LAMINAGRAPHY WITH CEREBRAL PNEUMOGRAPHY*

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Numerous procedures have been developed for the diagnosis and localization of intracranial pathology. Pneumography, arteriography, electroencephalography and radioactive isotope studies have all been used with some measure of success. Cerebral arteriography has proved its greatest usefulness in the localization of vascular abnormalities. However, this procedure has not been uniformly successful in the diagnosis and localization of space-occupying lesions, and the incidence of complications does not permit its routine employment as a diagnostic procedure for such lesions. Electroencephalography, while reliable in experienced hands, is not consistently accurate in the diagnosis and localization of intracranial neoplasms, particularly lesions not involving the cerebral convexities. Cerebral pneumography has remained the single most important aid in the diagnosis and localization of tumefactions.

The procedure of pneumoencephalography has been modified variously to obtain better filling and visualization of the ventricular system. These methods have all been concerned with variations in the technique of instillation of air and in the positioning of the head. The midline anatomy of the ventricular system has always been difficult to visualize with the usual techniques. The problem of obscuration and confusion by overlapping shadows of air in the lateral and midline ventricles, the cisterns and subarachnoid spaces and the overlapping bony shadows, persists. A satisfactory procedure that can overcome these difficulties, and one that has received little attention, is the addition of laminography to the routine pneumograms.

The use of laminography in neuroradiology has generally been limited to the visualization of the bony structures at the base of the skull. The use of this procedure in conjunction with air studies has been neglected and has not received full recognition of its potentialities. Pneumography is well suited to the laminographic studies. When air is placed in the ventricles, a system of contrasting densities results in an ovoid body surrounded by bone. With laminography, even small quantities of air in any region of the ventricles can be identified accurately by the level of the fulcrum of transection. It results in an unusual clarity of image and any deformities become obvious. Laminographic studies with pneumography have appeared sporadically in the literature. These reports have emphasized the value of this technique in

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Fig. 1. Case 1. Plain lateral view of normal pneumoencephalogram showing air in the lateral ventricles.

the visualization of the midline structures: the 3rd ventricle, the aqueduct of Sylvius and the 4th ventricle. We have found this technique to be equally valuable to demonstrate deformities and displacements of various regions of the lateral ventricles not demonstrable by the routine and stereoscopic views. By using this technique, formerly unsuccessful pneumograms are now satisfactory and visualization of the ventricular air shadows at any desired site becomes adequate.

This technique entails no added risk or discomfort to the patient. No more than 40 cc. of air are necessary to obtain adequate visualization of the ventricular system. The additional equipment is available as part of the standard equipment of most departments of radiology. It is a relatively simple technique and requires only an additional few minutes of time to provide an exceptional visualization of the ventricular system and a greater clarity of image at the desired site.

TECHNIQUE

This method was used in ventriculography and pneumoencephalography. The technique of the latter procedure is that described by Lindgren. By this method, not more than 40 cc. of air are necessary to adequately fill the ventricles. After the routine and stereoscopic radiographs are taken, the patient is placed horizontally