

Case of paralysis as to voluntary motor power of the limbs on one side of the body, attended by hyperæsthesia as regards the impressions of pinching and pricking on the corresponding side of the face : being the result of compression of certain lateral parts of the brain from an intra-cranial aneurism : with observations on "induced" cerebral paralysis / by John W. Ogle, M.D.

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CASE OF
PARALYSIS

AS TO VOLUNTARY MOTOR POWER OF THE LIMBS ON ONE
SIDE OF THE BODY,

ATTENDED BY

HYPERÆSTHESIA AS REGARDS THE IMPRESSIONS OF
PINCHING AND PRICKING ON THE CORRESPONDING
SIDE OF THE FACE;

BEING THE RESULT OF COMPRESSION OF CERTAIN LATERAL PARTS
OF THE BRAIN FROM AN INTRA-CRANIAL ANEURISM:

WITH OBSERVATIONS

ON "INDUCED" CEREBRAL PARALYSIS.

BY

JOHN W. OGLE, M.D.,

ASSISTANT-PHYSICIAN TO ST. GEORGE'S HOSPITAL.

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1859.

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REPORTED BY

HYPERAESTHESIA AS KNOWING THE IMPRESSIONS OF
PAINING AND PRICKING ON THE CORRESPONDING
SIDE OF THE FACE

WITH THE RESULT OF COMPRESSION OF CERTAIN CERVICAL PARTS
OF THE SPINAL CORD AS DETERMINED BY ANATOMY

WITH OBSERVATIONS

ON "INDUCED" CERVICAL PARALYSIS

BY
JOHN W. CROOK, M.D.

ASSISTANT SURGEON TO THE ROYAL INFIRMARY

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1864

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THE results of clinical research into diseased actions, and into their connexion with certain lesions found 'post mortem,' are so far uniform and constant that we have for some time had no difficulty in recognising the positive relation-

ship which obtains between certain affections of one side of the brain, and complete loss or impairment of motor power or sensation on the "opposite" side of the body, to be that of cause and effect, and not merely one of coincidence.

That this relationship might be expected to subsist we are, moreover, taught by the investigations of experimental physiologists into the natural anatomical disposition of various portions of the brain and spinal cord, and in no way more decisively than by the experiments of Dr. Brown-Séquard, recently brought before the notice of our profession in England.¹

According to these delicate and complex experiments (observed with such apparent truthfulness, and exposed so luminously, that they must be regarded, I think, as exhaustive), all the will-conducting fibres passing down from the brain to the voluntary muscles of the body decussate each other at the anterior pyramids.

We are assured by that observer, that "if a section is made longitudinally just at the place of the decussation of the anterior pyramids, so as to divide entirely all the decussating elements, we find that, although the animal lives some time after the operation, it has no voluntary movement at all in any of its limbs, which are almost always the seat of convulsions. A section of the two anterior pyramids is followed by the same results, while a section of the olivary columns, which are chiefly the continuation of the anterior columns of the spinal cord, does not seem to produce a notable paralysis."²

Such relationship, then, appears to be the rule, as determined both by direct experimental research and by clinical observation; and so completely is it generally established, and so naturally is paralysis on a given side of the body expected from injury or disease of the opposite side of the

¹ 'Lectures on the Physiology and Pathology of the Central Nervous System,' delivered at the Royal College of Surgeons in May, 1858.

² See Lecture No. IV, as communicated to the 'Lancet' for July 31st, 1858, p. 111.

brain, that when apparent exceptions are encountered, the bystander is at once apt to conjecture that some error of observation has been committed. In some cases, it may be supposed that after death the entire brain has not been scrutinised with sufficient closeness in the search after morbid lesion; or that the examination of the various nerves has been overlooked; or that the spinal cord, of which some unsuspected affection may have coexisted as a complication, has, for some reason, or without any, been neglected.

But *bonâ fide* cases of exception to this rule are, without any doubt, duly authenticated, and we have instances on record, in which more or less interference with the power of movement or of sensation on one side of the body has been found, after death, to have been dependent upon organic lesion of parts within the cranium on the side corresponding to the paralysis, although our existing knowledge has been unable to afford any valid anatomical explanation of the connexion between the lesion and the symptoms.

In the exceptional cases to which I allude it has happened that the central injury or disease has not been at all restricted to any definite portion of the nervous system; but it is not a little remarkable that there is one portion of the brain, injury of or pressure upon which, if carried to a certain degree,¹ will *invariably* produce as it appears more or less complete paralysis of motor power on the "corresponding" side of the body (provided paralysis be at all produced), and that precise locality is the inferior surface of one of the crura cerebelli along with the commencement of the trigeminal nerve. This connexion has been abundantly substantiated by Dr. Brown-Séquard, who has collected and sedulously collated fourteen cases—which have, by various authors, been placed on record—strikingly illus-

¹ Should, however, neighbouring parts be considerably involved by the direct pressure of such a tumour, or should inflammation produced by its pressure extend at all deeply, we then have paralysis, not on the corresponding, but on the "opposite" side of the body, just indeed as if the affection of the particular part of the crus cerebelli had not primarily existed.

trating the statement. That observer¹ shows, that when a tumour exists between the inferior surface of the middle cerebellar peduncle and the petrous element of the temporal bone, so as to press upon the former without affecting the interior or the superior surface thereof, and at the same time to involve but slightly the neighbouring parts, we have an incomplete paralysis of motor power produced on the "corresponding" side of the body. This is attributable, as he suggests, to primary irritation or excitement either of the crus cerebelli, or of the dura mater, or of the root of the fifth pair of nerves; but most probably it is due to irritation of the anterior (or inferior) part of the cerebellar peduncle.²

In the concluding part of the twelfth lecture above alluded to, a woodcut (fig. 25) is given by Dr. Brown-Séquard of the base of the brain, showing the anatomical relation of the various parts above mentioned, pressure of which by a tumour (at the point marked *c c*) is said by him almost invariably to produce this form of paralysis.

Singularly enough, the case of which I am about to give the details (and the records of which have for some time rested in my note-book, along with the accompanying illustration, Plate VI., uninterpreted, and therefore unused, until rendered significant by reading the lecture above mentioned), exemplifies, to a nicety, pressure upon the exact spot indicated in the fore-named woodcut, by means of an aneurismal tumour, which also implicated the apparent root or central connexion of the fifth cranial nerve, as well as the

¹ Lectures in the 'Lancet,' Dec. 25th, 1858; also Brown-Séquard's 'Journal de la Physiologie de l'Homme et des Animaux,' vol. i, p. 534.

² Dr. Brown-Séquard grounds this view mainly on the fact that the cerebellum into which the peduncle passes is itself capable, under diseased action (although it does not always do so), of producing a similar form of paralysis (see 'Journal,' sup. cit., p. 535). The similar form of paralysis alluded to is that termed amaurosis, which cannot, of course, be an "immediate" one, inasmuch as the cerebellum is neither a centre of volition or sensation, nor yet a channel for the conduction of sensory or motor fibres.

inferior surface of the middle cerebellar peduncle on the left side. This case, which I will at once proceed to relate, was as follows :

Epilepsy ; complete loss of sight for five years ; impairment of the senses of smell and taste on the "left" side ; partial loss of muscular power on the "left" side of the body ; contactile hyperæsthesia of the skin of the "left" side of the face and head ; aneurism of the anterior cerebellar artery on the "left" side, compressing the "left" crus cerebelli, and the contiguous portions, to a slight degree, of the pons Varolii, cerebellum, and apparent root of the fifth nerve.

Previous history.—The patient, Mrs. S—, æt. 46, and the mother of several delicate children, came under my care in December, 1851. She had always enjoyed tolerably good health until the year 1848, when she began to complain of pain at the front and vertex of the head, along with dimness of sight, which was especially worse on stooping, and pain referred to the back of the eyes. Occasionally she would entirely lose her sight for a few seconds at a time, the defect of vision "beginning at the upper part of the eyes," to quote the patient's own words, the upper part of any object regarded becoming invisible, whilst the lower part was still seen. I could not establish the fact that sight had failed more completely or sooner in one eye than in the other. She was also subject to feelings of stupidity and heaviness, which increased from the first. Shortly before I saw her she had had several epileptic seizures, during which she bit her tongue, which lasted about ten minutes, and followed an attack of giddiness ; and it was for one of these attacks that she came under my observation. About one year after the commencement of her illness, she became totally blind of both eyes, and was placed under the charge of one or two oculists.

Symptoms when first seen.—At this time (December,

1851), I found her pale in the face, but she was, however, pleasing in countenance; the mouth was drawn to the right side, the left side of the face and forehead generally being, comparatively speaking, deficient in wrinkles and power of expression. The pupils of both eyes were very large, but equal in size, and with a regular outline, and scarcely at all acted under the influence of light. There was no ptosis of either upper eyelid. The patient complained of great deafness in the "left" ear, but had never suffered from any discharge from the ears. The tongue was protruded in a straight direction. The patient had a want of power in properly blowing the nose, and seemed almost entirely to have lost the sense of smell on the "left" side of the nose; that of taste appearing quite unaffected. As to her mental faculties, she was generally very intelligent and spoke and answered questions fluently and sensibly. At times, however, her memory was deficient, and this was so especially as regarded recent events, whilst most present subjects appeared to the patient, as she said, "far off in thought." Her husband observed that she was wont to understand what was going on at the time, but would also talk of circumstances long past as if they had but just occurred. There was a loss of power, although incomplete, down the whole of the "left" side of the body, and also great *increase of sensibility of the skin covering the left side of the face and head*. This hyperæsthesia of the scalp was constant, and so great that the mere *touch* or pressure of her ordinary bonnet was most painful to her. Pain also existed in the back, but none was complained of in the abdomen. The urine was at times voided with difficulty, and there was an abundant dark-red vaginal discharge. Occasional palpitation of the heart also existed, but the sounds of the heart and lungs were natural; the pulse was regular, although quicker than it should be. The gums and tongue were rather affected with mercury, which she had been taking.

When I next saw her, which was not until March in the following year, she expressed herself as being "better in

health." There was the same distorted condition of the features, the mouth being, as before, drawn to the right side, and the eyes still blind; but she said that she had a "sort of a flash" in the right eye at times, the pupil of which was now larger than that of the left one. There was also a feeling as if something unusual existed behind the eyes, especially the left one. At times, she had pain in the forehead. The memory and senses of smell and hearing were as deficient as before, and a swelling of the right side of the head and neck had come on, which was very tender to the touch, and was at times the seat of a sharp pain darting to the right ear, and giving the sensation of pressure being exercised upon it from within. At times, also, she had a troublesome "twitching of the left arm," which became painful when laid upon in bed; but the limbs on the left side had recovered some of their power, and the increased sensibility of the integuments of the head and face on this side had to a certain extent diminished. The pulse was pretty good; the functions of the stomach, bowels, and liver were active.

In the month of April the pain in the head and neck was much less; but she complained of pain, with a feeling of numbness and stiffness, in all the limbs, and she was often overcome by drowsiness. There was, however, no proper anæsthesia as regards the impressions of pricking, pinching, &c., in any part of the skin. She complained of frequently having very odd sensations, fancying that she had water in the head, which caused pain in lying down; and she frequently thought that she heard the noise of a "sawing" in the head on any excitement. She was also subject to a feeling of sickness in a morning, but this had not amounted to actual vomiting.

In May, I was sent for to see her at Blackwall, and found her not so well, as she appeared to be debilitated by the use of remedies resorted to. In September she still retained the odd feelings before complained of, and frequently had "twitchings" and "contractions" of the muscles at the right side of the neck and shoulders, and of stiff-

ness of the left side of the neck and lower jaw. Anæsthesia, as to pricking, pinching, &c., was wholly absent; but now the sense of taste had become interfered with on the "left" side of the tongue, the power of swallowing remaining good. She told me at this time of her sons having become the subjects of consumption.

After the above date, I never again saw the patient alive. She appears to have gone on much in the same condition for about two years, during which time she had occasional returns of convulsive attacks, but scarcely to have suffered in any way from headache. At the end of the above period she heard of the death of one of her sons, and immediately had a violent epileptic seizure, for which she was attended by Mr. Bain, of Poplar. In a letter, which that gentleman kindly sent to me, he states that for several months she enjoyed exemption from the fits, but in September, 1856, she had one of a very aggravated character, the right side of the body being tolerably quiet, whilst the "left" arm was much convulsed, and the "left" eyelids continually winking. The right eye was, however, kept open, and the pupil of both eyes dilated, both eyeballs rolling about from side to side. The patient died immediately after this violent attack.

Treatment.—As I have before stated, when I first saw this patient she was under the influence of mercury, which, along with small quantities of ipecacuanha, and occasional aloetic purgatives, had been resorted to, under the impression that she was the subject of some form of intra-cranial chronic inflammation. Agreeing in this assumption for some time, I determined to continue this method of treatment, but with caution, combining with it the use of good nourishment. Afterwards, however, especially when I learnt her family history, and found that she became weaker, I discontinued the mercury, and gave her quinine and strychnia, which evidently agreed with her. Under their use, according to her husband, she became freer from pain, her appetite was improved, and her general comfort

and happiness increased. The convulsive attacks appeared to be diminished in duration and number from the use of a seton in the neck, which, towards the close of her life, Mr. Bain judiciously persuaded her to submit to.

Post-mortem examination.—On examining the cranium and its contents, along with Messrs. Bain, sen. and jun., the following condition of things was found. The blood-vessels of the scalp were very congested. The bones of the skull, as also the dura mater and the arachnoid membranes generally, were natural, but here and there the latter membrane was a little thickened at the summits of the cerebral hemispheres. A large amount of clear fluid existed in the ventricles of the brain and subarachnoid spaces, and the superficial vessels of the brain were very full of blood. The brain-substance was healthy to the naked eye, but the large and smaller superficial arteries at the base of the brain were highly atheromatous.

Connected with the anterior cerebellar artery on the "left" side of the brain was an aneurism of about the size of a small nutmeg, resting immediately upon the inferior surface of the left middle crus cerebelli, and indenting, although very slightly indeed, the contiguous structures of the pons Varolii and left lobe of the cerebellum (see Plate VI), which parts at the point of contact were very superficially softened. Moreover, the apparent root of the fifth or trifacial nerve (see Plate VI, fig. 3) was pressed upon by the aneurism anteriorly; and the seventh nerve, on the same side, as it passed forwards at the base of the cranium, was greatly implicated and stretched by it. In shape the aneurism was irregular and somewhat nodulated, its surface being very firmly adherent to the corresponding part of the dura mater at the base of the brain, and, by reason of the rupture of its adhesions, necessitated by the removal of the organ, very roughened. When cut into, it was found to be quite solid and full of firm material, part being altered fibrin of a yellow and pale-red colour, and part being composed of dark blood-clot. It was surrounded by a dis-

tinct resisting but thin membrane, evidently the thickened coat of the blood-vessel, which could be without difficulty dissected off.¹

The optic nerves, commissure, and tracts were very dwindled and softened, and of a semi-transparent yellowish colour, as also was the seventh nerve on the left side, in the neighbourhood of the aneurism.

Microscopical appearances.—On minute examination the atrophied and discoloured optic nerves and tracts and seventh nerve were seen to present, in addition to a few broken remnants of nerve-fibres, a large amount of granular matter and many delicately contoured round and oval-shaped nuclei of small size, with, here and there, a considerable quantity of fatty material.

No proper or healthy nerve-structure was found in these parts. The roughened surface of the aneurism, where adhesions to the dura mater had occurred, presented structures which are commonly expected among rather newly formed adhesions, such as delicate fibres, and also granular and slight fatty matter, with occasional blood-vessels possessing very delicate walls, containing spare elongated nuclei. In some places a few so-called granular corpuscles of large size existed.

In various parts of the brain small capillary vessels were met with in a state of "fatty degeneration," but beyond these particulars nothing unusual was found in connexion with the brain.

Remarks.—Respective of the diagnosis during life in this case, it proved that I was totally in error as regards the exact cause of the symptoms.

I was in no ways prepared to discover an aneurism to be the means of compression within the cranium; but that pressure, from some cause, was being exercised, and that at the base of the brain, I felt quite assured; and I fully

¹ The preparation showing this aneurism of the cerebellar artery will be placed in the St. George's Hospital Pathological Museum, as No. 3, b, Sub-series ii, Appendix to series xxi.

anticipated that we should meet with a scrofulous tumour within the cranium. The nature of the pain, the absence of any great mental disturbance, the blindness, and the existence of facial paralysis and deafness on one side, pointed to the base of the brain as the locality where pressure was being exercised. From the history and appearance of the patient, as well as from the fact that her family were very delicate, and that of her children two had died of phthisis, I was eventually possessed by the opinion that the supposed growth or tumour was, in all probability, one of a scrofulous nature. As regards the various symptoms and their value, the most notable was doubtless the fact of the incomplete loss of power of motion in the arm and leg on the "left" side, that, viz., corresponding with the brain-lesion, and this, too, without true anæsthesia in any part of the body; whilst at the same time there was greatly exalted sensibility of the skin of the face and head on the same side. The dependence of these symptoms upon such a lesion is certainly quite anomalous, and a few words may well be spent on their consideration in reference to that lesion.

In the first place, the character of the symptoms showed that the lesion was, at any rate, a cranial, and not a spinal one; and, as before said, that it was situated somewhere at the lower part of the encephalon. Could the lesion have been considered during life as one of the pons Varolii or of the medulla oblongata, or of the crura cerebri or cerebral hemispheres, &c.?

The admirable and extensive researches of Gübler and Brown-Séquard demonstrate that if a lateral part of the pons Varolii be so greatly affected as to lead to paralysis of motion in the limbs, that paralysis is on the side of the body "opposite" to that on which the lesion exists; and Gübler has pointed out that if facial paralysis be produced in such cases, it is generally "*not*" on the same side as that on which the limbs are affected, but on the side on which the encephalic lesion exists.

Moreover, in injury of this exact portion of the nervous

system, we have produced, as the ordinary rule, destruction or impairment of cutaneous sensibility on the side "*opposite*" to the lesion.

Considering these facts, the intra-cranial lesion in the present instance could not have been looked upon as existing in the pons Varolii, inasmuch as there was altogether an absence of anæsthesia; and, moreover, the facial paralysis was on the same side of the body as the diminished power of moving the limbs; whereas, where it exists along with more or less hemiplegia in connexion with injury or disease of the pons Varolii, it is most frequently observed on the side of the face opposite to that of the paralysis of the limbs. Still less was there evidence of lesion of the central part of the pons Varolii, for under such circumstances we should have had produced loss or diminution of power in the limbs of "*both*" sides.

Nor, again, were the symptoms suitable to lesion of the medulla oblongata, for then we should have had no facial paralysis, unless the cause of pressure had so extended in an upward direction as, in addition to the injury to the medulla oblongata, to affect the junction of the seventh nerve with the pons Varolii. Moreover, in this case, as in the instance of lesion of the pons Varolii, we should, as a rule, have had some degree of cutaneous anæsthesia on the same side as the paralysis of the limbs.

Neither, again, could the symptoms have been considered as tallying with lesion of the cerebral lobes, of the corpus striatum, optic thalamus, or crura cerebri, &c.; for in disease of all of these parts we should expect impaired cutaneous sensibility on the same side of the body as that on which impaired motor power existed.¹

¹ In connexion with this case I have been unable to say anything as regards the temperature of the skin (a subject of such interest as regards the diagnosis of disease or injury of the brain or spinal cord), inasmuch as no alterations in this respect were noticed during life. Nor, indeed, if they had been remarked, is it probable that in so long continued a case they would have been so invariable as to have afforded any reliable data for useful inference.

Seeing then that the symptoms, although indicative of disease of some parts of the base of the brain, did not harmonise with lesion of any of the above-mentioned parts of the encephalon, and also considering that the third, fourth, and sixth cranial nerves were unimplicated (as shown by the complete absence of ptosis or any interference with the movements of the eye-balls), it only remained that some part of the cerebellum or of its crura should have been considered as affected. But inasmuch as the two divisions of the seventh nerve on the "left" side were interfered with in some part of their course (as was obvious from the deafness and the paralysis of the facial muscles), it would seem that the exact point of lesion could not be very far removed from the central line, and therefore (apart from other reasons) it was highly improbable that the cerebellum itself would be its seat.

By the method, therefore, of exclusion or isolation, one would be compelled to locate the lesion in one of the crura cerebelli, and thus in the present case, as well as in the other like fourteen cases to which I have before alluded as having been placed on record, it becomes necessary to establish a relation of cause and effect between the presence of morbid phenomena as regards muscular action in certain parts of the body, and lesions of such portions of the nervous centres as are not known (as far as hitherto has been gathered from the results of vivisection) to possess, in a state of health, any specific influence upon those parts.

It may then be asked,—What explanation can be assigned of the existence of paralysis (more or less complete) of the muscles of the limbs as resulting from lesion of the middle crus cerebelli; and by what tract or nervous channel in such an anomalous case as the present one, has the morbid impression (whatever that may be), caused by the aneurism, been carried *to all appearance* vertically downwards from one side of the brain to the muscles on the corresponding side of the body?

Of course the answer to this question must, in the absence of any anatomical facts supporting it, be purely

hypothetical; but I see no reason why we should not (in the present state of our knowledge) accept the explanation put forth by Dr. Brown-Séguard—that in such a case as the one which I have just related, the paralysis ought to be regarded as similar to what has been termed the “reflex” paralysis due to an irritation of centripetal nerve-fibres in any viscus, any membrane, or the trunk of a nerve; and that it is not, indeed, the result of any “absence of action,” or impossibility from some cause or other, of, or obstruction to, nervous transmission along certain voluntary nerve-fibres in the immediate neighbourhood of the lesion; but, on the contrary, that it is the result of an “excess of action” or irritation, exercised on some particular part, and acting in a direction from the affected region towards and upon some other part either central or conducting, so as (by some disturbance of nutrition, it may be) to bring about a paralysis or cessation of action in the nerve-fibres connected with that other supposed part; just as if that other supposed part had been primarily affected by some cause producing “absence” of its action.

That in such a case as the present one, the phenomena may arise from any implication of the small number of motor nerve-fibres which at a former period were conjectured by physiologists to exist as passing down (according to an ordinary arrangement) in a vertical direction from one side of the brain to the corresponding side of the spinal cord, thus avoiding the interlacement or decussation to which all the other motor fibres in the medulla oblongata are subject, cannot be supposed.

The knowledge which we now possess, attained chiefly by direct experiment, concerning the exact course taken by will-conducting fibres, or at least by volitional nerve-influence, renders such a view completely untenable. But even were motor fibres known to exist as thus in their course escaping the ordinary inter-crossing at the anterior pyramids, still their presence could not be considered as explaining these enigmatical phenomena, because in such a case as the present we have lesion of a part with which volitional nerve-

fibres on their course downwards towards the medulla oblongata have ordinarily no possible connexion.

Can we explain the subject under the supposition that in such a case as the present we have an instance of motor nerve-fibres, or nerve-influence, taking an unwonted or fortuitous course, finding their way in an abnormal manner from the cerebral hemispheres into the crura cerebelli, and getting down to the spinal cord eventually by the restiform bodies, so escaping any decussation?¹ Even allowing the possibility of irregularity of distribution of intra-cerebral nerve-fibres, it can, I think, hardly be maintained as

¹ Of course there can be no abstract difficulty in surmising that in some individual adult persons we may have an irregularity of distribution of nerve-fibres as well within as external to the great nervous centres. This general supposition receives support from the fact, that the intermingling or decussation of nerve-fibres which exists in the composition of the optic commissure is sometimes found in man to be defective, or even altogether wanting, as exists naturally in some of the lower animals. An instance of this observation in the human adult is mentioned by Vesalius, in a section in his anatomical work concerning the Optic Nerve (see vol. i, p. 366, of Boerrhaave's edition); and a small woodcut, showing the total absence of any chiasma, accompanies the description. Another instance is related in the Catalogue of the Museum of the late Mr. Langstaff (see Preparation No. 655). This specimen was purchased by Mr. Hillman, and presented to the Westminster Hospital; but having it removed from the bottle, and carefully examining it, with the help of that gentleman and Mr. Christopher Heath, it was found that the optic commissure really does exist, although, along with the optic nerves and tracts, it is in a very dwindled state. The subject of mal-distribution of nerve-fibres within the nervous centres is also illustrated by cases of deficiency of commissures, as of the corpus callosum, and by those cases (called by the French *Diastématomyélie*) in which, owing to some influence producing arrest, retardation, or perversion of growth, a bifid condition of the human spinal cord remains; a non-union remaining of the two juxtaposed longitudinal columns, of which, at one period in the course of development, the cord consisted. Such conditions of the spinal cord are alluded to by Andral, Ollivier, Vrolik, and many writers on Teratology; and generally occur in cases of acephalia and fissure of the bony spinal column. The subject is, moreover, exemplified by the fact stated by comparative anatomists, that in fishes the fibres of the spinal cord do not decussate.

affording an explanation of such cases as the one under consideration, inasmuch as it would not be at all probable that such an irregularity or misplacement of nerve-fibres would exist in almost every case in which a particular part of a particular crus cerebelli is injured in a particular manner.

We must then, I think, adopting an alternative course, accept the hypothesis suggested by Dr. Brown-Séquard as explanatory of those cases in which paralysis of the muscles on one side of the body is brought about by lesion on the corresponding side of the brain, and with him assume that the paralysis is one of an irritative character, and produced by an "*excess*" of action.¹ On this form of paralysis Dr. Brown-Séquard has lately to a considerable extent developed his views, whilst considering² the functions of the pons Varolii with reference to its various conducting and dynamic properties. In so doing it will be seen that he has given to this form of paralysis the distinguishing epithet "*reflected*" or "*sympathetic*;" or, again, "*active*" or "*mediate*," placing it in opposition to that other and more usual form which he terms "*passive*" or "*immediate*," and which is evidently the result of pressure immediately applied to nerve-fibres in direct communication with the muscles paralysed.

But under correction of so astute an authority, whilst fully and implicitly allowing the general method of explanation suggested by him to be the most probable one, I would venture to designate this kind of paralysis "*induced cerebral*" paralysis, thus bestowing upon it a title less likely than "*sympathetic*" to create confusion between this variety of paralysis, and that other of which, having its origin in

¹ The frequent existence of twitching or contraction of the affected limbs accords well with the supposed irritative character of the cause of the paralysis.

² See the valuable papers in his '*Journal de la Physiologie*,' entitled "*Recherches sur la Physiologie et la Pathologie de la Protubérance annulaire*," Nos. 3 and 4, 1858, pp. 523 and 755; and No. 1, 1859, p. 121.

irritation of thoracic or abdominal viscera, or distant surfaces, we know the true sympathetic or ganglionic (so-called) system to be the medium.

The adjective "induced" is, I think, an especially advantageous one, as being more significant and expressive of the nature of the process through which this form of paralysis is supposed to be effected; an action so wholly different from, and indeed opposed to, that which causes the diagonal form of paralysis ordinarily met with. For whereas the term "reflected" would merely imply that the specific kind of action caused by a given lesion being transferred to some central part in another portion of the nervous system is simply reflected or diverted, and by means of efferent nerve-fibres operates on certain distal parts of the frame, we must on the other hand suppose that in these cases of paralysis which I would denominate "induced" the irritative action is carried, by the intervention of commissural fibres, from a given point to another part (and that too of the "opposite" side) of the brain, and there induces a repressive or inhibitory action of some kind or other¹ (but at any rate one wholly different in quality to that which was originally started) of motor nerve-fibres.

Thus, in short, we have an irritative action starting from the point of lesion, and so operating as in some manner or other to paralyse certain motor fibres in the opposite side of the brain, which, decussating at the anterior pyramids, affect the muscles on the side of the body corresponding with the original encephalic lesion.

It remains to consider one or two other symptoms in the case, which, although of minor importance compared with the hemiplegic symptoms, are worthy of special observation.

For instance, the partial impairment of the sense of taste which came on at a late period in the history of the disease, was of course referrible to paralysis of the lingual or

¹ Dr. Brown-Séquard is inclined to look upon this secondary action as producing a disturbance of nutrition upon which the paralysis depends. See the Journal above cited, vol. i, p. 536.

gustatory branch of the third division of the fifth cranial nerve;¹ but the complete integrity of the power of protruding the tongue and of deglutition, and the absence of noticeable interference with the functions of the heart, lungs, and larynx, &c., indicated that the ninth and remaining cranial nerves were uninjured.

Again, the hyperæsthesia of the skin of the face and head on the side of the body corresponding to the paralysis of the limbs was a symptom pre-eminently deserving of regard. This increase of sensibility of the part (so intense that acute pain was occasioned by the mere contact of the bonnet) must doubtless be referred to irritation or excitation of the apparent commencement of that most sensitive of all the nerves of the body, the fifth cranial nerve; and a glance at the accompanying illustration (see Plate VI, fig. 3) will show how this nerve at its point of union with the central nervous mass was pressed upon by the aneurismal tumour.

The subsequent decrease of the exalted sensibility of the skin of the face and head, as well as the partial re-acquirement of muscular power in the affected limbs, were probably due to diminution of pressure, owing to some gradual lessening of the aneurismal tumour in consequence of desiccation and shrinking of its contents.

To irritation of the motor or smaller division of the fifth cranial nerve must also be attributed the stiffness of the lower jaw (the temporal and pterygoid and masseteric muscles being affected).

It is worthy of notice that the nutrition or vascularity of the eyeball on the side affected did not appear to be disturbed.

The attacks of epilepsy to which the patient was subject form also a salient feature in the history of the case, and point decidedly to irritation of some part, it may be of the fifth cranial or some neighbouring nerve, or it may be of

¹ The fact that loss of taste was not complete, whilst the fifth nerve was so considerably affected, appears to corroborate the proof, derived from other sources, that the glosso-pharyngeal nerve (in this case uninjured) is associated naturally with the fifth nerve in the function of taste.

some part of the cerebral membranes to which the aneurismal tumour had become adherent, and to which, as it is well known, so much nerve-influence from various sources is derived. To the frequent epileptic seizures no doubt it was that the defect in the patient's memory was due, as also the peculiar subjective sensations of which she latterly complained.

Finally, the loss of vision is not without interest.

Dr. Brown-Séquard shows that injury of one of the tubercula quadragemina produces a "*crossed*" paralysis of sight, whilst lesion of the pons Varolii, of the cerebellum or its peduncles, causes loss of vision on the side "*corresponding*" to the brain lesion. Can it be that injury to a single crus cerebelli, or to the cerebellum, is occasionally capable of affecting sight in "both eyes," and that simultaneously? The facts of the present case, taken in conjunction with the *à priori* reasonableness of the supposition, as afforded by the peculiar anatomical arrangement of the nerve-fibres at the optic commissure, lend some colour to the hypothesis.

The peculiarity which existed in this case as regards the power enjoyed by the eyes of only seeing certain parts of an object at a time, was no doubt attributable to a partial implication only of the nervous or vascular elements of the retina, in the first instance.

To the above case of paralysis I might have added others of which I have notes, in whose history paralysis of motion, with or without anæsthesia, was noticed as consequent upon disease or injury of the "corresponding" side of the brain.

This case I have selected, partly as being one of a comparatively rare nature as regards the relation between the aneurism and the particular part of the brain affected by it, and partly as being especially adapted, by reason of its simplicity and the freedom from complicating phenomena, to illustrate the general subject of what I have ventured to term "*induced*" cerebral paralysis.

DESCRIPTION OF PLATE VI.

The drawing represents an aneurism of the anterior cerebellar artery on the left side resting upon the middle crus cerebelli, the contiguous parts of the pons Varolii and cerebellum, and the apparent origin of the fifth or trigeminal nerve.

Fig. 1.—The anterior cerebellar artery.

„ 2.—The aneurism.

„ 3.—The root of the fifth nerve.







