Tuberculosis of the choroid : perforation of the sclera ; extension posteriorly with involvement of the optic nerve ; histological and bacteriological examination of the specimen / by G. E. de Schweinitz and E. A. Shumway.

Tuberculosis of the Choroid; Perforation of the Sclera; Extension Posteriorly with Involvement of the Optic Nerve; Histological and Bacteriological Examination of the Specimen : : : : : :

Paper read before the Ophthalmic Section of the College of Physicians of Philadelphia, Oct. 18, 1904.

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Reprinted from Ophthalmic Record, December, 1904.

1904.
PRESS OF AMERICAN MEDICAL ASSOCIATION

TUBERCULOSIS OF THE CHOROID; PERFORATION OF THE SCLERA; EXTENSION POSTERIORLY WITH INVOLVEMENT OF THE OPTIC NERVE: HISTOLOGICAL AND BACTERIOLOGICAL EXAMINATION OF THE SPECIMEN.

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The following case of extensive tuberculosis of the choroid has certain features of clinical and pathological interest which render it worthy of record.

Catherine H., colored, born January 8, 1900, was admitted to the Shelter for Colored Orphans of Philadelphia on February 4, 1902, and was examined in the Dispensary for Diseases of the Eye in the Hospital of the University of Pennsylvania on the 5th of April, 1904.

History.—For the history of the case we are indebted to Dr. William Evans, the physician in charge of the Shelter for Colored Orphans. The patient's father is living and well; the mother died of pneumonia; two sisters are residents of the Home and both are afflicted with tubercular glands. From the date of the patient's admission she was weak and complained much of headache, had a poor appetite and frequently vomited. About one year prior to her visit to the University Hospital it was noticed that the right eyeball was more prominent than the other. This prominence gradually increased until the condition presently to be described obtained. As the time wore on, the patient's general symptoms became more pronounced; emaciation increased, her joints, especially the knee joints, became swollen and painful, giving the impression of a tubercular process. She could not retain solid food.

Examination.—When seen at the University Hospital, the patient was exceedingly emaciated and the chains of glands on both sides of the neck were swollen and tender to the touch, but not superficially ulcerated. The knee joints were considerably enlarged, and a similar enlargement was evident in the elbow joints. There was distinct beading of the ribs. The head was slightly retracted, and the child not infrequently gave vent to a short,

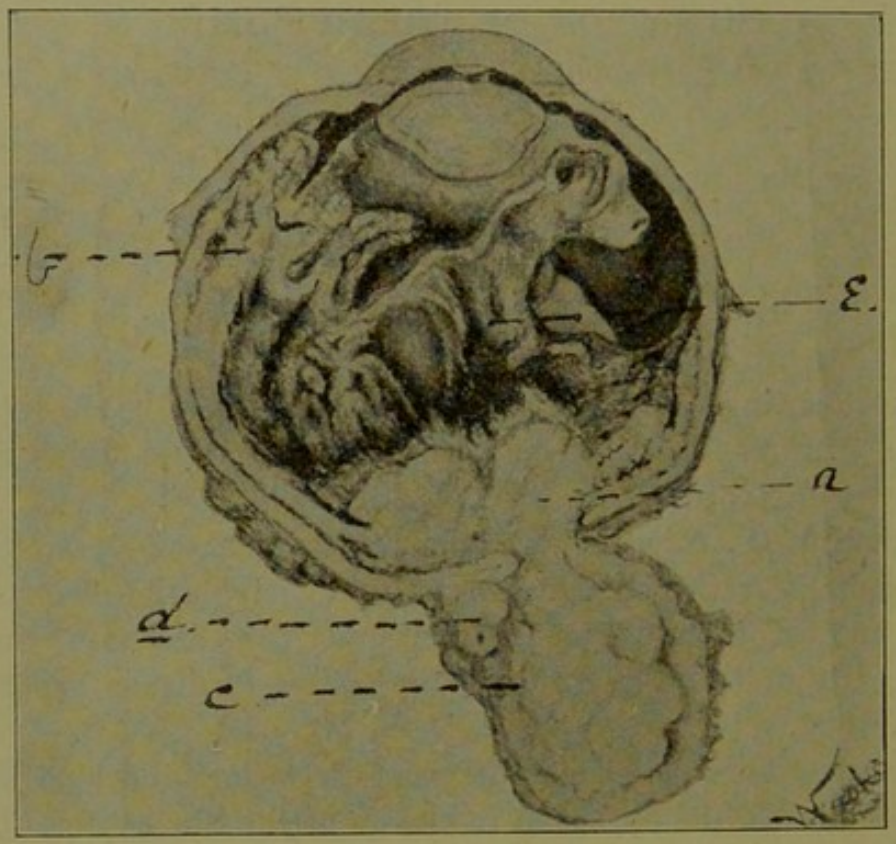

Fig. 1. a, tuberculous tumor-mass at posterior part of eye; b, site of the scleral perforation; c, greatly thickened optic nerve, replaced by the growth; d, small extrascleral nodule; e, blood-stained necrotic tissue.

sudden cry resembling the so-called hydrocephalic cry. There was slight fever, and, although the temperature was not taken in the dispensary, we understand that it did not rise above 102. The pulse was rapid and irregular, the respirations were not especially disturbed, and physical signs of tuberculosis in the lungs were wanting.

The right eyeball was decidedly proptosed, immobile and turned downward and outward, the surrounding conjunctiva swollen and

edematous, the iris discolored and adherent to the lens. The anterior chamber was practically obliterated. Within the pupil space a yellowish-white material was evident, probably in the vitreous chamber, not easily studied owing to opacity of the cornea and opacification of the lens. In the lower portion of the eyeball posterior to the ciliary zone there was a large nodule which bulged downward and outward, and which had perforated the sclera and which was covered with injected conjunctiva. The eye upon the opposite side was free from external disease, nor could any changes be detected with the ophthalmoscope, although this examination was somewhat difficult and unsatisfactory.

During the patient's residence in the Home all manner of treatment had been tried, and amongst other medication for a time full doses of anti-syphilitic remedies had been exhibited without benefit.

With this history in view, it seemed probable that the disease was tubercular, although the diagnosis of glioma was not positively excluded and was for a time entertained. A syphilitic process was eliminated by reason of the negative results from anti-syphilitic treatment.

Six weeks after the child's examination in the University Hospital, to which place she did not again return, she died with all the symptoms of intracranial involvement. Through the courtesy of Dr. Evans, the physician of the Home, the specimen which is here exhibited and which has been thoroughly examined with the results presently to be detailed was obtained, having been removed at our request by Dr. B. F. Baer, Jr. A general postmortem examination was not permitted.

PATHOLOGICAL REPORT.

The eyeball was removed at autopsy and by accident was placed in 10 per cent. formalin solution, in which it remained about ten minutes. It was then taken out, wrapped in gauze and brought to the Pepper Laboratory, where some of the material, removed through the opening in the eyeball by means of a sterilized platinum loop, was introduced into the anterior chamber of a rabbit's eye. The human eye was subsequently hardened in formalin and in ascending strengths of alcohol, and divided into halves by a

section which passed through the scleral perforation, the center of the cornea and the optic nerve.

Microscopically the eye showed a tumor mass in the position of the choroid, which was 4 mm. thick at the posterior pole, and extended well forward both above and below. It was non-pigmented, and presented in many respects the appearance of a glioma of the retina. The optic nerve was thickened to a diameter of 10 mm. and was evidently destroyed by the growth. The opening in the sclera noted in the clinical history was 3 mm. wide and located 3 mm. back of the attachment of the ciliary muscle; no trace of the retina could be found. The lens was pushed forward so that the iris was in contact with the cornea; the latter showed evidence of previous ulceration. (Fig. 1.)

Microscopical examination of the celloidin sections show the character of the tumor to be that of a conglomerate tubercle, which has had its origin in the choroid coat. Considerable portions of the tissue have undergone necrosis and contain no formed elements; in other places there are fragments of cell nuclei and granular detritus which stain with the hematoxylin, and great numbers of typical tubercular giant cells, with their nuclei arranged about the periphery of the cell bodies. At the margin of the tumor there are masses of round cells, which stain well and with them the usual epithelioid cells. All traces of the choroid coat have disappeared, with the exception of the pigment cells; the mass extends forward as far as the ora serrata below and to a point 3 mm. back of the ora above. In the center of the growth the blood vessels have been completely destroyed, while in the less necrotic portions they show thickening and hyalin degeneration of their walls, with obliteration of their lumens by the growth of the lining endothelial cells.

The sclera is invaded, and at the point of perforation its structure has disappeared, the lips of the opening being filled with necrotic tissue. Posteriorly a similar perforation has just taken place, and an extra-scleral nodule may be seen alongside the nerve.

The retina is detached and passes forward as a disorganized membrane from its attachment at the ora serrata to the posterior surface of the lens.

The optic nerve is enormously thickened, and replaced by a necrotic mass in which no nervous elements can be found.

The lens is cataractous, shows deposits of lime salts, and is pressed forward so that the iris is adherent to the cornea at the position of a healed perforating ulcer of the latter. There is a moderately severe plastic irido-cyclitis, and the iris is covered with a connective-tissue membrane which occludes the pupil.

A number of sections were stained and examined for tubercle bacilli, and a few typical organisms were found.

Four weeks after the inoculation the rabbit's eye showed distinct injection, and a number of grayish-white nodules appeared in the iris. The cornea became cloudy and staphylomatous, and the eye was enucleated one week later. Sections in celloidin show marked infiltration of the staphylomatous cornea and an intense irido-cyclitis. The round cells are massed in the form of nodules in the iris stroma and as an exudate on its surface. Stains with carbol fuchsin reveal the presence of myriads of tubercle bacilli throughout the iris, and thick masses of them in the nodules and in the exudate on the surface. The diagnosis, therefore, of conglomerate tubercle of the choroid is proved by the histological examination of the eyeball, and by the results of animal inoculation.

Remarks.—The number of cases of tuberculosis of the choroid, whether of the diffuse or conglomerate type, is still comparatively small, and there are questions of differential diagnosis, therefore, which still remain to be settled. The literature of the subject has been analyzed recently by Zur Nedden[1] and La Grange[2], so that it will be unnecessary to review it here. The conditions with which choroidal tuberculosis is most frequently confounded are glioma (neuro-epithelioma) of the retina in the young and sarcoma of the choroid in adults. As most of the cases occur in children, the differential diagnosis usually rests between it and glioma. Certain points of value in making this diagnosis have been determined and have been recorded by Dupuy-Dutemps[3] in a recent investigation of this subject, as follows:

1. Although conglomerate tubercle has been found almost constantly in young subjects, sometimes it appears in adults. In a

1. Klin. Monatsbl. f. Augenheilk., vol. xli, No. 2, 1903, p. 351.
2. Traité des Tumeurs de l'Oeil, Tome I, Paris, 1901.
3. Archiv. d'Ophthalmologie, vol. xxiv, 1904, p. 317.

case recorded by Manfredi and Cofler, the patient was 43 years old, and in one described by Posey before the American Ophthalmological Society, in July, 1904, the man was 49 years old. According to Zur Nedden, the age of patients suffering from tubercular tumors of the choroid has varied between 1½ and 62 years, although the age of childhood has furnished by far the greatest percentage. Between the ages of 6 and 20 years, however, the probabilities will be in favor of tuberculosis, as it is too late for glioma and too early for sarcoma.

2. The evolution of tuberculosis is generally more rapid than that of a tumor, and an ectasia of the sclera follows soon after the appearance of glaucomatous symptoms. Scleral perforation has been noted in from three weeks to four months in many cases, although the process is sometimes slower, and very exceptionally in adults the duration may be several years. Zur Nedden also considers the early involvement of the sclera with perforation a sign of first diagnostic importance.

3. The appearance of iritis is also a probable symptom of value, and the earlier it is found the greater is the likelihood of uveal tuberculosis, even if the iris does not show typical tubercular nodules. In the case of intraocular tumor, the inflammatory symptoms do not appear usually until a much later period.

4. Choroidal tuberculosis is very rarely primary, and other signs of tuberculosis will be found in the general system. Hence inquiry into the state of health of the individual, and his family history, together with very careful examination of the other organs of the body, are very important.

5. The test with tuberculin may be of value, although Dupuy-Dutemps does not place any great reliance upon it.

6. Finally, the inoculation into a rabbit's eye of the aqueous humor obtained from the patient by corneal puncture, although often negative in its results, especially in the early stages of intraocular tuberculosis, should not be omitted, as a positive result would make the diagnosis certain.

The case we have described fulfils in all important respects the requirements of diagnosis of tuberculosis of the choroid, and is chiefly interesting in the elaboration of the process, its extension posteriorly with involvement of the optic nerve, the early per-

foration of the sclera, the extra-scleral nodules which account for the proptosis and displacement of the eyeball downward and outward, and the positive results of the bacteriological examination of the specimens and the inoculation of the rabbit's eye.

Successful implantation of the products of tubercular disease of the choroid in animals' eyes has been reported, but apparently not frequently. Groenouw in his article on "Tuberculosis of the Choroid"[4] describes only three positive results. They were recorded by Hosch, Reissman and Proebsting.

4. Graefe-Saemisch Handbuch der gesamten Augenheilkunde, Zweite Auflage, Lieferung 81-83, 1904, p. 710.