

the United States is willing to pay a premium for fresh wall-eyes (p. 53). I then stated that, in connection with these data, the observations of physicians in regard to the large number of cases of infestation with *D. latum* among the Jews become significant, and that examination of imported Canadian fish for plerocercoids of *D. latum* is important and necessary.

Through the courtesy of one of the leading importers of unfrozen fish, I received on March 8 a shipment of twenty-seven wall-eyes (*Stizostedion vitreum*) taken from Lake Winnipeg, Canada. The flesh and the viscera of these fish were carefully examined for the plerocercoids of *D. latum*. None were found in or among the viscera, but a single plerocercoid was taken from the flesh of each of five fish. One plerocercoid was cut in pieces during removal but the other four were uninjured and immediately recognized as plerocercoids of *D. latum*, a description of which was given in the previous report.⁶ These were fed, on March 11, to a dog⁷ which by repeated fecal examinations proved to be free from *Diphyllobothrium* tapeworms. Fish from other Canadian lakes will be examined as soon as possible.

While it is admitted that the number of Canadian fish examined for plerocercoids is too small, and that the knowledge concerning the distribution of infested fish is too meager to permit of safe generalization, the observations reported in this paper indicate that the eating of infested fish imported from Canada may be responsible for a large percentage of the cases of *D. latum* infestation in the United States outside the known endemic areas.

CEREBROSPINAL FLUID PRESSURE IN THE NEW-BORN*

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The data relative to cerebrospinal fluid pressure in the new-born presented in this paper have been accumulated during the past seven years. They have been compiled from a series of 117 cases of cranial and intracranial injury. Fifty-six of the babies included in this series died while in the hospital. Of these, forty-five came to autopsy, the postmortem material being subjected to both gross and microscopic examination in twenty-three instances. Fifty-eight patients were discharged relieved. Of these, forty-eight were followed for from less than six months to more than six years. Three were duplicate entries. A detailed study of the end-results in these cases has been presented before the Southern Surgical Association¹ and need not be considered further at this time.

METHODS OF MEASUREMENT

Measurements of cerebrospinal fluid pressure were made during ventricular and lumbar punctures. A mercury manometer was used in every instance. The lowest figure read on the scale with the infant lying quietly on its side with the spine extended was taken as the maximum reading. The puncture was considered successful when respiratory oscillations were visible in

6. Vergeer: THE JOURNAL, March 3, 1928, p. 675.

7. Since this article went to press, another shipment of twenty wall-eyes from Lake Winnipeg has been examined, and from these one plerocercoid has been removed and has been fed to a second clean dog. Four adult *D. latum* tapeworms have since been recovered from the first dog and one from the second.

* Read before the Association for Research in Nervous and Mental Disease, New York, Dec. 28, 1927.

1. Munro, Donald: Cranial and Intracranial Damage in the New-Born, to be published.

the manometer, whether or not cerebrospinal fluid was obtainable.

Six ventricular punctures were made in four cases, the measurements being recorded three times. Two of these three punctures were done in a case of meningitis and cannot properly be included in this study. The

TABLE 1.—Methods of Treatment Other Than Lumbar Puncture

	Living	Dead	Total
Ventricular Puncture: Pressure Data			
Number of cases in which puncture was done	2	2	4
Number of punctures made	2	4	6
Number of measurements taken	1	2	3
Highest pressure read	50 mm.	20 mm.	
Lowest pressure read	0	20 mm.	
Unsuccessful punctures	0	0	0
Pressure not recorded	1	2	3
Ventricular Puncture: C. S. F. Data			
Bloody cerebrospinal fluid			
Greatest amount	90 cc.	¼ cc.	
Smallest amount	2 cc.	¼ cc.	
Number of amounts measured	2	1	3
Purulent cerebrospinal fluid			
Greatest amount	90 cc.		
Smallest amount	30 cc.		
Number of amounts measured	3		3
Typical subtemporal decompression	1		2
Elevation of depressed fracture	4	..	4
Intubation under wrong diagnosis before admission	..	1	
Intraventricular administration of antimeni- gococcus serum	..	1	1

remaining showed an intraventricular pressure of 50 mm. This was reduced to normal by the withdrawal of 90 cc. of bloody cerebrospinal fluid. The child is now 6 years and 1 month of age and, except for a residual sixth nerve palsy, is normal in every way.

One hundred and forty-nine lumbar punctures were made in ninety-five cases, 139 measurements being recorded.

NORMAL PRESSURE

Sidbury,² in 1920, stated that the normal pressure in the new-born will probably lie between 5 and 2 mm. of mercury. On the basis of pressures recorded at discharge in babies treated for intracranial injury and rendered symptom free by lumbar punctures, I have placed the limits as between 6 and 2 mm. of mercury.

There were thirty-five such cases. In addition, the measurements of twenty patients who died came within this pressure field at the final lumbar puncture. Thus, fifty-five showed a normal cerebrospinal fluid pressure at the final measurement before death or discharge. Sixteen cases, under the same conditions, showed a pressure of more than 6 mm. of mercury. The average figure in the latter was about three times that of the former.

The most significant finding, however, whether considered in the light of the determinations of the normal limits of intracranial pressure or in that of the efficiency of the treatment given is in the "death and disease percentage" as revealed in the follow-up. In the patients discharged relieved but with an intracranial pressure known to be above 6 mm., this percentage was 37.5 from "all causes" and 25 from "known cerebral causes only." In those discharged with normal pressure, the corresponding percentages were 11.4 and 5.8.

DECREASED PRESSURE

Decreased cerebrospinal fluid pressure, that is, pressure below 2 mm. of mercury and frequently present as respiratory oscillations only, occurred in eleven

2. Sidbury, J. B.: The Importance of Lumbar Puncture in Intracranial Hemorrhage of the New-Born: Report of Case with Recovery, Arch. Pediat. 37: 545 (Sept.) 1920.

patients. Six of these were discharged relieved and five dead. In my experience this condition has been associated only with surgical shock or extreme dehydration. The number is too small to warrant the drawing of any conclusions and, in any event, what figures there are should never have been available, since lumbar punctures should not be performed under such circumstances. If made through diagnostic error, however, the information obtained is of use as pointing to a grave prognosis.

INCREASED PRESSURE

In the absence of surgical shock and dehydration, increased intracranial pressure has been demonstrated at least once previous to discharge in this series in every case of depressed fracture, intracranial hemorrhage from whatever cause, cerebral edema or cerebral congestion. However, to eliminate possible error, all original pressure measurements except those listed in table 2, whether increased, decreased or normal, have been included under this heading.

It is interesting to note that the variation between living and dead patients, whether considered as the highest, lowest or average pressure, is insignificant. This is not in accord with figures that I³ obtained in a series of head injuries in adults, although from a broad point of view the pathologic changes are analogous. In the adult cases the average pressure in those terminating fatally was two and one-half times higher than in the nonfatal cases. I am unable to offer a satisfactory explanation for this difference.

REDUCTION OF PRESSURE BY REMOVAL OF CEREBROSPINAL FLUID

In the presence of increased intracranial pressure, sufficient fluid has been removed to bring the pressure level to within the limits set as normal. This was done 135 times. The amounts were measured eighty-one times. Clear fluid was never found and measured in

TABLE 2.—Normal and Decreased Intracranial Pressure

Classifications	Total	Dead	Living
Decreased intracranial pressure (below 2 mm. of mercury)			
Number of cases.....	11	5	6
Normal intracranial pressure (from 6 to 2mm. of mercury, inclusive)			
Number of patients discharged symptom free or dead.....	55	20	35
Intracranial pressure over 6 mm. of mercury			
Number of patients discharged symptom free or dead.....	16	8	8
All cases: living, 43; dead, 28			
Highest intracranial pressure on discharge.....	18 mm.		10 mm.
Lowest intracranial pressure on discharge.....	1 mm.		2 mm.
Average intracranial pressure.....	5.07 mm.		4.56 mm.
Dead or diseased in follow-up from all causes.....			3.57%
Cases with 6 mm. to 2 mm. pressure: living, 35; dead, 20			
Average intracranial pressure on discharge.....	3.2 mm.		3.68 mm.
Dead or diseased in follow-up from all causes.....			11.42%
Cases with over 6 mm. pressure: living, 8; dead, 8			
Average intracranial pressure on discharge.....	9.75 mm.		8.37 mm.
Dead or diseased in follow-up from all causes.....			37.5%
Diseases and death percentages in follow-up			
All causes			
Cases with pressure of 6 mm. or under.....			11.42%
Cases with pressure of over 6 mm.....			31.5%
Known cerebral cause			
Cases with pressure of 6 mm. or under.....			5.8%
Cases with pressure of over 6 mm.....			25.0%

a fatal case. The presence of blood in the removed cerebrospinal fluid cannot be considered pathognomonic of an intracranial hemorrhage, although if followed at a later puncture by the removal of yellow fluid it is certainly suggestive. In an average case it was necessary to remove more than twice as much fluid in the

living as in the dead before increased cerebrospinal fluid pressure could be brought to normal.

It was deemed inadvisable to remove any fluid fourteen times. This was chiefly because, in the earlier cases, it was considered unsafe, and ventricular drainage was instituted or subtemporal decompression was

TABLE 3.—Lumbar Puncture Data

Pressure Data	Living	Dead	Totals
Number of cases in which puncture was done	56	39	95
Number of punctures made.....	99	50	149
Number of measurements taken.....	91	48	139
Highest pressure read (mm. of mercury)....	50 mm.	48 mm.	
Lowest pressure read (mm. of mercury)....	Less than 1 mm.	Less than 1 mm.	
Average pressure reading (mm. of mercury)...	10.9 mm.	11.1 mm.	
Cerebrospinal Fluid Data			
Bloody cerebrospinal fluid: total punctures living, 27; dead, 31			
Greatest amount	19 cc.	19 cc.	
Smallest amount	1/4 cc.	1/2 cc.	
Average amount	4.2 cc.	3.7 cc.	
Number of amounts measured.....	20	22	42
Clear cerebrospinal fluid: total punctures living, 12; dead, 1			
Greatest amount	25 cc.		
Smallest amount	1/4 cc.		
Average amount	10.96 cc.		
Number of amounts measured.....	7	0	7
Yellow cerebrospinal fluid: total punctures living, 24; dead, 10			
Greatest amount	17 cc.	4 cc.	
Smallest amount	1/2 cc.	1/2 cc.	
Average amount	6.9 cc.	3.75 cc.	
Number of amounts measured.....	18	6	24
Contaminated bloody cerebrospinal fluid: total punctures—living, 16; dead, 4			
Greatest amount	3 cc.	1 1/2 cc.	
Smallest amount	1/2 cc.	1 1/2 cc.	
Average amount	1.11 cc.	1 1/2 cc.	
Number of amount measured.....	7	1	8
No fluid removed.....	10 punctures	4 punctures	14
Combined Cerebrospinal Fluid Data			
Greatest amount	25 cc.	10 cc.	
Smallest amount	1/4 cc. yellow	1/2 cc. bloody	
Average amount	5.542 cc. bloody or clear	2.485 cc. bloody	

performed when the original pressure was 20 mm. or more. Later experience has shown that this precaution was unnecessary.

CONCLUSIONS

Measurements of the cerebrospinal fluid pressure were made 142 times in ninety-five new-born babies. Of these, 139 were made at lumbar puncture and the remaining three were made at ventricular puncture.

Normal cerebrospinal fluid pressure in the new-born, as determined from figures obtained from patients treated for cranial and intracranial injury and discharged symptom free, lies between 6 and 2 mm. of mercury.

Cerebrospinal fluid pressure below 2 mm. of mercury has occurred in this series only in the presence of surgical shock or dehydration.

Increased cerebrospinal fluid pressure has been present in every case of depressed fracture, intracranial hemorrhage, cerebral edema or cerebral congestion.

Intracranial hypertension in cranial and intracranial injury in the new-born may be safely reduced to normal by lumbar decompression regardless of the degree.

Patients discharged as relieved and symptom free with a known cerebrospinal fluid pressure of between 6 and 2 mm. of mercury show a late death and disease percentage of 11.4 from all causes, and of 5.8 from known cerebral causes only.

Patients discharged as relieved and symptom free with a known cerebrospinal fluid pressure of more than 6 mm. of mercury show a late death and disease percentage of 37.5 from all causes and of 25 from known cerebral causes only.

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J. Munro, Donald: The Therapeutic Value of Lumbar Puncture in the Treatment of Cranial and Intracranial Injury, Boston M. & S. J. 193: 1187-1189 (Dec. 24) 1925.