

III. Symposium I

Clinical Values and Limits of RI Scanning

1) Brain

Experience with Tc^{99m} Brain Scanning

H. HANDA

Department of Neurosurgery, Kyoto University Medical School, Kyoto

Results of 200 consecutive brain scans with ^{99m}Tc in pertechnetate form were analysed. A scintillation scanned with $3'' \times 1.5''$ NaI crystal and 37 hole honey corn collimator was used for this study. The brain scan was started 30-60 minutes after the intravenous administration of 10 mCi of ^{99m}Tc pertechnetate (in adult), and two to four views were obtained.

Of 200 scans reviewed, 75 had brain tumors (Table 1). In 56 (75%), correct localization

of the lesion was obtained.

As to the histology of the tumor, meningiomas, glioblastomas and metastatic carcinomas showed the highest rate of correct localization (29 of 32), followed by astrocytomas. In 10 cases, deep midline tumor was diagnosed on the basis of neuroradiological contrast studies, but histological diagnosis was lacking. Brain scans were positive in 7 of them. Five sellar-tumors (craniopharyngioma and pituitary adenomas) were missed.

Table 1. Results of brain scanning in 75 tumors

Diagnosis	Total	Positive	Negative
Meningioma	13	11	2
Glioblastoma	11	11	0
Ependymoblastoma	3	2	1
Astrocytoma	11	7	4
Oligodendroglioma	2	2	0
Metastatic Tumor	8	7	1
Malignant Lymphoma	1	1	0
Hemangioma	2	1	1
Acoustic Neurinoma	5	3	2
Tumor, Deep, Midline	10	7	3
Craniopharyngioma	2	1	1
Pituitary Adenoma	7	3	4
Total	75	56	19

The site of the lesion was an important influence on detection accuracy of the lesion in the overall series. While 56 of 64 high supratentorial lesions were correctly localized

by conventional scans, 12 were missed out of 16 lesions lying near the base of the skull or in the posterior fossa (Table 2).

Carotid and/or vertebral arteriographies

Table 2 Influence of site of lesion
(neoplastic and nonneoplastic)

Location	Positive	Negative
Supratentorial, High	56	8
Supratentorial, Base	9	7
Infratentorial	4	4
Multiple	3	1
Total	72	20

were performed in 68 tumor cases. Both arteriographies and scans were positive in 47. In 4 cases in which the arteriograms were negative, brain scans localized the mass correctly.

Air studies (pneumoencephalography or pneumoventriculography) were done in 48 tumor cases. In 32 both air studies and brain scans were positive. Both were negative in only one case of small hemangioma in the

deep parietal region.

In 71 of 75 tumor cases either arteriography or air study, or both, were performed in addition to the brain scans. Contrast studies and scans were both positive in 53, contrast studies positive and scans negative in 17, scans positive and contrast studies negative in 1. In no case was the diagnosis missed by combined use of arteriography, air study and brain scan.

Thus the positive diagnostic rate of brain scans in localization of brain tumors was less when compared to arteriographs of air studies. Nevertheless both air studies and arteriographies had a considerable number of false negatives and the brain scanning could definitely improve the diagnostic accuracy when combined with those contrast studies.

Finally the comparative merit of four physical diagnostic methods, brain scans, plain radiographs of the skull, funduscopy and electroencephalograms, were analysed.

Table 3. Comparison of four physical diagnostic methods in tumor cases

	Positive	Negative	Total
Scanning	56	19	75
Skull Radiographs	32	43	75
Funduscopy	44	24	68
EEG	30	42	72

The results in tumor cases were summarized in Table 3. Although each of the four tests showed a high percentage of false negatives, a correct diagnosis was missed in no case where three of four of the tests were performed in combination.

It is concluded that the combined use of the four physical and innocuous methods of ex-

amination is highly reliable as a screening test for tumor cases in a busy neurological-neurosurgical outpatient clinic.

Results in nonneoplastic lesions were summarized in Table 4. In spite of a small number of cases, the high diagnostic rate for chronic subdural hematomas should be emphasized.

Table 4. Results of brain scanning in 17 nonneoplastic lesions

Diagnosis	Positive	Negative	Total
A-V Malformation	4	1	5
Chr. Subd. Hematoma	8	0	8
Brain Abscess	3	0	3
Hypertensive Cerebral Hemorrhage	1	0	1
Total	16	1	17