Brain Tumors

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In the past 2 years, a total of 500 patients were scanned for intracranial lesions with ^{99m}Tc pertechnetate (in a few cases ^{113m}In was used). A diagnosis of brain tumor was verified either by operation, autopsy or by neuroradiological contrast studies in 147 cases.

In the series of 107 verified brain tumors scanned with a conventional rectilinear scanner, 81 patients had positive scans (75%). The postive scans were obtained in 39 out of 44 patients with meingioma, glioblastoma or metastatic carcinoma (90%). The results were unsatisfactory in patients with pituitary adenoma, craniopharyngioma or acoustic neurinoma.

As to the location of the tumors, the high supratentorial mass lesions yielded the best result (85% positive), whereas the positive scans were obtained in not more than 50% of cases with tumors at the base of the skull or in the posterior fossa.

Among the supratentorial meningiomas, frontal, parietal, or occipital lobe was the favorable location for scanning (95% positive scans were obtained in 50%.

Diagnostic rate of brain scanning by no means exceeds that of air study or arteriography. Nevertheless, those neuroradiological contrast studies also have a considerable number of unavoidable false negatives, and the combined use of brain scanning apparently and significantly improves the diagnostic accuracies in neurological cases.

When the brain scannings were combined with plain skull radiography, ophthlamologic examinations and the EEG, all being the examinations with no morbidity, a diagnosis of brain tumor was missed in less than 2% of cases in the present series.

In the series of 40 verified brain tumors scanned with the scintillation camera (PHO/GAMMA III), 35 patients had positive scans (88%).

The scintillation camera images whole brain in a much shorter time than the focused collimator scanner. Usually, optimum pictures were obtained in 60 seconds with intravenous dose of 10 mC of ^{99m}Tc. As a rseult, acutely ill, agitated, unconscious or uncooperative patients can be scanned. This is particularly importnat in the neurosurgical cases. In addition, the use of scintillation acmera encourages obtaining oblique, vertex, or suboccipital views in severaly ill patients without positioning the patient's head in uncomfortable position. These permit a more precise localization and improve the diagnostic accuracy of the scanning procedure.

In approximately 30 patients, a serial scanning up to 2 hours was performed following the intravenous administration of 10 mC of ^{99m}Tc. Count rates were printed on the strip tape by the use of 1,600 channel memory scope and printer, and the LESION/NON-LESION count ratio was calculated and plotted.

In meningiomas, angiomas and arteriovenous malformations, the lesion was best visualized on the serial scintiphotos immediately after the administration of Tc, thereafter, the focus became progressively blurred. Calculated LESION/NON-LESION count ratio showed an initial peak followed by a rapid fall.

In astrocytomas, oligodendrogliomas and cerebral infarctions, the initially equivocal focus became progressively clear on the serial scintiphotos, and the focus was best visualized at the end of the examination. LESION/NON-LESION count ratio also showed a gradual and progressive rise.

In glioblastomas, the LESION/NON-LESION count ratio showed an initial increase followed by secondary gradual decrease. The lesion was best visualized at 45～60 minutes.

It seems certain that the diagnostic accuracy of the brain scanning will be substantially improved by means of serial scanning. Also the serial scanning and the estimation of time course of uptake ratio seem to permit the preoperative pathological diagnosis, at least to some extent.