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S. C. AYRES, M. D.,

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READ BEFORE THE

OHIO STATE MEDICAL SOCIETY,

JUNE 3D, 1879.

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I do not, on this occasion, propose to open the much discussed and still unsettled question of the pathology of Glaucoma, but shall merely aim to call your attention to the fact that the diagnosis of this treacherous and always dangerous disease is often overlooked entirely. This seems the more surprising, when we consider that its diagnostic symptoms are generally well marked, and its prominent characteristics recognized, even without the aid of the ophthalmoscope. True the inspection of the fundus oculi to detect the presence of retinal pulsations, confirms the diagnosis made from certain subjective and objective symptoms, yet it is also true that in many cases the ophthalmoscope is useless on account of the turbidity of the media. And this is unfortunately the case in the acute attacks of this disease. The cornea becomes so hazy, and the aqueous so turbid, that an inspection of the fundus is impossible, and we have to fall back on general symptoms. The specialist, skilled in the use of the ophthalmoscope, is no better off than the family physician who first sees the case, except that he interprets the symptoms aright, and is able to apply the correct remedy.

The more prominent symptoms of glaucoma are so masked by and confused with those of neuralgia, that un-

less he be on his guard, the physician is apt to be misled, and to overlook the true origin of the disease.

We recognize two kinds of glaucoma, acute and chronic inflammatory, with two sub-varieties under the former, glaucoma hemorrhagicum and glaucoma fulminans. As the two latter mentioned varieties are rare, we will confine ourselves to the two more common forms.

The dividing line between these two forms, the acute and chronic, is not always sharply drawn. The exacerbations which a person suffering from chronic glaucoma has, very much resemble the acute form, and the differential diagnosis must be left to the ophthalmoscope. But as practitioners in general are not yet sufficiently skilled in the diagnosis of intra-ocular diseases with the ophthalmoscope to recognize glaucoma, I propose to dwell particularly upon its objective and subjective symptoms. These are, in fact, in a great many cases, quite sufficient to confirm a diagnosis. They are distinct and characteristic, and if I can aid any of you, who are unacquainted with this disease, in making a differential diagnosis between glaucoma and neuralgia, or anything else that may resemble it, I shall have accomplished my task.

I have undertaken to write on this subject for the reason that my opportunities for observation have impressed upon my mind the fact that many of these cases are treated for neuralgia until the period for surgical interference has passed. They then come into the hands of the specialist, who finds himself helpless to relieve a patient who might have been relieved earlier.

In acute glaucoma, the prodromata frequently attract very little attention, particularly if only one eye is attacked and its fellow is sound. Persons have a dimness in one eye which passes off, in a few moments in some cases and in an hour or more in others, and they attribute it to headache or indigestion, or some other equally satisfactory cause. These attacks may or may not be accompanied by pain. If there is pain, and it is severe, it is treated as neuralgia, and apparently with success, for the exacerbation passes off and nothing more is thought of it until another attack comes on. There is a complete intermission of all the symptoms, which is one of the characteristics of acute glaucoma. If the eye were carefully examined, during an acute attack, it would be found that there was a

decided episcleral injection; that the pupil was more or less dilated, and to a degree fixed—not responding to the influence of light; that the cornea was hazy, and possibly somewhat anesthetic; the aqueous turbid; the tension of the ball increased; and that a halo was always noticed by the patient around the light. The ophthalmoscope would also reveal a pulsating central artery, if the media were clear enough to admit of an inspection of the fundus. Often, however, an acute attack is accompanied with intense ciliary neuralgia, with some febrile excitement and nausea, and great prostration, during which all the symptoms just described are greatly intensified.

In the more common—the chronic form of the disease, the attacks of dimness come on periodically, and the interval between the attacks becomes less and less, so that in time there are only remissions without distinct intermissions. The power of accommodation fails rapidly, and persons have to use stronger and stronger glasses. The anterior chamber becomes very shallow, a halo is seen constantly around a light, and the field of vision inwards becomes obscured. The cornea becomes anesthetic, and you may touch it with a piece of paper or a feather, without causing the slightest sensation. The intra-ocular tension now becomes very great, and the ball feels as hard as a marble; and as this tension increases, and the pupil dilates more and more, and becomes fixed, the vision gradually fades out and we finally have a picture of hopeless glaucoma consummatum.

In the confirmed cases there will be seen a corona of enlarged veins around the cornea which are so characteristic as to be almost diagnostic of the disease. Now is to be seen the true greenish glaucomatous reflex from the fundus which gave a name to the disease at a time when the interior of the eye was almost a *terra incognita*. Not unfrequently cataract develops as the sight is failing, and the patient is lulled into security by a promise of a successful extraction as soon as it shall have matured.

While glaucoma is universally acknowledged as a disease certain, in course of time, to be fatal to vision, it is also an established fact that in the hands of specialists generally the success of the operation has been very satisfactory in acute as well as chronic cases, where the process of atrophy was not far advanced.

In ordinary acute cases, (except the hemorrhagic form) the prospect for a favorable issue of an iridectomy is very good, but, of course, the result depends on the time at which it is made. If done early, before the glaucomatous tension has destroyed the integrity of the retina, we may look for a good result even although the sight is temporarily very much impaired. If delayed beyond a certain time we can promise but little. The necessity for an early recognition of the disease is apparent to all, as well as the necessity for the application of the only known remedy—an iridectomy. It makes but little difference to us how it does so. Volumes have been written on the subject, and the question of the pathology of glaucoma is still being discussed. Whether it is caused by sclerosis of the arteries or alterations in the secretory nerves, or in the obliteration of the spaces of Fontana, or in a serous exudation into the vitreous, we will not stop to discuss; we only urge the early recognition of the disease and the necessary surgical interference.

As a practical illustration of my subject, I have collected fifty-two cases, and will give you the figures in a very few words: Of this number, eleven, or twenty-one per cent., were hopelessly blind in both eyes when first seen. In most of them vision was reduced to *nil*. In some, glaucomatous cataract had developed, and they were patiently waiting for its maturity in hopes of a successful extraction.

In seventeen cases, or 32 per cent., there was found chronic glaucoma in one eye, its fellow remaining sound. Of these, five submitted to operation; three of which were successful and two unsuccessful. Persons suffering with glaucoma in one eye, the other remaining sound, are loth to submit to an operation on the affected eye. They seem to prefer to take their chances on the sound eye, not appreciating their danger.

Where chronic glaucoma existed in one eye, and acute in the other, two operations were successfully, and three unsuccessfully, made on the acutely affected eye. It is only fair to say that of the three unsuccessful ones, two were of the hemorrhagic variety.

Of all the cases in this series, only six, or 11 per cent., were seen in the acute stage, the other eye being at the same time healthy. Four of these submitted to iridectomy, and the operations were all successful.

We have, then, nine out of eleven cases of acute glaucoma, submitting to iridectomy, six of which are successful and three unsuccessful.

I will not give you, in detail, the results of all the cases, for I only wished to bring in contrast the cases of absolute and acute glaucoma. All of the former were, of course, beyond the reach of surgical aid, while two-thirds of the latter, which submitted to iridectomy, recovered good sight. This is a percentage in favor of the treatment which claims your earnest consideration. As good a percentage, if not better, of results could be obtained, if all acutely affected eyes could be iridectomized.

Eserine in Glaucoma.—Within the past two years, the use of eserine in glaucoma has attracted much attention. Experiments with varying results have been made in this country and Europe. The well known effect of this myotic in diminishing the intra-ocular tension, seemed at first to give promise of excellent results, but they have been only in part realized. It has relieved, and probably permanently cured, some cases of acute glaucoma; but its influence on the sub-acute and chronic forms is either negative or sometimes positively injurious.

Dr. Knapp, of New York, in the *Archives of Oph.*, vol. 7, reports one case out of his extensive experience where eserine was successful in curing acute glaucoma. His conclusions are that it temporarily relieves acute as well as chronic cases, but that in the latter it is at times undoubtedly detrimental.

I have taken the liberty to report a case where eserine was used, and to give in detail its influence upon the eyes:

J. W. F., aged 53 years, merchant, is a well developed, healthy, temperate man. He has led an active business life, but has never abused himself. His vision was always good until about a year ago, when his right eye began to fail. He had occasional attacks of dimness, accompanied with neuralgic pain, but paid but little attention to them, as the left eye was still good.

It was not until last September (1878), that he had any trouble in the left eye. Then he had an attack of so-called neuralgia (?) in both eyes, which lasted for several days. The pain was more severe in the right eye than the left. He says he was blind for about ten days, and then his vision began to clear up slowly. In course of time his

eyes so improved that he could attend to business, but he had occasional attacks of dimness attended with pain, and he observed his sight had lately grown much worse.

Status presens, January 16th, 1879.

Right eye; glaucoma chronicum, + 2T., pupil considerably dilated, v. = 15-100, and reads 5 Sn. with + 15. The lower margin of the cornea presents a punctuate or ground-glass appearance. The anterior chamber is very shallow. There is a strong retinal pulsation in the main trunks going upward and downward.

Left eye: the cornea is perfectly clear, the pupil is moderately dilated, and apparently more upward than in other directions, giving it an eccentric appearance. The anterior chamber is very shallow, and tension is + 1. There is a strong arterial pulsation similar to that of the right eye. V. = 15-40 and reads Sn. $3\frac{1}{2}$. At 11:10 A. M., a solution of eserine, gr. j. ad 3 ij., was instilled in each eye, and at 11:30 an ophthalmoscopic examination was made, which revealed the interesting fact that the pulsation in the left eye had ceased entirely, while that in the right eye remained unchanged.

The vision in the left eye increased to 15-30, and in the right eye remained as before. With Am. 42, axis 90° , v. = 15-20 l. e., and 15-70 almost r. e. He was also able to read Sn. $2\frac{1}{2}$ with left eye. The tension, by the ordinary finger test, was not diminished in either eye.

At 3:30 P. M., the vision was as above recorded, but the ocular tension was unmistakably diminished in both eyes, and the patient expressed himself relieved, and said he could see things around him more clearly.

Jan. 17th, 10 A. M.: vision was found to be the same as yesterday afternoon. There was no pulsation in the left eye, and tension was about normal, while that of the right eye was + 1.

Second instillation of eserine, at 11 A. M., v. = 15-20 l. e., and with Am. 60 axis 90° , v. = 15-50 r. e.

At three P. M. was seen again, when he stated that since the last examination this morning, he had had severe pain in the right eye, which was now subsiding, and that there had been decided dimness of vision, but that it was now clearing up. Vision in right eye = 15-200, but in left eye the same as this morning, with no increased tension.

Jan. 18th, 10 A. M.: v. = 15-100 r. e., and 15-40 l. e. There was no pulsation in the l. e., but that in the r. e. continued as usual. Eserine was now used for the third time, and in half an hour vision of the l. e. increased to 15-30, while the r. e. remained stationary.

At 3 P. M. he reported that since morning he had had violent pain in r. e., and it was found that vision was reduced to 5-200. The tension was greatly increased, and the pupil dilated *ad maximum*. Atropia was now used, and with marked benefit, for in half an hour the pain was much relieved.

Jan. 19th, 10 A. M.: v. = 15-100 r. e., and 15-40 l. e. Right eye free from pain, but the diffuse opacity of the cornea, noticed the first day, now extended over two-thirds of its surface. There was no pulsation in the l. e., and tension was about normal. No eserine used to-day.

Jan. 20th, 10 A. M.: v. = 15-200 r. e., and 15-40 l. e. Eserine has not been used for forty-eight hours in l. e., and pulsations have returned, but are not so strong as at first. Tension is perceptibly above normal. Eserine was now instilled into l. e. only and in thirty minutes pulsations had ceased, and vision had increased to 15-30. The right eye remained in *statu quo*. At 3 P. M. no change in either eye.

Jan. 21st: at 10 A. M., v. = 15-200 r. e., and 15-30 l. e. The cornea in r. e. is clearing, and no pulsation in l. e. At 3 P. M. same in both eyes. No eserine used to-day.

Jan. 22d, 10 A. M.: In the r. e. there is a diffuse haziness of the cornea, extending nearly over its entire surface, and the ball presents an angry, injected appearance. V. = 15-200 in r. e. In l. e. v. = 15-40; pupil considerably more dilated than yesterday, and tension is + 1. Pulsations are again visible in l. e., and patient states that his vision is sensibly diminished since yesterday. A drop of eserine was now instilled in each eye, and at 1 o'clock P. M., a double iridectomy upward was made. Operations made without accident, but incisions were very slow in healing.

Feb. 6th: First ophthalmoscopic examination since the operation. No pulsation in either eye; cornea of right eye quite clear, but there are several hemorrhages in the retina. V. equals 15-200 r. e., and 15-100 l. e., with Am 15, ang. 90°, v. = 15-100 r. e., and 15-50 l. e.

Feb. 14: tension normal in both eyes. Right eye does not improve in vision, owing to the retinal hemorrhages. In l. e., Am 14, ang. 90° , \ominus Ah 30, ang. 0° , v. = 20-20. Ordered same for l. e., and plane r. e. for distance. For reading ordered Ah 14, ang. 0° , \ominus + 36 s. l. e., and + 36 s. r. e.

In carefully considering the influence of eserine in this case, we may note the following interesting points:

In twenty minutes after its instillation, pulsation ceased in the left eye and vision increased from 15-40 to 15-30. Just how soon the ocular circulation was influenced cannot be stated, but it might have been definitely fixed had examinations been made every two or three minutes. It is also shown that the controlling influence of one instillation of eserine lasted twenty-four, but not so long as forty-eight hours.

Its influence on the tension was not immediately evident to the test by pressure with the fingers, but became so in the course of a few hours. The vision in both eyes was unquestionably improved, as the patient expressed himself relieved of that foggy or smoky appearance so characteristic of glaucoma, and the examination with test type gave the results above stated. Upon the right eye, its effects were at first favorable, in diminishing tension and increasing vision. The second time it was used, however, it caused a violent exacerbation of all the glaucomatous symptoms. The same effects, only in a more aggravated form, followed its third instillation.

In conclusion, I would say that from my experience I consider eserine a valuable agent to use in glaucoma, on account of its effects upon the intra-ocular tension. It undoubtedly has, in the great majority of cases, a favorable influence in the acute stages of the disease. It checks and controls it, so as to enable the patient to gain time for the operation of iridectomy. To the practitioner, then, who is unwilling to operate himself, it especially recommends itself.

I would, with equal earnestness, warn you against the use of atropine in acute or chronic glaucoma. Several cases of the development of acute glaucoma from a single instillation of atropine are on record. Its effects are directly the opposite of those of eserine. While one relieves the intra-ocular circulation, the other impedes it, and brings on those conditions so dangerous to the eye.



