NORTON (A.B.)

With the Compliments of the Author.

ACUTE GLAUCOMA

BY

A. B. NORTON, M. D.

Surgeon to the New York Ophthalmic Hospital; Professor of Ophthalmology and Secretary of the Faculty of the College of the New York Ophthalmic Hospital; Ophthalmic Surgeon to Protestant Half Orphan Asylum; Chairman of the Bureau of Ophthalmology and Otology American Institute of Homœopathy, etc.

READ BEFORE THE HOMŒOPATHIC MEDICAL SOCIETY OF THE STATE OF NEW YORK, OCTOBER, 1890.

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ACUTE GLAUCOMA.

BY A. B. NORTON, M.D., NEW YORK CITY.

[*Read at the Semi-Annual Meeting of the Homœopathic Medical Society of the State of New York, Brooklyn, October 1st*]

Glaucoma is "the expression of a disturbance of equilibrium between secretion and excretion, with increase in the contents of the eye, and increased tension."—*De Wecker.*

PATHOLOGY.

Different authorities attribute glaucoma to either one of the three following conditions or to them all combined, viz., 1st. A hypersecretion of the inflamed ciliary body. 2d. Impeded outflow caused by pressure of the enlarged ciliary body upon the periphery of the iris, or 3d. From impeded outflow from the vitreous chamber by enlargement of the lens. Owing to this diversity as to the initial cause, the pathological changes are imperfectly understood, but the following conditions have been sufficiently often noticed to be placed under this heading. An inflammation and enlargement of the ciliary body in the early stages which later becomes atrophied. The iris which at first is slightly inflamed, becomes as the disease advances adherent to the cornea, thus partially blocking up the flow of the aqueous to the canal of Schlemn, and finally the iris may become atrophied. The entire surroundings of Schlemn's canal are infiltrated with cells. The optic nerve is at first somewhat inflamed, while in the advanced stages the nerve fibres are shrunken with hypertrophy of the intervening connective tissue, together with hypertrophy of the pial sheath of the optic nerve and the lamina cribrosa. The choroid and retina become atrophied in the later stages from pressure. The retinal vessels become degenerated and the walls of the arteries thickened. The vitreous shows externally an increase of consistence, and internally liquefaction.

SYMPTOMATOLOGY.

In about one-half of all cases of glaucoma, careful inquiry will elicit the history of prodromal symptoms, recurring at longer or shorter intervals for a period sometimes extending over months

or years, and seeming to result from mental or physical fatigue. These premonitory symptoms consist of increased tension, premature recession of the near point (a higher degree of presbyopia than the age of the patient would indicate), the appearance of haloes around a light and periodic dimness of vision, while in some cases the pupil may be dilated and sluggish, the field of vision contracted and the retina hyperæmic.

These prodromal symptoms may occur from time to time, the intervals between the attacks becoming shorter and shorter, until suddenly an attack of severe pain will usher in the onset of acute glaucoma. This is apt to occur at night and is often the result of some sudden excitement or great grief. An examination will reveal a part or all of the following symptoms. The lids somewhat swollen may be œdematous. The conjunctiva reddened, possibly chemosed; scleral vessels injected and enlarged, eyeball protruded, lachrymation, photophobia. Cornea hazy, and may have lost its sensitiveness to touch. Iris discolored, pupils dilated and inactive, greenish reflex from the pupil. Aqueous, cloudy. Anterior chamber shallow. Vision impaired. Eyeball hard. Field of vision contracted. An ophthalmoscopic examination will be difficult to make on account of the haziness and generally inflamed condition of the eye, but should show a pulsation of the retinal arteries, which are diminished in caliber, while the veins are large and full; excavation of the optic disc, and there may be extravasation of blood.

An analysis of the chief symptoms of glaucoma proves instructive as well as interesting, and hence is detailed. One of the first symptoms is the diminution of the range of accommodation, and although glaucoma is a disease especially found in elderly people in whom we would naturally have presbyopia, still it is much greater than should exist at that time of life, and is due to the increased pressure causing greater tension upon the choroid and suspensory ligment of the lens, thereby keeping the lens flatter.

The halo around light appears like a rainbow with the colors of the solar spectrum, the usual arrangement being with the violet end inwards and separated from the light by a non-luminous space, with the red end of the spectrum outwards. This arrangement is probably due to the refraction, because this is the arrangement in hyperopic eyes and is reversed in myopia, (the majority of cases of glaucoma occur in hyperopic eyes.) Priestly Smith considers the iridescent vision to be due to an exaggeration of the latent physiological chromatic aberration of the eye, while Donders considers it due to a diffraction of the rays entering the eye, owing to the opacity of the cornea. The halo seen is always circular in shape, and its size, and breadth of each colored ring increases the further the light is from the eye.

The increased tension is best determined by palpation with the index fingers of both hands applied to the upper lid of the closed eye, when the eye is turned downwards. It is customary to determine three grades in the variation of the tension, either above or below normal, and are designated by the signs T+ or — 1, 2, 3. A marked increase in the hardness of the eye is noted as T+1, a greater increase but still admitting of some dimpling of the eyeball is noted as T+2, but an eye that admits of little or no impression is noted as T+3. This system of notation, while but relative and varying with different examiners is sufficiently accurate for all practical purposes, as the difference in the degree of hardness is of less importance than the demonstration of the fact that hardness exists. Instruments called tonometers have been devised for measuring the tension, but experience shows that no more delicate information can be obtained from their use than by the *tactus eruditus* of the skilled surgeon. To determine the tension when but one eye is affected, it should always be compared with its fellow. The normal tension of the eye is noted as Tn; this is apt to vary under certain conditions; a large eye is apt to yield more than a small one; the elasticity of the sclera may be increased or diminished by disease, and is more elastic in youth than in old age, and hence the tension would be greater than in an old person. The palpation should always be made when the eye is turned downwards, as it varies when made over the cornea from that made over the sclerotic.

The haziness of the cornea is peculiar in that it is quite uniform and most intense towards the centre of the cornea. The seat of the opacity is the parenchyma of the cornea, with some dotted appearances of the surfaces; the opacity soon disappears upon the return of the tension to the normal. The cause of the opacity seems to be, according to the investigation of Fuchs, an œdema of the cornea which takes place through the nerve channels. Others have attributed the haziness to a disturbance of the nutrition of the cornea brought about by the pressure, and still others claim it is due to a compression of the cell elements of the cornea, and thereby changing their relations.

Anæsthesia of the cornea is usually present in chronic cases and may be found to a greater or less degree in acute cases; this is due to a paralysis of the corneal nerve fibres resulting from the distention and pressure upon them by the increased amount of fluid in the nerve channels and the infiltration around the same.

Dilatation of the pupil together with inactivity is usually present. The dilatation is not always circular, and when of an oval shape is believed to be due to a greater amount of adhesion of

the iris to the sclera at that point. There are several theories as to the cause of the dilatation, none of which have been satisfactorily demonstrated as yet, it is most probable, however, a result of some vascular constriction of the vessels of the iris. The greenish reflex from the pupil is dependent upon the haziness of the cornea and aqueous humor, combined with the physiological haziness of the lens.

The shallowness of the anterior chamber is due to the increased pressure from the vitreous pushing forward the iris and lens.

The haziness of the humors is a very slight, diffuse haziness, and is due to an increased amount of fluid in the eye.

Dilatation of the anterior ciliary veins is the result of compression of the venæ vorticosæ causing a damming up of the blood, which then has to pass off through the anterior ciliary veins.

Enlargement of the anterior ciliary arteries is due to an impeded entrance of blood.

Pulsation of retinal veins is a phenomenon occasionally found and is not a true pulsation, as the arterial wave cannot be transmitted through the capillaries, but is due to the external pressure upon the veins produced by the incoming arterial wave and transmitted to the vein through the vitreous humor. It also may be occasionally noticed in a normal eye when an artery crosses over a vein and the pulsation is then sent direct to the vein.

Pulsation of the arteries of the optic disc. The physiological pulsation of the retinal arteries is so slight that it is not recognizable except in extremely rare instances, but it may often be produced in the normal eye by pressure on the globe with the fingers. In glaucoma, the increased tension causes a stoppage of the blood at the optic disc, and extra force is required to push it forward into the retina, which is done by the next systole of the heart. This pulsation disappears after an iridectomy is performed. The pain of glaucoma may be very slight or it may be the most intense ciliary neuralgia, and is due to pressure upon the ciliary nerves.

Contraction of the field of vision, is one of the most characteristic signs of glaucoma. The contraction is first seen at the inner (or nasal) and later at the lower, then the upper, and lastly at the outer side of the field; thus showing that the temporal side of the retina, then the upper and lower are first affected, and is probably due to the fact that there is less blood and nerve supply to the temporal than to the nasal side of the retina, and in consequence the result of increased pressure would be first noticed at the temporal side. It has also been shown by

Leber that the periphery of the retina receives its nerve supply from the centre of the optic disc, and as it is these central fibres that are first and mostly affected by the excavation of the disc, the contraction of the field may be the result of the excavation.

Excavation of the optic disc. The cupping of the optic disc in glaucoma involves the whole of the nerve, is very abrupt at the edge, the vessels are lost sight of as they pass over it and the nerve has a greenish appearance. It is due to the increased pressure upon the lamina cribrosa, which gives way, is pushed backwards, and finally passes into an atrophic condition.

ÆTIOLOGY.

Glaucoma averages about one per cent. of all eye cases. Its frequency varies somewhat in different countries, and the sex seems to cause little or no difference. It is especially a disease of advanced life and is *very* rarely found under the age of forty. Usually affects both eyes although rulably one eye is further advanced than the other. Chronic glaucoma is more frequently met with than acute, the proportion being about three to one. Heredity seems to have some influence. Hyperopia is found to exist in about 50 to 75 per cent. of the cases, and is considered by some to act as a cause of glaucoma owing to the excessive thickness and prominence of the ciliary muscle in hyperops, and also to the shallowness of the anterior chamber, owing to the more anterior position of the iris and lens in hyperops. Trigeminal neuralgia is in some cases a precursor of glaucoma and is also considered as an exciting cause, as in animals, irritation of the fifth nerve will induce a temporary increase of the intraocular pressure. Irritation of the fifth nerve from decayed teeth will cause glaucoma in some cases. Convulsions, hysteria, anxiety, excitement, grief and mental depression have been recorded as causing glaucoma. Gout may predispose to it. Climatric changes and other disorders causing a vascular turgesence may cause, as intoxication, indigestion, strain of the eyes, sleeplessness, fever, etc. Atropine has often been the cause.

COURSE.

Acute glaucoma is as a rule extremely sudden in its onset and will often run its course to complete blindness in a few days and sometimes in a few hours; occasionally a case will be met with in which the disease has been very slow in its attack, and in these there has been usually no pain or inflammatory symptoms directing attention to the eye, so that careless people will often allow of an almost total destruction of sight before seeking a physician.

PROGNOSIS,

depends upon the time it has existed before coming under treatment; if seen within a few hours after its onset the use of eserine and our homœopathic remedies will often cut short an attack and vision be restored, but even in any stage treatment either medicinal or operative should be expected to save the existing vision with more or less improvement.

DIAGNOSIS.

Acute glaucoma should present no especial difficulty in its recognition, as its symptoms are so characteristic that they should be appreciated by any careful observer. When you find an inflamed eye with dilated pupil, intense ciliary neuralgia, haziness of the cornea, rapid loss of vision, etc., your attention should at once be directed to the tension and glaucoma be suspected. In glaucoma simplex, where there is no inflammation, pain, etc., it may be confused with atrophy of the optic nerve, but the duration, tension, excavation of the disc, etc., will at once clear up the diagnosis.

TREATMENT.

This should vary according to the stage of the disease; taken in the premonitory stage where the patient suffers from only occasional attacks of temporary blindness, pain, etc., while in the interval the vision is good, we may look for benefit from the use of remedies. The only local remedy to be considered is either the sulphate or salycylate of eserine, which is usually employed in the strength of a half per cent. solution and may be instilled into the eye as often as every hour or even oftener, and should in itself speedily cut short an attack. Even in some cases of acute glaucoma, if used early and often, the necessity of an operation may be postponed, if not permanently avoided. In all cases the use of eserine should be early, *very early*, hence we believe it best in cases once having had a premonitory attack, that the patient should be supplied with the eserine with directions as to its use that no time should be lost. The action of the eserine is by causing contraction of the iris, it is drawn away from the iritic angle and the filtration passages opened, it also by constriction of the vascular system of the eye diminishes secretion.

IRIDECTOMY.

The introduction of this operation for the relief of glaucoma was empirically made by von Graefe, in 1857, and is still *the* operation for this disease. Iridectomy has been the means of

saving useful vision in thousands of patients who would otherwise have been hopelessly blind. While iridectomy is the most valuable remedial agency extant for this disease, still it is not infallible, as in some cases or forms of glaucoma even this operation will not check the disease. In operating, the previous use of eserine is advisable, as it renders less liable accidents from sudden relief of the tension, and it has also been advised by Arlt and others, that it be used in the sound eye as well, for the mental anxiety caused from the dread of an operation has been considered not infrequently to have been the cause of an attack in the good eye. Ether should, as a rule, be used in this operation, as thorough anæsthesia cannot be obtained from cocaine in a glaucomatous eye. The incision should be made entirely in the sclera, the iridectomy large, and care taken that the escape of the aqueous be very gradual, and that no remnants of the iris remain in the wound.

Sclerotomy has been strongly advocated by DeWecker, but it has not seemed to have met with the hearty support of the other authorities. In certain cases, especially the hæmorrhagic form of glaucoma, sclerotomy may with advantage take the place of iridectomy. The writer has had the best of results from this operation in a few instances. Other operative procedures have been suggested for the relief of glaucoma, but thus far have not proved worthy of notice.

REMEDIES.

The results from the use of internal remedies in glaucoma seem to me somewhat problematical, chiefly because the reports of cases cured by remedies alone, seem sufficiently unreliable to warrant a question as to the diagnosis. In the majority of cases recorded, where no operation was made, the local use of eserine was employed as well as the remedy, and in consequence it is unscientific to give the credit to the remedy alone.

Aconite may be of service at the commencement of an acute attack when we have much heat, redness and burning pain in the eye, together with fever and other symptoms of the drug generally.

Belladonna may occasionally be indicated in severe throbbing pains aggravated by noise and light, together with the flushed face, etc.

Bryonia is a remedy to which much credit is given. The eyes feel full. Sharp shooting pains through the eye and head. Eyes sore to touch and on moving them. Halo around the light.

Cedron may relieve a severe shooting pain over the eye.

Colocynth has a severe cutting pain in and around the eye which is relieved by pressure.

Gelsemium is one of our principle remedeis in this disease and is perhaps more frequently used than any other, and yet there seems to be no especial characteristic symptoms upon which it is given, hence we come to the conclusion that its use has depended upon the fact that clinically it has proven its value, as many favorable results are recorded from its use.

Nux vom. has been used more in the later stages of the disease when atrophy of the nerve is present, the morning aggravations, and the other symptoms of nux.

Osmium is a remedy that has proven of value in the hands of some, and from its symptoms should be given a more thorough trial. It has sudden, sharp, severe pains in and around the eye. Dimness of vision, objects seem in a fog. Halo of various colors around a light.

Phosphorous is useful after an iridectomy and in some cases is of value early. Halo around light. Objects appear red.

Prunus spinosa has a very severe pain in the eye as though it were being pressed asunder, sharp, shooting pain in the eye and side of head.

Rhododendrum has severe periodic pains in the eye aggravated before a storm.

Spigelia will also often relieve the sharp, shooting pains in the eyes and head of glaucoma. The pains are worse on motion and at night. Among other remedies we would note apis, eserine, merc. and thuya.

CASE. 1. Mrs. B——, aged fifty-six years, came to me Oct. 10, 1885, to have her eyes examined for glasses, stating that for three or four months had noticed that she could not see as well with her glasses as formerly. Examination gave O. D. V= $\frac{1}{3}\frac{5}{8}$+1. D. V=$\frac{1}{2}\frac{5}{0}$. O. S. V=$\frac{1}{3}\frac{5}{8}$. dif.+1. D. V=$\frac{1}{2}\frac{5}{0}$ slight difficulty. Has been wearing +3. 25D. for near vision, but now requires +4. 50D. States that she has suffered from more or less headaches of late, with occasionally neuralgic pains around the eyes. Says that at times vision seems to be very much poorer than usual for a day or two, and at these times cannot see to use the eyes at all. In answer to the question, says that she has noticed colors, especially red, around the light at times, but had supposed it was due to biliousness or something of that kind and had paid no attention to it. Has had sickness in the family for the last six months causing her a great deal of physical fatigue as well as worry. Had been in the habit of reading aloud for hours at a time. Ophthalmoscopic examination reveals a slight dilatation of the retinal veins, arteries normal. The slightest pressure on the eyeball produces a pulsation of the retinal arteries. The pupil slightly dilated and T+1 ?. The diagnosis was made of prodromal glaucoma. The patient

forbidden all use of the eyes, was advised to get as much rest as possible, combined with moderate exercise in the fresh air, and placed upon a nutritious diet. Eserine sulphate one-half per cent. solution, was prescribed to be instilled into each eye every two hours and gelsemium given.

Oct. 14th. Reported as feeling better in every way. Vision was found to be $\frac{1}{5}^{0}_{5}$ dif. with +1D. O. U. Pupil contracted. Tn. Headache and pain is better yet has still seen the red color around the light at times. The eserine was ordered to be instilled but twice a day and the remedy continued.

Oct. 24th. Still improving, none of the colored vision since the last date, and other symptoms disappeared. Tn. Eserine to be used once a day and the remedy repeated.

Nov. 20th. Seems to have been all right since the last date, and can now read as well as ever, she thinks, with her old glasses, but +3. 75D. are clearer and easier for near vision and were ordered for her. Distant vision the same as Oct. 14th. Patient was discharged at this date without further treatment, except that a solution of eserine was given her with directions to use it upon the return of any of her symptoms and to report at once.

Jan. 8, 1886. Mrs. B. returned with the report that she seemed to have been all right until four days ago, at which time the death of her daughter was followed by a return of the halo, dimness of vision and very severe pain in the eye which was inflamed. The eserine was at once used with a relief of her symptoms, and now beyond a slight irritable condition of the eye with an occasional ill-defined halo and some headache, seems to be all right. She was seen a few times after this until wholly recovered, and since which time has had no recurrence of the symptoms. In this case, I believe had it not been for the use of the eserine together with the remedy, that this lady would have continued to have these premonitory attacks, until the sudden grief from the loss of her daughter would have resulted in an onset of acute glaucoma with probably more or less destruction of sight.

Case II. Mrs. W., aged seventy years, was first seen on July 31st, of the present year, when she gave the following history. Four days ago she began to have very severe pain in the eyes and extending into the top of the head, with poor sight in the right eye. Could ascertain no prodromal history. Says the attack seemed to have come on suddenly one night. Has one daughter that had glaucoma in both eyes a few years ago and was relieved by an iridectomy. Has been under a severe physical and mental strain, caused by serious sickness in her family, which a few days later resulted fatally. Examination gave O. D.

V= fingers at eight feet with +14. glass V=$\frac{15}{10}$ O. S. V=$\frac{15}{20}$ +14. V=$\frac{5}{10}$ dif. Pupil dilated, cornea hazy. T+2. Conjunctiva congested, lachrymation. Ophthalmoscopic examination could not be made on account of the haziness of the cornea. Diagnosis of acute glaucoma was made and an iridectomy to be made at once was advised. In the mean time eserine sulphate half per cent. solution was to be instilled into the eye every hour and gelsemium given internally. The eye the following day was about the same, but vision was reduced to the counting of fingers at seven feet. An iridectomy was then made under cocaine, with no pain from the operation. This patient made a very quick recovery, and on August 15th, two weeks after the iridectomy, all inflammatory symptoms had subsided and the eye was apparently as well as ever, with a vision of $\frac{5}{10}$+14, V=$\frac{5}{40}$ and two letters of $\frac{5}{30}$.

These two cases are merely detailed as illustrating the most favorable results that may be expected from the treatment of cases of acute glaucoma when taken early, and not as displaying any especial skill in the treatment or brilliancy of operation. In all cases of glaucoma it may be considered as favorable results to prevent further loss of vision, than that which exists when the patient first comes under treatment. My records, like those of all oculists, will show many other favorable cases where the disease has been checked and vision improved, but not to such an extent as in these, because not seen as early. In the first case the operation was avoided because the disease was simply in the prodromal stage when first seen, and the treatment undoubtedly prevented an attack of acute glaucoma. The result in that case we believe may be considered as extremely favorable, and yet probably no more so than should be had in any similar case, *i. e.*, seen at the same early period.

In the second case the condition had progressed to such an extent, that we believe had the iridectomy been delayed while trying other treatment, no such favorable results could have occurred, as I think the improvement after the operation was unusually good, and was simply due to the fact that the operation was made early.

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