Dr. Little's practice. In each case one saw with the ophthalmoscope a very large spherical bluish-white cyst, and springing

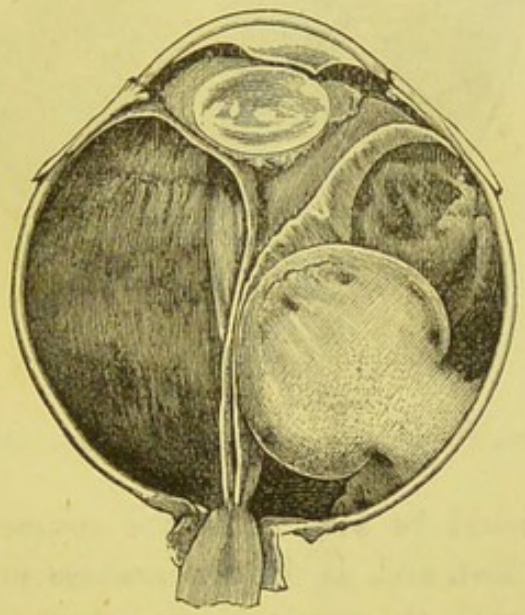

Fig. 10.—Leuco-sarcoma.

from this, the neck of the animal, like an alabaster pillar, surmounted by the head and suckers, which with its slow, regular, and graceful movements reminded one of an elephant's trunk, the whole appearances presenting a picture never to be forgotten.

I have never seen—at least, I have not recognised—a case of cysticercus in the earliest stage, while still under the retina, between this membrane and the choroid, but those who have frequent opportunities of seeing such cases, as in Berlin, say that its recognition is not difficult. I may say that I have a case at present under my charge which I believe may be of this nature, and which I shall publish later.

It is, however, in the later stages, when destructive inflammation has taken place from the presence of the entozoön, that errors of diagnosis

easily take place, and in Germany such a cause is always kept in view in the reports of doubtful cases of intra-ocular growth and irido-cyclitis, whereas in this country nine observers out of ten would never dream of such a thing. In an eye which was enucleated at this hospital for sarcoma, Mr. Roberts, who examined the eye, found a cysticercus. The case occurred in a healthy girl of 19, who complained of dimness of vision of the left eye for one week. The vision was reduced to $\frac{6}{36}$. One could see a large round bluish-white cotton-ball-like mass springing from the floor of the eye. The disc was invisible, but one or two patches of recent

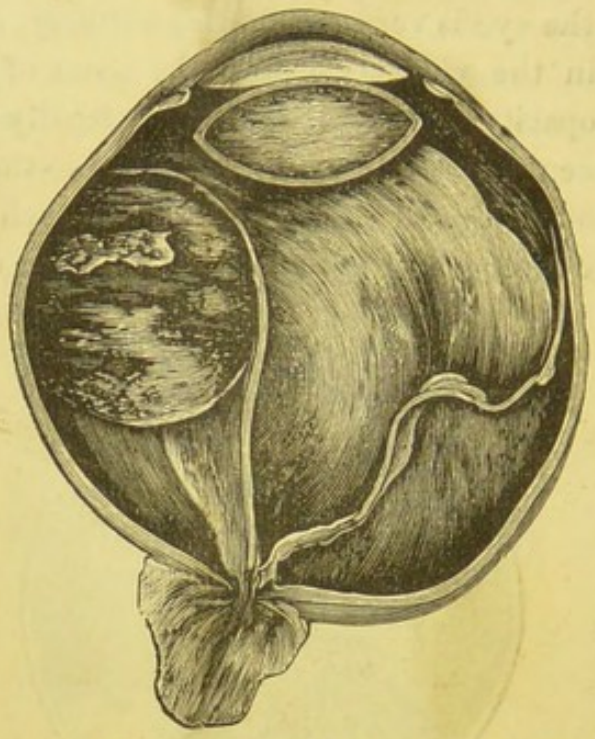

Fig. 11.—Melanotic sarcoma with retina adherent.

choroido-retinitis could be seen. In the course of a year the vision became practically lost, and, as the appearances suggested a tumour, the eye was removed, with the result above mentioned. Dr. Emrys-Jones had a somewhat similar case, in which the eye was removed and examined, and I believe that other cases have occurred at this hospital of late years, so I think that this disease is perhaps not so extremely rare in this country as the published cases would lead us to infer.

In concluding this paper, I would again thank my colleagues for the liberal manner in which they have allowed me to make use of their cases.

John Heywood, Excelsior Printing and Bookbinding Works, Manchester. [P 9,780