THE CHEMOTHERAPY OF INTRA-CRANIAL INFECTIONS

IV. THE TREATMENT OF PNEUMOCOCCAL MENINGITIS BY INTRATHECAL ADMINISTRATION OF PENICILLIN*

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In a previous study,¹ penicillin administered intrathecally, even in relatively small doses, was found to be beneficial in experimental staphylococcal meningitis in dogs. We wish here to report a similar study of meningitis due to the pneumococcus, Type I.

A virulent strain of this organism was inoculated into the cerebrospinal fluid of a number of successive dogs until the resulting meningitis was relatively consistent in its course, nearly always terminating fatally in two to seven days, with viscid, grossly purulent cerebrospinal fluid. A large amount of an eighteen-hour culture of the organism (in saline suspension) was then sealed in sterile glass ampoules and preserved in the frozen state, as with the cultures of staphylococci previously reported.¹

Meningitis was produced in a number of groups of ten to fourteen dogs by injection of approximately 3,000,000 pneumococci into the cisterna magna. Half of each group of animals was treated, the remaining half was used as controls. Daily (or more frequent) cultures of blood and cerebrospinal fluid were made, clinical observations were recorded and necropsy was carried out at the termination of all experiments. Histologic studies were made on most animals. Surviving animals were sacrificed only after cultures had been sterile and symptoms absent for at least ten days.

RESULTS

Control experiments were strikingly similar in most groups. Only two of forty-six control animals recovered (4.3 per cent). Death occurred within three days (usually on the third day) in nearly half and from three to seven days (usually on the fourth or fifth days) in nearly all the remainder.

In the first series of 48 experiments, divided into four groups, intracisternal injection of 50 units† of penicillin (dissolved in 1 c.c. of saline solution) twice daily was the therapy employed (Fig. 1). In each of the four groups, results

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† This very small dosage was employed partly because very little penicillin was available to us at the time and partly because it seemed advantageous nevertheless to determine the effects of the same minimal dosage employed in previous experiments on staphylococcal meningitis.
were slightly but definitely more favorable in the treated than in the untreated animals. Of 22 untreated dogs, only one survived, whereas four of 26 treated dogs recovered. Furthermore, the incidence of early death was distinctly higher among the control animals.

In the next two groups of 12 dogs each, treatment consisted of intracisternal administration of 100 and 200 units of penicillin, respectively, twice daily (Fig. 2). One treated animal is not included in the chart because a positive culture was not obtained in the cerebrospinal fluid at any time in a period of 12 days and it was thought possible that the organisms had been injected epidurally.

Among the twelve control animals, only one survived, whereas five of the eleven treated dogs recovered.

It was observed in these groups that the cerebrospinal fluid of all treated animals was grossly clear with a very moderate pleocytosis, whereas in the control dogs, the fluid was invariably grossly purulent and frequently so viscid that only small specimens could be obtained by cisternal puncture.