A CASE OF ACUTE POLIOMYELITIS IN AN
ADULT, WITH MARKED BULBAR AND OCULAR
SYMPTOMS: MICROSCOPICAL REPORT.

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G. C., male, aged 26, was admitted to St. Thomas's Hospital on October 21, 1906.

Neither the family history nor the patient's previous history contained anything of importance. Four years earlier he had suffered from inflammation of the bowels for five days, but there was no other history of any serious illness.

The present illness dated from October 16, when the patient felt chilly and suffered from frontal headache, with pains in the limbs. Though able to go to work next day, he felt ill and took to his bed in the evening.

When seen by Dr. Kitchin on October 20 the headache and pains had disappeared, but he complained of sore throat and weakness. The fauces, however, were clean, the palate moved normally, and there was no alteration of speech or difficulty in swallowing.

The temperature was normal, the pulse 80. By the evening there was regurgitation of fluids through the nose. Next day the patient was unable to swallow and coughed up large quantities of very frothy mucus, which he had

great difficulty in expelling. The temperature was 99° F., and the pulse 100.

On admission to the hospital, on the evening of October 21, the fauces were found to be somewhat reddened, the palate was raised poorly on phonation, its right half being slightly flattened, while the uvula was a little deflected.

He was still bringing up large quantities of frothy mucus with great difficulty. The whole right side of the thorax moved badly, especially in the lower part. Over the base of the right lung, both in front and behind, the percussion note was impaired and the air entry diminished, while over the left lung resonance and air entry were good. A few rhonchi were heard over both lungs.

The heart was healthy, except for a soft systolic murmur over the pulmonary area. The movements of the abdomen were equal on the two sides and fairly good and nothing abnormal was detected on palpation; neither liver nor spleen was enlarged.

Muscular power was generally poor, but not more so on the one side than on the other: no muscular wasting was apparent. The knee jerk on the right side was barely obtained, while that on the left was brisk. The plantar reflex was of the flexor type on both sides.

The reaction of the pupils to light was good but doubtful on accommodation; there was no ocular paralysis. Sensation was perfect everywhere. Micturition was unaffected.

October 22.—He complained of diplopia, but there was no gross ocular paralysis. The reaction of the pupil was absent on accommodation.

The right half of the diaphragm moved badly; the condition of right lung was unchanged. The power of swallowing was completely lost. A considerable amount of purulent material was still expectorated with difficulty.

A culture was taken from the fauces, but no diphtheria bacilli were found.

October 23.—The patient lay in a listless state, taking no interest in his surroundings. The breathing was rapid (56) and shallow, the thorax hardly moving at all. Marked ptosis of eyelids was present on both sides.

Death occurred about midday.

The temperature was raised throughout, ranging from 99° to 100·5°.

POST-MORTEM EXAMINATION.

Lumbar puncture was done immediately after death, but no fluid could be withdrawn. Formalin was injected into the spinal canal at the same time.

Autopsy.—The trachea and bronchi were deeply injected and contained tenacious mucus.

The lungs were in a state of such extreme engorgement as to be almost black, but there was no complete consolidation, and all parts floated in water. Microscopic examination revealed hypostatic pneumonia.

No other naked-eye changes were visible in any organ, and the brain and spinal cord appeared normal. The fluid in the subdural space was slightly turbid, but was not in excess.

Blood cultures.—Several cc. of blood were inoculated on to broth, agar and blood agar tubes at the autopsy, but all remained sterile at the end of a week.

MICROSCOPICAL ANATOMY.

Portions of the brain and spinal cord were subjected to a careful investigation by means of the Nissl method and Busch's modification of the Marchi method. Sections were also examined with Leishman's stain, hæmalum and eosin, and with van Gieson's stain. The vagus, phrenic and anterior crural nerves were examined by Busch's method and also stained with hæmalum and eosin. The muscular system was stained with Scharlach R., hæmalum and eosin, and with van Gieson's stain.

The heart.—No fatty change was present. The pericardium was healthy. There was complete absence of any inflammatory reaction. Most of the muscle cells appeared to be healthy, but a few showed loss of transverse striation and of definite outline of the cell boundary. A few cells showed either degenerative changes in the nucleus, or loss of the nucleus.

The diaphragm.—Scattered fine fatty changes were present in some of the muscle cells. Many of the fibres showed absence of transverse striation and slight fissuring. These stained in a regular manner with eosin, and were mottled when stained by van Gieson's method; some portions of the fibre were coloured red, other portions yellow.

Anterior crural, vagus and phrenic nerves.—Teased preparations were made of the nerves which had been treated by means of the Marchi method. No fatty change was detected. Nothing abnormal was noticed in the specimens stained by the usual methods.

The bulb: Nissl's method.—Specimens stained by means of the Nissl method were sent to Dr. Farquhar Buzzard, who kindly gave the following report: "All cell changes very general, but in most instances early and slight central chromatolysis was a marked feature in a great many of the bodies; this was generally associated with some granulation of the Nissl bodies near the periphery. Swelling of the nucleus and sometimes of the nucleolus was also common. Slighter degrees of change were present in some of the cells of the vagus and hypoglossal nuclei and more marked changes in the nuclei more deeply (dorsal) situated. Some cells belonging to the nucleus ambiguus on the one side were much affected, and especially those which were situated in close proximity to a vessel with much perivascular infiltration. On the other hand, complete chromatolysis and excentration of the nucleus were very rare."

Marchi method.—Scattered fatty change was present throughout transverse sections of the bulb, but more especially in the peripheral portions. Many of the nerve cells contained fat droplets which had gathered together, especially at the periphery of the cells. Some cells contained very large numbers of golden-yellow granules, and others the brownish granules which are so commonly met with in all osmic acid preparations, and of the nature of which it is impossible to give an opinion.

Cervical cord.—Slight Nissl changes, such as have been described in the bulb, were present in the anterior horn

cells, and fatty change was present in some of these cells, but here again it was specially marked at the cell periphery. Scattered fatty change was also present, especially at the periphery of the cord. Some of the blood vessels in the anterior portions of the grey matter were surrounded with fine fat droplets which were also very numerous in the walls of the vessels.

Dorsal and lumbar region.—Similar changes were present in the peripheral portions of the cord, but only very slightly in the nerve cells and around the capillaries.

Nerve roots.—Scattered fat droplets present, mostly of small size. Vessels were full of red blood corpuscles.

Cellular Changes present in the Central Nervous System.

The most striking feature in the specimens stained by Leishman's method and with hæmalum, was an extreme degree of cellular deposit in the perivascular sheaths of the vessels in all parts of the medulla and cord. The large majority of cells which were gathered together in these situations, may be classed as small lymphocytes, that is to say, they consisted almost entirely of a deeply staining nucleus and a very slight rim of cytoplasm. Polymorphonuclear neutrophils were almost absent; basophilic and acidophilic cells appeared to be absent. Plasma cells were present only in very small numbers. A few large mononuclear cells could be seen. The striking feature, therefore, was the enormous collection of lymphocytes in the situations already mentioned. Most of the capillaries were engorged with red blood corpuscles. Only a few showed a small number of white cells in their interior, and these were lymphocytes. Neuroglia cells were present in large numbers throughout the bulb and spinal cord.

The spinal meninges were infiltrated with cells, almost entirely small lymphocytes, and the vessels were engorged with red blood-cells.

SUMMARY.

The findings in this case agree well with the picture of acute poliomyelitis given by Dr. Buzzard in his lectures, and in Wickman's monograph, and bear out to a large extent

FIG. 1

FIG. 2.

their conclusions. The diffuseness of the lesions, not confined to the large cells of the grey matter, and in the white matter causing peripheral fatty degeneration and affecting severely the neuroglia, was well shown; our case also showed the wide extent to which the nervous system may be involved, the brain as well as the whole length of the spinal cord being affected. The bulbar symptoms were the most marked feature of our case, clinically, but the progress of the lesion to an even higher level was shown by the onset of ocular paralysis and the paralysis of accommodation. Unfortunately, no portion of the brain above the bulb was kept for examination.

In all parts examined the involvement of the vessels and the peculiar cellular infiltration of their wall was particularly noticeable. These small round cells were in appearance quite indistinguishable from lymphocytes, and, in our opinion, were lymphocytes, confirming perhaps Nissl's dictum quoted by Buzzard (this number, p. 42). There was at any rate no trace of proliferation of the adventitia, and the cells themselves did not suggest that origin.

A similar infiltration was present and widely spread in the meninges, but nowhere apart from these two situations were such cells to be seen, the proliferating cells of the neuroglia being the only new formed cells in the white matter, except in connection with the vessels.

The fatty changes were particularly well shown at the periphery of the cord, and in the tissues around the capillaries.

The mode of onset of our case, the sore throat, the faucial hyperæmia, the intense congestion of the trachea and bronchi, and the engorgement of the lungs, all point to an infection, taking root primarily in the fauces.

It is to be regretted that attempts at cultivation were, as in the other reported cases, negative, but this may possibly have been due to the presence of the formalin, with which we injected the spinal canal.

DESCRIPTION OF FIGURES.

FIG. 1.

Section of medulla, showing collections of cells in a vessel wall. Obj. $\frac{2}{3}$. Eyepiece "B."

FIG. 2.

Section of spinal cord (cervical region) to illustrate the enormous numbers of "lymphocytes" in the vessel walls, and of coarser and larger cells in the surrounding tissues. Obj. $\frac{3}{4}$. Eyepiece "B."

FIG. 3.

Section of spinal cord (cervical region) showing accumulation of lymphocytes in the spinal membranes. Obj. $\frac{3}{4}$. Eyepiece "B."

FIG. 4.

Section of spinal cord (cervical region), including a blood-vessel containing minute fat droplets in the vessel wall, and in the cells immediately around the vessel. Stained by Busch's method. Obj. Zeiss "D." Eyepiece "B."

FIG. 5.

Section of spinal cord (cervical region) to show the Marchi reaction in the periphery of the cord. Obj. $\frac{3}{4}$. Eyepiece "B."

FIG. 6.

Section of medulla, stained by Nissl's method to show nerve-cells which have undergone degenerative changes. Obj. Zeiss "D." Eyepiece "C."

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.