The Method and Uses of Cisternal Puncture. By W. S. DAWSON, M.D.Oxon., The Maudsley Hospital, London.

THE puncture of the cisterna magna was proposed and carried out in 1919 by Wegeforth, Ayer and Essick (1), who performed a series of experiments on animals before applying the method to man.

The cisterna magna or cerebello-medullaris is a sub-arachnoid space formed by the under-surface of the cerebellum and the dorsal aspect of the medulla. On its upper aspect the cisterna is bounded by the inferior vermis and the hemispheres of the cerebellum. The transverse diameter varies from 5 to 6 cm., while antero-posteriorly the depth rarely exceeds 2 cm. At the outer side of the flocculus the cisterna communicates with the lateral recess of the fourth ventricle through the foramen of Luschka, while anteriorly in the middle line the foramen of Magendie opens into the fourth ventricle at its lower end. The cisterna magna is in continuity with the cisterna spinalis, and so with the medullary and pontine cisterns and the interpeduncular space. It has been shown that substances injected into the cisterna magna may pass into the spinal canal, the cisterna basalis and cisterna pontis, and thence upwards above the corpus callosum and also into the Sylvian fissure, so as to bathe the whole cortex.

The puncture is performed as follows: The head should be shaved in the mid-line below the external occipital protuberance down to the lower cervical spines. All aseptic precautions should be observed as for lumbar puncture. Special needles are used of a narrower bore and shorter than those used in lumbar puncture. The patient should lie down on his side with the head bent forwards on to the chest, and supported on a pillow in such a way that it is set squarely on the spinal column and not rotated or inclined to either shoulder. The puncture is made in the midline in the space between the lower edge of the foramen magnum and the upper edge of the atlas. The spine of the axis may be palpated and the needle inserted a little above. The procedure is almost painless, although a local anæsthetic or an injection of morphia may be given to an apprehensive patient. The direction of the puncture is in a line passing through the external auditory meatus and the nasion or root of the nose. After the skin has been pierced the needle encounters the ligamentum nuchæ, which offers a fair resistance, and, when this has been traversed, the occipito-atloid ligament, which is even tougher. Resistance now ceases until the needle has been thrust a fraction of a centimetre further, when the dura

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is felt. A little push drives the needle into the cisterna magna. The needle should never be inserted more than 5 cm. under the skin. If no fluid is obtained at this depth another puncture should be made at a slightly different level, but still in the midline. If the needle is pushed in more than 6½ cm. there is grave risk of injury to the vital centres in the medulla. Pfister (2) reports a case in which breathing ceased when the needle had been inserted over 6½ cm.; the patient recovered after artificial respiration had been performed for several hours. Success depends upon placing the patient in the proper position and upon keeping the needle strictly in the middle line. If the needle is pushed forward slowly and carefully until the resistance offered by the ligaments is no longer felt the procedure is without risk.

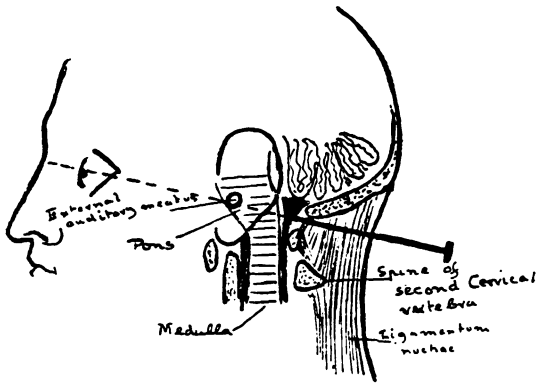


Diagram showing direction of puncture (after Pfister).

Cisternal puncture may be performed both for diagnosis and as a therapeutic measure. As regards diagnosis it is of limited value, and has few advantages over the safer procedure of lumbar puncture. It is questionable whether the fluid obtained from cisternal puncture ever gives information which may not be obtained from lumbar fluid. The injection of substances which are opaque to X-rays into the cisterna magna allows of the accurate determination of the upper limits of spinal tumours.

Good results have been reported by Sir James Purves-Stewart and others (3) (4) from the injection of salvarsanized serum in cerebral syphilis and general paralysis. But the results are often disappointing. There may be a reduction in the number of leucocytes and in the amount of globulin without any material improvement in the clinical condition. Pfister (2) reports good results from the injection of ·75 to 3·0 mg. salvarsan in normal saline added to 40 or 50 c.c. of cerebrospinal fluid, especially in syphilitic

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meningitis of the base of the brain. McCusker (5) gives encouraging reports of repeated injections of salvarsanized serum, and also describes non-syphilitic cases in which headaches and feelings of cerebral congestion were relieved by cisternal puncture. Lavage of the cerebrospinal fluid has been performed in tubercular and other forms of meningitis through combined cisternal and lumbar puncture (Ayer (6)).

In the following short series of cases the fluids obtained from cisternal and lumbar puncture were compared as regards the strength of the Wassermann reaction, number of cells, percentage of protein and the Lange curve. Candler and Mann (7) compared the intensity of the Wassermann reaction of the cerebrospinal fluid withdrawn from the lateral ventricles and from the spinal canal after death in cases of general paralysis, and found that invariably the lumbar fluid gave a more intense reaction. The intensity varied from twice to ten times as much.

CASE 1.—Male, æt. 6. Encephalitis lethargica. Onset four months ago, with diurnal drowsiness and headache, and restlessness and noisiness at night. He is still drowsy by day, and in the early part of the night has "occupation" delirium, but later sleeps fairly well and is quiet. Cisternal fluid appeared to be under considerable pressure. Puncture was followed by severe vomiting after an interval of two days, although the patient was kept strictly in bed. The vomiting lasted four days. The patient is now as he was before the puncture.

CASE 2.—Male, æt. 11. Encephalitis lethargica. Onset four months ago, with diurnal drowsiness and nocturnal delirium, also diplopia. Now has double ptosis. He is still drowsy by day but is quiet at night. Cisternal puncture caused severe vomiting and headache two days later, lasting three days. He is now as before.

CASE 3.—Male, æt. 8. Encephalitis lethargica. Onset three months ago with headache, drowsiness by day, restlessness at night, and diplopia. He is much better now, though still a little drowsy. Cisterno-lumbar puncture has not altered his condition. There was no after-disturbance.

CASE 4.—Male, æt. 45. Had syphilis three years ago and had eighteen intravenous injections until blood was negative on two occasions. Has been a heavy drinker and has suffered from severe headaches for years. Arteries are thickened and hard; blood-pressure 170/90. *Nil* abnormal noted in the central nervous system. Blood and cerebrospinal fluid both negative to the Wassermann reaction. Cisterno-lumbar puncture has not relieved the headaches, but there were no unpleasant after-effects.

CASES 5–8 are general paralytics.

CASE 9 is one of general paralysis after a course of 16·0 grm. of tryparsamide. Before treatment the cerebrospinal fluid gave a Wassermann of + 40, and there was a big excess of cells and protein. The physical signs of general paralysis persist but there has been an almost complete mental remission.

CASES 10 and 11 both show a strongly positive Wassermann reaction in the blood and have physical signs of tabes.

According to Mestrezat (8), the normal amount of protein in the cerebrospinal fluid may vary from 20 to 30 mgrm. *per cent.* Davis and Ayer (9) give a higher figure—35 to 100. According to the latter, in encephalitis lethargica the figures may be 100 to 200, in tabes the same, in cerebral syphilis and general paralysis 200 to 600. These figures are higher than those found in the present series.

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	Cisternal.			Lange.	Lumbar.			Lange.
	Wasser-mann.	Cells per c.mm.	Protein, mgrm. %		Wasser-mann.	Cells per c.mm.	Protein, mgrm. %	
1.	Neg.	3	100	Neg.	Neg.	60	100	Neg.
2.	Neg.	Neg.	40	Neg.	Neg.	Neg.	40	Neg.
3.	Neg.	Neg.	50	Neg.	Neg.	Neg.	50	Neg.
4.	Neg.	10	100	Neg.	Neg.	100	100	Neg.
5.	+200	100	200	555542100	+ 200	100	200	555554210
6.	50	85	180	5554321000	50	100	180	5555432100
7.	70	24	80	5555532100	70	40	120	5555543210
8.	8	16	50	5543210000	8	22	110	5544321000
9.	30	Neg.	30	Neg.	30	Neg.	30	Neg.
10.	Neg.	2	60	0023200000	Neg.	6	100	001232000
11.	Neg.	Neg.	30	Neg.	Neg.	Neg.	45	Neg.

In general the lumbar fluid gives more intense reactions than the cisternal. From the standpoint of diagnosis, therefore, cisternal puncture appears to offer no advantages over lumbar puncture, and merely subjects the patient to an unnecessary risk.

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