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On the Coincidence of Optic Neuritis and Subacute Transverse Myelitis.*



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MR. PRESIDENT AND GENTLEMEN:—For nearly thirty years since the first researches of Budge and Waller, of Claude Bernard and of Brown-Séquard, on the spinal innervation of the eyeball, physicians have been acquainted with various ocular symptoms of spinal diseases. The more prominent of these associations have been the myosis and atrophy of the optic nerves observed in the course of sclerosis of the posterior columns of the spinal cord, or progressive locomotor ataxia. Again, myelitis of the cervical spinal cord, whether

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inflammatory or from compression (Pott's disease, tumors, etc.), has been known to cause variable states of the pupil, due to irritation or destruction of the cilio-spinal centre, so-called, a region of anterior grey matter extending from the level of the fifth or sixth cervical nerve to that of the third or fourth dorsal nerve.

But the literature of spinal affections has been searched in vain for an example of transverse myelitis associated with an acute affection of the optic nerve. All of the recorded changes in the optic nerves in the course of spinal affection, were of a chronic and degenerative kind.

In the last year three instances of the remarkable coincidence of optic neuritis and transverse myelitis have occurred, and I have thought it might prove interesting to lay them before you.

Although two of the three cases had been observed and recognized by me before reading an account of the third, I think it but right to place this first in order of relation, because it was the first published. The observation is by the distinguished neurologist, Dr. W. Erb, now Professor in the University of Leipzig. His paper was read on May 17, 1879, at the fourth meeting of the Neurologists and Alienists of Southwestern Germany, held at Heidelberg; and it was published later in the autumn in *Westphal's Archiv*.*

CASE I., by Prof. Erb.—I was consulted, on July 18, 1877, by a man aged 52 years, who, previous to the present illness, had enjoyed good health, and had never had syphilis. He had experienced a combination of rapidly developed and peculiar blindness with alarming paralytic phenomena.

The following is a history of the case: In February, 1877, the left eye became suddenly affected; diminished vision; central scotoma, and in a few days total amaurosis; and after a few weeks return of vision. The ophthalmoscopic examination was negative. Soon afterward the right eye was similarly affected. Blindness followed by recovery, negative results

* W. Erb.—“Ueber das Zusammenkommen von Neuritis Optica und Myelitis Subacuta.”—*Arch. f. Psych. und Nervenkrankheiten*. Bd. X., Hft. I., p. 146.

to ophthalmoscope. The beginning of the illness was marked by slight headache.*

After a while there was still another attack; this time in both eyes, commencing with bi-temporal hemiopia and color-blindness; progressing rapidly to complete blindness. On this occasion the ophthalmoscope revealed a well-marked optic neuritis, with some distinct atrophy. At no time was there choked disc.

In the last few weeks improvement has once more shown itself. The patient can now read Jäger No. 4; distinguishes the outlines and colors of objects, but cannot yet recognize faces.

The treatment consisted in 76 inunctions with unguent. hydrargyri cinereum, local abstraction of blood, purgatives, and a seton in the neck.

During the three or four weeks preceding the consultation, there had occurred drawing and tearing pains in the legs, trunk, and in the lower thoracic regions (cincture pain); there was but little pain in the arms. In the course of 14 days the following phenomena were added: Rapidly increasing weakness of the *right* leg, which soon became completely paralyzed, and at the same time anæsthesia of the *left* leg. Later still the left leg also became weak. Associated with these symptoms were retention of urine, later incontinence (now present) and anæsthesia of the urethra and rectum.

Examination on July 18.—The patient is a strong, healthy-looking man. He has slight fever (38.5° C.); amblyopia of both eyes; pupils and movements of the eyeballs are normal. The other special senses are normal. Memory and intelligence preserved; no headache or vertigo.

The upper extremities present no symptoms. The right

*The ophthalmic notes concerning the first stages of the disease, including the three distinct attacks of blindness, are by Dr. Steffan, of Frankfort-on-Main. These notes differ from Dr. Erb's summary in the important particular that in the first two attacks (each optic nerve alternately) a slight optic neuritis, œdema of edges, without swelling, was seen with the ophthalmoscope. Besides, some interesting limitations of the field of vision were noted.

Dr. Steffan will publish a full account of the eye-symptoms in this interesting case.

hand is often the seat of slight pain, but there are no paræsthesiæ or disorders of motility.

The right lower extremity is entirely paralyzed, and the left thigh though paretic, can be moved in all directions; the muscles of the abdomen and back are very weak.

The sensibility of the right leg is generally preserved, though in a few places it is diminished. The right half of the abdomen is evidently hyperæsthetic, as is a region round about the thorax at the level of the nipples. The left lower extremity and the left half of the abdomen are very distinctly anæsthetic; the left side of the back is anæsthetic, the right sensitive. These are the unmistakable signs of a lesion involving one lateral half of the spinal cord, as given by Brown-Séquard. The lower dorsal region is the seat of some pain; no spinal tenderness, or deformity, or stiffness.

The cutaneous and tendon-reflexes in the legs are increased; reflex movement of abdominal muscles not present.

No atrophy or bed-sore. There is paralysis of the bladder; there is occasionally involuntary evacuation of urine; the patient is constipated, and he is not fully conscious of the passage of fæces.

Prescription.—Cold compresses, according to Priessnitz's method, to the spine; every three days dry cups along the vertebral column; iodide of potassium; extreme cleanliness, and attention to bowels.

July 27.—In the last few days signs of acute cystitis; bowels distended with gas; from time to time the legs jerk. Other symptoms not much changed. The right lower extremity is still completely paralyzed, the left a little weak. Sensibility very slightly diminished on the right side; there is no longer any hyperæsthesia; the cincture feeling is gone; the right half of the abdomen shows muscular tension. Plantar reflex and the tendon-reflexes are greatly increased; dorsal clonus is easily produced. No bed-sore; eyes as before.

In the next few days, probably in consequence of the cystitis, there were several chills, and the temperature rose to 40.3° C.

In the next few days improvement began, and the following is noted on August 11: The left leg once more possesses all its movements and is quite strong; the right lower extremity

is also movable, but is weaker than the left. There is hardly a trace of the alteration of sensibility; there are next to no pains in the legs. Reflexes less marked; bladder and rectum unchanged; eyes in *statu quo*. The patient's general condition is much better. Ordered same treatment except that the iodide of potassium is omitted, and a little morphine given for insomnia.

Progressive improvement took place so that on September 28, it is noted that the legs are strong enough to enable patient to take a few steps (no ataxia); the sensibility is normal, and the bladder acts well. At times he has a sense of tension in the back, and an occasional pain in the legs. The eyes have improved a little.

Toward the close of the year the patient's objective symptoms were about gone; the reflexes were still strong, but he complains of various paræsthesiæ in the legs, a "ringing" or vibration while sitting, sensations of weight and of swelling.

In the spring of 1878 the patient was well, except that he had sensations of slight heat and crawling in the legs and back.

From November 12, 1878, to March, 1879, the patient had a galvanic treatment for his eyes, with marked improvement.

Dr. O. Becker of Heidelberg, found the following: Slight myopia of both eyes; pupils rather small, acting well. R. V. $\frac{6}{80}$, L. V. $\frac{6}{20}$; fingers counted at 6 metres, with +3 R. V. Jäger No. 3. L. V. No. 6. Both eyes are blind for green and red.

The ophthalmoscope shows atrophy of the optic nerves, with slight excavation; nerves bluish. Lesion more marked on left visual field, slightly reduced concentrically; no scotoma.

At the close of treatment, March 4, 1879. R. V.— $1 = \frac{6}{18.12}$, L. V.— $1 = \frac{6}{24.18}$, with +3, can read No. 3 Jäger and make out a few words of No. 2; with +4 and +5, can read newspaper print easily.

CASE II.—Drs. H. D. Noyes and T. A. McBride. On September 5, 1879, I saw Mr. D., a patient of Dr. H. D. Noyes, at the request of Dr. T. A. McBride. Dr. McBride has already made an exhaustive examination of the case, and the following is a history based upon a memorandum which he sent with the patient. I desire to express my thanks to Dr. Noyes and Dr. McBride for permission to make use of the

case. Mr. D., a clerk, aged twenty-five years, suffered from debility during the whole of the past summer. Since March has had several "bilious attacks."

On August 9, was seized with severe diffused headache, which lasted day and night for a week. Was constipated and nauseated. No headache since.

August 18, retention of urine occurred, for which the catheter was used three or four times in the course of ten days. The bladder has been sluggish since. During the same period (last two weeks of August) patient noticed stiffness and pain in the muscles of the back, preventing his bending forward. The pain was in the lower dorsal region. In the last ten days no pain, but a sense of numbness and anæsthesia has appeared in all parts below the waist. The loss of sensibility was discovered in the bath; he did not feel the contact of water normally. About the same time (ten days ago) he also noticed a dimness of vision, which has since increased almost to blindness, at times. No symptoms in upper extremities. Patient denies syphilis, or injury to the head and spine. Several members of his family have died of phthisis. Examination: walks well; no disturbance of equilibrium, or inco-ordination. Dynamometer shows in right hand, 65, 63, 65; in left, 60, 56, 61 (weak instrument). No actual paresis of the lower extremities. Knee tendon-reflex normal. Sole reflex deficient, especially on the right side. Sensibility is much impaired below the waist. Touch is badly perceived (an æsthesiometer point seems like a finger), and pricking or pinching still less. There is, consequently, more analgesia than anæsthesia. At times the legs tremble; no spasm, or formication. Sight is very defective, the fields of vision are irregularly limited, there is marked loss of color perception. The ophthalmoscope shows typical choked disc on both sides. The temperature in the mouth is 100.25° F. The heart is normal; percussion of skull and vertebræ produces no pain.

The above was Dr. McBride's examination. My own gave corroborative results, viz.: a paraplegiform anæsthesia (incomplete), and double neuro-retinitis. The latter lesion seemed less than as described by Dr. McBride, and vision less impaired: he could count fingers and trace features easily.

My diagnosis was double lesion, one at the base of the brain involving the optic nerves and the chiasm, and a focus of myelitis in the centre of the cord in its lower dorsal region. I advised a continuance of the iodide of potassium in full doses.

[The following are additional notes furnished by Dr. Noyes. Dr. Noyes took part in the discussion on this paper and exhibited to the Society diagrams illustrating the extraordinary changes in the fields of vision in his patient.]

“Vision became impaired at the same time that the bladder trouble came on. No phosphenes; no tenderness over lower portion of spinal column.

September 2d.—The field of vision, O. S., normal. O. D.: Perception absent on nasal side, encroaching centrally beyond the median line, with contraction of the peripheral portion in other localities. Ophthalmoscope shows, O. D., the inner half of disc is most swollen—there is a small segment downwards and outwards, which is not much affected. It looks more like a neuritis descendens, than a true choked disc. Not much choking of left disc. O. D. H= $\frac{1}{15}$.

The patient was next seen September 6th.—The condition of fields of vision being much the same, except that the sight has improved. Sight returning in the infero-nasal quadrant. O. S. normal.

September 11.—To-day for the first time, find that the left eye on the outer has lost its perceptive power, almost entirely, there being only a small ovoid spot on the horizontal meridian, where perception remains. The right now shows that the field is changed from the showing on the 6th, and things are reversed—seeing now only in the nasal quadrant. The patient feels satisfied that September 8th the change began for the worse in his left eye—at the same time that his right eye had changed as to field, viz., seeing only in the infero-nasal quadrant. The inner half of the right optic disc is swollen—the vessels are tortuous—the outer half is pale. The inner half of the left disc is swollen, the same as the right, the outer half being pale.

September 16th.—His sight, in his own opinion, has not altered much. Examination shows recovery of a considerable amount of his lost fields of vision—the right being normal

except for the presence of a scotoma; while the left shows the previously mentioned oval area of perception lower in the temporal portion of the field to have increased considerably in size; otherwise the field in O. S. is similar to last entry.

September 20th.—Fields of vision have improved, there being only a central scotoma, of small size, in each field of vision. The sight is better, but it is not possible to measure it accurately. Both discs are in parts swollen, but not so much as at last examination—yet plainly to be seen still. There is an unusual pallor of other parts of the discs, that were at the earlier stages swollen.

September 26th.—Patient says that his sight was much better yesterday than it has been for some time. His fields have not altered—the scotomata being still present. The color perception is poor. He recognizes blue and most of its shades. Red is recognized next. Grey, violet and green are mistaken.

October 4th.—V. = $\frac{2}{7}$ O. S.

October 14th.—O. D. V. = $\frac{2}{200}$. O. S. V. = $\frac{2}{50}$. Cannot find positively any true scotoma in either eye. There is a certain amount of dullness of perception over the small scotomata found at the last examination.

October 21st.—O. D. V. = $\frac{2}{50}$. O. S. V. = $\frac{2}{50}$.

October 30th.—O. D. V. = $\frac{2}{50}$. O. S. V. = $\frac{2}{50}$. Inner half of both discs swollen—the outer pale.

December 20th.—V. = $\frac{2}{50}$ O. D. No scotoma—color perception good. Fields of vision perfect for both objective and color tests.

January 24th, 1880. V. = $\frac{2}{50}$ in each eye. Fields for objective and color tests normal.”

The paraplegia had long since disappeared.

CASE III.—Personal.—Shortly before reading Prof. Erb's paper, I had the opportunity of seeing the following interesting case, and of treating it. The patient was originally under the care of Prof. Willard Parker, who, on December 9, 1879, transferred the case to me.

J. P. M., a banker, aged 35 years, had enjoyed excellent health for many years, and had never contracted syphilis. For some time previous to the development of the present

illness he was in business in Virginia City, Nevada, at an altitude of more than 7,000 feet.

On September 5, 1879, he first noticed numbness in his feet and legs, but was perfectly able to walk. This numbness was stationary for three or four days; then a feeling was noticed as if there were an iron bar or block in the perineum; the legs became noticeably weak about the 28th. Mr. M. came east by way of Panama, and while on board the ship he used his legs actively. Arrived in New York in the first week of October: he could still walk to his meals in the hotel, though he dragged his feet—the right more. The numbness continued. He suffered a “distress” in the sacrum, but had no pain in back or legs. After a week, during which he exerted himself a good deal, the paralysis increased, and he ceased walking; sensibility became impaired. For a fortnight (middle of October) there was absolute loss of motility below the waist and much anæsthesia, though he never lost his feet in bed. At one time he had the feeling of numbness as high as the groins.

Sensation and motion returned in the left leg first; and since the end of October both legs have gradually but steadily improved. He can now move every joint in the lower extremities, but he has not yet tried to stand or walk. He has had a band-like feeling around the calves of his legs, and a pressure-feeling in front of the abdomen. He never had retention of urine, but at times involuntary squirts. Was greatly constipated. There have been no active symptoms in the arms, but it was noticeable that if placed in an awkward position they easily became numb. The paralyzed muscles did not waste, no bed-sores formed, and the general health remained good. During the period of convalescence Mr. M. noticed severe tonic and clonic spasms in the legs; less lately.

During the past two weeks blurred vision of the right eye has been noticed. This was preceded one week by severe pain in the right orbit and near the brow. Lately sensibility has greatly improved; a little tight feeling remains around the insteps.

Examination.—Patient is surprised to find that he can stand. Closing eyes does not impair equilibrium. The legs are weak,

but every muscle and articulation can be moved. Tendon-reflex at knee and sole-reflex are exaggerated. Sensibility is normal to touch and pinching; localizes impressions correctly. No ataxia; the muscles are well nourished; spine not tender; erections (absent for a time) are returning.

Treatment was begun only at the time when paralysis became marked, seven or eight weeks ago. He was then given moderate doses of iodide of potassium, one-thirtieth grain of strychnia three times a day, and he was rubbed.

December 15.—At my request Dr. Arthur Mathewson, of Brooklyn, saw the patient and examined his eyes. The following are Dr. Mathewson's notes: "On first examination the nerve of the right eye was found whitish and œdematous, with outlines rather indistinct; vessels only slightly tortuous, veins full and dark (in both eyes); media clear; refraction nearly emmetropic, but the most prominent part of the nerve disc was in focus with a No. 16 convex glass. Vision was not tested accurately for want of means at patient's house, but he could read about Jäger No. 10 with the affected eye. There was also a slight lateral tremulous motion of the right eye, a sort of nystagmus."

These two examinations justified the diagnosis of sub-acute transverse myelitis in the lower dorsal region, with optic neuritis limited to one eye.

I will not weary the Society with a transcript of my full notes of the further progress of the case. Suffice it to say that improvement in vision and in the power of walking, with decrease of reflexes, occurred, until at the present time the patient is nearly well. The treatment consisted in the withdrawal of the strychnia; the gradual increase of the iodide of potassium up to more than 4 grams three times a day, galvanism to the spine and muscles, and massage.

My friend, Dr. L. C. Gray, of Brooklyn, had the immediate management of the case, and I saw the patient nearly once a week. In January there was added to the above treatment an evening dose of 2 grams each of fluid extract of ergot and bromide of potassium, which had the desired effect of lessening the reflexes. On February 20 Mr. Martin came to New York to see me. His gait was quite normal; the knee

tendon-reflex rather strong (no spontaneous reflex movements); he complained of only a trace of numbish sensation in the calves and in the nates; in walking a slight sense of constriction is experienced upon each leg below the knee, on the inner side. Vision of right eye is nearly normal; the nerve is whitish, and the nystagmus (horizontal) is still present.

March 1.—Dr. Mathewson has kindly sent me the following memorandum: "I have just carefully examined Mr. M.'s eyes as they stand to-day, and send you the result. There is now no limitation of the fields of vision, and no scotomata, and there is no marked diminution of color perception. The œdema of the nerve disc of the right eye has now wholly passed away, so that its outlines are perfectly distinct, and the disc is paler than normal, and quite in contrast with the nerve of the other eye, which is rather hyperæmic, with outlines not quite well defined. There is a manifest hypermetropia, of $\frac{1}{38}$ (by ophthalmoscope $\frac{1}{4} +$), of the right eye, its vision is $\frac{2}{30}$; while the left is nearly emmetropic and has perfect vision. There is still a slight trace of the nystagmic movement, though it is not constant."

The optic neuritis in this case was intermediate in type between the conditions observed in the two other cases. There was œdema of the periphery of the nerve with some swelling of the disc—a degree of choked disc. This was followed by atrophy without marked loss of vision. All the morbid processes occurred in one eye.

It is interesting to note that the distribution of the inflammatory lesions varied in each case within very considerable limits. In the eyes it affected alternately each optic nerve, and both at one time in two cases. In Dr. Noyes' case the changes in the fields of vision were singularly capricious. In the third case only one optic nerve was affected. These irregularities and the peculiar symptoms of bi-temporal hemiopia (in case I.) are, it seems to me, explicable only upon the supposition of a lesion at the base of the brain involving the chiasm and optic nerves. The phenomena in the third case (symptoms in one eye only) would seem to exclude most positively a central cerebral lesion.

In the spinal cord the inflammatory changes were in the

dorsal region in all the cases, but in all other respects there were marked differences.

In case I. the right half of the spinal cord no doubt contained most of the lesions.

In case II. the æsthesodic region of the cord (posterior grey matter or peri-ependymal region?) was chiefly involved.

In case III. the entire structure of the cord must have been slightly affected, the motor region most. The comparative escape of the bladder in case III. (no retention) is instructive anatomically, as the limitation of the numbness to the altitude of the groin would indicate that the lesion was in the lowest dorsal or upper lumbar region of the cord, below the vesical centre. In cases I. and III., where the limits of numbness and the constriction band indicated disease of the mid-dorsal portion of the cord, retention and cystitis occurred.

The question naturally arises: Is there any causal or physiological relation between the two sets of phenomena observed in these three cases?

Prof. Erb answers in the negative, and it seems to me that with our present knowledge of the relations between the optic apparatus and the spinal cord we must in agreement with him consider this association of optic neuritis and transverse myelitis as accidental.