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AMENORRHŒA;

ITS CAUSES AND TREATMENT; ESPECIALLY BY ELECTRICITY.

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WE have read with interest the suggestions made and the cases reported in this JOURNAL relative to our subject; and these have so impressed us with its importance as to lead to a new investigation of it, both by experiment and by a review of the most recent and the best authorities. The results of this study are given in this article. We will briefly consider the causes of this affection, and the various methods of treating it, particularly that by electricity; and we will endeavor to show in what class of cases this agent should be employed, what variety of it should be used, and what is the best method of its application.

The term amenorrhœa etymologically denotes "not to flow monthly"; or, in other words, the morbid suspension or non-appearance of the menses.

To understand this abnormal state, we must consider the normal condition which it interrupts. In obedience to a natural law, which we cannot fully comprehend, one or more ova mature and burst from either or both ovaries, passing into the uterus through the Fallopian tubes, once in about twenty-eight days during the period of fecundity. At this time, under the influence of the ganglionic system of nerves connecting the ovaries and uterus, congestion is produced in the latter as it already exists in the former; the uterus becomes thereby somewhat engorged, and consequently descends toward the floor of the pelvis. Its mucous membrane being swollen and the vessels thereof enlarged, the walls of the capillaries burst under the excessive congestion, and hæmorrhage ensues.

The menstrual flux was not formerly considered a true hæmorrhage, but an effort of nature to expel injurious substances, from

the accumulation and retention of which very deleterious consequences were feared. But it is generally received by physiologists of our time, and proved by microscopic examination and chemical analysis, to be a veritable hæmorrhage; and therefore the former apprehensions of danger from the postponement of the menses beyond the age of puberty, or the time of their periodic return after it, are shown to be groundless.

Amenorrhœa, as previously indicated, is an anomaly of this function, an abnormal state of the organs concerned in menstruation. In the works of most writers, prior to a period comparatively recent, it was treated as a disease, and considerable space devoted to it as such, and to other diseases which were thought to follow and to be produced by it, the effect being substituted for the cause. But the riper experience and the more advanced scientific knowledge of to day attach to it only a symptomatic importance, and treat it as to the disease that produces it rather than the effect produced by it, since it is itself a result of an abnormal condition of these organs, of the blood, or of the nervous system—all of which should be in a state of perfect integrity.

It is more common in the higher than in the lower classes of society, on account of the frequent retirement of the former from those activities and habits of life which contribute to the health and vigor of the body.

Causes.—One of the best classifications of these, for precision and completeness, is that given in the admirable work of Prof. T. G. Thomas. To this we have made one or two additions.

"*Abnormal states of the organs of generation:* as the absence of the uterus or ovaries, rudimentary condition of either or both of these, occlusion of the uterus or vagina, metritis or endometritis, superinvolution, pelvic peritonitis, atrophy of both ovaries," fibrous tumors of the uterus and cystic degeneration of both ovaries.

"*Abnormal states of the blood:* as in chlorosis, plethora, phthisis, cirrhosis and Bright's disease."

Baker (W. H.)

"*Abnormal state of the ganglionic nervous system.*"—This occurs in "atony from nervous depression, from indolence, luxury, deficiency of fresh air, want of exercise and constitutional disease, as phthisis," and the like.

The most common causes of amenorrhœa are chlorosis or anæmia, and phthisis, which does not prevent the establishment of the menses, because the tuberculous diathesis is not usually developed at so early an age. To these may be added atony of the nervous system from the above-named causes, rudimentary condition of the uterus or ovaries, occlusion of the uterus or vagina, superinvolution, prolonged anxiety of mind, severe hæmorrhages from other parts of the body, or long-continued discharges from the various mucous surfaces, or in fact anything which interferes with the proper nutrition of the body.

These causes are more or less permanent and internal; others are occasional and external in their primary source; but their results in turn become the causes of this affection—*e. g.* exposure to cold or wet, sudden fear, excitement and severe sickness. But these are only of secondary importance; for instance, the influence of cold or wet at the period of menstruation may cause a sudden suppression of the flux and produce an acute metritis, which may become chronic, resulting in a permanent amenorrhœa.

Where the causes of this phenomenon are so various and recondite, great skill and thoroughness of examination are indispensable, in order to accurately determine the particular condition which produces the abnormal state, and therefore to distinguish the mode of treatment.

Differential Diagnosis.—Before deciding upon the treatment, as the author above referred to suggests, the practitioner must distinguish this affection from pregnancy, from the *climacteric period*, and from *delayed menstruation*.

If great caution is not exercised in distinguishing this affection from pregnancy, a mode of treatment may be adopted, as we have before intimated, which may be both injurious to the subject and destructive to the fœtus.

Treatment.—This, as previously stated, must vary with the causes producing the affection. There can, of course, be no treatment in cases of the *absence of both ovaries*, a condition extremely rare.

The *absence of the uterus* is more easily diagnosed, but is equally beyond remedy, although the symptoms which are usu-

ally alleviated by the hæmorrhage from this organ, if urgent, may be periodically relieved by venesection. Like the former, this condition is extremely rare.

In cases where a *rudimentary or atrophied condition of the uterus or ovaries*, or where *superinvolution of the uterus*, are the cause of this state, electricity, of which we shall shortly speak, affords the most efficient method of treatment.

When *occlusion of the cervix or of the vagina* exists, a surgical operation is necessary. A case of the first-named class was treated by the author in December, 1871. A brief of the case then made is as follows: K. C. was a native of Ireland, aged 30 years, having been married six months, and until within five months of marriage always strong and well, when, without any known cause, the menses ceased. At each succeeding monthly period the patient had all the usual symptoms of menstruation, except the hæmorrhage. Two days before her marriage, being the menstrual period, she had very severe pain, with the discharge of only two or three drops of blood. But from that period to the time when first seen, there was no return of the catamenia. A digital examination of the vagina proved it to be normal; examined bimanually, the uterus was found not enlarged, perfectly free and movable, slightly retroflexed; cervix normal as to position, size and consistency; but no os could be felt. By speculum, no os was to be discovered; but after several minutes' delay a single drop of secretion appeared at the centre of the cervix, showing that there was not a *total* occlusion of the os. After considerable manipulation, a probe of the smallest size was passed, when the cervical canal was found to be unobstructed, and the cavity of the uterus not enlarged. This was followed by the use of probes of larger size, until an orifice was obtained sufficient for the admission of an exceedingly small sea-tangle tent. The next day, this being removed, the orifice was found so much enlarged as to admit a tent of tolerably large size, which was left in position for twenty-four hours; and, when removed, the first phalanx of the finger could be readily introduced through the os. The patient was not seen again for five months, when she reported herself entirely relieved, the menses having appeared ten days after the last operation, and been regular from that date.

In this case what became of the menstrual flux, which the symptoms warrant us to believe occurred each month? That no such discharge appeared externally is evi-

dent; and yet the non-enlargement of the uterus and the subsequent operation proved that there was no blood pent up within the cavity of this organ. Can any one reasonably doubt that this blood, which may have been less than usual in amount, was removed by the absorbents, so active in all parts of the body?

In cases more grave than the above, when the cervical canal is *absolutely* closed, resort must be had to the knife.

In *occlusion of the vagina*, occasioned generally by an imperforate hymen or congenital malformation, there is great danger of the death of the patient from peritonitis or pyæmia, in consequence of the operation; the blood which is retained within the cavities of the Fallopian tubes, the uterus and vagina, and which, being suddenly evacuated from the two latter, is forced by the contraction of the uterus from the tubes into the peritoneal cavity, thereby producing inflammation. There is also danger lest immediately after the evacuation of the blood from the uterus, air should enter that organ and cause a decomposition of the blood remaining there, which, being absorbed, produces pyæmia. As a precautionary measure, the blood should be withdrawn in small quantities and at considerable intervals, care being taken to avoid the entrance of air.

When *endometritis, peritonitis, fibrous tumors of the uterus, or cystic degeneration of both ovaries* are the causes of amenorrhœa, they, and not it, should be treated.

When this affection is dependent upon *chlorosis or anæmia*, these should be first treated by generous diet, exercise in the open air, and the various preparations of iron; and when by these means the system is brought up to its normal standard, if menstruation does not take place spontaneously, it may be promoted by the application to the uterus of a local stimulus, as of electricity.

On the contrary, where amenorrhœa results from *plethora*, a restricted diet, activity, free air, and even venesection may be found beneficial. Nature itself suggests the propriety of this latter course, since when the menses are interrupted or very much diminished for any considerable period, hæmorrhage often takes place from some other part of the body—as from the lungs, stomach, intestinal canal, mucous membrane of the nose or mouth, from the skin, or whatever part may have been most reduced. The greater impulse of the heart and the quickened circulation which always exist at such times in sympathy with the conges-

tion of the organs of generation, increase the pressure against the walls of the vessels and rupture them at the point of their greatest weakness. In these cases of vicarious menstruation the hæmorrhage is commonly more copious than the catamenial flow, and it is apt to induce an anæmic condition requiring the administration of the tonics before mentioned.

If *phthisis, cirrhosis or Bright's disease* be the cause of amenorrhœa, these affections should receive our treatment, for under such circumstances the normal hæmorrhage from the uterus would only be a source of additional weakness.

When this condition results from an *atonic state of the nerves*, the use of nervous tonics, as *nux vomica, strychnia* and similar drugs, is indicated, together with exercise in the open air, liberal diet and the general application of electricity, to be spoken of hereafter. When these have sufficiently elevated the tone of the system, emmenagogues may be useful, foremost among which is the local application of electricity. Other local stimuli which may be advantageously used are the passage of the sound, the introduction of the tent, cupping of the cervix, stimulating enemata and hot baths. These means not only act upon the uterus, but often promote ovulation.

Treatment by Electricity.—In this branch of our subject it will aid us to classify the methods for the application of this agent, and its results, according to the mode of its generation and use, into *statical, galvanic and Faradic*.

Statical or frictional electricity has been employed in medical science for more than a hundred years. But early in the present century it began to be supplanted by galvanism, and still later by electro-magnetism, on account of the inconvenient size of the electrical machine, the influence of the weather upon its action, the difficulty of regulating the quantity required and of applying it only at the precise point where it was needed. For these reasons its use is now generally discontinued.

Galvanism dates from near the close of the last century, and in the very beginning of the present the discovery of the Voltaic pile introduced it to medical science. But this apparatus was soon superseded by the galvanic battery, which is now in general use.

The continuous current is specially applicable to cases in which there is a want of proper development of the uterus or ovaries, or in which there has been an ex-

cessive structural change of the same, as in atrophy of both or superinvolution of the former, and perhaps in some other cases, which the practitioner will readily recognize.

A case is here introduced which came under the personal observation of the writer, and which shows how this current may succeed where other modes of its application fail.

A. D. was aged 20 years, single, domestic, and a native of Ireland. She had been in a chlorotic condition; but this state had been so far corrected in August, 1871, that it was thought advisable to apply electricity as a local stimulant. The menstrual flow had never appeared but once, and then about a year previously; but it continued only one day. Upon bimanual examination, nothing abnormal was found. The Faradic current was applied externally—one electrode to the sacrum, the other to the pubes for five minutes on two successive days, with no marked effect. Five days afterwards, the galvanic current, with six cells of Stöhrer's zinc and carbon battery, was applied externally to the same points for five minutes. This produced, on the same day, pains through the pelvis, with slight hæmorrhage from the genitals. The application was repeated the next day, and the flow became natural. Unfortunately, after this the patient was lost sight of, and therefore the permanent result could not be ascertained.

In this case, why did the continuous current succeed where the interrupted failed? Was it not due to catalysis—that is, to the action of this agent upon the bloodvessels, dilating them, quickening the circulation, and thereby bringing about the flow?

Faradization has but a slight effect upon the sympathetic nerves, which supply the ovaries. Galvanism, however, has a powerful effect upon them; and this, as we have just intimated, is probably the reason why we failed with the former and succeeded with the latter.

But in all cases where galvanism is employed, caution must be exercised: *first*, not to continue the application too long, and thereby produce exhaustion and collapse; the proper length of time is from three to five minutes; *second*, lest too great a persistence in a uniform direction of the fluid should destroy the tissues at the point of application by its caustic action, a result which can be realized only by a very strong current, and which may be avoided by a reversion of it once in from thirty to sixty seconds; *third*, for reasons

just given, too strong a current should not be used. The proper quantity may be ascertained by the galvanometer.

Proper Mode of Application.—In the use of the galvanic battery, one electrode should be applied to the lower portion of the spine, whence proceeds the nervous supply of the parts requiring treatment; the other, either externally to the abdomen in the region of the uterus or ovaries; or internally, directly to the cervix or to the interior of the uterus.

A very convenient instrument for applying the continuous current is the galvanic pessary of Sir J. Y. Simpson, modified by Dr. Noeggerath, and still further by Prof. T. G. Thomas. If the use of this pessary causes excessive irritation, the instrument must be temporarily withdrawn and the current from the battery substituted.

It is not yet decided whether the beneficial results of this pessary are to be attributed to the mechanical effect of the metals or to the chemical action of the current—a question which, it is to be hoped, progressive science may ultimately decide.

Electro-magnetism was first used in 1832 by Faraday, whose name it now generally bears. It was soon after applied to medical science, and re-animated the whole department of electro-therapeutics on account of its special adaptation as a remedy for certain phases of disease, because from the greater tension and diminished volume of its current, it has been found specially applicable to cases where its effects are desired upon the muscles and vaso-motor nerves.

The cases, relative to our subject, in which Faradization is of the greatest benefit, are those of acute suppression of the menses, resulting from undue exposure to cold or wet, from strong mental emotion, and in other cases requiring a local stimulant. It is also useful where an atonic state of the nervous system exists. In many of these cases it should be administered in connection with some other therapeutic agent, as the various tonics, for example.

Proper Mode of Application.—Many writers give the following rule:—One electrode should be applied to the lumbar region of the spine, the other to the hypogastrium. This may be true as a general law, but it requires more minute specification. This rule is correct where the electricity is from the secondary inductive coil, because in this case the course of the current is changed at each interruption; and it makes no difference in respect to the ute-

rus which electrode is applied to either point. But this rule does not apply where the electricity is from the primary inductive coil, because here the course of the current is not changed; and experiment proves that the positive pole should be applied to the lumbar and the negative to the hypogastric regions, in order that the fluid may pass in the same direction as the nerve fibres.

It is advisable first to try this external application, on account of the facility of its use, and for the sake of sparing the delicate feelings of the patient; and it will commonly be found sufficient. But if this is not effectual, resort must be had to its application to the cervix or even to the fundus of the uterus. The advantage of the internal application to the cervix over the external, results from the absence, in that part, of nerves of sensation, and from the consequent opportunity of using a stronger current and applying it to the desired point.

We have an appropriate illustration in the case of M. B., a seamstress, married, who entered the Boston City Hospital, and became the patient of Dr. J. G. Blake, March 25th, 1871. The patient had suffered from the symptoms of anæmia since the birth of her child, two years previously. Upon examination, the uterus was found retroverted, but not specially enlarged, and perfectly free and movable. She was immediately put on tonic treatment. Two weeks after entrance, catamenia appeared, though very slight; none subsequently for three months, although for some days previous to her expectation of it, the usual emmenagogues, and external stimulants to the parts were used. During this third month she had so far recovered from the anæmic state that between the periods when the menstrual flow should have appeared she was comparatively well. On the 5th of July, when the catamenia was expected, until the 8th, Faradization of the fundus of the uterus was practised by the author at the request of the attending physician. A current from the secondary inductive coil, sufficiently strong to produce a pricking sensation in the hand of the operator, was used. The positive electrode was applied to the lumbar region and the negative to the fundus of the uterus.

If any inquire why we did not, in this case, first apply electro-magnetism externally, our answer is found in the advanced state of the catamenial period and in the severity of the symptoms of the patient.

After the second application for five minutes on two successive days, the menstrual flow appeared, and in a few days the patient was discharged from the hospital, "well." She was seen again after nine months, and reported perfect regularity of the menses from the last application.

Brief of other Cases.—The value of these would, in many instances, be greatly enhanced if the causes could have been more fully stated.

We are indebted to Dr. Francis Minot, of this city, for the three following cases in his own practice.

March, 1871. Mademoiselle M. had been regular until eleven months ago, when catamenia ceased without known cause. On the 13th, 14th and 15th of the month, electricity was applied through both hands and from one hand to the opposite foot for five minutes. On the 16th inst., patient reported that the catamenia appeared on the previous evening, in the most natural manner, and still continued.

June, 1867. A. B. had perfectly normal menstruation; none subsequently for sixteen weeks; cause of cessation unknown. On Oct. 2d electricity was applied through both hands, and on the two following days it was applied in a similar manner, and also from each hand to the opposite foot, the current being reversed. On the evening of the latter day the catamenia appeared.

Another case also occurred without known cause. The last menstruation was perfectly normal in time and amount. But here electricity was applied in a similar manner as in the previous cases, yet without any effect.

Dr. Golding Bird reports twenty-four cases treated by statical electricity, the current being passed through the pelvis from the sacrum to the pubes, at intervals of from two to three days. The result was cure in twenty cases, the remaining four being chlorotic.

Drs. Beard and Rockwell report fourteen cases with these results:—eight cured; one approximately recovered; and five not benefited.

Dr. Althaus in his remarks on amenorrhœa reports one case in his own practice, treated by Faradization, which resulted favorably. He also quotes from the *New York Journal of Medicine* of 1844 a remarkable case in the practice of Dr. Le Conte, of Georgia, in which a negress, 70 years of age, in whom the menses had been absent more than twenty years, was treated by thunder and lightning from the Al-

mighty's battery, one charge from which brought on the menstrual flow, which continued regularly for the two succeeding years.

Thus, each form of electricity has its specific action and produces its specific results; and, therefore, the cause of the affection should be sought and well under-

stood in order to apply the agent appropriately.

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