THE CEREBROSPINAL FLUID AND THE CERVICAL LYMPH NODES

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ONE PLATE (TWO FIGURES)

That the cerebrospinal fluid passes both into the venous sinuses and into the cervical lymph nodes has been adequately demonstrated by Key and Retzius and more recently by Weed and his co-workers. A review of the literature is unnecessary, as the latter group has covered it in detail. We simply wish to point out that there are now available two agents with which one can demonstrate readily in the living that foreign material introduced into the subarachnoid space appears after a short period of time in the cervical lymph nodes both superficial and deep.

The early work was with a brominized oil (brominol, light), the later with thorium dioxide (thorotrast) and it will be most convenient to describe the work in terms of these two agents. Dog no. 3 will illustrate what may occur with brominol; dog no. 12 with thorotrast.

DOG NO. 3. BROMINOL

Using nembutal for anaesthesia, a cisternal puncture was made in a female of about 14 pounds. Slightly less than 3 cc. of clear cerebrospinal fluid was withdrawn and replaced by the brominized oil. A roentgenogram taken 30 minutes later showed the oil along the cervical cord and along the base of the brain. There is some diffusion of the oil in the posterior cranial fossa. At the end of the second hour there is a little more spreading over the cerebral hemispheres and the optic nerves are outlined. At the end of the third and fourth hours

the cerebral region shows no appreciable change, but the nasal region is absorbing more x-ray. At the end of the fifth hour enough of the brominized oil had reached the upper deep cervical nodes so that they were differentiated in the roentgenogram from the neighboring tissues. These nodes lie just caudal to the tympanic bulla and ventral to the atlas. At the end of the sixth hour these nodes are more clearly outlined and the submaxillary nodes together with a group opposite the third cervical vertebra can be recognized. The infiltration of the nodes continues at least to the end of the seventy-fifth hour, the increase in the submaxillary group being rather greater than in the deep cervical.

This represents in a general way our experience with the oil. In no dog were the nodes demonstrable in less than 5 hours, and in two instances it could not be demonstrated in the nodes even after several days. In interpreting the time element, however, it must be kept in mind that the oil is heavy, inert, and non-miscible with the tissue fluids and that it must be present in the nodes in quantity before it is demonstrable by x-ray.

It is interesting that there could be a filling of either the deep or superficial nodes in a particular animal and also that the filling was not necessarily bilateral.

DOG NO. 12. THOROTRAST

A cisternal puncture was made as before and 30 drops of clear fluid were permitted to escape from the needle. This was replaced by slightly less than 2 cc. of thorotrast. A roentgenogram made 5 minutes later showed a rather uniform dispersal of the thorotrast around the brain and cervical cord. This is in marked contrast to the brominol, which tends to be limited to the base of the brain. At the end of 30 minutes, the convolutions of the brain are clearly outlined, the optic nerve is seen and the upper deep cervical nodes are differentiated from the neighboring tissues. The nodes are rather more distinct than in the brominol dog at 5 hours. It is also obvious that the nasal region is absorbing more

x-ray. At 90 minutes the cervical nodes are infiltrated as far caudad as the third vertebra and the submaxillary group can be recognized. In a roentgenogram at the end of the sixth hour (fig. 2), it is easy to recognize vessels entering the cephalic end of the nodes. Somewhere in this period the picture of the nodes become relatively stable and remains so for at least 2 months. There are detailed but not significant changes.

As an aid in the interpretation of the roentgenograms, gelatin injections of the subarachnoid space were made. On dissection it became clear that the deeper nodes were filling by way of the nasal cavity. This route has been demonstrated by earlier workers using the gelatin method, and it is only necessary to review the fact that the mass passes from the subarachnoid space along the olfactory nerves to the nasal mucosa and then by way of lymph vessels along the pharynx to the upper deep cervical nodes. The submaxillary nodes are filled by vessels running subcutaneously. We were able to trace these vessels only as far as the bucconasal junction and were inclined to interpret them as coming from the terminal part of the nose. Wustmann, however, has demonstrated that vessels coming from the orbit pass along the angular vein and then take much the course we have just described. The fact that in some animals there was a filling of the submaxillary nodes without a filling of the deep nodes would support his interpretation.

It does not seem necessary to describe the effects of the brominol on the animals beyond saying that they showed symptoms similar to those described by Davis, Haven, and Stone in their use of iodized oil.

Our experience with thorotrast differed from Wustmann's. His animals died when he used the standard formula. Our animals showed rather less reaction than with the brominol. Comparing methods, it may be pointed out that he used 8 cc. of thorotrast and does not state whether fluid was withdrawn. We used only 2 to 3 cc. to replace an equal amount of fluid. The latter amount seems entirely adequate. With a modi-

fied preparation he got excellent results and while he does not record a filling of the nodes until the end of the thirty-fourth hour, it is obvious from his illustration that he could have demonstrated it earlier.

SUMMARY

Two agents, now available, make it possible to demonstrate in the living animal that foreign material introduced into the subarachnoid space passes rather readily into the cervical lymph nodes both superficial and deep. Thorium dioxide is transferred more rapidly than brominized oil and is more satisfactory from the standpoint of roentgenology.

LITERATURE CITED

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PLATE 1

EXPLANATION OF FIGURES

1 Head and neck of normal dog (no. 12).

2 Same dog, 6 hours after injection of thorotrast.