A Trial to Evaluate Quantitative RI Cisternography Using Anger Camera

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The purpose of this paper is to evaluate the RI cisternography quantitatively. Thirty minutes after RI injection into the lumbar subarachnoid space, patients were fixed on supine position and RI counts were recorded with Anger camera tape-recorder at the spinal and cranial levels simultaneously for 30 minutes in posterio-anterior view. Playing back the records, the regions of interest (ROI) were decided in each levels with image scope. The changes of RI activity in each levels were displayed with digital ratemeter.

Almost straight line as a tendency on these changes was found. This slope is called as "flow rate" in this study for convenience. These "flow rates" were compared with the results of routine way in cisternography.

Nineteen patients in our department of neurosurgery were examined. In 7 patients whose cisternographies were normal, the "flow rates" as stated above were plus in each levels which related to grade of increase of RI activity. As an interesting findings, these "flow rates" were higher in cranial levels than in spinal levels. It is understood that this changes were physiological because the combination of a rigid skull and relative ly elastic spinal dura results in a considerable surge of fluid through the foramen magnum.

In 6 patients whose cisternographies were abnormal because of the appearance of RI activity in ventricular system, "flow rates" discrepancy as stated above between spinal levels and cranial levels was absent. This fact might be caused by the disturbance of physiological CSF flow.

In another 6 patients whose cisternographies were also abnormal because of malabsorption of RI concentration in vertex subarachnoid space, no constant patterns of "flow rates" was found. However, in every case, "flow rates" of thoracic levels were minus which is caused by the decrease of RI activity.

Investigating these results, some correlation was found between cisternography and our experimental quantitative evaluations. To clarify the CSF dynamics with the quantitative method in evaluation, more study is still continued clinically.

Radioisotope Cisternography in Patients with Brain Tumor

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Radioisotope cisternography (RI-cisternography) has provided valuable information to be used in the diagnosis of hydrocephalus. However, there are few reports about the application of this technique to the detection of intracranial tumors. The purpose of this report is to review our experience of RI-cisternography in patients with brain tumor.

First of all, as the diagnostic accuracy of Tc-brain scintigraphy for the detection of intracranial basal tumors is not so great, we tried to raise the rate of diagnosis of these tumors using RI-cisternography. As a result, most cases of basal tumors were correctly localized by RI-cisternography showing the obstruction or narrowing of the subarachnoid space and abnormal cerebrospinal fluid (CSF) dynamics.

However, in patients with a high CSF pressure, when we used Yb-DTPA, we often experienced the rapid transport of Yb-DTPA from the spinal subarachnoid space to the blood and obtained the images showed that little Yb-DTPA was inclined to go up into the intracranial space. This is due to the small molecular weight of Yb-DTPA, less than 1% of that of RISA which is little absorbed in the spinal region. For this reason, there are occasions when it becomes necessary to use RISA instead of Yb-DTPA.

In the next place, we took scintiphotos of the intracranial subarachnoid space up to about 48 hours after the lumbar injection, observing an accumulation of RISA in the tumor tissue. We have not found any literature describing such an accumulation of RISA in RI-cisternography. Rather, it has been reported that the site of the lesion is commonly associated with a lack of tracer activity. At present, we have the following hypothesis about this mechanism: RISA is absorbed from the subarachnoid space to the blood and then, as its excretion is very slow and its concentration in the blood keeps at a high level for hours, it may enter the tumor tissue through the broken blood-brain barrier rather than directly through the CSF-brain barrier.

Radioisotope Cisternography in Intracerebral Hemorrhage

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The use of radioisotope cisternography on the dynamic flow studies of CSF yielded valuable information in varied pathological entities, but it does not appear to be a comprehensive evaluation dealing with intracerebral hemorrhage.

Isotope cisternography using ^{169}Yb-DTPA was performed on 17 patients with hypertensive intracerebral hemorrhage, which included 10 cases treated surgically and 7 cases treated conservatively.

All subjects were examined by serial carotid angiography.

Radioisotope cisternography was performed by ^{169}Yb-DTPA which was injected into the subarachnoid space via lumbar puncture, and frontal occipital and both lateral views of head were scanned routinely at 2, 6, 24 and 48 hours after the injection using a scintiscanner.

Abnormal findings were observed on 14 cases out of 17 cases of intracerebral hemorrhage and its findings were as follows.

1. Delayed progression of radioactivity was observed on 7 cases out of the 17 cases. Three cases showed only a little distribution of radioactivity over cerebral convexities at 24 hours and four cases demonstrated mild delay on progression. Marked disturbed group on CSF flow was observed on severe intracerebral hemorrhage with ventricular rupture.
2. Ventricular backflow was detected on 4 cases persistent ventricular configuration was noted on 2 cases, which seemed to be normal pressure hydrocephalus. Other two cases showed only transient ventricular backflow.
3. Asymmetrical spread of radioact vity over cerebral convexity was observed on 11 cases.

On all the cases, the poor distribution of radioactivity was detected over the diseased hemisphere. This finding might be due to subarachnoid block induced by the cerebral hematoma.