

A STUDY OF CSF DYNAMICS BY RI-CISTERNOGRAPHY

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Although many investigators have studied CSF dynamics by RI-cisternography, it seems that exact indicator on CSF absorption to determine the indication of shunt for communicating hydrocephalus have not been established. This may be because CSF dynamics is affected not only by rate of CSF absorption but also by volume of CSF space and so on.

Sixty-six patients were examined by RI-cisternography to evaluate their CSF dynamics. Both images and counts of the head in each case were obtained at 3, 6, 24 and 48 hours after intrathecal injection of ^{111}In -DTPA using a gamma camera. Then, ratios of the head counts at 24 hours to that at 6 hours (C_{24}/C_6), at 48 hours to at 6 hours (C_{48}/C_6) and at 48 hours to at 24 hours (C_{48}/C_{24}) were studied with regard to classification on cisternograms, ventricular size on computed tomograms and final diagnosis. Furthermore, these values were evaluated with regard to patients who had received shunt operation retrospectively.

Result.

1. There was a tendency that C_{24}/C_6 and C_{48}/C_6 were much affected by widening of CSF space, such as brain atrophy.
2. Although C_{48}/C_{24} appeared to reflect CSF absorption more exactly than C_{24}/C_6 and C_{48}/C_6 , this was not conclusive to determine the indication of shunt.
3. If one's C_{24}/C_6 is under 0.6, it seems that he has normal CSF absorption. Therefore, on the study of C_{48}/C_{24} , we tried to use C_{24}/C_6 instead of C_{48}/C_{24} in some patients whose C_{24}/C_6 is under 0.6. In this method, communicating hydrocephalus was well distinguished into two groups retrospectively, this is, patients who had received shunt and patients who had not received shunt.

We named this as "A factor" on trial. This coefficient will be useful to determine the indication of shunt for communicating hydrocephalus.

THE CLINICAL APPLICATION OF rCBF FUNCTIONAL IMAGE

—On The Regional Hemodynamic Changes after various physiological tests—

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We reported the method of generating functional image of rCBF at the 16th Annual Meetings of the Japanese Society of Nuclear Medicine.

For a precise understanding of the cerebral circulation, we observed the regional hemodynamic changes after various physiological tests such as CO_2 inhalation, hyperventilation, the change of arterial blood pressure, the change of the posture and the contralateral compression of common carotid artery.

With CO_2 inhalation, the rCBF values were generally increased in normal subjects. But in a few patients with middle cerebral artery occlusion, the rCBF values were increased in the non-occluded area and reversely decreased in the occluded area, showing paradoxical CO_2 reactivity of cerebral blood vessels. With hyperventilation, the rCBF values were almost homogeneously decreased in the whole area. But in some patients with middle cerebral artery occlusion, the rCBF values were adequately decreased in the non-occluded area and inadequately decreased in the occluded area with non-developed collateral circulation. These tests made it possible to examine the regional abnormality of CO_2 responsibility of cerebral blood vessels.

With the change of arterial blood pressure or the posture, the rCBF values were not changed significantly in normal subjects. In some patients with cerebral infarction, the rCBF values were decreased during the posture of head-down at supine position, showing the dysautoregulation of cerebral blood flow.

The contralateral carotid compression generated the blood redistribution via the circle of Willis to the bilateral hemispheres with the reduction of all rCBF values in normal subjects. In the patients with internal carotid artery occlusion, some cases represented the remarkable reduction of rCBF values on the bilateral hemispheres, suggesting the efficient collateral circulation via the compressed-side external carotid artery. And other cases represented little change of rCBF values, suggesting inefficient collateral circulation.