

ON THE CASES OF CEREBRO-SPINAL FEVER TREATED AT THE ISOLATION CAMP CASUALTY CLEARING STATION

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SINCE October, 1915, to present date, May 9, the total number of true cases have been thirty-nine, diagnosis in each case being verified by bacteriological examinations. Fatal cases were fifteen. Cases recovered and sent to base, sixteen. Number present in camp, eight. Four of these are definitely convalescent and are marked for evacuation. Remaining four are still acutely ill, two of them seriously. The death-rate is 38 per cent. of the total cases. One of us has attended thirty-five out of the thirty-nine. Cases are never evacuated to the base until they are firmly advanced in convalescence and usually have had their temperature normal for several weeks. Of the fifteen fatal cases the bulk were of the so-called fulminating type and were hopeless from their admission, many of them dying within 24 hours to 48 hours after entering hospital, one recent case in $6\frac{1}{2}$ hours' time. Two cases, after apparently progressing towards recovery, gradually became hydrocephalic and died from inanition. Of the twenty cases which have definitely recovered to date sixteen were of a severe type, the remaining four being of a comparatively mild nature. In nineteen of these cases, after recovery there was apparently no permanent physical or mental impairment. In the remaining case the patient was stone deaf. In all cases the duration of illness before admission here varied from a few days up to a fortnight or even longer.

The long duration did not necessarily render the case hopeless, although it is obviously very important to see the cases as early as possible. One case, for example, admitted February 18, 1916, had a history of twelve days' duration of illness. This case was unconscious, with well-marked subsultus tendinum and high delirium, for a week after admission here. He eventually recovered and was evacuated to the base on March 17, 1916. A tolerably common duration previous to admission here has been a week.

We do not think the appearance of the cerebro-spinal fluid can give any criterion as to the severity of the case or otherwise. Some cases with thick pus-laden fluids have proved comparatively easy to cure, and again cases with fluid showing a small amount of turbidity showed the reverse.

We have found that early high delirium is not a good sign, and a temperature

with only small variations between the morning and evening readings is likewise rather unfavourable, but cases with a big swing, say of a few degrees, invariably did well.

Treatment. Daily lumbar puncturing, emptying the spinal canal on each occasion *as much as possible*. We have used this as the routine treatment and continue until all pressure symptoms are gone, such as headaches, and even then, if the temperature is still above normal, continue it until the temperature has been normal for at least four successive days. We always withdraw fluid until it is below the normal pressure, and have seen no bad results, either temporary or permanent, from this. With very few exceptions the patients had a general anaesthetic, chloroform being usually employed. We have found that more fluid can be withdrawn under a general anaesthetic than if nothing was given. The daily dose of chloroform seems to do no harm, for the common rule is to give them chloroform ten or twelve times in successive days on an average, and no bad effects have followed.

At first we used Mulford's, Burroughs Wellcome's, and Parke Davies's serums, but gave them up as we became quite convinced that they do no good, and for a long time treated the cases with simple lumbar puncture. Latterly, we have used the Lister Institute serum made for the War Office, but we cannot say that the results are any better than with simple lumbar puncture.

In February we had ten cases. Eight of them recovered and were sent to the base; two died, making a death-rate of 20 per cent. In April we had also ten cases. One case recovered and was sent to the base; four are convalescent and are now awaiting evacuation; three have died; two cases are still seriously ill. The death-rate is then 30 per cent. up to the present (see later note). The February cases had no serum given. The April ones all had serum.

We think that after four daily injections of 30 c.c. of serum it should be discontinued and simple lumbar puncture only done, but it appears to us that this serum no more than the other serums seems to meet the strain of the present epidemic in France. At any rate we have got no better result since using it. It has not modified the symptoms or cut short the duration of the disease. In fact after simple lumbar puncture the patients are more comfortable than when the serum is introduced, which is obvious seeing that by the injection the intrathecal pressure is restored, at any rate to some extent.

For severe pains in any part of the body we have used hypodermic injections of morphia pretty freely with quite good results. For persistent sleeplessness and delirium, common complications in cerebro-spinal fever, we have found a mixture of chloral and bromide quite satisfactory. For irregularity of the pulse and other signs of cardiac weakness, hypodermic injections of strychnine are very suitable. Also half-ounce doses of whisky every four hours have answered very well. When there has been incontinence of urine we have been able to stop it in some cases by using the catheter every three hours or thereabouts thus reducing the risk of bed-sores besides increasing the comfort of the patient.

We have used hexamine extensively in the most of our cases, the dosage being high, 20 grains every four hours, that is, 120 grains in twenty-four hours, and continued it for weeks, in one case for six weeks.

In December and January last we took the cerebro-spinal fluid from one patient who had been having hexamine for four days with a lumbar puncture each day and had the fluid examined for free formaldehyde. The report stated that it was present in the proportion of 22·5 in 100,000 parts. We kept the same patient for seven days on hexamine without lumbar puncturing and at the end of the week collected the fluid, lumbar puncturing only at the end of the seven days, had it examined and found that free formaldehyde was present to the extent of 45 parts in 100,000. We have continued this treatment in the bulk of the cases, as it is obviously of value to have such a powerful bactericide present in the spinal canal. In no case has the hexamine produced any bad effects. One or two of the cases showed haematuria and it was stopped for a time, but as haematuria is a fairly common complication in cerebro-spinal fever and as some cases showed it before they were put on to hexamine it was probably a coincidence.

Dieting has been liberal in quantity and quality. If at all possible, patients, even those with a fairly high temperature, are kept on a solid diet of porridge, fish, chicken, fresh vegetables, eggs, milk pudding, tinned fruit, and so on. We have always emphasized to the nursing staff the importance of plenty of food. The following is what we have been giving to cerebro-spinal fever patients :

7.30 a.m.	10.30 a.m.	12.30 p.m.	3.30 p.m.
Porridge, tea, bread and butter	Soup or cocoa and bread	Tinned chicken or fish, potatoes, milk pudding, fruit (bottled or stewed), bread	2 eggs, tea, bread and jam, cake, fresh fruit
7.0 p.m.			
Fresh chicken or fish and soup. Bread and butter	Through the night milk is given frequently		

In addition convalescing patients are given 10 ounces of stout per diem.

We have kept the bowels freely evacuated, and if a day passed without a motion laxative medicine was given the same evening. The comfort of these patients has been specially studied. We put them all on beds, with frequent changes of body and bed linen. As soon as they are fit, books and periodicals are provided, and if at all possible we have allowed them cigarettes and in certain cases a pipe and tobacco. We have insisted on one orderly at least being always present in each ward night and day, and we have used every endeavour to keep the patients ignorant of the true nature of the disease, our intention being to keep the patients' attention away from their disease as much as possible.

Cerebro-spinal fever cases require a good deal of attention, and good nursing orderlies, preferably with experience of the disease, are indispensable.

The points we consider important are :

1. Early diagnosis with consequent early start of treatment.

Date of Admission.	No.	Type of Case.	Result.	Date of Evacuation or Death.	Chemical Tests.			Bacteriological.		Cells present.	
					Appear- ance of Fluid.	Albu- min.	Fehl- ing's Test.	Micro- scopl.	Culture.	Polys.	Monos. Other Cells.
1915											
23/x	1	severe	recovered	10/xii/15	purulent	+	—	+	+	excess	
7/xi	2	severe	death	11/xi/15	purulent	+	—	+	—	excess	
12/xi	3	chronic	death	9/i/16	turbid	+	—	+	+	excess	
19/xi	4	severe	recovered	4/i/16	purulent	+	—	+	—	excess	
4/xii	5	fulmt.	death	5/xii/15	purulent	+	—	+	+	excess	
10/xii	6	fulmt.	death	11/xii/15	purulent	+	—	+	—	excess	
12/xii	7	fulmt.	death	14/xii/15	purulent	+	—	+	+	excess	
15/xii	8	chronic	recovered	7/ii/16	turbid	+	—	+	+	excess	
18/xii	9	severe	recovered	7/ii/16	turbid	+	—	—	—	excess	
19/xii	10	severe	recovered	7/ii/16	purulent	+	—	+	—	excess	
22/xii	11	fulmt.	death	24/xii/15	turbid	+	—	+	—	excess	
1916											
1/i	12	severe	death	15/i/16	purulent	+	—	+	+	excess	
14/i	13	severe	death	18/i/16	purulent	+	—	+	+	excess	
31/i	14	severe	death	12/ii/16	purulent	+	—	+	—	excess	
6/ii	15	light	recovered	10/iii/16	sl. turbid	?	+	—	—	equal numbers	Polys. and Monos.
6/ii	16	severe	recovered	10/iii/16	turbid	+	—	+	+	excess	
7/ii	17	severe	recovered	17/iii/16	turbid	+	—	—	—	excess	
5/ii	18	light	recovered	10/iii/16	turbid	+	—	+	+	excess	
7/ii	19	fulmt.	death	9/ii/16	turbid	+	—	+	+	excess	
18/ii	20	severe	recovered	17/iii/16	sl. turbid	+	—	+	+	88 %	6 %
21/ii	21	severe	recovered	10/iii/16	purulent	+	—	+	+	excess	
20/ii	22	severe	recovered	17/iii/16	purulent	+	—	+	+	excess	
23/ii	23	chronic	death	26/iv/16	purulent	+	—	+	+	83 %	6 %
26/ii	24	severe	recovered	17/iii/16	purulent	+	—	+	+	75 %	10 %
5/iii	25	fulmt.	death	8/iii/16	sl. turbid	+	—	+	—	excess	
19/iii	26	light	recovered	2/v/16	purulent	+	—	+	+	85 %	9 %
27/iii	27	severe	recovered	2/v/16	purulent	+	—	+	+	65 %	23 %
1/iv	28	severe	recovered	2/v/16	turbid	+	+	+	+	87 %	1 %
11/iv	29	severe	convalest.	10/v/16	hazy	+	—	+	+	69 %	18 %
13/iv	30	severe	death	20/iv/16	purulent	+	—	+	+	81 %	8 %
18/iv	31	light	convalest.	10/v/16	purulent	+	—	+	+	84 %	11 %
19/iv	32	fulmt.	death	19/iv/16	sl. turbid	+	—	+	+	78 %	5 %
20/iv	33	severe	death	12/v/16	purulent	+	+	+	+	excess	11 %
21/iv	34	severe	convalest.	10/v/16	purulent	+	—	+	+	excess	
22/iv	35	severe	death	3/v/16	purulent	+	—	+	—	excess	
23/iv	36	severe	convalest.	10/v/16	purulent	+	—	+	+	excess	
28/iv	37	severe	convalest.	14/v/16	purulent	+	—	+	+	excess	
4/v	38	severe	convalest.		purulent	+	—	+	—	excess	
7/v	39	severe	death	11/v/16	purulent	+	—	+	+	68 %	7 %
10/v	40	severe	death	15/v/16	purulent	+	—	+	+	81 %	9 %
12/v	41	severe	convalest.		purulent	+	—	+	+	excess	Very degenerate
15/v	42	severe	doubtful		turbid	+	—	+	+	89 %	5 % 6 %

{ Blood
culture

2. Daily lumbar puncturing, removing as much fluid as possible on each occasion, until all pressure symptoms are gone, and the temperature has been normal for at least four successive days.
 3. Good feeding, preferably solid, liberal in both quantity and quality.
 4. Hexamine in large doses and continued over a long period if necessary.
 5. Keeping the bowels freely evacuated.
 6. Good nursing and constant attention to the needs of the patient.
 7. Treating complications as they arise.
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In continuance of above report two of the April cases have since died. The other five having recovered and been evacuated to the base, the death-rate for April is then 50 per cent. One other case, the last admitted before above report was written, has also died. It was of a severe type, showed no improvement, and death took place in less than four days after admission. Three other cases have been admitted to date, making total number of cases forty-two. One of these has died. This case on admission was maniacal and had at first to be forcibly held down in bed. He died five days after admission. For forty-eight hours before death there was a considerable amount of cardiac distress. In the remaining three cases in hospital at present the prognosis is quite good. One case is practically convalescent, another is greatly improved with temperature down, and the remaining case is progressing satisfactorily. The deaths out of the forty-two cases are thus nineteen, or 45 per cent. This is higher than in above report, but there have been a series of fulminating cases in the last few weeks, and as these appear to occur in cycles, there will probably be now a succession of a less severe type, tending to bring the percentage back to 39 per cent., which has been the average. An indication of this is that the last two cases, although not mild, were of a much less severe nature than the others for a month previous.

We may mention that one case, which was admitted last month, contracted German measles while here. He recovered and was sent to the base. This is the first case of cross-infection which has occurred here, although the hospital has occasionally been crowded.