THE TECHNIQUE AND REACTION OF INTRACRANIAL MERCURIC BICHLORIDE INJECTIONS

BY

J. JAY KEEGAN

FROM THE DEPARTMENT OF NEUROLOGICAL SURGERY,
UNIVERSITY OF NEBRASKA MEDICAL SCHOOL

THE first five injections in this series of twenty-four intra-cranial injections of mercuric bichloride were made into the anterior horn of the right lateral ventricle, through a trephine opening. The usual technique of ventricular puncture with a blunt graduated needle was used, and about 10 cubic centimetres of fluid removed. To five cc. of this were added from three to five drops of 0.5 per cent. mercuric bichloride solution, each drop being calculated as equivalent to 0.25 milligramme of the drug. Four drops, the average dose, would thus contain one milligramme. The cerebro-spinal fluid containing the selected amount of the drug was then re-injected by gravity method. The usual reaction from these injections was a fairly severe headache with nausea and vomiting, appearing shortly after the injection and lasting twenty-four to forty-eight hours with gradually lessening severity.

The necessity of incision and trephine for ventricular puncture made it desirable to use a less difficult place of entry into the intracranial cerebro-spinal fluid space. Cisternal puncture had been used in several cases to obtain cerebro-spinal fluid for diagnostic purposes, and it was decided to use this route for the bichloride injections.

Cisternal puncture has only recently been used in a large number of cases and has been shown to be comparatively safe in experienced and careful hands. The technique of entry is not difficult. The ordinary eighteen gauge lumbar puncture needle is inserted in the neck, directly over the prominent spine of the second cervical vertebra. (Fig. 1.) It is directed upwards in the mid-line at an angle of about 45 degrees, and is felt to pierce the dense occipito-atlantal ligament between the occipital bone and the first cervical vertebra. It enters the cerebro-spinal fluid space in the angle between the cerebellum and the medulla, called the cisterna magna, at a depth of four to six centimetres. The depth varies with the thickness of the neck, and this must be accurately judged since insertion of the needle a depth of six centimetres in a thin neck might injure the medulla, or vermis of the cerebellum. A guard is placed on the needle at the depth beyond which it is not considered safe to go and prevents plunging of the needle.

The injection of mercuric bichloride into the cisternal space is made by the gravity method. An adapter, tube and open 20 cc. glass syringe is connected with the needle in situ, and about 25 cc.

of fluid removed by syphonage. Ten cubic centimetres of this fluid are saved for serological examination, the drops of bichloride added to the remainder in the syringe barrel, and this diluted solution allowed slowly to re-enter the cisternal space by gravity pressure.

Most cases have shown an almost immediate reaction of severe occipital and frontal headache with nausea and vomiting. There is also a temporary drop of blood pressure, pallor and sweating indicating a moderate degree of shock. This latter is quickly recovered from, but the headache and nausea persist a few hours.

FIG. 1.

Showing routes of injection:—(a) Intra-ventricular; (b) Into posterior horn, by occipital route (not used in this work); (c) Into cerebello-medullar cisterna.

There is an elevation of temperature of one degree or of two degrees. Within twenty-four hours all the cases have been sufficiently recovered to leave the hospital, but at times feel some effects from the injection for two or three days. These prolonged symptoms usually are some persisting stiffness in the suboccipital region, slight headache and nervousness. In one case a spinal puncture was performed twenty-four hours after the cisternal injection, and a cell-count of 350 cells per cubic millimetre obtained with 47 per cent. polymorphous clear and 53 per cent. mononuclear cells, indicating a moderate aseptic meningitis.

In the recently-treated cases the bichloride injection has been followed by an intra-venous neo-arsphenamine injection the next morning.

The advantage of cisternal injection over ventricular injection is not only one of convenience, but the drug enters a point in the cerebro-spinal fluid circulation considerably nearer the optic tracts. (Fig. 1.) From the ventricle the fluid must pass through the foramen of Monro to the third ventricle, through the aqueduct of Sylvius, the fourth ventricle and out through the basal foramina of Majendie and Luschka into the basal cisternal spaces. The fluid then flows forward to bathe the optic chiasma, nerves and tracts. It is thus readily seen that injection of the bichloride into the cisternal space would have quicker and possibly more effective action on these nerves.

The constancy and severity of the immediate reaction from the injections makes this a rather heroic procedure, which would be warranted only by the seriousness of syphilitic optic atrophy and definite results not obtainable by other methods. It is possible that less toxic mercury compounds might give less reaction and be as effective. Trial of these should be made.

Case.	Date.	Punct.	HgCl ₂	Cells.	Wassermann Reaction.	Temperature Reaction.
†1. H. ...	5-2-23	Cist.	—	2	Neg.	—
2. W. ...	5-20-21 5-27-21 6-13-21	Vent. Vent. Vent.	4 gtt. 5 gtt. 5 gtt.	— — —	— — —	T. 99.6 100.8 101.4
3. G. ...	1-4-22 2-6-22 3-8-22 4-4-22	Vent. Vent. Cist. Cist.	5 4 3 5	— 3 — 1	— Neg. — Neg.	102 101.2 99.2 99.2
* H. ...	7-3-22 7-21-22	Cist. Cist.	4 5	— —	0.1-0.2+0.4+ 0.1-0.2+0.4+	101.6 101
* A. ...	9-13-22	Cist.	4	65	0.1+0.2+	101.6
4. C. ...	9-13-22 10-3-22 11-10-22 3-15-23	Cist. Cist. Cist. Cist.	4 3 3 4	64 13 6 3	0.1-0.2-0.4+ 0.2-0.4-0.8+ 0.2-0.4-0.8+ 0.2-0.4-0.8-	101.2 101 101 101
5. L. ...	4-3-23 4-17-23 5-1-23 6-1-23 6-3-23	Cist. Cist. Cist. Cist. Cist.	5 5 3 5 5	— 22 — 8 6	0.1+ 0.1+ 0.1+ 0.1+ 0.1-0.2+	102.4 — 100.4 — —
6. B. ...	2-25-23 3-3-23 4-22-23	Cist. Cist. Cist.	3 4 5	2 16 2	Neg. Neg. Neg.	— — —

*Incomplete cases.

†Last puncture on Case 1. For Wassermann only.