ON A CASE
OF
EARLY DISSEMINATED MYELITIS

OCCURRING IN THE EXANTHEM STAGE OF MEASLES AND
FATAL ON THE ELEVENTH DAY OF THAT DISEASE.

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REPORT ON THE MICROSCOPICAL EXAMINATION OF THE SPINAL CORD, BY
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JOSEPH W—, æt. 23, a policeman, of previous good health, was admitted under my care at the London Fever Hospital on June 11th, 1885, suffering from measles.

He had felt ill first on the 4th of June. Between that day and the 10th he suffered from cough and soreness down the breast bone, and at the pit of the stomach; but continued at his duty till the 10th, when the rash appeared.

On admission on the 11th the patient had a well-marked measles rash. It was most abundant on the face, neck, and trunk; but was also present on the limbs. There was some crescentic arrangement on the arms; but on the

trunk many patches were confluent, and some areas were as big as a shilling.

The superficial lymphatic glands were enlarged.

There was injection of the conjunctiva, and the nostrils were red and swollen, but there was no actual coryza. The tongue was coated with a thin and creamy fur, and there was slight punctate injection of the palate and fauces. There was no audible rhonchus, but the patient was hoarse, and complained of soreness down the breast-bone, and at the epigastrium. He had no backache, and had had no vomiting.

His pulse was 92, and his temperature 100.8° .

He was kept in bed on spoon diet and ordered some colocynth and hyoscyamus pills, and a linctus for his cough.

His bowels acted freely next evening, and he passed his urine naturally. His temperature on the 12th was 100° F. and 100.2° F. He still complained of pain down the sternum, and at the ensiform cartilage, and was ordered some benzoin inhalations, with a view to relieve it.

On the 13th the rash was fading, but was still very marked, and there was considerable intermediate staining of the skin of the trunk.

There was a slight apex systolic murmur to be heard. The pulse was 76, soft and regular. There were a few râles in the chest. Again the patient's only complaint was of the pain down the sternum and at the epigastrium.

At midnight it was ascertained that he had been several hours unable to pass his urine, it was therefore withdrawn by catheter and found to be quite clear and free from albumen.

His temperature this morning was 100, but rose in the evening to 103.8° .

On the 14th the patient's morning temperature was 103.2° . He was very drowsy. He could be roused, and then answered questions with a little irritability, but presently relapsed into his former drowsy state. He swallowed without difficulty, but required to be persuaded to take food.

His pupils were equal, of medium size, and they reacted somewhat sluggishly to light. There was no ocular or facial paralysis. His tongue, which was dry, brown, and fissured, was protruded in a straight line. The grasp of the hands was distinctly weak, but equal on the two sides. The patient declared he was unable to move his legs. The right leg was semiflexed by Mr. Arkle, the house physician, without giving rise to any pain, rigidity, or spasm, and was found in exactly the same position some hours subsequently.

The patient felt and localised a pinch on the two legs. The plantar-reflex was absent, and no knee-jerk could be obtained. There was no ankle clonus. There was still retention of urine. The urine was withdrawn by catheter and contained a very faint trace of albumen.

On examination of the chest, the systolic murmur before noted was found still present, and it could be traced into the axilla.

There was some deficient resonance at the left base, and weak breathing. In the afternoon I found the condition as Mr. Arkle had noted it. Taking the above signs in conjunction with the entire absence of head retraction, of rigidity of back muscles, and of anything like spasm of limbs, the diagnosis appeared to me against meningitis, and in favour of acute myelitis, with its focus in the anterior grey cornua.

I was the more inclined to this view because, although I had never before seen a similar case in the acute stage of one of the exanthemata, some examples of infantile paralysis had come under my observation, in which the history of onset pointed to their being sequels of measles or typhoid, and I thought that this might be the early stage of such a condition.

Taking that view I did not at this visit regard the prognosis as necessarily grave, so far as life was concerned, but I hoped the general symptoms had arrived at their climax, and looked forward to the subsequent localization of the paralysis in some group of muscles. There appeared no

immediate indication for therapeutic measures except the application of ice-bags to the spine, in addition to the one on the head which Mr. Arkle had already ordered.

During the evening the temperature rose to 104.2° , and thirty grains of antipyrin were given.

In one hour's time there was subsidence to 101.2° , but there was no improvement in the general state. The patient retched at times, but there was no actual vomiting. At midnight he was not quite so drowsy and answered questions slowly but quite intelligently. His temperature was then 99° .

On the morning of the 15th the patient continued less drowsy. His mental state was indeed quite clear. He had had no delirium throughout. He recognised his father, and evidently understood questions, and answered them intelligibly. Otherwise he was much worse. He could only speak in a whisper, and his cough was quite ineffectual, and half suppressed. When questioned as to headache he said he had aching at the backs of his eyes, but his chief trouble now, as from the beginning, was of fixed pain down the breast bone and at the epigastrium, and he said he had a weight on his chest. The paralysis had evidently increased; for in addition to the paralysis of the lower limbs, the absence of reflexes and the retention of the urine, the weakness in the grasp of the hands was more marked, and there was now paralysis of the intercostals so that the upper part of the chest was quite immovable, and the respiration was entirely diaphragmatic.

The tongue when protruded deviated slightly to the left, and there was a suspicion of slight flattening of the right naso-labial fold, but not enough to justify any importance being attached to it.

The pulse was 76, soft and regular. Respirations 28.

The temperature ranged during the day between 100.2° and 100.8° .

The urine was withdrawn, and found free from albumen. The rectum was emptied by enema.

The patient gradually became cyanosed with rapid respiration, clammy sweat, and tracheal râles, and died at 9 p.m. I regret that we had no opportunity of making an electrical examination.

The date of appearance of symptoms may be summarised as follows :

June 4th (first day of illness).—First felt ill.

Between 4th and 10th complained of cough, pain, and tightness referred to breast bone.

10th (sixth day of illness).—Rash.

13th (ninth day of illness).—Retention of urine.

14th (tenth day of illness).—Paralysis of lower limbs and loss of superficial and deep reflexes. Paresis of upper limbs.

15th (eleventh day of illness).—Paralysis affecting intercostals. Death.

The post-mortem examination was made twenty hours after death. Rigor mortis was well marked. There was much staining of the skin, the vestige of the measles rash. The heart was free from valvular disease, the right cavities were greatly distended with coagulum. There was consolidation of the lower lobe of the left lung, and intense congestion with ecchymosis of the trachea and bronchi. The liver showed some pallid areas, and there was a small calcareous nodule in the right lobe of uncertain origin. No syphilitic lesions were to be found in any part of the body. There was no scar on the penis, and no enlargement of glands in the groins, and the tibiæ were natural. The spleen was enlarged and rather soft. The kidneys appeared healthy. The intestines were natural. The calvaria was natural; there was much venous distension of the meninges, but no lymph. The grey matter of the convolutions was darker than natural. The brain-substance generally was unduly soft. The ependyma of the lateral ventricles was very easily detached.

In the spinal canal there was much venous engorgement. On slitting up the membranes no lymph was found. The

FIG. 1.—Portion of left vagus nucleus, showing congested vessel and escaped leucocytes. $\times 180$. L=Leucocytes. N=Nerve-cell. V=Distended vessel.

FIG. 2.—Portion of lateral column in cervical enlargement, showing longitudinal section of a small vessel; perivascular space distended and full of red blood-corpuscles; hæmorrhage into surrounding tissues. $\times 500$. C=Clot in centre of vessel. NF=Trans. section of nerve-fibre. Ng=Neuroglia cell. R=Red blood-disc. PV=Perivascular space. V=Distended vessel.

FIG. 3.—Portion of anterior cornu in lower dorsal region of cord, showing small hæmorrhages into grey substance. $\times 225$. F=Fibrinous exudation. H=Hæmorrhage. V=Distended vessel.

FIG. 4.—Transverse section of anterior root of a spinal nerve from dorsal region of cord, showing distended vessel. $\times 380$. C=Clot in vessel. V=Distended vessel. MN=Medullated nerve-fibres. Non-MN=Non-medullated nerve-fibres.

DESCRIPTION OF PLATES I AND II.

(Case of Early Disseminated Myelitis, THOMAS BARLOW, M.D.)

PLATE I.

FIG. 1.—Transverse section of medulla oblongata. There are several congested vessels in the grey matter of the floor of the fourth ventricle. They are especially noticeable in the region of the left hypoglossal and vagus nuclei. $\times 9$.

Hy = Hypoglossal nucleus.

Va = Vagus nucleus.

V = Distended vessel.

FIG. 2.—Semi-diagrammatic sketch of section of cord in lower cervical region. $\times 13$.

H = Hæmorrhage.

V = Distended vessel.

Showing in both grey and white substance distension of vessels and exudation around many of them. There is a small hæmorrhage in the left anterior cornu.

PLATE II.

Portion of transverse section of lower part of dorsal region of cord (from a photograph), showing—

H = Hæmorrhage into grey matter.

V = Distended vessel.

The distended vessel marked V in the posterior column is surrounded by exudation. $\times 30$.

For this photograph I am indebted to the kindness of Edgar Crookshank, M.B.

whole of the cervical enlargement was swollen and softer than natural.

At a situation corresponding with about the fifth dorsal vertebra, the whole of the cord was diffuent, and it could not be removed intact.

The lumbar enlargement, although it felt tolerably firm externally, was found on section to present some softening in the lateral and posterior columns, and the grey cornua seemed to have been the seat of small hæmorrhages, being discoloured, and in places tunnelled out, and the substance very pulpy.

The cord was hardened in a 2 per cent. solution of bichromate of ammonium, and I have to thank Dr. Penrose for the microscopic examination of it.

His report is as follows :

Examination of the cord shows that the changes are entirely vascular in character, that they are universally distributed, but of greater intensity in some regions than in others. There is great engorgement of the vessels, most of the veins being many times their normal calibre and crammed with corpuscles. Many vessels are surrounded by a zone of coagulated exudation, and beyond this for a considerable distance the surrounding tissues are infiltrated with leucocytes, giving the appearance in transverse section of a series of concentric rings.

Beyond extensive diapedesis there is further evidence of the severity of the congestion, shown by rupture of vessels with subsequent slight interstitial hæmorrhage.

The portion of the cord which had suffered most was the upper dorsal region, which was so soft that it was impossible to make sections of it. From this region the damage seems to have radiated upwards and downwards through the whole extent from the medulla to the lower part of the lumbar portion.

Throughout, the anterior cornua have been most affected, as it is chiefly in them that the hæmorrhages are to be found, but vascular changes in the other parts are nearly as great, and, moreover, are not confined to the

cord, for in both anterior and posterior nerve-roots the vessels are much engorged.

No changes have been found in the nerve-cells, fibres, or supporting tissues of the cord, and staining by Gram's, and the ordinary methods, has failed to demonstrate the presence of micro-organisms.

In the medulla oblongata the changes are very similar to those in the cord, except that no hæmorrhages have been seen. The stress seems to have fallen chiefly on the hypoglossal and vagus nuclei, and, from the sections which have been made, would appear to have been greater on the left than on the right side.

Commentary.

There could be no doubt during life that this patient was suffering from measles, and within a fortnight of his admission a comrade of his who slept in the same room at the police station was admitted to the London Fever Hospital also suffering from measles, which he passed through without complication.

Also the post-mortem appearances and the microscopic examination establish, I think, without doubt the existence of early myelitis.

The changes were, as Dr. Penrose has demonstrated, vascular in character, and they had led to such damage to the cord that in one part it was diffuent and in other parts there was red softening. The myelitis was of the disseminated form, for the lesions found were not along systematic lines but varied in intensity and distribution at different levels and in different regions of the cord. The retention of urine, the paralysis of lower limbs, and paresis of upper limbs, the paralysis of intercostals, the absence of knee-jerks and of plantar reflexes, were all spinal symptoms; and it seems probable that the pain down the breast bone and at the epigastrium, which was complained of by the patient even before the rash appeared,

was also a spinal symptom. The fatal issue may, I think, be referred in part to the involvement of the medulla. The loss of voice, the ineffectual paralytic cough, perhaps even the rapidly developed pneumonia, deserve to be thought of in connection with the damage to the vagus nuclei; and it is possible that the deviation of the tongue to the left which came on under observation may have had some relation to the damage to the hypoglossal nucleus. But although it be granted that the patient was the subject of measles and of myelitis, is it certain that there was any necessary connection between these two affections?

It is fair to state that in reply to inquiries made after the patient's death the father informs me by letter that his son's previous health had been good, but that for a month before his death he had complained of his chest. The patient himself, however, told me positively that his illness dated from June 4th, and only referred to the pain down the breast bone as having troubled him from that time forward.

Further, he had kept to his police duty until the 10th, on which date the rash appeared. I think, therefore, that there is no sufficient reason to suppose that the myelitis dated from a period anterior to the invasion of the measles.

The question now arises, Is there anything in the records of measles and its complications which bears on the case under discussion?

The clinical facts, though not abundant, are more to our purpose than the pathological, which are very scanty indeed. The earliest case in point that I have been able to find is recorded by Mr. James Lucas in 1790.¹ A woman, aged twenty-three, was feverish on the first day of her illness, developed the rash of measles on the third day, the rash was declining on the eighth day, and on the ninth day she became paralysed in both lower limbs. On the tenth day she had retention of urine, obstinate constipation, and a feeling of fullness of the abdomen. The

¹ 'London Medical Journal,' 1790, p. 325.

retention continued and for ten days the catheter was needed. The paraplegia¹ was complete for one week, and two days after that time entirely disappeared. It was ascertained that the same patient, when attacked by smallpox nine years before, had been similarly affected with regard to her limbs and had completely recovered.

M. Liégard¹ relates the case of a child, aged two, who at the beginning of convalescence from measles developed an ascending paralysis of lower limbs, upper limbs, back and neck muscles, with difficulty of mastication and deglutition. There was loss of sensation in the limbs but no affection of sphincters and no convulsions, tremblings, or contractures. The child recovered completely in three weeks.

M. Bergeron² records a fatal case of paralysis after measles. A child, aged three, was admitted to hospital with measles, and in eight days afterwards developed superficial gangrene of one ear. About one month afterwards, when cicatrisation was nearly complete and the child's condition was satisfactory but for a certain amount of languor, she suddenly became paralysed in all four limbs and deglutition became difficult and the voice nasal. Ultimately the diaphragm and respiratory muscles became paralysed and the sphincters likewise, and the child died with asphyxia eleven days after the onset of the paralysis and about sixty-two days after the onset of the measles.

Post-mortem examination showed extensive pneumonia. The brain was congested, but no microscopic change could be detected by Ranvier. The cord is said to have presented very marked congestion, and this was attributed by M. Bergeron to the asphyxial condition, but no record is given of any microscopical examination.

The question may now be asked, Can any light be thrown on the present case by records of nervous complication in any of the other exanthemata?

A most satisfactory parallel is forthcoming in the first

¹ 'Gazette des hôpitaux,' 1859, p. 562.

² 'Gazette des hôpitaux, 1868, p. 5.

fatal case recorded by Westphal¹ in his paper on "Disseminated Myelitis."

A man, aged thirty-two, on the eleventh day after the first appearance of the rash of smallpox, had incontinence of urine. On the twelfth day he had retention of urine and paralysis of the left lower limb. On the thirteenth day both lower limbs were paralysed. Within the next few days he had involuntary defæcation. On the seventeenth day a sacral bed sore developed. The motor paralysis was complete, but sensation was only diminished. There was a feeling of constriction round the abdomen from the navel outwards. The muscles of the lower extremities responded to a strong induced current.

Catheterism was necessary and cystitis developed. The bed sore increased. Rigors and pyrexia set in. The sensorium became blunted and the patient died four weeks after the onset of the paraplegia. At the autopsy the bed sore was found to have extended down to the sacrum and the trochanters.

The pia mater of the brain was cedematous and moderately opaque in the sulci. There was no focus of disease in the hemispheres or medulla. The membranes of the cord were soft. There was marked congestion of the grey substance. In the lumbar region considerable difference was observed between the grey substance of the right side and that of the left.

Whilst the right anterior and posterior cornua were of the usual grey colour the left horns were of a dark reddishbrown. This condition extended up to the lower dorsal region. Above this the dark colour was manifest in the grey cornua of both sides. Higher still the normal colour reappeared. In the upper dorsal region there was a considerable extent of softening, so that the left anterior horn, with a little of the left posterior horn, was actually hollowed out. There was also slight hollowing out, consequent on softening in the right anterior horn.

¹ 'Archiv für Psychiatrie,' Bd. iv, 1873, p. 338.

The white substance was very pale but showed no other naked-eye change. On microscopic examination the blood-vessels were found remarkably dilated, filled with blood-corpuscles, and invested with sheaths of granular corpuscles. There was extensive infiltration of these granular corpuscles, especially in the grey matter, which throughout was prominently and often exclusively affected. In the irregular walls of the hollowed-out regions there was a great heaping-up of granular cells.

No hæmatoidin crystals were to be seen, and the dark brown colour in the softened regions was found to depend on the enormously distended vessels sheathed with granular cells.

The ganglion-cells were natural.

It will be observed how very remarkable is the resemblance in many respects, both clinical and pathological, between the above case and the one under discussion—the differences being rather of degree than of kind, and corresponding with the more acute and rapid course and the more extensive involvement of the nerve-centres in my case as compared with Westphal's. There is a second case, recorded by Westphal, of paraplegia commencing about three days after the beginning of the rash of small-pox and in which, post mortem, myelitis was found especially affecting the lateral columns, but as this case diverges considerably, both clinically and anatomically, from the one under discussion it need not further be considered.

I think enough has been said to justify the view that the myelitis in my case was not a mere asphyxial effect but an integral part of the acute specific disease from which the patient suffered. Whether it was produced by micro-organisms which we assume to be concerned in the other phenomena of measles I will not presume to say, but, at all events, its evolution was very nearly parallel with the skin and respiratory mucous membrane affections of the disease.

There only remains for me to ask the question (which has been partly broached by others) whether cases like

the one under discussion may not be regarded as a middle term between two clinically well-recognised spinal sequelæ of acute specific diseases.

The first group, originally described by Westphal,¹ comprises cases which present symptoms very like those of multiple sclerosis, the said symptoms being definite sequelæ of smallpox and typhoid.

To this group there have been added by subsequent observers more or less similar cases accompanying or following measles, scarlet fever, pneumonia, ague.²

It has been cautiously suggested by Westphal in one of his papers that a slighter degree of mischief than that found in his cases of fatal disseminated myelitis might have given rise to changes which eventuate in something resembling multiple sclerosis.

The second group of spinal sequelæ of fevers to which I refer comprises cases resembling infantile paralysis. Westphal is very careful to emphasize that in his first case of disseminated myelitis there was no damage to the great ganglion-cells, and the same fact obtains with regard to the case under discussion.

But it is easy to understand how such a vascular storm as we have pictured before us, if a little more localized in the anterior horns, might have swept away a number of ganglion-cells and thus induced atrophy of separate groups of muscles in relation to them.

Of such atrophies, in every respect resembling infantile paralysis, we have a fair number of cases on record as sequels of the acute specific diseases.

¹ 'Archiv für Psychiatrie,' Bd. iii, 1872, p. 376.

² For further cases and for bibliography of this group of nervous sequelæ (in which symptoms resemble the clinical type of multiple sclerosis), vide Whipham and Myers, 'Clin. Trans.,' vol. xix, 1886, p. 164.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' New Series, vol. ii, p. 146.)