of the right hand on voluntary movement. The touch with the head of a pin recognised on both hands, but not quite so distinctly on the fingers of the right hand as on those of the left. The sense of pain and temperature and the power of localising tactile sensation not affected. Objects placed in the right hand (when the eyes were closed) were felt, but their nature was not recognised. The sense of pressure (tested by weights) and the sense of passive movements and of position were lost in the right hand. Left hand not affected. Heart normal.

CASE IV.—M. H., female. Dilated heart, mitral systolic murmur. History of left-sided hemiplegia of sudden onset, complete recovery from the paralysis. Tactile and painful sensations recognised in the left hand quite well, but inability to tell the nature of objects placed in the hand, the eyes being closed.

CASE V.—E. R., female, aged 37. Cardiac dilatation, mitral systolic murmur, right-sided hemiplegia of sudden onset; recovery almost complete, only the slightest impairment of the grasp of the right hand remained; tactile and painful impressions recognised in the right hand quite well, but loss of the stereognostic sense.

NATURE OF THE SYMPTOM.

Whenever there is marked tactile anæsthesia in the hand the patient is unable, of course, to tell the nature of the objects placed in the hand. But the cases now under consideration are those in which the patient is able to feel tactile sensations on the hand quite well, and yet is unable to tell the nature of the object (the eyes being closed). Not only is he unable to give the name of the object, but he does not recognise its nature. A patient once described the condition to me as follows: "I can feel it (a coin placed in the hand, the eyes being closed) quite well; I know there is something in the hand, but I cannot 'picture' it."

Complete motor paralysis of the hand may be present and yet the patient may be able to recognise the nature of many objects placed in contact with the affected hand when the eyes are closed. Also when there is a considerable diminution, but not total loss, of tactile sensation in the hand, the stereognostic sense may be but little affected, and when there is marked inco-ordination of the movements of the fingers, as in Friedreich's disease, this sense may be unaffected.

In the normal condition the nature of many objects may be recognised by tactile impressions alone. Thus if various flat objects be placed on the table, such as coins, flat boxes, books, etc., they may often be recognised (when the eyes are closed) by simply bringing the fingers or hand in contact with them. Some objects—such as a cube or ball—can only be recognised when the fingers are moved so as to grasp or handle them; in the recognition of other objects the weight or sense of pressure gives much assistance. The power of recognising objects placed in the hand, when the eyes are closed, is probably an associative process dependent on tactile sensation, on the power of localising tactile impressions, and on muscular sense, and sometimes, in addition, on the sense of pressure; but this power (stereognostic sense) may be lost, and yet the separate forms of sensation just mentioned, as well as the sensation to pain and temperature, may all be normal (as in Case II). I have previously pointed out that in reference to general sensibility, the loss of the stereognostic sense appears to be analogous to the condition of word-deafness in reference to auditory impressions.¹

SYMPTOMS ASSOCIATED WITH THE LOSS OF THE STEREOGNOSTIC SENSE.

In the 5 cases which have come under my observation the results were as follows:

Motor Symptoms.—Slight paresis of the affected hand was noted in 1 case, but in the other 4 paresis was absent at the time of examination. In two of the cases there had been hemiplegia, and in 1 case slight hemiparesis, which had disappeared. In 1 case there was distinct facial paresis, and in 1 very slight temporary facial paresis, on the side on which the stereognostic sense was lost. In 2 of the cases there was inco-ordination in the movements of the fingers of the affected hand.

Sensory Symptoms.—In all of the cases tactile and painful impressions on the affected hand could be recognised readily; in one case not quite so distinctly as on the hand which was unaffected. In 3 of the cases, tested more carefully, the sense of temperature was normal, and the patient could localise tactile sensations readily. In 1 of these 3 cases the patient could tell the nature of passive movements and the position of the fingers of the affected hand when the eyes were closed, but in 2 cases this sensation was lost. The sense of pressure

(tested by weights) was lost in 2 of the cases and present in a third case.

In the cases of loss of the stereognostic sense recorded by Sailer² and Burr⁴ tactile sensations were felt readily but could not be localised; in Sailer's case the sense of position and passive movements of the fingers on the affected side was also lost. In a case recorded by Olmsted⁵ the sense of pressure was lost, but the patient was able to tell the nature of passive movements.

In the case reported by Sailer there was left-sided hemianopsia. Case II recorded above is of much interest, because, apart from the blindness left by the optic neuritis, there were finally no symptoms, motor or sensory, except loss of the stereognostic sense—sensation to tactile impressions, pain, temperature, the power of localising sensations, the sense of pressure and position being normal.

NATURE OF THE LESION.

In 2 of the cases which have come under my own observation the patient had recovered from hemiplegia due to cerebral embolism; in a third case the lesion in all probability was syphilitic (? gumma); in the 2 other cases the cause was indefinite, but probably thrombosis or embolism. In cases recorded by Dubbers,⁶ Burr,⁴ and v. Monakow⁷ the loss of the stereognostic sense had followed an injury causing fracture of the parietal bone. Oppenheim⁸ states that loss of the stereognostic sense is often met with in the hemiplegia of children which dates from birth or early infancy, and he thinks that in such cases the sense has never been acquired in the paralysed hand.

SEAT OF THE LESION.

Though the exact seat of the lesion causing loss of the stereognostic sense has not been demonstrated pathologically, it is extremely probable that it is situated in the cortex of the parietal lobe. In Case II recorded above there was tenderness on percussion of the skull close to the parietal eminence, just behind the position of the ascending parietal convolution, and there was a history of convulsions commencing in the thumb of the affected (opposite) hand. In Case I there had been pain just behind and below the parietal eminence on the side opposite to the affected hand. In the case recorded by Dubbers a gunshot injury had caused fracture of the right parietal bone; a fragment of the bone had been removed and a depression was left at the lower margin of the parietal bone, at a spot situated between the position of the middle and lower third of the ascending parietal convolution. In the case recorded by Burr the symptom had followed an injury to the head which had caused fracture of the right parietal bone. In the case recorded by v. Monakow the symptom was caused by a blow on left parietal region. An operation was performed and a splinter of bone was found compressing the ascending parietal convolution. In this case there was paralysis of the affected arm as well as loss of the stereognostic sense. In most cases there has been no paralysis of the hand at the time of examination, and it appears probable that the lesion causing loss of the stereognostic sense is situated in the parietal region just behind the arm centre of the ascending parietal convolution.

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- ⁸ Oppenheim, *Lehrbuch der Nervenkrankheiten*, Berlin, 1898, p. 505.

ON THE DEVELOPMENT OF DISTURBANCES OF SENSATION IN DISEASES OF THE SPINAL CORD.

By L. J. J. MUSKENS, M.D. UTRECHT.

THE development of disturbances of sensation of the skin in locomotor ataxy is subject to the following rules:

I. As to the quality, the following changes succeed each other: (1) Retardation of sense for pain;¹ (2) loss of sense for pain; (3) loss of sense for touch. These different stages are studied best on the chest of early cases. The importance of the examination of the region of the thorax was, so far as I

am aware, first pointed out by Sir W. Gowers and Hitzig. Stages 1 and 2 follow each other rapidly; stage 3 supervenes usually after a long interval or not at all. This happens in such a way that in the midst of an area with retardation of pain stimuli a smaller area becomes analgesic. In accordance with this, an area of stage 2 is, at least in early cases, surrounded by a zone of retardation of pain sense;² and an area of the third stage is found as a rule surrounded by an analgesic zone. Frequent changes in involved areas within a short time also are characteristic of the first and second stages. In the first two stages no marked lack of co-ordination is observed in the affected limbs. Wherever this was the case diminished sensation for touch was found. In no incipient case with lost Achilles jerk³ in one or both legs was a normal condition of sensation found in that limb. In all cases with deficient sexual power some disturbance in the sensation of the skin of the genital organs was found.

II. As to the quantity, the disturbance of sensation develops also systematically; that is to say, it follows the distribution of the posterior spinal roots. This has already been suggested by Hitzig⁴, M. Laehr,⁵ Marinesco⁶, and H. Patrick⁷.

Owing to the very extensive overlapping of these roots (quite in accordance with the observations of C. S. Sherrington⁸ in *Macacus*) absolute loss of pain sense in a certain area can be observed only if two or more adjacent roots are involved. In the zones, where healthy overlap diseased roots only relative analgesia and retardation of pain sense is found.

The first roots involved in locomotor ataxy are, with great constancy, the third, second, and fourth dorsal, the fifth lumbar, first sacral, and fourth lumbar; from these localities the pathological process extends upward and downward.⁹

The comparative study of the development of disturbances in sensation in locomotor ataxia and allied diseases is most helpful in locating with greater accuracy the root distribution in certain parts of the human body. We find in many cases in the cervico-dorsal region the same peaks and notches in the border lines as were observed by Head and Sherrington. It appears, however, that the extent of the root areas, mapped out after this method, correspond more closely to the areas of Sherrington than to those of Head; and that, as Head himself and Thorburn have suggested, Head's zones do not correspond to posterior root zones, but to sensory segments of the cord. The cutaneous overlapping is certainly more extensive for touch than for pain; this is in accordance with Head, who worked on entirely different lines.

With regard to this method, the following facts are important:

1. As a rule, the extent of the disturbance of sensation in early cases is not quite symmetrical; usually on one side one or two more roots are involved than on the other.

2. In early cases of tabes the involvement of another root accompanying an attack of pain or numbness is a rather frequent occurrence. Areas with numb feeling are nearly always found analgesic, at least for quickly applied pin pricks.

3. In cases of advanced tabes persistent healthy root zones are very often observed within large areas of analgesia.

Finally, it is remarkable that the trigeminus area, at least the two upper branches, is very rarely involved; and also, that the nipple in very many cases, though surrounded by analgesic areas, long preserves its sensibility for pain and touch.

The development of disturbances of sensation of the skin described above was observed to occur with very great constancy¹⁰ in nearly 100 cases examined during the last eighteen months in New York and London. Of many of these cases diagrams and photographs were repeatedly taken. No border lines were drawn, but the answer obtained after each individual inquiry was noted down on the skin. These results held good also for many cases of allied diseases (ataxic paraplegia, syphilitic affections of the cord, combined sclerosis). The different qualities of disturbance of sensation were also met with in several cases of other spinal maladies—for example, different forms of myelitis, surgical cross lesions, and even disseminated sclerosis—often extending in the same order as in tabes.

If my observations can be accepted as numerous enough to permit me to draw conclusions, I would say that:

1. Cases of recognisable tabes dorsalis without any change in the perception of the skin do not occur.

2. The first and most constant objective symptoms of the disease are disturbances in the sensation of the above description, and absent or slowly-produced diminished Achilles jerk.¹¹

From the practical point of view we arrived at the conclusion that in suspected cases of tabes incipiens it is hardly of any use to test the sensation for touch, whereas it is of the greatest importance to test with great care the sensations of pain (pin prick), and to inquire also after the existence of retardation of pain perception, especially in the customary chest zone (third dorsal root zone). In three cases, in which the differential diagnosis between tabes and pseudo-tabes had to be suspended, adequate examination according to the above rules proved to be of decisive value.

It is rather strange that thus far in clinical examination, as well as by previous workers in this particular line, the sense for touch was by preference examined, whereas the sense for pain gives far more information; and also that the dissociation of the sense for touch and pain was regarded so long as characteristic of syringomyelia, whereas this dissociation, as I have shown, is a most common phenomenon in nearly all organic diseases of the cord.

As far as the work was done in London, I am greatly indebted to the visiting physicians of the National Hospital for the Paralysed and Epileptics, especially to Sir William Gowers for permitting me to examine the cases fully, and also to the house-physicians for facilitating the work.

NOTES AND REFERENCES.

¹ Examined after the method, described by me in the *Journal for Nervous and Mental Diseases*, July, 1899, p. 424. ² Loc. cit. ³ Compare previous communications in *Belge Médicale*, January, 1899; and *Neurologisches Centralblatt*, No. 23, 1899. ⁴ Hitzig, *Ueber traumatische Tabes*, etc., Berlin, 1894. ⁵ M. Laehr, *Archiv für Psychiatrie*, Bd. xvii, H. 3, 1895, p. 609. ⁶ G. Marinesco, *Semaine Médicale*, October 13th, 1897. ⁷ H. Patrick, *New York Med. Journal*, 1897, p. 173. ⁸ C. S. Sherrington, *Phil. Trans. R. S. of London*, 1898, v. 190, p. 46. ⁹ It is most probable that further anatomical research will throw some light on this peculiar distribution. ¹⁰ Except in one case of so-called high tabes. ¹¹ Examined after the method described by me in the *Neurologisches Centralblatt*, 1899, No. 24.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

THREE VARIETIES OF SKIN TUMOUR EXISTING SIMULTANEOUSLY IN ONE INDIVIDUAL.

I HAVE recently had under my care two cases of epithelioma of the right hand occurring in men employed in gasworks. One of them, aged about 60, presented a somewhat unusual combination of tumours. The three following were present:

1. On the outer aspect of the left hand over the fifth metacarpal bone was a warty-looking growth, which had existed for about five years. When removed it showed microscopically the typical structure of a warty papilloma.

2. Near the inner canthus of the right eye there was a small ulcer with slightly raised edges and smooth base, which had made its appearance ten years previously. Clinically it had all the appearance of a rodent ulcer, and after removal this was confirmed by microscopic examination.

3. Lastly, on the right hand there was an ulcer of some size on the stump of the index finger, which finger had been amputated some months previously for epithelioma. The original ulcer that necessitated the amputation of the index finger appeared about five years before. I amputated the hand above the wrist, and microscopic examination of the ulcer proved it to be a typical squamous-celled epithelioma.

The simultaneous occurrence in one individual of three varieties of skin tumour exhibiting different modes of growth and with different clinical characters seems to me of sufficient interest to justify the case being put on record.

Glasgow.

GEORGE THOS. BEATSON.

FRACTURE OF BOTH CLAVICLES.

FRACTURE of both clavicles is an accident of such rarity that it is worth recording. A gentleman was galloping over one of his harvest fields, and put his horse at a stook; instead of rising to clear the stook it rushed through it, its forelegs got