M. Brain and Nervous System

The Double Trace Method and Converging System of the Brain Scintigraphy for Deep Midline Brain Tumors

Y. Kokubo, Y. Maki, and T. Nose

Department of Neurosurgery, School of Medicine, Chiba University

N Arimizu

National Inst. of Radiology, Chiba

It has been noted that the diagnostic valve of the convetional scintigraphy is very much limited for such intracranial lesions as deep midline tumors. The purpose of this study is to incrase the scintigraphical acuracy with the double trace method and converging system.

Sixteen cases, including three subfrontal tumors, six pituitary tumors, six posterior fossa tumors and one temporal infarction, were investigated, and the scintigraphical images obtained with these method are compared with the images of the conventional scintigraphy. Characteristic findings of the abnormal pituitary region and posterior fossa were visualized, and our new techniques were cosidered to be more confirmatory than the conventional scintigraphy.

Brain Scintigram of Basal Medline Lesions —Significance of Digital Processing in Clinical Diagnosis

T. Ikeda, K. Horibe, K. Kamikawa

Neurosurgery, Osaka University, Osaka

Brain scintigrams with 8—10 mci of pertechnetate were studied refering to surgical, histological and other neuro-radiological findings for 91 cases with diagnosis or suspect of basal midline lesions. Anterior view of 45 cases were stored in magnetic tape, displayed on CRT of data processing system and studied the ratio of average count for regions of interest, 2cm×2cm in size, placed on areas of lesion, sagittal sinus and normal brain hemispheres.

In 18 pituitary adenomas, excluding acromegaly and other intrasellar cases, 89% of cases with surgical indication for optic nerve symptoms were reported as abnormal scintigrams. In 20 craniopharyngiomas, 11 positive cases consisted mainly of solid, recurred or thick cystic tumors. Five of 6 ectopic pinealoma and all 6 parasellar or medial sphenoidal ridge meningiomas showed positive uptake.

Average count of 9 pituitary adenomas were 169.4% of normal hemispheric areas, 192.5% in 3 solid craniopharyngiomas, 192.3% in 6 meningiomas and 193.3% in 5 ectopic pinealomas.

Difference of average ratio of lesion count to normal hemispheric count was significant statistically between cystic craniopharyngioma and adenoma, ectopic pinealoma, meningioma, glioma and solid craniopharyngioma, and between adenoma and acromegaly with $p<0.005$, and between solid craniopharyngioma and acromegaly and between glioma and acromegaly with $p<0.025$. In the ratio of lesion count to sagittal sinus count, on the other hand, difference of average ratio was significant with $p<0.005$, only between cystic craniopharyngioma and ectopic pinealoma, and between cystic and solid craniopharyngioma.

These facts suggested that sagittal sinus count is unsuitable to be a standard count of an anterior scintigram to compare with basal midline lesion count. Semiaxial anterior view of pertechnetate brain scintigrams proved their clinical diagnostic value for various basal midline lesions which size required craniotomies. Differential diagnosis between solid and cystic lesions of scintigrams are found very helpful in the decision of surgical indications.

A Model Subtracting of Scalp and Skull Isotope Contents from Brain Scans

H. Tanaka, K. Torizuka

Universty of Kyoto.

W.H. Oldendorf,

University of California, Los Angeles,

In routine brain scans, brain must be viewed through scalp and skull. These superficial tissues interfere with the precise analysis of brain isotope content.

Usually one collimator sees geometrically a demarcated space to determine radioactivity. This space can be splitted into three compartments, that is, scalp, skull and brain.

By using a mathematical expression as below;

$$\begin{pmatrix}\text{Scalp } \gamma_2 \\ \text{Skull } \gamma_3 \\ \text{Brain } \gamma_3\end{pmatrix} = \begin{pmatrix}A1 & B1\cdot V1 & C1\cdot V1\cdot U1 \\ A2 & B2\cdot V2 & C2\cdot V2\cdot U2 \\ 1 & V3 & V3\cdot U3\end{pmatrix}^{-1} \begin{pmatrix}\text{Total } \gamma_1 \\ \text{Total } \gamma_2 \\ \text{Total } \gamma_3\end{pmatrix}$$

We can calculate three isotope contents from the compartments.

In an energy spectrogram, 99m Tc pertechnetate demonstrates total γ_1 count (18 kev X-ray) and γ_3 (140 kev gamma ray), but does not present γ_2. This isotope limits us to use the items which have suffix "2" in the matrix, so that we can determine only scalp and brain $\gamma_3$counts.

Under an experimental situation, 13 human external head counts were obtained. The results were that 36±3% of total count originated from scalp and when brain has same a unit volume as blood in the calculation then 20±2%