

Original Articles.

SPINAL IRRITATION; PROBABLE CEREBRAL ORIGIN OF THE SYMPTOMS SOMETIMES CLASSED UNDER THIS HEAD.

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THE rôle played by the term spinal irritation has of late been greatly limited. Many cases formerly so classed have found their place under hysteria, and many more under hypochondria, both presumably diseases whose symptoms result from functional disturbance of the brain rather than of the spinal cord. The effort has been made, and with considerable success, to collect the remainder of these "nervous" cases under the term neurasthenia, while the subdivision adopted by some authors into cerebrasthenia and myelasthenia, denotes that some of the symptoms are supposed to be of cerebral, others of spinal origin.

The object of this paper is not to discuss the classification of these diseases, but to consider the relative importance of the brain and the spinal cord in the causation of those symptoms concerned, which are by many authors still attributed to "spinal irritation." It is upon the accurate analysis of these symptoms that the final classification must rest, and until this goal is reached, all efforts to arrive at exact diagnoses, and to distinguish the real from the feigned, will be but groping in the dark. This fact is not recognized by those who depreciate the importance of looking for the seat of the morbid process, and who, inverting the scientific order, propose to separate the real from the feigned among the symptoms before studying the causation and character of those symptoms.

It is the tendency of modern neurological research to transfer to the brain much of the attention hitherto given the spinal cord, but the preservation of the term spinal irritation in prominent text-books shows that there exists a set of symptoms which the medical as well as the non-medical world still ascribes to a disordered "spine." The disease called railway spine includes practically the same symptoms, if we exclude the cases in which real lesion, as hæmorrhage, exists in the cord, and this name expresses the idea that a jar to the spinal column has caused the same symptoms that sometimes follow overwork, mental strain, and the various causes of so-called neurasthenia.

Erb represents the views expressed in many text-books, when he includes under spinal irritation such symptoms as vertigo and headache, sleeplessness, inability to confine the attention, and mental irritability, and states that when the disturbance is high up in the cord these symptoms are more prominent than when it is low down. He assumes that these manifestly cerebral symptoms are dependent upon spinal disorder, although he recognizes the fact that the spinal disorder itself rests upon a mere hypothesis, and states that in the absence of pathological data the theories of spinal hyperæmia, anæmia, etc., must be regarded as merely conjectural.

The line of argument in this paper is intended to show, in the first place, that the presumptions on anatomical and physiological grounds are all in favor of the brain, rather than the cord, as the centre not only of these but also of the more general symptoms ascribed to spinal irritation; and in the second place, that in point of fact all the symptoms can be more satisfacto-

rily explained by supposing functional disturbance in the cerebral than in the spinal centres, while many of the symptoms can be explained only in this way. If these conclusions be established, we must look to the brain as the chief centre of the difficulty, and the cord as playing, if any, a subordinate part.

It should be premised that we cannot hope as yet to arrive at the exact pathology of the disorder in the cerebral centres. The distinctive characteristic of these cases is the absence of demonstrable lesion. Whether these functional affections of the nerve cells are due in the various cases to malnutrition (as in lithæmia), to vaso-motor irregularities, to molecular disturbance (as in concussion), or possibly to irritation through the sympathetic nervous system from abdominal or other organs, are subjects at present under discussion. It is highly improbable that any one pathology will be found applicable to all cases; perhaps all of the above causes play their part separately or in combination, so that each case must be analyzed by itself.

These symptoms may be practically considered peculiar to the human race, although they perhaps obtain to a certain degree among animals below us in the scale of development. This fact leads us to inquire what part of the nervous system is most fully developed in the higher animals, and what part is peculiar to the human race?

The answer is easy. The development of the cerebral hemispheres is not only the most distinctive feature of the higher animals, but it is the one peculiarity which gives man his supremacy among them.

On the surface of these hemispheres lie the nerve cells which constitute the final centres of sensation and motion, and which are generally acknowledged to be the seat of the mental processes. It is these delicate centres which are probably the chief sufferers in the nervous cases under consideration. It is not claimed that the spinal cord of man is on exactly the same plane of development with that of the lower vertebrates. Allowing, however, a considerable superiority in the spinal centres in man over, for example, those of the dog or monkey, we must still consider the difference trifling as compared with the difference between the brain of such an animal and that of man.

These facts do not in themselves show that all functional nervous symptoms peculiar to man come from the brain; they should, however, be taken into consideration in looking for the seat of symptoms which admit of explanation by either cerebral or spinal disturbance, especially when such symptoms are accompanied, as they almost invariably are, by those of evidently cerebral origin. As an example, a certain case presents among other symptoms mental irritability and local anæsthesia; the latter can be explained as arising either from the brain or the spinal cord; the former cannot be explained without the brain. The presumption is therefore in favor of the brain as the seat of both symptoms, whereas the old classification would attribute both to the spinal cord.

The ætiology of these cases is instructive. Lively emotions, mental distress, unrequited love, are mentioned by many authors as exciting causes of spinal irritation. Now the supposition that such stimuli as these affect the spinal cord, excepting through the brain, is absurd; but we have become so used to associating these symptoms with the spine as to have overlooked or forgotten the fact that the brain is the organ

primarily affected. It requires no stretch of the imagination to assume that the highly organized and exquisitely sensitive cerebral centres whose function it is to receive and interpret the stimuli which give rise to the mental processes may be disturbed in the exercise of their functions when such stimuli become excessive. In fact, the delicacy of organization which the cerebral nerve cells *must* have to perform their complicated functions furnishes alone a strong presumption for attributing to them the irritability and depressibility hitherto ascribed to the spinal cord, an organ containing only the lower reflex centres, which preside over functions possessed by man in common with animals far below him in the scale of development.

Trauma, in the form of falls, blows, and collisions, figures largely in the ætiology of these cases, and the nervous symptoms following a jar to the whole body have been for some time attributed to disorder in the cord, under the name of railway spine. It seems, probable, however, that "railway brain" would be a more appropriate term, first, because these delicate cerebral nerve cells must be more susceptible to a jar than the lower spinal centres; and secondly, because the spinal cord, an organ light in weight, hangs suspended in a large amount of fluid, loose areolar tissue, and a plexus of veins, while the comparatively heavy brain lies almost in contact with its bony case, rendering its mechanical liability to a shock much the greater of the two.

If the spinal cord were to suffer so severely in man from a moderate jar, we should expect a cat, whose spinal cord is approximately delicate as ours, to show some slight symptoms on falling from a height. Her immunity is probably due to the comparatively undeveloped state of her brain. In point of fact a patient suffering from so-called railway spine always exhibits mental irritability, emotional tendency, and other symptoms of evident cerebral origin. Recent investigation¹ has also shown that unilateral loss of sensation, including the head and special senses, is not unfrequently found among the symptoms, which absolutely establishes, at least in these cases, a disturbance of cerebral function.

There seems to be at present a strong movement in favor of attributing neurasthenical symptoms in many cases to lithæmia or suppressed gout. This by no means interferes with placing the seat of the symptoms in the brain, for the cerebral nerve cells may be safely considered at least *equally* liable with those of the spinal cord, or with any organ of the body, to malnutrition from disordered blood supply.

One other cause of "spinal irritation" should be considered before passing to the symptomatology. This is excessive sexual excitement. The fact that the reflex centres for erection and ejaculation are seated in the spinal cord should not lead us to identify with that region all irregularities connected with the sexual functions. We must not forget that these spinal centres are in connection with, and to a certain degree subservient to, higher cerebral centres. This is evidenced

by the fact that erection itself, while capable of being brought about in a purely reflex way, may also be produced by a thought. On the other hand it may be inhibited by a fear, as, for example, the very fear of not being able to perform the act of coitus. This subject will be alluded to again, and is mentioned here merely to remind the reader that the nervous symptoms which sometimes follow excessive sexual excitement may as well be attributed to the shock which these higher centres have received as to injury of the spinal centres connected with the mechanical portion of the sexual act.

All the symptoms of so-called spinal irritation will be found, on careful analysis, to admit of satisfactory explanation by disordered function of the cortical cerebral nerve cells, to whose sensitiveness we have alluded, and which have been stated to constitute the final centres of sensation and motion. Confining ourselves to those symptoms which seem to have been hitherto most plausibly connected with the spinal cord, we shall consider in detail only a few of the more prominent, the rest falling readily into line when analyzed in a similar manner. Such symptoms as hopelessness, morbid fears, sleeplessness, mental irritability, and inability to confine the attention, may be left out of consideration as being obviously of cerebral rather than spinal origin. The disturbances of special sense, as asthenopia, amblyopia, and nervous deafness, may be passed by for the same reason.

Besides symptoms of these two classes no less than forty others are mentioned by Beard in his work on neurasthenia, among which are included, perhaps, nearly all which have ever been attributed to spinal irritation. Among them we find pains in the back, sensitiveness of the spine to pressure, weakness in the back, tenderness of the scalp, heaviness of the loins and limbs, sensitiveness to the weather, special idiosyncrasies in regard to food, medicines, and external irritants, anæsthesia and hyperæsthesia in various parts of the body, and impotence.

The fact that these patients complain of *pains in the back, sensitiveness of the spine, and weakness in the back*, perhaps explains in great measure the association in our minds of all the other symptoms with the spinal cord. These symptoms are, however, among the easiest to dispose of. As far as we know there are no nerve cells in the cord capable of feeling. The cord can, it is true, answer stimuli by reflex action, as is seen in the decapitated frog who withdraws his foot from the acid. We do not, however, imagine that he *feels* the irritation of the acid in the ordinary acceptation of the expression to feel. Certainly no physiologist fancies that a decapitated man feels external stimuli. On the contrary the centres of sensation lie in the brain, and when we feel a pain in the back it is our cerebral centres which feel the pain. This means that a disagreeable sensation is produced by, for example, pressure on the nerve fibres distributed to the regions of the back, whether the external regions, as the skin, or the deeper-seated parts, as the membranes of the cord. That is to say the neuralgic pains in the back belong to the same category as those in the arms, legs, or face, and have nothing to do with the spinal cord itself excepting that the sensory nerves travel through the cord to reach the brain. If, then, the pains are caused by the irritability of any nerve centres it is by the irritability of cerebral, not spinal, centres. These pains, like those of hypochondria, with

¹ "Recent Investigations into the Pathology of so-called Concussion of the Spine, with Cases illustrating the Importance of seeking for Evidences of Typical Hysteria in the Chronic as well as the Acute Stages of the Disease." J. J. Putnam, M. D., Boston Medical and Surgical Journal, September 6, 1883. See, also, the following articles by the writer: "Possible Cerebral Origin of Symptoms usually Classed under Railway Spine," Boston Medical and Surgical Journal, October 11, 1883; and "Case of Typical Hysterical Hemianæsthesia in a Man, following Injury," Archives of Medicine, New York, July, 1883.

which they are really coincident, probably mean that the cerebral centres are so sensitive that the normal pressure of part upon part in the body becomes painful, just as the auditory centres become sometimes so sensitive that the ticking of a clock causes distress, while in the normal condition it would hardly be noticed.

The term spinal irritation, therefore, used as it undoubtedly is to express the idea that irritability of the spinal nerve cells furnishes the basis for these symptoms, is certainly misleading.

Sensitiveness of the spine to pressure has probably no more to do with the spinal cord itself than sensitiveness at the supra-orbital notch in frontal neuralgia. The tender spots over the spine represent the course of the sensitive nerves over the spinal cord, not the nerve cells in the spinal cord. *Sensitiveness of the scalp*, one of the most common symptoms, falls into a similar category excepting that when it occupies parts of the scalp supplied with sensation by nerves which do not even pass through the cord on their way from the brain to the periphery, the absurdity of considering the spine the seat of disorder becomes the greater.

The feeling of *weakness in the back* means probably that the muscles of the back are wearied in holding up the vertebral column, just as any other muscles may tire of performing their functions, and we have no reason for seating the feeling of weariness or weakness in the spinal centres, but must refer these sensations directly to the brain, the seat of all feeling. The sense of *heaviness in the loins and limbs* must be classed with the feeling of weakness in the back, requiring therefore no further discussion.

Special idiosyncrasies in regard to weather, food, medicines, and external irritants may be all classed together as common to hysterical, hypochondriacal, and so-called neurasthenical patients, as well as those suffering from "railway spine." Such patients report the most severe symptoms following directly upon the application of cold water or electricity, and upon the exhibition of drugs in absurdly minimal doses. In such a patient a wet pack may cause weakness and trembling for days, and an apparently alarming prostration may follow a brief exposure to the heat of the sun. Such symptoms are apt to vary greatly in severity according to the solicitude of the family and the interest of the medical attendant, and while they are by no means to be passed by with the mere word "imaginary," they are so obviously to be explained by perversion of cerebral function as to require no discussion in this paper.

Anæsthesia and hyperæsthesia, however limited in extent, may be of cerebral as well as spinal or peripheral origin, and when these disturbances occupy the whole of one side of the body, including the head, they can only be explained as arising from the brain. Now a number of these cases have been found to suffer from unilateral loss of sensation, not only involving the integument of the head, but also the special senses. This fact alone leaves the presumption in favor of the brain as the seat of all the disturbances of sensation.

The last symptom on the list is *impotence*. The lower and higher centres presiding over the sexual act have been already alluded to. Attention has been called to the fact that the spinal centres for erection and ejaculation are under the influence of the higher cerebral centres; that the reflex may be started by a thought and may be inhibited by a fear. While confidence is a necessary factor in the consummation of the sexual act, depression, anxiety, or even the diversion

of the mind into other channels may prevent it. Interesting cases have been recorded in which the thoughts of business or of a mathematical problem have persistently prevented the consummation of the marital relations in persons otherwise healthy. These facts illustrate the close relation between the mind and the sexual activity; and if a mere emotion, or the diversion of the thoughts to other subjects, can render a comparatively healthy man temporarily impotent, it must be allowed that persistent functional derangement of the cerebral centres may cause lasting impotence.

The arguments in this paper tend to show that, —

(1.) The presumptions on anatomical and physiological grounds are all in favor of the brain rather than the cord, as the seat of the functional nervous disturbances, attributed by some authors to spinal irritation.

(2.) In point of fact the symptoms involved are more satisfactorily explained on the ground of cerebral than of spinal disorder.

No exhaustive discussion of the subject has been attempted, but it is hoped that this brief sketch of the main points at issue will serve to throw doubt upon the appropriateness of the term spinal irritation, at least with its present signification. It is believed that the views here advanced are so far in accordance with the tendency of recent neurological research as to meet with general recognition. In this case the mental symptoms in neurasthænia and allied diseases will surely be considered by no one as dependent upon spinal trouble, but will be looked on as indicative of the disturbance of cerebral function which gives rise to these and all the other symptoms. The accurate localization of the symptoms being once determined, the field is cleared for the study of the pathological changes giving rise to the disturbance.

LARGE VESICAL CALCULUS IN AN INSANE PATIENT. REMOVAL THROUGH VAGINA. DEATH ON SIXTH DAY. AUTOPSY.

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PATIENT thirty-eight years of age. Has been insane for over two years. The form of her insanity, chronic mania, with hallucinations of hearing and smell. During the entire period of her insanity patient has been much excited, at times incoherent, and generally very irritable and capricious. For a long time she insisted that there were noises in her ears, and expressed it as her opinion that there was some animal lodged within the external ear. She made many attempts to reach this imaginary animal by inserting rags, hair-pins, sticks, and other foreign bodies. Finally she insisted that there was a skunk in her nose, and that the odor was very perceptible to her. She introduced a piece of stout wire, seven inches long and bent on itself, into the right nostril, and passed it back into the posterior nares. One point appeared at the nostril, and the other curved up and inserted itself between the nasal bones at their junction with the upper lateral cartilages. The blunt end, which resembled the closed end of a hair-pin, was back in the posterior nares. This wire I was obliged to cut an inch within the nasal cavity, and, by making an incision between the two nasal bones, remove one part through the bridge and the other part through the nostril. After this episode