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WEBBER, (S. G.)

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BY S. G. WEBBER, M.D.

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A STUDY OF ARTERIAL TENSION IN NEURASTHENIA.¹

BY S. G. WEBBER, M.D.

It is scarcely necessary to say that variation in the amount of blood contained in the brain, and especially irregularity in its distribution, may give rise to abnormal phenomena. This has been known for many years. Mosso was among the first to give a practical demonstration of the ease and rapidity with which the amount of blood in the brain may vary. He was fortunate in having patients who had lost portions of their skull, the brain being thus covered only by soft tissue. He fitted instruments to register the variations of circulation under different conditions.

He learned, by comparing the cerebral circulation with that of the arm that when there was a marked increase in the amount of blood flowing to the brain, the vessels of the arm were less full, and the reverse. Any intellectual operation, as multiplying two numbers, or any emotional excitement, or a sudden surprise, were sufficient to send more blood to the brain. Under certain conditions, the form of the tracing changed both for the brain and for the arm pulse.

These investigations have only an indirect bearing upon the subject which I now wish to bring to your attention; they are chiefly of value as showing that there is a marked relation between the circulation of the brain and that of the arm.

Dr. Anjel² has studied the circulation in the arm in

¹ Read before the Boston Society of Medical Sciences.

² Archiv. f. Psychiatrie, etc., xv, 1884, p. 618.



neurasthenia, using the plethysmograph. It will be sufficient to mention that he found, when the brain is active, the amount of blood in the arm is diminished. In health, after the mental effort has ceased, the return of the normal circulation is rapid, and soon the previous equilibrium is re-established. In cases of neurasthenia the contraction of the vessels in the arm is of only short duration; they soon dilate. This change in the size of the arm is repeated at irregular intervals so long as the mind continues in action, and for a time afterwards, so that the normal equilibrium is only slowly re-established. Also, the circulatory disturbance is excited by very slight mental impressions, which have no influence upon healthy persons.

The prominent fact in Anjel's experiments is the instability of the vaso-motor innervation. There is a lack of healthy tone in the vessels.

This is the opinion generally held in regard to neurasthenia. I do not know that any special effort has been made to study the condition of the bloodvessels in neurasthenia with the aid of the sphygmograph. I have taken a large number of tracings in such patients at the Adams Nervine Asylum, and propose to study them with the purpose of learning, if possible, whether by this means the above opinion can be proved to be well founded, and also whether the sphygmograph can be depended upon as a guide in diagnosis, prognosis, or treatment.

Neurasthenic patients may be divided into several classes: First, those in which the vascular tension is nearly or quite normal. There are a few such, who seemingly have been only temporarily run down, and quickly recover.

Another class may be formed of those who, at first, show a decided loss of vascular tone, who, after a course of treatment, regain a normal tension. These

usually recover in a longer or shorter time. Those whom I have had under my care have not always regained health while under observation, but I have had subsequent information from many who have continued to steadily gain, and have recovered a fair amount of health.

A third class are those whose vascular tone is very much below normal, who show a variable condition of the vaso-motor system, sometimes apparently gaining a little, then losing ground, but on the whole making no substantial progress. Many of these have a hereditary tendency to an unstable nervous equilibrium, or there is some condition of the system that reacts unfavorably upon the circulation. These cases do not improve much, and whatever is gained is of very doubtful permanency; there is a lack of vascular stability which is unfavorable to recovery.

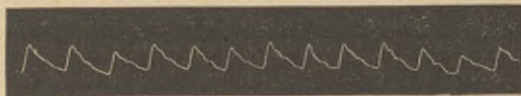
I have had a few cases where the earlier tracings showed a nearly normal condition of the bloodvessels, but later tracings were less favorable. In such cases there has usually been some cause to which such unfavorable change could be ascribed. One patient was doing well, gaining, with a good pulse; her son-in-law, upon whom she was partially dependent, met with an accident which was nearly fatal. This shock completely upset her, and the vessels afterwards showed a very great lack of tension.

Some of the worst cases show a great variation within a few minutes, one tracing being only slightly variant from the normal, the next, taken within five minutes, showing a great loss of tension.

Tracing No. 1 is quite normal, and may represent that obtained from the most favorable cases.

CASE I. Miss A., aged twenty-five, had taught school until entirely used up. She was a pale, weak, nervous-looking woman. She had several hysterical

attacks, with loss of consciousness and delirium, at the catamenial period. These began with severe headache. There was no special uterine lesion, simply tenderness of all the pelvic organs. There was a murmur with the second sound over the aorta when she entered, which was supposed to be due to the anæmia.



No. 1.

Several tracings of the pulse were taken at different times during her stay. They were all very similar, and nearly normal.

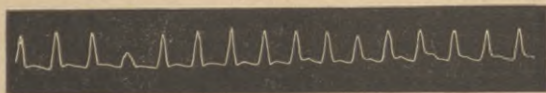
She gained much, continued to improve after leaving, and after a year's rest was able to teach again. She has taught nearly two years, and when last seen was in good health; walked about three miles nearly every day. She took a small school, so as not to overtax her lately regained strength.

The second group consists of tracings from those patients who showed loss of vascular tone, but recovered a nearly normal tension and had a corresponding gain in symptoms.

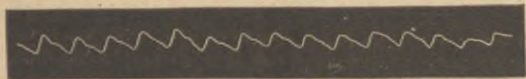
CASE II. Miss D., aged thirty-one, was an interesting patient. She had never been strong. She was run down by care of mother who was paralysed. She had a distinct hysterical propensity to exaggerate and dwell upon her symptoms. When talking she winked her eyes rapidly, spoke in a complaining, whining tone. The real symptoms were those of nervous depression, headache, dizziness, insomnia, dyspepsia, *et omne id genus*. There was no ovarian tenderness; the lower parts of uterus and cervix were

tender, there was extreme anteversion with slight flexion at junction of neck and body, a probe entered with difficulty, there was an ulceration with granulation about three-fourths of an inch in diameter around the os. A very faint murmur was heard with the first sound, and there was a slight increase of area of cardiac dulness.

The tracings showed a variation from time to time, irrespective of the medicine taken. The first tracing (No. 2) was not taken until the patient had been at the asylum three months. This shows a marked loss of tension. The next (No. 3) six weeks later is quite



No. 2.



No. 3.

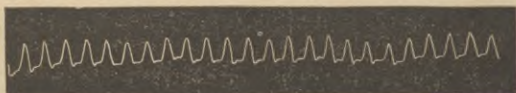
normal, but two days after the tension was again diminished. A month later there was less energetic action of the heart and a nearly normal tracing, with very slow descent. On the whole the vascular tone improved, the symptoms improved, the uterine ulceration was nearly or quite cured. She was examined some time after leaving and found to have recovered, and later gained in health and nervous vigor.

CASE III. Mrs. L., aged thirty-three, had had various local treatment for uterine disease. There was an enlarged uterus, probe passed in more than

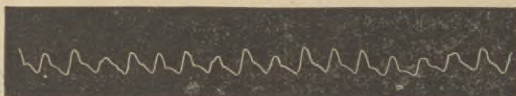
three inches, the cervix was enlarged, almost purple in color, bled easily, and presented many small spots of erosion. The symptoms were those of nervous prostration with headache, backache, irritability of temper, hysterical condition. She said any attempt to do for the uterus had only upset her, so she was simply given hot douches when it seemed necessary.

At entrance the tracing (No. 4) is seen to be characteristic of loss of tension, there is a slight tendency to dicrotism, the pulse is rapid.

After six months (No. 5) the pulse is much more



No. 4.



No. 5.

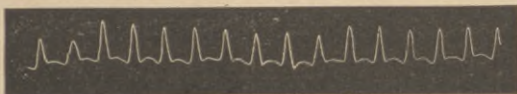
nearly normal, but of irregular strength. The tension is improved, not any tendency to dicrotism, in one or two spots the needle seemed to catch in the paper and make a slightly toothed summit.

This patient was very much benefited by treatment and continued to improve after leaving.

CASE IV. Miss F., aged thirty-seven, was a patient who had suffered long from nervous prostration, of a very decidedly hysterical tendency, without any convulsive or other attacks; who, when fairly strong, had pretty good self-control. There was no

complication. The patient was very fleshy and her nutrition was not in a good condition.

The tracing (No. 6) taken about two weeks after she came shows a great lack of vascular tension. She gained slowly, lost some of her superfluous flesh, and five months after gives a tracing (No. 7) much more



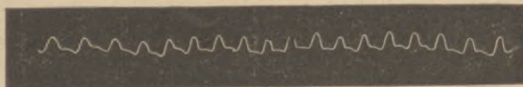
No. 6.



No. 7.

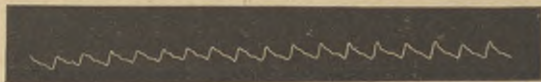
nearly approaching health. There seems to be even a slight excess of tension. She was at this time taking no medicine to increase the tension. She continued to gain after leaving here, though probably she will never be very strong. Urine 1040 acid on entering.

CASE V. Miss M., aged thirty-two, had quite marked hysterical attacks before coming to the asylum. She was underfed and a simple case of nervous exhaustion without any complication. A tracing (No. 8) taken a few days after her admission, shows a cer-



No. 8.

tain amount of loss of tone in the bloodvessels, not excessive; the first descent is too sudden. There is also an irregularity in the tension, the first part of the tracing the descent being more gradual at the beginning than near the centre of the tracing. After three months there was a decided improvement, the tracing (No. 9) became quite natural and healthy.



No. 9.

This patient was very much relieved; but her subsequent history is not known.

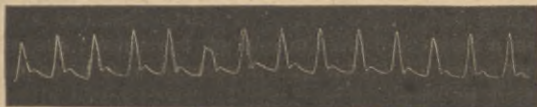
The next case is one in which there was an irregular gain and loss. The patient gained much while in the asylum, but not so much as those whose cases have been just recorded. This may be considered as intermediate between those first given and the next class.

CASE VI. Miss J., aged thirty-three, had suffered for a long time with weakness and pain of back, headache, a confused feeling in head, inability to read long, and a sense of general exhaustion and tiredness. She was able to take only a small amount of nourishment at first, but later could eat well, though occasionally she had attacks of nausea and was obliged to live lightly. She had extreme anteversion of uterus, and after exertion or walking complained of distress. The displacement was rectified as much as possible, though owing to tenderness very little could be done. She probably exaggerated her discomforts to gain more attention. The heart sounds were normal.

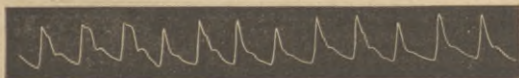
The tracing (No. 10) taken soon after her admis-

sion, shows a strong impulse unresisted by the arteries, a decided loss of tension, hence a sudden descent nearly to the original level, then a slight dicrotic rise.

The next tracing (No. 11) taken three months

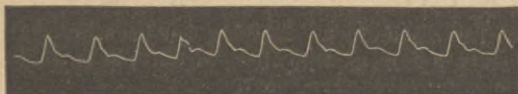


No. 10.



No. 11.

later, after a long rest in bed, good feeding and a general gain shows a less sudden descent, an absence of dicrotism, and a near approach to the normal, but much loss of tension. Five months later there is again a tracing very similar to the first; less dicrotic. Some months later (No. 12) the tracing is approach-



No. 12.

ing more closely the normal, but the tension is still rather defective.

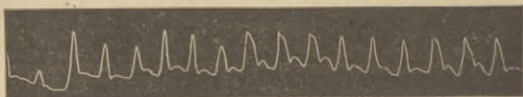
This patient gained after leaving the asylum; several months after was strong but still had an appear-

ance as if lacking in nervous force. She called herself well. It is not likely that she can withstand much of a strain.

The following are cases in which there was little or no gain, the condition of the vessels remained unfavorable. These belonged to the third group of cases.

CASE VII. Miss G., aged thirty-nine, had a fall from a horse and hit the end of her spine; she suffered from backache and headache, was tired and looked worn.

There was very little difference between the tracings taken when she entered (No. 13), and when she



No. 13.



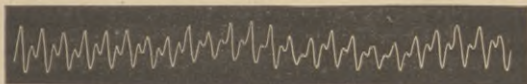
No. 14.

left (No. 14). She gained from her rest and quiet in that she had less pain and was able to be about with much less discomfort. Nothing has been heard from her since a few months after she left; it is doubtful if the gain proves permanent.

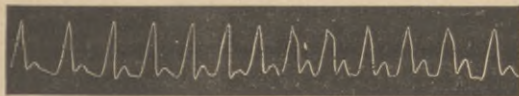
CASE VIII. Miss H., aged thirty-one, fell down stairs when twenty-one years old, hurting her back; she was in bed four years or more; she suffered much from pain in abdomen. Afterwards she had attacks during which she was dizzy and then unconscious, with weakness and trembling afterwards. She was

obliged to catheterize herself; she had aphonia which came on suddenly at the time of her father's death. Soon after she entered, her mother died suddenly which was a shock to her, after which she was less well and more hysterical. There was partial hemi-anæsthesia, which after a convulsive attack became more marked. There was a neurotic history on the father's side; he, his three brothers and nine sisters had sick headache, and the patient has three brothers, out of six, and two sisters who have sick headaches. The father suffered from some wasting disease for thirty years, perhaps progressive muscular atrophy.

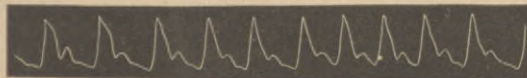
The first tracing (No. 15) was taken soon after entrance and shows excessive loss of tension and hyperdicrotism. A peculiar pulse which is seen occasionally in very excitable patients. The second tracing (No. 16) presents a loss of tension, the dicrotism is well-marked. The third tracing (No. 17) is much more



No. 15.



No. 16.



No. 17.

nearly normal, but there is still loss of tension. At the time when the last tracing was taken she had improved very much and had been able to speak aloud for a few days. She subsequently became worse and had a very greatly modified or aborted hysteropileptic attack.

She subsequently improved again, but a year after leaving was still far from well.

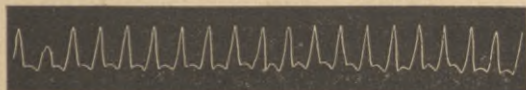
CASE IX. Mrs. G., aged forty-five years, had passed the menopause. She had from girlhood had sick headaches, which were probably hereditary. Her mother had these, and was very nervous; her maternal grandparents died of phthisis; she has five brothers and one sister, all nervous; her daughter is hysterical. The patient was full of all sorts of notions, was a firm believer in "mind cure," but had only been slightly benefited by it; she shed tears frequently every day for every and no cause. She was thin, emaciated, evidently half-starved. She had spells of low spirits. She gained in flesh and spirits, and after five months said she had never felt so well.

The tracings show a variation which is interesting. The earliest (No. 18),^a taken about a month after entrance, shows an increase of tension; the impulse of the heart did not drive the needle very far; the descent is gradual, commencing only after a brief interval. Two weeks later a tracing showed a decided loss of tension; about three weeks later (No. 19), the same loss of tension, but a little more tendency to dirotism; yet a second tracing taken on the same occasion gives a rather better showing. A tracing (No. 20) taken after she had been four months under treatment shows stronger impulse, but there is not a return to the normal tonicity of the arteries.

Although this patient felt so well and was so very

^a Omitted by mistake.

much benefited, I think it is very doubtful if the improvement will be permanent. There is probably a too radical defect in the condition of the vessels, or rather of the vaso-motor nerves, and I doubt whether at her age permanent recovery of tone can be expected in one with such a hereditary tendency.



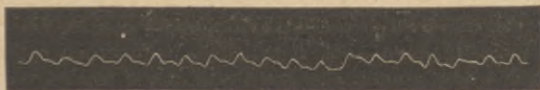
No. 19.



No. 20.

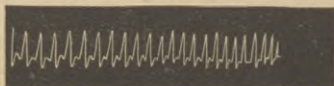
CASE X. Miss W., aged thirty, was running down during several years. She had backache, headache, tenderness over some of the vertebræ, generally weak, with little endurance, insomnia, anorexia, and other symptoms of general nervous depression. There was retroversion and some excoriation about the os, with much tenderness. She had attacks of palpitation, which at times gave her much discomfort; no abnormal sounds were discovered.

The first tracing (No. 21) was taken soon after she



No. 21.

came; the second (No. 22) was taken during an attack of palpitation; the fourth (No. 23) was after she had gained much, was up much of the time, and going outdoors daily. A later tracing showed, again, loss of tension, and was far from normal.



No. 22.



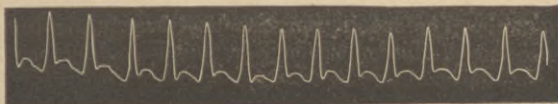
No. 23.

This patient continued to gain slowly after leaving, but eighteen months afterwards was by no means well.

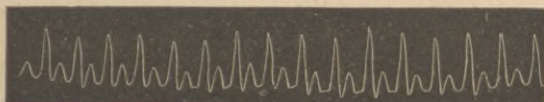
CASE XI. Miss M., aged twenty-seven, had had sick headaches very much; contracted malarial fever on Staten Island. She had various nervous symptoms, as backache, trembling, staggering, faintness; the headache was continuous with periods of exacerbation. There was special tenderness over the left ovary. There was great tenderness on vaginal examination, a small spot of excoriation about os.

Her father, mother, sisters, and brothers are subject to sick headache; her grandmother had headaches, her grandfather was insane when he died. A female cousin, nineteen years old, and a male cousin, fifteen years old, have sick headaches. Fourteen other cousins are young, one aunt and three uncles have sick headaches; several in paternal grandfather's family are free from trouble.

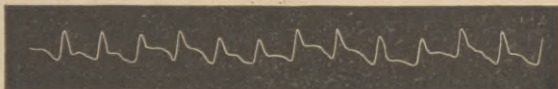
The first tracing (No. 24) was taken the day after admission; the second (No. 25), hyperdicrotic, was taken after a severe headache and attack of pain in region of left ovary; the third (No. 26) was taken



No. 24.



No. 25.



No. 26.

during an exacerbation of headache, and is the nearest normal of any. A fourth one was taken four months after the first, and showed almost exactly the same characteristics.

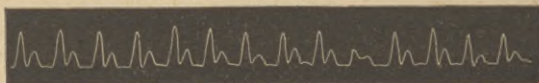
The patient's general condition improved, the headaches were less severe, and she had periods of freedom from pain. She did not recover, and there seems very little prospect of recovery.

In view of this and some other cases, the question readily suggests itself whether unstable vaso-motor action and loss of tone may not be hereditary and con-

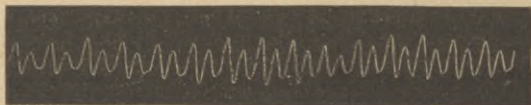
stitutional, and such persons be unable to endure even moderate strains in life.

CASE XII. Miss W., aged sixteen years, ten months, had hysterical aphonia and ptosis; she had two or three attacks of hysterical spasms.

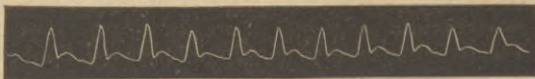
The tracings show decided loss of tension and irregular innervation of the arteries. The first tracing showed considerable loss of tone in the vessels. The second tracing (No. 27) was taken a few days before she began to talk aloud. The third tracing (No. 28), was taken the day after she stopped talking because some request was refused; she was much agitated at the time. When the fourth tracing (No. 29) was



No. 27.



No. 28.



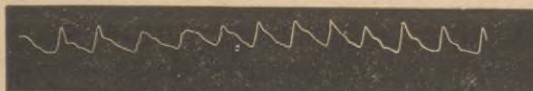
No. 29.

taken she had been gaining in strength, and was less nervous; she seemed more willing to follow directions, but still could not talk. After leaving she still

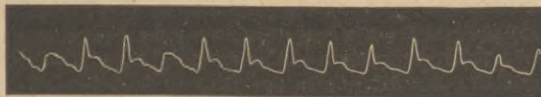
improved, and I heard that in the afternoon of the day she left she spoke aloud. In the morning she would or could not make a sound. This is a good example of the instability of the arterial innervation in hysteria, the vaso-motor nerves being as irregular in action as other parts of the nervous system.

CASE XIII. Mrs. P., aged thirty-two, had been run down for some time. The chief discomfort was sick headache and pain in back of neck, with neuralgia about the face.

The first tracing (No. 30) was taken soon after entrance, and is quite normal. One (No. 31) taken soon after a headache showed a lack of tension.



No. 30.



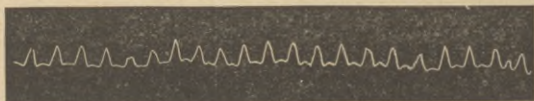
No. 31.

She gained decidedly, and after leaving continued to gain in strength, though, if she over-exerted herself, she was liable to have an attack of headache. The other pains disappeared or were very much diminished.

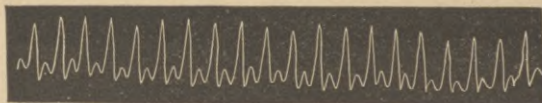
I give two tracings from a patient who had attacks of severe pain. They seemed to arise from the ovaries, or from some of the sympathetic ganglia in the abdomen. The first (No. 32) was taken before the pain; the second (No. 33) when the pain was at its

height. The change in the tracing was probably due to the commotion caused by the pain.

In conclusion, then, it may be said that the sphygmo-



No. 32.



No. 33.

graph is an aid in determining the amount of exhaustion; and by comparisons of tracings taken at intervals, the progress of the patient towards recovery can be estimated. A fictitious gain can be recognized, as distinguished from a real gain; no gain being permanent unless the tension of the arteries is permanently restored. A patient's future prospects of health can be calculated with more certainty by an occasional use of the sphygmograph. It is sufficient to take a tracing once in two or four weeks.

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