

The Vertex View in Brain Scanning¹

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Our accumulated experience with radioisotope scanning of the brain has convinced us of the value and application of the technique (1,2). One of the more frequently encountered problems in performing this procedure has been the choice of a proper "view" to best demonstrate a suspected lesion. Routinely we have performed either frontal or occipital and right or left lateral views as indicated by clinical findings. However, when no localizing findings are present, the choice of views is arbitrary and may not show a lesion to best advantage or even result in false-negative results. In an attempt to prevent this, we have evaluated a superior or vertex view in our scanning procedures.

MATERIAL AND METHOD

In the last four months, 39 patients have been scanned with ¹⁹⁷Hg utilizing the conventional scanning positions and a vertex position. Both neoplastic and nonneoplastic lesions have been encountered.

Equipment:

Standard photoscanning devices have been employed. One instrument with a 3 inch NaI crystal and 19 hole collimator and the other with a 5 inch NaI crystal and 31 hole collimator. The focal distance of the two collimators is approximately the same and the results have not been significantly different.

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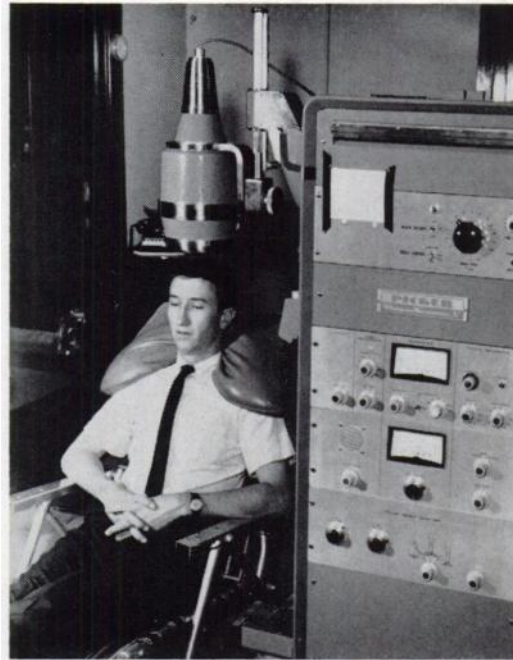


Fig. 1. View from the front of a patient positioned for vertex scanning.

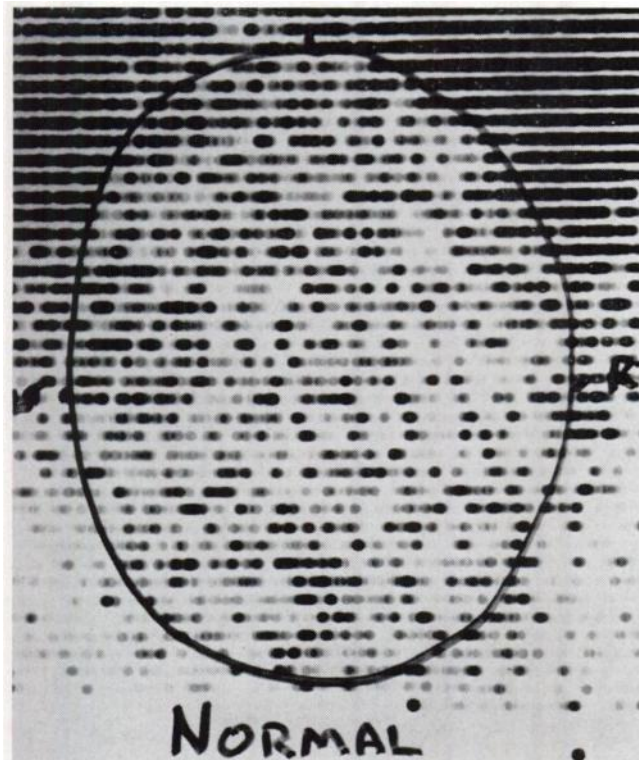


Fig. 2. Normal vertex scan.

Patient Positioning:

The patient is seated in a common reclining lawn chair beneath the collimator and so that the detector is perpendicular to the transverse plane of the skull in its passage over the brain (Fig. 1). A sand filled rubber pad attached to a vacuum pump is used to stabilize the head and reduce patient fatigue. In this position, the radioactivity present in the remainder of the body (particularly kidney and liver with ^{197}Hg Neohydrin) is seen in the anterior portion of the vertex scan, but presents no particular problem. The nasion,inion and the right and left external auditory meati are marked for external landmarks.

Procedure:

The radioisotope is administered intravenously in the usual dosage of $10\ \mu\text{C}$ per kilogram of body weight into an anticubital vein and scanning procedure begun three to five hours later. When the patient has been properly positioned, the vertex view is obtained and then other appropriate views may be performed as indicated.

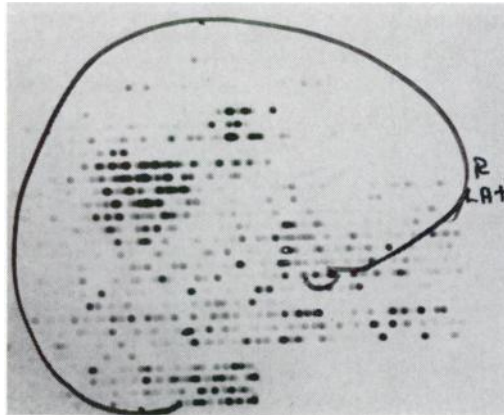
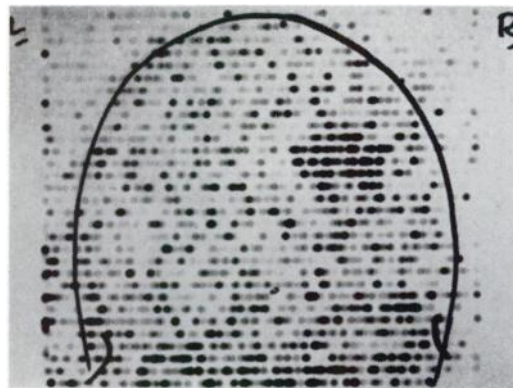
**Fig. 3A****Fig. 3B**

Fig. 3 A & B. A conventional posterior and left lateral view of a patient with a metastatic adenocarcinoma of the brain. The lateral view suggests two lesions, but the posterior view shows only one, probably due to superimposition.

RESULTS

Of the 39 patients scanned in the vertex position, 18 have had positive scans. All patients had the diagnosis confirmed by contrast studies and/or surgery. Neoplastic lesions have accounted for 14 or 78 per cent of the positive scan. Included in this group were seven gliomas, two meningiomas and five metastatic carcinomas. A normal vertex view is seen in Fig. 2. One patient (Fig. 4) was encountered where the routine posterior and lateral views were negative, but the vertex scan indicated a lesion in the posterior brain near the midline. This patient proved to have an ependymoma of the fourth ventricle in the region indicated by the vertex view. In retrospect, there was more concentration on the right in the posterior view, but the tumor was obscured by radioactivity in muscle and blood in this area. The remainder of the positive scans were from four (22 per cent) patients with nonneoplastic lesions. Included in this group were two brain abscesses, a cerebral infarction and a chronic subdural hematoma. Figure 3 illustrates a patient with metastatic carcinoma where the vertex view clearly demonstrated two lesions. One false-negative scan has been encountered in the case of a recurrent chromophobe adenoma of the pituitary gland. Both laterals and the anterior scan were also negative in this case. Surgery verified the lesion, 3 cm in its greatest dimension. In every instance of a positive conventional scan, the vertex view was also positive.

DISCUSSION

In performing radioisotope brain scans as a screening test, we have found that in some cases after two views have been performed, a lesion is visualized in

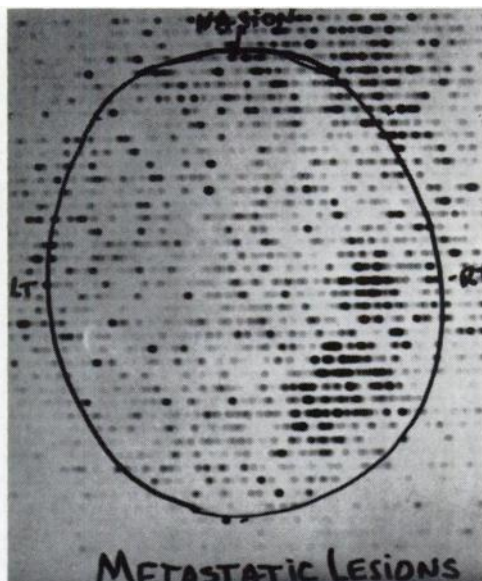


Fig. 3 C. Vertex view of the same neoplastic lesion, showing clearly the presence of two lesions and confirming the lateral scan. In this scan a lead apron was used to exclude much of the body background.

a region of the brain remote from the probe. This necessitates repeating the study in the more appropriate projection. We have found that this loss of time and discomfort for the patient can be minimized by utilizing a vertex scanning position in those patients where localization of a lesion prior to the scanning procedure is not possible.

An additional advantage of this view is that helpful information is obtained in those patients with lesions in the area of the posterior fossa. As a result of the increased radioactivity in the muscle mass of the occipital areas, lesions in this area are difficult to visualize by brain scanning techniques. It appears that this method may enhance the value of brain scanning in these lesions, since the muscle masses in the vertex scan will not be interposed between the probe and the lesion.

Finally, the application of brain scans to stereotaxic instruments is being investigated (3), and the need for a better coordinate may be partially aided by utilizing this vertical view of the lesion.

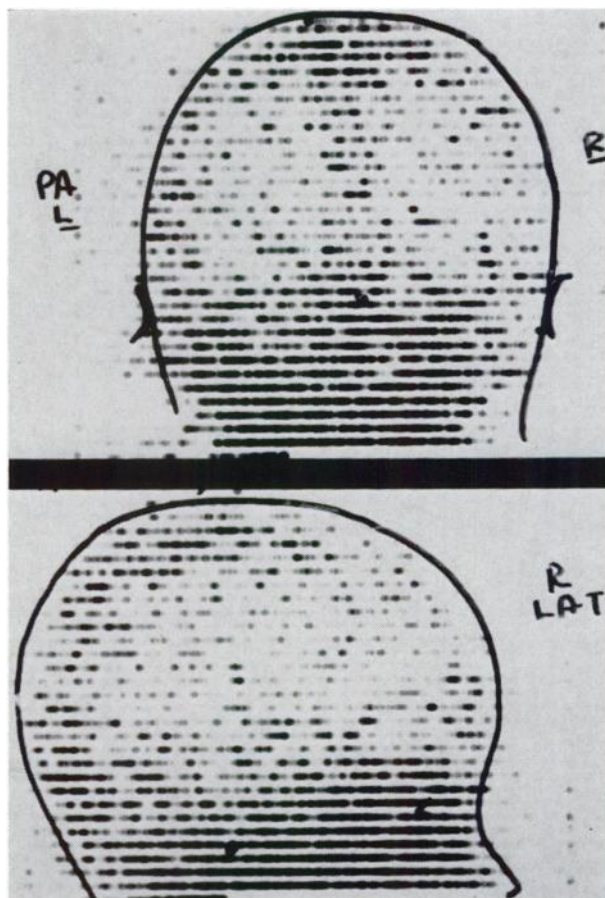


Fig. 4 A & B. Negative conventional posterior and lateral scan in a patient subsequently found at operation to have an ependymoma of the fourth ventricle.

Our group of vertex scans is at this point too small to draw any firm conclusions as to its advantages over routine techniques. Our results reveal, however, that it indicates the area of the lesion well and is not uncomfortable for the patient.

Although we are not aware of reports of this technical modification, it seems unlikely that it would be confined to our institution. We hope that this report will stimulate others to evaluate this view.

SUMMARY

A new vertical scanning position (vertex scan) is described to aid in determining more quickly the position of an intracranial lesion. In patients without localizing neurological symptoms, it may establish the presence of a lesion that might be overlooked with a routine AP and lateral scan. It also appears that the vertex scan may be helpful in obtaining positive scans of lesions in the more difficult to visualize area of the posterior fossa.

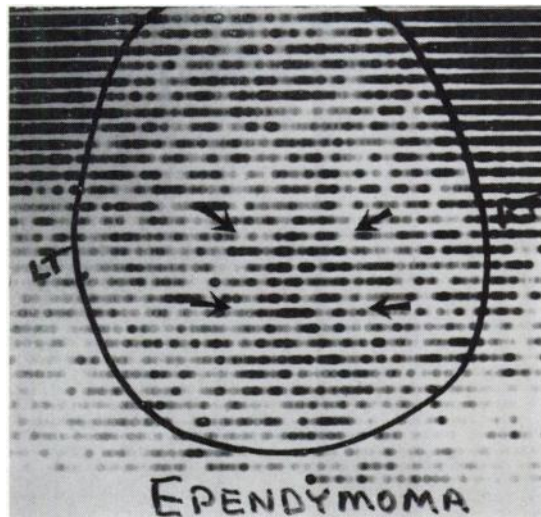


Fig. 4 C. Vertex view of the patient demonstrating increased concentration of radioactivity in the region of the fourth ventricle.

REFERENCES

1. OVERTON, M. C., HAYNIE, T. P. AND SNODGRASS, S. R.: Brain Scans in Nonneoplastic Intracranial Lesions. Scanning with Chlormerodrin Hg 203 and Chlormerodrin Hg 197. *J.A.M.A.* 191:431-436, February 8, 1965.
2. OVERTON, M. C., OTTE, JR., W. K., BEENTJES, L. B. AND HAYNIE, T. P.: A Comparison of 197 Mercury and 203 Mercury Chlormerodrin in Clinical Brain Scanning. *J. of Nuc. Med.* 6:28-37, January, 1965.
3. COE, J. E., OMMAYA, A. AND BALDWIN, M.: Conversion of an Area of Positive Radioisotope Uptake into Stereotaxic Coordinates: An Experimental Technique. *Journal of Neurosurgery*. Accepted for publication.