the inflation, deflation or artificial respiration.

On condition that the mean posterior fossa volume should be 13g, and unless it developed no farther than the stage III, about 15 volume percent of posterior fossa mass might be hopeful.

7. Hydrostatic Brain Edema Caused by Vasomotor-Paresis

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8. Cerebral Hemodynamics and Cerebrovascular Reactivity in Experimental Subarachnoid Hemorrhage

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Purpose: Experimental subarachnoid hemorrhage was produced and consequent spasm of cerebral arteries, including Willis' circle and its main branches, was confirmed angiographically. This phenomenon was observed from the standpoints of cerebral circulation and cerebrovascular reactivity.

Method: In adult mongrel dogs which were maintained under artificial respiration, degree of the arterial spasm was sequentially observed angiographically and changes in cerebral blood flow were measured with an electromagnetic flow meter. Cerebrospinal fluid pressure was measured in the cisterna magna and systemic arterial blood pressure was measured at the abdominal aorta. Experimental subarachnoid hemorrhage was produced by injecting 2 ml of autogenous blood into the chiasmatal cistern according to McQueen's method. Effect of inhalation of 5% CO₂ in air on cerebral blood flow in the presence of arterial spasm was observed. Observation was also made on cerebrovascular reactivity. Under hypertension produced either by noradrenalin or adrenalin administration or by clamping the aortic arch, and under hypotension produced by exsanguination.

Results: Injection of 2 ml of the blood into the chiasmal cistern was followed by a wide spread cerebral vasospasm, which was confirmed angiographically 15 minutes after the injection and cerebral blood flow was found to be reduced by 11% on the average (23% in the maximum) about 20 minutes after the injection, apparently reflecting occurrence of cerebral vasospasm. Cerebrospinal fluid pressure showed a transient rise after the blood injection, returning subsequently almost to the control level and there was no marked change in arterial blood pressure. Inhalation of 5% CO₂ was started either immediately after the subarachnoid blood injection or at the time when cerebral blood flow was reduced due to cerebral vasospasm. In either case, 5% CO₂ inhalation was found to increase cerebral blood flow despite prior existence of cerebral vasospasm. This fact, which was supported also by angiographic finding, shows that vasodilating action of CO₂ is more potent than vasospasm due to subarachnoid hemorrhage. It was also found that autoregulatory function of the cerebral vessels, as expressed under experimental hypertensive or hypotensive condition, persisted in the presence of cerebral vasospasm.

Conclusion: Cerebral blood flow was found to be reduced by cerebral vasospasm due to experimental subarachnoid hemorrhage. It was observed that cerebral vasodilating action of CO₂ and autoregulation of cerebral vessels under hypertensive or hypotensive condition persisted despite prior existence of cerebral vasospasm.

9. Studies on Autoregulation of Cerebral Vessels in CO₂ Inhalation

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It has been said that by CO₂ inhalation cerebral circulation increases and autoregulation disappears. We made measurement of regional cerebral circulation using oxygen electrodes of the enamelled copper wire. The oxygen electrodes were inserted into the cerebral and cerebellar cortex, the thalamus, the mid brain, the common carotid artery and the subcutaneous tissue of the dog made immovable by succinylcholine chloride and under artificial respiration. CO₂ inhalation was tried at various CO₂ concentration ranging from 3% to 10%. It was disclosed that response of the cerebral and cerebellar cortex and that of the thalamus were different in each CO₂ concentration. Autoregulation was also variable according to CO₂ concentration. In addition, some interesting findings have been found by the investigations of relations between the CO₂ concentration and vascular response to it and the mechanism of autoregulation.

1) The 3%–8% CO₂ inhalation made cortical circulation increase straight, which coincided with some studies by other investigators, but thalamic circulation only made a small increase. On the other hand, the 9%–10% CO₂ inhalation made