scleral trephine operation for glaucoma has late results which may develop even years after the operation.

Second—That rarely if ever should it be the operation of choice.

Third—That it should be tried where iridectomy has failed.

Fourth—Some reports in cases of buphthalmos would seem to warrant further trial in this condition.

MELANOBLASTOMAS OF THE EYE.

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Studies from the Laboratory of Pathology of the Ohio State University. Supplemented by clinical notes regarding the four cases reported; and reasons for preferring the term melanoblastoma to the more commonly used sarcoma of the uveal tract.

Tumors of the choroid may be either primary or secondary in origin. Primary growths are the more frequent and the large majority of these are composed of pigment producing cells.

The pigment bearing choroidal tumors are usually referred to as melanomas. In this region pigment-free tumors are sometimes observed which differ in no wise either in structure or clinical course from those which contain pigment. Such tumors have been collected by Schieck¹ under the term leucosarcoma. This would appear to be an unfortunate term, because it is used by Sternberg and others to designate those cases in which a definite tumor-like mass is developed in some organ or tissue; and is composed of lymphoid cells which seem to escape into the blood stream, giving rise to leukemic alterations of the blood. Ribbert designated both the pigmented and the pigment-free tumors of this group as *chromatophoromas*. Mallory adopted the more euphonious and equally comprehensive term of *melanoblastoma*. The use of a group name for all tumors composed of melanoblasts, or chromatophores, has the advantage of not placing any emphasis upon benign or malignant forms. This compels a more careful study and accurate evaluation of the individual tumor.

Marshall² in his collection of 134 cases of melanoma of the eye, found that the age ranged from 15 to

90 years with an average age incidence of 50 years. One eye, as a rule, is affected. The cases on record appear to be about equally divided between the left and the right eye. Injury is considered as an important etiologic factor by some authors. Marshall found a definite history of injury in about ten per cent of his series. Among the fifty-five eye specimens in the Museum of Pathology at the Ohio State University, there are four cases of melanoblastomas arising in the eye.

CASES.

Case I. *Clinical Notes:* A white woman, aged 30, consulted an ophthalmologist on October 8, 1914, because of pain and loss of vision in the right eye. Upon the appearance of a dark area on the upper surface of the globe of this eye about three years before, the vision of the patient began to decline. This area increased in size, bulged slightly, and was attended by an excruciating pain throughout the entire period. The patient recalled rather indefinitely having received an injury to the right frontal region. Ophthalmoscopic examination of the right eye revealed a normal fundus reflex. The details of the fundus were imperfect. There was a marked cupping of the disc. This was verified by the indirect method.

Removal was advised and the eye was enucleated October 9th, 1914, under ether anesthesia. The patient made an

uneventful recovery and left the hospital on the 15th of October. In June, 1916, the patient died with the symptoms of a generalized sarcomatosis. No autopsy, however, was permitted.

Pathologic Notes: Upon gross examination the eye is spherical and presents a diameter of 2.5 cm. The cornea is clear and apparently normal. On the upper surface of the eye extending from the sclero-corneal junction back to the equator and measuring 1.5 x 1 cm. is a blackish area. At the equator, this gradually blends into the sclera.

Upon section, the blackish area is revealed as the outer surface of a tumor mass occupying the ciliary body and the anterior portions of the choroid and sclera. The anterior one-third of the tumor mass does not contain pigment while the remainder is a dark brown.

Upon microscopic examination, sections from the side of the tumor present an iris which is decidedly shortened. The pigment coat has curved over onto the anterior surface of the iris in the process of shortening, forming in this way a fish hook figure. The muscle of the ciliary body is destroyed and replaced by tumor cells. The tumor cells are spindle shaped associated with a varying amount of pigment. In the tumor mass just posterior to the ciliary region, the tumor cells are so deeply pigmented that their nuclei are hidden and the outline of the cell is obscured. In the ciliary body, the tumor cells are spindle shaped and present but little pigment. The tumor begins at the equator and extending forward, at a point opposite the ciliary body it passes on either side of the sclera leaving it free from invasion. Over the outer surface of the sclera, the tumor mass extends for a distance of 2 mm.

To summarize, the tumor is a malignant melanoblastoma taking its origin in the choroid coat of the right eye. This tumor came to operation because of the pain associated with it.

Case II. *Clinical Notes:* A white man aged 34 years consulted his family physician about two years before his death because of a "bulging of the left eye." The physician made a dia-

gnosis of malignancy, and referred the case to an ophthalmologic surgeon who removed the eye. The patient made an uneventful recovery and remained well until May, 1916, when he noticed an enlargement of the abdomen and weakness upon exertion. He again consulted his physician and was referred to a general surgeon who viewed the case as hopeless and refused to operate. He grew rapidly worse and died on the 18th of July, 1916.

Pathologic Notes (abst.): The autopsy revealed a liver about twice its normal size. This enlargement was due to the presence of pigmented tumor nodules. Since the autopsy was complete and no other possible origin for the primary growth was found, it seems reasonable to conclude that the tumor of the eye was the primary growth, even though no pathologic study of that eye is available.

Microscopic examination of the liver reveals tumor nodules composed of cells varying in shape, size, and the amount of pigmentation. These cells are supported by a rather liberal amount of stroma. In some of the larger nodules, this is quite marked, so that nests of the tumor cells appear to be buried in a dense connective tissue, giving an alveolar arrangement to the tumor. Here the tumor cells tend to be spherical in shape and have only a small amount of pigment associated with them. In the smaller and more isolated nodules the tumor cells are of a spindle shape and have produced much more pigment.

To summarize, there is a melanoblastoma involving the liver. The eye had been removed on account of a tumor. Although we did not have the opportunity of studying the specimen from the eye, it seems certain that this tumor was the primary growth, since the autopsy eliminated other possible points of origin. This case is similar to that recorded by Adams³ and others. The liver is a favorite seat of metastases.

The following two cases have been in the museum for some years and lack

both histories and pathologic notes. The descriptions are made entirely from the specimens of one-half of each eye and from the celloidin blocks and microscopic sections. Both specimens have been cut to supply the teaching loan collection of the laboratory⁴ so that many microscopic sections are available for study.

Case III. The eye, after fixation, presents an antero-posterior diameter and a vertical diameter of 2 cm. each. The external examination reveals nothing worthy of note except the presence of a nodular ovoid swelling about 1 cm. in diameter and extending along the optic nerve for a distance of 1.5 cm.

The sectional view presents an apparently normal cornea. The aqueous chamber is filled with a mass of greyish material, which extends to and covers the anterior surface of the lens immeshing the iris and ciliary body. The lens is normal in appearance. The sclera is not remarkable. In the vitreous cavity on the one side, there is a mass similar in appearance to the one seen in the aqueous chamber. This extends from the ciliary body to slightly behind the equator. On the other side, the choroid coat is apparently thickened to 3 mm. This thickening extends around and across the fundus to within 1 cm. of the greyish mass on the opposite side.

Microscopic examination reveals the mass in the aqueous chamber to be a fibrinous exudation. The lens is not remarkable. The iris is composed of dense connective tissue and a few blood vessels and is decidedly shortened and thickened. The pigment layer has been drawn over the anterior portion of the iris. The posterior surface of the iris is intimately attached to the ciliary body and its processes by granulation tissue. This granulation tissue contains pigmented cells from the iris. The ciliary body is flattened against the sclerotic coat. The greyish mass in the vitreous cavity is also a fibrinous exudation. The retina has been dislocated by the exudation. The choroid is normal until the equator is reached, when it gradually broadens out into the tumor mass. This mass involves

the other coats of the eye in the region of the optic nerve. It passes into the optic nerve head and extends on inward forming the tumor nodule seen on the optic stalk. This tumor is composed of spindle shaped pigmented cells, supported by the tissue cells of the part. It presents the typical picture of an infiltrating sarcoma plus pigmentation.

To summarize, this is a typical specimen of melanoblastoma arising in the choroid and invading the optic nerve.

Case IV. Eye of a white male American. Clinical Diagnosis: Melanosarcoma of the eye.

Pathologic Notes: Since the eye presents nothing noteworthy, except the tumor, which is a small circumscribed nodule, the description will be confined to the tumor. It is a brownish mass, measuring (after fixation) 4 mm. in diameter. It appears to take its origin in and projects from the posterior portion of the ciliary body.

Microscopic examination shows that the posterior portion of the ciliary muscle has been displaced inward and forward. The ciliary processes and the iris are normal in structure, but are displaced forward so that the angle of the anterior chamber is acute but not obliterated. The tumor mass is circumscribed. It is covered by a thin layer of uveal pigmented cells and one of the cells of the pars ciliaris retinae. The tumor cells vary greatly in size and are round or polyhedral in shape. They all contain granules of brownish black pigment. Interspersed between the tumor cells is a scant network of the cells of the part. In certain of the sections, the pigmented cells of the tumor are continuous posteriorly with those of the choroid.

To summarize, this tumor is a small, fairly definitely circumscribed but not encapsulated melanoblastoma arising in the choroid coat.

Four specimens of malignant melanoblastomas arising in the choroid are here recorded. Most cases show a gradual loss of vision with the progressive involvement of the eye by the growing tumor. Fortunately these four speci-

mens illustrate in detail the four arbitrary stages of the disease mentioned by Adams³ and Alter,⁵ viz.:

1. Case 4 presents a comparatively small tumor which has not involved the eye to any great extent.

2. Case 1 presents a larger tumor coming to operation because of the pain.

3. Case 3 presents an excellent example of extraocular involvement in

which the tumors have grown into the optic stalk.

4. Case 2 is a study of the liver in an instance of melanosarcoma. These tumors frequently metastasize from the eye to the liver and to the lungs.

In conclusion the authors wish to acknowledge their indebtedness to Drs. C. F. Clark, Ivor G. Clark, Arthur M. Schaeffer, and H. R. Wright for the use of the material upon which this study is based.

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THE ROLE OF THE DUCTLESS GLANDS IN OPHTHALMOLOGY

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A general review of the subject with three illustrative cases. Read before the Third Colorado Ophthalmological Congress, August 10, 1917, with discussion.

That the eye is influenced by the secretion from the ductless glands we know; but just how, when or what changes are produced in each case, we do not always know so well. Likewise we know relatively little concerning the chemistry of the internal secretions, in spite of the fact that our knowledge of this subject has increased tremendously during the past decade. This subject should receive more consideration from ophthalmologists than it does, in order to classify the etiology, symptomatology, diagnosis, prognosis and treatment, even though we are dependent upon physiologists, physiologic chemists and other laboratory experts for our basic knowledge.

The literature of the past 10 years contains many valuable articles upon this subject and the author has reviewed many of these, especially those appearing in ophthalmic journals. Notable among these, during the past year,

are those by Lamb, Lissner, Schirmer and Zentmayer. However, to give all due place would make a book, even upon the hypophysis alone. It is needless to state that in the brief time allowed me such a discussion is impossible.

If we could be sure in any given case, from the eye symptoms alone, or even from the general symptoms, that we were dealing with hyper- or hyposcretion from this or that ductless gland, singly and unmodified by other glands, the problem would be greatly simplified. Fortunately or unfortunately, as the case may be, nature does not, as a rule, prescribe such an easy task, because overabundance of secretion from one gland is apt to be followed by the same condition in another gland as Lamb and others have mentioned. The result is stimulation of the sympathetic nervous system, especially in the incipient stage of hypersecretion from