MENTAL SYMPTOMS IN CEREBROSPINAL MENINGITIS

BY

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During the winter months of 1940-1 three male patients were admitted to this hospital suffering from abnormal mental symptoms which were subsequently found to be due to cerebrospinal meningitis. All these cases were certified before admission. Present wartime conditions, with evacuation, expanding war production, and the congregation in schools and halls of large parties of men and women engaged in civil defence (Underwood, 1940), have given rise to circumstances which are apt to encourage the development of infectious diseases. Among these occurs cerebrospinal fever, a disease whose spread by carriers is notoriously associated with overcrowding. Now, the following three cases have a direct association with the wartime effort, and a description of them may prove of interest and perhaps of assistance to those in charge of the health and welfare of people living under such conditions, and be a guide to the best means of dealing with them.

Case I

A man aged 29. Employed as a labourer at War Office construction works. Slept in hut with other workers. Heavy drinker for several weeks prior to onset of illness. Noticed to be restless and excited two days before admission. Became more restless, confused, violent, and abusive. Regarded by fellow-workmen as suffering from alcoholic excitement. The doctor called in reported him as being restless and abusive, unable to recognize friends who were attempting to pacify him. Patient was certified and sent to the mental hospital. No history of cases of cerebrospinal fever in area where patient worked.

Admitted to this hospital October 30, 1940. Well-developed patient. Mental state confused; restless, violent, and abusive. Resisted examination strongly. Axillary temperature and pulse rate normal. No neurological abnormality observed, nor was any rash present. Shortly after admission given morphine and hyoscine; became quieter and slept for a few hours. On October 31, pulse 120, temperature 101.6° F.; delirium more marked; was fairly quiet with sedatives.

November 1.—Pulse 110, temperature 101.4° F. Restless and irritable. Patient noticed to be lying on side with head slightly drawn backwards. Neck rigidity present, with positive Kernig's sign. Brudzinski's sign was also elicited. A lumbar puncture was done, and showed the cerebrospinal fluid to be under pressure and opalescent. A slide smear and subsequent cultural growth revealed meningococci. Treatment with sulphapyridine begun. Patient made no complaint of headache. Dosage was as follows: 3 grammes of sulphapyridine orally at once; after six hours 2 grammes given four-hourly for twenty-four hours, followed by 1½ grammes four-hourly for twenty-four hours; subsequently 1 gramme given three times daily. On the twelfth day the dose was reduced to 2 grammes daily for three days, and then discontinued. The total amount of the drug given was 54 grammes. Except for initial cyanosis no other untoward symptom was observed.

Progress.—During second and third days remained delirious, with moderate degree of cyanosis. Able to swallow fluids well. On November 4 less confused, but still restless, able to answer questions slowly. Temperature 102.2° F. Slight headache.

November 8: Temperature normal; improvement continues; much clearer mentally, with rational response; some neck rigidity still present.

November 23: Progress continues to be satisfactory; rigidity completely gone; mentally normal; weak physically; allowed up for short time.

January 17, 1941: Physical condition now normal; mental state normal; to-day discharged from hospital as recovered. A post-nasal swab examined on December 31, 1940, showed no meningococci.

Case II

A man aged 52. Employed as ordinary seaman on coastal steamer. Had been taking alcohol. Captain of steamer stated that at 6 a.m. on November 10, 1940, one of the seamen reported that patient was ill and had been restless all night. Two hours afterwards mate went ashore for doctor. Patient was restless, throwing the bedclothes about; could not answer questions. Doctor reported that he behaved strangely, was unable to understand or answer questions put to him, and must be removed as unfit to travel at sea with his vessel; he regarded patient as suffering from delirium tremens.

Admitted to this hospital in evening of November 10. A heavily built man in state of muttering delirium. He was in a filthy state owing to general incontinence on way to hospital. Temperature subnormal; poor pulse. No stiffness of neck or any sign of rash. Restless night. Coma deeper in morning of the 11th. Cyanosed. Pulse poor. Temperature suddenly rose to 103° F. Slight degree of neck rigidity now present. Lumbar puncture performed. Cerebrospinal fluid opalescent; some blood. Slide smear showed numerous polymorphonuclear leucocytes, meningococci, and a few pneumococci. Treatment with sulphapyridine begun immediately.

Dosage and Progress.—2 grammes sulphapyridine intravenously, followed by 1 gramme six hours later. Rectal salines with 5% glucose and general stimulants used, but heart began to fail, with increased congestion of lungs. Patient died in early hours of following morning.

Necropsy.—Arachnoid thickening, especially over vertex of brain. Cerebrospinal fluid increased in quantity and opalescent. Thin pus in ventricles. Intense congestion of meninges and numerous petechial haemorrhages in white matter of brain. Some purulent lymph on under-surface of cerebellum. Signs of fracture of skull looked for since pneumococci present in cerebrospinal fluid, but nothing found. Lungs showed congestion. Heart enlarged; muscle pale and flabby.

Case III

A man aged 41. A labourer on Admiralty construction scheme. Living in own cottage with wife. Had been receiving attention at home for several days for "influenza." Nursed by wife. On morning of day of admission became extremely restless, getting out of bed, and wife was unable to manage him. Patient was therefore sent to the local Poor Law institution, whence he was transferred to this hospital. It was stated that he was violent and unmanageable, and that four firemen had to hold him down. He had been taking alcohol recently.

Admitted on March 3, 1941, as certified patient. Slightly build. He was confused and irritable, and wanted to be left alone, lying curled up on his side in bed. Persisted in covering his head with the bedclothes, and resisted examination. Did not complain of any headache. It was noticed that he held his head stiffly and that he could not be made to put his chin on his chest, the neck muscles being rigid. Meningitis was thus suspected. Kernig's sign and Brudzinski's neck sign were present. Temperature 99° F.; pulse 80 and full. No rash observed. Lumbar puncture showed the cerebrospinal fluid under pressure and milky in appearance. A diagnosis of cerebrospinal meningitis was made and treatment with sulphapyridine immediately started. Subsequent slide smear and cultural growth showed meningococci in large numbers. 1 gramme sulphapyridine was given intramuscularly; followed by 3 grammes by mouth four-hourly for three doses; then 1 gramme four-hourly for forty-eight hours, followed by 1 gramme three times daily for five days; total amount 37 grammes.

Progress.—March 28: restless and irritable during first three days of treatment; able to respond, though reluctant to do so; took fluids well; temperature did not rise above 99° F.; visual hallucinations present; stated he could see policemen in the

room above him, and also insects crawling round the room. On April 2 was quite amenable; pleased when spoken to, with a polite response; temperature normal; some headache and stiffness of neck; eating and sleeping well; hallucinations disappeared, although remembers having them; herpes labialis present. April 9: temperature normal; mentally clear; allowed up for a short time; no noticeable neck rigidity. On April 28 the patient had completely recovered, and was discharged that day.

Incidence of Cerebrospinal Fever in Wartime

Wartime conditions are demanding an increased industrial output, shipping movements, and constructional undertakings. To fulfil these has meant the concentration of workers in numbers never previously contemplated and in areas where accommodation, more particularly at night, has often proved far from adequate. This has led to improvised billets, which vary from wooden dormitory huts to commandeered mansions in which very often some degree of overcrowding exists, with poor ventilation and insufficient sanitary facilities. It is not unnatural to expect that diseases encouraged by such unsatisfactory conditions should increase in incidence. This has been found so, and among such diseases cerebrospinal fever has figured prominently. This disease has for a long time been associated with the camp and barrack environments of military life. Since the beginning of the present war its occurrence has shown a decided increase, as conditions in the early days of general mobilization, with the difficulty of obtaining suitable accommodation, proved a fruitful field for its development. The disease is not, however, confined to active service personnel, but can occur among civilians if they are gathered together under like conditions. It will be noticed that the three cases above are those of civilians who have been working in Admiralty, War Office, and Merchant Service employment.

These cases have been the first of this form of illness to be admitted to this hospital. Each presented superficially a picture of the class of mental illness known as confusional psychosis. In this state the patient appears confused and muddled, does not know where he is or recognize those around him, and talks in a rambling incoherent fashion. Added to this there is usually present a varying degree of restlessness and excitement which may be accompanied by outbursts of violence.

Development and Course of the Illness

Now a number of the patients admitted to mental hospitals are suffering from this form of mental illness, and in them no clearly defined organic disease can be found. It is a confusional state without an organic basis. On the other hand, it is well recognized that this mental picture may arise in the course of acute illnesses of known origin, especially if a prolonged rise of temperature is present. This is well seen in pneumonia and typhoid after the first week, the condition being more usually termed delirium. Exogenous poisons, as alcohol and opium, will produce the state. It is found in puerperal cases. It may accompany diseases of special organs, as the kidney and brain. In this last instance the pathological state may be tumour, or inflammation of the brain substance or the meninges as in the present cases. Here the mental symptoms have an organic basis; they constitute one of the complications of the disease. Cushing (1940), reporting on 124 cases of cerebrospinal fever, noted that 2 patients were very violent and required constant restraint, 4 were noisy, 13 rambling and delirious, 10 irrational and disorientated. Medical officers of mental hospitals at some time in their experience have had to admit cases regarded as suffering from a purely mental disturbance which have turned out to be instances of organic disease, the mental symptoms being only second-

dary. The development and course of the illness are such that the mental symptoms, though really secondary to the main illness, overshadow the true condition, the real nature of the illness being overlooked. In certain cases the cause is recognized, but the mental state is so acute as to prevent the patient being nursed in a general hospital. As previously mentioned, the predominant symptoms most often take the form of confusion, with muttering rambling talk, disorientation, and varying degrees of restlessness and excitement even to the extent of violence. The last two symptoms give most worry to those called in to see such patients. These symptoms are of such immediate urgency that a more detailed examination for a possible physical cause is omitted; the patient is considered to be a danger to himself and perhaps to others, so is sent to the place best adapted for the care of such patients—the mental hospital.

In all three cases reported the mental symptoms held the picture during the onset of the illness. In Cases I and II these developed suddenly without any previous complaint of ill-health and were the first indication of something seriously wrong. Patient No. III had not been feeling well for several days and thought he had "influenza." In him, also, the mental symptoms appeared suddenly. They were chiefly confusion, disorientation, restlessness, and general resistiveness with violent outbursts. Irritability was pronounced. Patients resented any nursing attention and wanted to be left undisturbed. Hallucinations, not usually present, occurred in one case. Photophobia was present. There was a considerable degree of hypersensitiveness and rigidity of back muscles, best seen during lumbar puncture. There was a history of alcoholism in each case. In Cases I and II the doctor in attendance had made a tentative diagnosis of delirium tremens. Case III during the second and third days of illness developed vivid visual hallucinations resembling those found in delirium tremens. These were not present before admission. One wonders if the consumption of alcohol caused a lowering of resistance to the meningococcus, which was most likely harbouring in the nasopharynx of carriers in the vicinity. Alcohol itself can cause acute mental symptoms resembling those found in the present cases, and would of course tend to make a correct diagnosis more difficult. Meningitis was suspected in all cases on finding some degree of neck rigidity and commencing head retraction. The best way to demonstrate this was to try to bend the patient's head forward so as to put the chin on the chest. Kernig's sign and Brudzinski's neck sign were easily elicited. In Cases I and II these signs were not obtained on admission, although the mental symptoms were marked. In Case III the signs were observed on admission. It would appear that mental symptoms may be present for a time before definite signs of meningeal irritation can be elicited. In spite of this, neck rigidity is one of the earliest signs of meningeal trouble. Headache was not complained of at all in the early stage of the illness; it only appeared to a mild extent as the patient's mental state improved. If there is any doubt as to the possibility of meningitis, a lumbar puncture should be done, and this will help to make clear the nature of the illness. The temperature in cerebrospinal fever is of little help in estimating the severity of the illness. The highest temperature in Case I was 101.6°F., settling in a few days. In Case II the temperature rose suddenly as a terminal phenomenon. Case III did not show a temperature above 99°F. It would seem that temperature-taking will not always exclude a serious illness. The pulse rate showed little of note. No rashes were observed, nor did any paralysis appear. Herpes labialis was present in Case III.

Cerebrospinal meningitis often occurs in epidemic form, but is more usually sporadic. Underwood, reviewing a recent outbreak, states that it is very widespread, and there is no county in England and Wales which has not had at least one case. This statement is important, as it affirms that cases can crop up in any district without other active cases being present. This point is borne out in our cases, for, so far as is known up to date, no others had occurred previously; or have arisen since, in the area from which each patient came. Medical officers in charge of the health of workers in large industrial concerns or war undertakings of any sort have a special responsibility in this matter, for it is among such people that the disease is apt to occur, and quite often without any warning. So in any case where sudden mental symptoms develop the possibility of cerebrospinal meningitis should be kept in mind.

Mental Hospitals and Cases of Meningitis

It is the duty of mental hospitals to receive patients suffering from confused mental states as well as from any other form of mental illness, whether the condition be due to known, unknown, or overlooked causes. We may, therefore, draw attention to what is now regarded as the most satisfactory procedure for the admission of such cases. The recovery rate for this type of acute mental illness is high. If the mental state is directly due to an organic illness, and the latter is curable, the mental state will clear up in most instances on recovery from the primary illness. But even where no definite cause can be found the outlook is reasonably good. So there is a distinct hope that these types of case will recover within six months or, at most, a year. Previous to the Mental Treatment Act, 1930, the only means of admitting these patients was by some form of certification with a magistrate's order. This was realized to be a hardship to such recoverable cases, and thus the procedure of admission as a temporary patient was introduced. Here no magistrate's order is needed. All that is required is:

1. A recommendation from each of two medical practitioners, one of whom must be approved by the Board of Control for the purpose of making recommendations. There are such approved doctors in every district. These recommend that the patient be received into the mental hospital for a period not longer than six months, stating that he is likely to benefit by such a period of treatment. Some particulars of the patient's mental state are also required.

2. An application made by a relative or a relieving officer.

3. Statement of particulars as to name, age, etc.

At the end of the six months, and should the patient not have yet recovered, a three-months extension can be authorized by the Board of Control, with a further three months if necessary. If recovery has not taken place at the end of twelve months the patient will either have to be discharged, or be certified in the ordinary way if further detention is necessary. Occasionally it is found that the patient is willing to remain on as a voluntary patient. It may be noted that patients best suited to be dealt with as temporary inmates are those who, through disturbance of their mental functions, are not able to come to decisions themselves: they lack volition; they are confused. Once the mental faculties are restored the patient can then express his own desires; he does not need to be detained any longer. If this method of admission is used in all cases of acute confusion, then even should the case subsequently turn out to be cerebrospinal fever or any other organic illness with mental symptoms there is the satisfaction, on recovery of the patient, that certification has not been resorted to.

Once again these cases show the satisfactory results obtained by the use of sulphapyridine in cerebrospinal

meningitis. Previously this disease was a source of worry as to an ultimate recovery. Before serum treatment was employed the mortality rate was as high as 70 to 80%; now with sulphapyridine, as seen in 200 cases treated by Harries (1940) with this drug, the mortality rate was 11%, the cases being of all degrees of severity. Cases I and III were typical cases, with complete recovery. The difference in amounts of the drug required in the two cases was most probably due to treatment having started earlier in Case III than in Case I. Case II was too far advanced on admission, and the mixed infection made the outlook hopeless. There were no complications that could be attributed to the sulphapyridine medication.

Summary

Three cases have been described which were sent as certified patients to a mental hospital with acute mental symptoms of confusion and excitement. The patients were subsequently found to be suffering from cerebrospinal meningitis.

It is recommended that medical officers in charge of the health of workers who are collected together in large numbers keep in mind the possibility of cerebrospinal meningitis being the cause when sudden acute mental symptoms arise in any of the personnel, especially when the symptoms take the form of confusion, restlessness, and excitement.

All cases of acute confusional psychosis should be sent to the mental hospital as temporary patients only.

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EXPERIENCE WITH THE WILSON AND BLAIR MEDIUM FOR B. DYSENTERIAE (FLEXNER)

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At the time of publication by Wilson and Blair (1941) of their new media for the Flexner group an outbreak of this type of dysentery was in progress in a Yorkshire town. One of the new media was immediately put on trial, with the results here stated. Though small, the figures are worth recording because opportunities to test such a medium under working conditions in this country are few and because the results were unequivocal.

The material was from cases admitted from a general hospital, in which infection first appeared in a children's ward and subsequently spread to a female ward. There were several cases among the nursing staff and several positive stools among clinically uninfected contacts. A few cases were admitted from the general population and from a second hospital. It is probable that the infection was widespread in the town, cases being missed owing to their mildness. This mildness was a remarkable feature of the outbreak. Initially the cases showed typical dysenteric stools, liquid, with much bloody mucus and often no faecal material. Constitutional disturbance was, however, not pronounced, and many cases had clinically cleared up in thirty-six hours. In the first thirty cases there was only one death—that of a senile patient.

All strains of the organism gave acid in glucose and mannite; no change in lactose; indole+. A few strains were inoculated into dulcitate, but they produced no change. All agglutinated strongly with Flexner polyvalent serum I