

rived from the recurrent branches of the intact anterior ciliary arteries, and also from any posterior ciliary arteries which may have escaped section. The retinal arteries probably fill up first from the periphery, the blood trickling in the wrong direction from the already refilled veins."

Cases in which a histologic examination of the parts was made have been reported by Reis⁷ and Liebrecht,⁸ but their accounts throw little additional light upon the ophthalmoscopic appearances. The anatomic conditions of recent rupture of the choroid have been observed by Alt.⁹

In every serious injury to the vessels, thrombosis is a first step in the process of repair. In the vessels of the eyeball and orbit it rarely extends sufficiently to increase the damage done by trauma. In the majority of cases it helps to secure reestablishment of the circulation. But it may become a factor in extending the damage done within the eyeball, as has occasionally occurred in the orbit following injections of paraffin into the tissues, or injections in the region of the lacrimal sac. It might be well to consider this even in connection with operative trauma.

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UNRECOGNIZED CHRONIC SIMPLE GLAUCOMA.

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MINNEAPOLIS.

A report of cases showing the association of eye strain and noninflammatory glaucoma.

In a paper with the above title read by me at the Pittsburgh meeting of the American Academy of Ophthalmology and Oto-Laryngology in October, 1917, I presented clinical evidence in favor of the following propositions:

1. Simple glaucoma is the result of eye-strain as shown by the fact that women suffer more frequently than men, and that dressmakers and seamstresses suffer more frequently than other women.

2. The writings of Priestley Smith and Samuel D. Risley show by implication that the dividing line between myopia and simple glaucoma is largely an imaginary one, depending upon the greater or less degree of resistance of the fibrous envelope of the eye.

3. Intraocular tension is relative, and the tension that is sufficient to cause stretching of the fibrous coat of the eye is probably sufficient to cause damaging pressure at the same time upon the optic nervehead and upon the delicate structures of the ciliary region, and with a more resistant sclera the latter effects will be the more in evidence.

4. Numerous cases are constantly passing thru the hands of ophthalmologists as simple refraction cases, which present more or less of the following conditions: Engorgement of the episcleral vessels, unequal tension, subnormal sensibility of the cornea, shallow anterior chamber, paleness and concavity of the temporal disc, con-

traction of the visual fields, especially for colors, and enlargement of the blind spot of Mariotte.

The following cases have especially interested me as further evidence in that direction:

Case 1.—Dr. R., 70 years of age, consulted me in 1914 for an aural trouble. I had known him for many years and had noted in former years that his eyelids were congested. He once in the absence of his oculist asked me to prescribe for some acute condition of the lids. I found he was wearing sphericals for reading and suggested that he ask his oculist to give him a correction for his astigmatism, which was later done. In March, 1915, I noticed a slight dilatation of his pupils and suggested an examination of the eyes. He was wearing from his former oculist: R. and L., each $+0.75 \text{ C} +0.50 \text{ C. axis hor.}$ with a presbyopic correction. My findings were as follows: R. $+0.62 \text{ cy. ax. } 180^\circ = 20/15$. L. $+1.25 +0.87 \text{ cy. ax. } 177^\circ = 20/15$. The temporal discs were slightly cupped and the relatively enlarged veins in places obliterated by the crossing of the arteries. Tension seemed normal to the fingers. Either because of my remissness, or because the patient was a physician, the fields were not taken. In November, 1915, there was some discomfort in reading and a slight increase in the astigmatism. Corrected vision: R. 20/20 and L. 20/15.

On the 17th of January, 1916, tension seemed slightly plus. The tonometer registered 30 mm. of Hg. in each eye. There was marked contraction of both form and color fields, the former mostly inside fifty degrees. Under 1 per cent pilocarpin muriat t. i. d. one week later the tonometer registered 19 and 25 mm.

He returned in November, ten months later (for his ears). His astigmatism was slightly greater in the right and less in the left eye. He had long since discontinued the pilocarpin. Tonometer 20 mm. Vision good; but the fields markedly contracted, for white mostly inside thirty degrees. The pupils were slightly dilated. He

was urged to be faithful with the pilocarpin. In June, 1918, vision is normal, the form fields have returned nearly to the normal, tension was normal and both discs slightly concave, the right entirely and the left only the temporal half.

Case 2.—W. E. N., 62, (case of Dr. Charles Nelson Spratt) consulted Dr. S. on the 12th of December, 1917, complaining of steamy vision of R. No history of pain. V., R. $5/12 \text{ plus}$, $+1.25 = 5/6 \text{ plus}$. V., L. $5/12$, $+1.75 \text{ C} +.50 \text{ cy. axis, } 120^\circ$ V. $= 5/4$: R. cornea hazy, pupil dilated, disc not cupped, tonometer 43 mm. Hg. L. cornea clear, tonometer 17 mm. Hg. December 19, after use of miotic, R. cornea clear, tonometer 36 mm. December 26, tonometer 25 mm. January 16, V., R. $+1.25 = 5/5$, tonometer, both normal. March 11, V., R. $+1.25 = 5/7$. Tonometer 21 mm. April 8, V., R. $+1.25 = 5/200$. Tonometer 51 mm. April 9, Lagrange operation. April 22, eye white. April 29, V., R. $+6$. Cyl. axis $15^\circ = 5/30$. I had had the pleasure of seeing the entirely smooth operation, and on May 14, Dr. Spratt had the kindness to bring the man to my office. The operative result seemed ideal, a fine large bleb over the iridectomy, but vision was $= 5/200$, the swollen lens afforded no view of the fundus details, and the tension was 48 mm. Hg. I found a moderate temporal cupping of the left disc, and the same had probably been the case with the right.

Case 3.—M. A. S., 44, bookkeeper, came to me in 1910 with the complaint of misty vision especially of horizontal lines. V., R. and L., 20/20+. She had not worn glasses. Her quarter diopter of astigmatism was corrected, and 1 D. presbyopic correction added. There were also L. H. $1/2^\circ$, Exoph. 2° and abduction 9° . In 1914 2 D. presbyopic correction was given.

In January, 1918, she complained that vision had been bad for two months. She accepted an addition of a half diopter sphere to the distance correction, which gave V., R. 20/30, L. 20/30. A presbyopic correction of 2.50 D. The anterior chambers were

shallow, the irides dull, the pupils sluggish, temporal discs 2-3 D. concave, tension apparently normal, the fields for white contracted from ten to twenty degrees, for red mostly inside fifteen degrees. Each blind spot of Mariotte at 2 meters is 35 cm.

She was given a 1-24,000 solution of eserine sulphate for use four times daily. She has a moderate sized goiter and for the nervous symptoms was given 2 grains t. i. d. of hydrobromide of quinia.

On July 31, Miss S. complained of having more or less pain in her eyes.

20/15. I had not seen her again till Aug. 1 of this year, when she came with the complaint that she had foolishly looked for some moments at the solar eclipse of June 8 without a protecting glass, since which her vision had been bad. The dark spots of which she had complained had gradually disappeared but the eyes remained weak. No scotoma was demonstrated in either eye, vision with her glasses was 20/30, and could be only slightly improved by the addition of +0.12 cyl. The corneas were 12 mm. in diameter, subnormally sensitive, the anterior

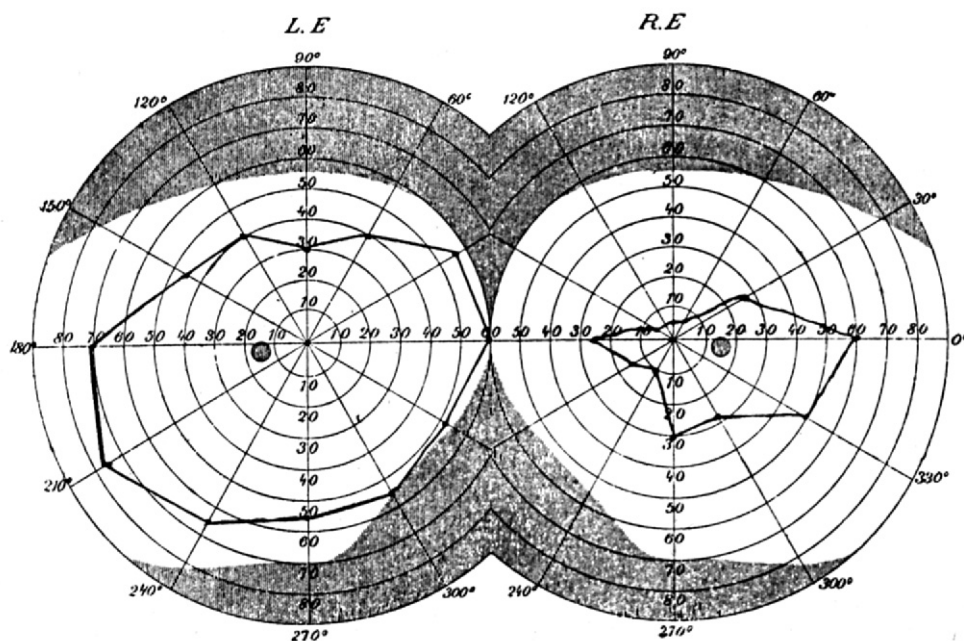


Fig. 1. Fields of vision in Case II, taken April 8th, 1918.

She accepted the following: R. +1.75 +0.25 c. 45°; L. +1.50 +0.25 cy. ax. 90° = 20/15. Evidently a cycloplegic should have been used years ago. I neglected to say that her exophoria at 13" is now 16°, an element of eye-strain of no small importance.

Case 4.—Miss E. B., 31, stenographer, wearing +0.75 cy. axis 90° from an optometrist, consulted me in 1910 for pain in her eyes. Under scopolamin the addition to her correction of plus 1.50 spheres gave vision of

chambers shallow, tension apparently normal, the temporal discs about 2 D. concave, the blind spots of Mariotte at 2 m. 27 cm.; and both form and color fields defective, especially the latter. Miss B. was given eserine sulphate solution 1-24,000, one drop to be used in each eye at bed time. The following morning she reported the eyes feeling better than for a long time, and the corrected vision of each eye was 20/15. The addition of +0.75 D. gave Jaeger 1 at from 10° to 18°.

Case 5.—A. B., 61, attorney, alcoholic and impecunious, came to me in 1905 with the complaint that for two years he had been inclined to miscalculate distances on going up or down stairs; and for a year and a half had noticed growing failure of the vision of the left eye. No pain or other symptoms. The eyes were large and prominent, the cornea 12 mm., anterior chambers rather deep, tension not noted, probably appeared normal. The right optic disc was slightly cupped in the temporal half, the left rather deeply in its whole extent, with undermined edges. V., R. 20/20, +0.50 cy. axis $90^\circ = 20/15$. The left eye could not count fingers. The right field for white was normal, the left field was limited to the temporal, outside fifteen degrees from the center.

Eight years later, in 1913, he returned for a change of lenses having had no treatment in the interval. Tension seemed slightly plus in both eyes. The left field was limited to a small paracentral area 30×20 degrees, the right form field still normal, color fields not taken. V., R. +0.75 C

+0.25 cy. axis $60^\circ = 20/15$. One year later a quarter diopter addition to the cylinder and a slight change of axis. Vision = 20/20.

In 1916 B. concluded to settle down to business and have the remaining eye cared for. In May the right field contracted from 20 to 30 degrees, the horizontal diameter of the blind spot 31 cm. at 2 meters. Tension clearly plus but no complaint of pain, tonometer 30 and 80 mm. of Hg. After a few days' use of a weak solution of eserine the tonometer registered 22 and 35 cm. Hg. In April, 1917, under the use of 1-12,000 solution of eserine, the pupils were slightly dilated and vision $-20/30$, tension plus and the field mostly inside of 40° , the defect on the 60th meridian reaching within five degrees of the center. The blind spot was 35×50 cm. at 2 meters. Under a 1-6,000 solution the eyes became softer, and in June the paracentral defect had disappeared and the field was concentrically about 35° . In August, 1918, corrected vision is = 20/20, fields and objective conditions much the same as one year ago.

NOTES, CASES, INSTRUMENTS

PARALYTIC STRABISMUS CURED BY SIMPLE OPER- ATIVE PROCEDURE.

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On February 10th, 1917, a baby of eleven months was brought to my office by the mother who was greatly perturbed by the prognosis of an eminent ophthalmologist regarding the sight of her child. This physician had informed her that the brain of the child had been damaged by a prenatal hemorrhage, that part of the face was palsied, and a great part of the sight of the remaining good eye had been destroyed.

The patient was a fat healthy baby, of grotesque appearance due to a con-

vergent strabismus of the left eye of nearly 45° . This ocular deviation had existed since birth. The child made no effort to turn the left eye toward the temple and when the right eye was turned nasally the left never moved past the median line. Dilation of the pupils with atropin 1 per cent, showed that the ocular media were clear. The disc of the right eye was apparently normal surrounded by an area of chorioidal atrophy. Above the disc was a coloboma of the choroid about the size of ten papillae. The left fundus seemed normal, with possibly a patch of pigment below the disc. As the ophthalmoscopic picture in eleven month babies is not very steady, a more careful study could not be made. The vision seemed good for each eye tested separately with small marbles.