Extracranial Masses Complicating the Interpretation of Echoencephalograms
A New Technique for Quantitative Evaluation

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Clinical experiences with echoencephalography have shown this procedure to be a valuable aid in the diagnosis of intracranial mass lesions. However, the usefulness of the procedure depends on establishing techniques for accurate localization of certain midline structures of the brain. Ultrasonic reflections can be obtained from a number of structures including the pineal gland, the septum pellucidum, and the longitudinal fissure. A recommended site for placement of the probe, and the site most frequently used by us to obtain these reflections, is a point above and anterior to the ear. We have also used posterior sites for evaluation of other supratentorial midline structures. Although satisfactory for obtaining reflections from the midline, these areas are also frequent sites of occurrence of subgaleal hematomas after cranial trauma. On routine echoencephalography the distances from the scalp to the midline reflection are compared to a theoretical midline established halfway between the sites of the probes on the scalp. The use of such a method in the presence of extracranial mass, such as a subgaleal hematoma, can give factitious evidence of a shift in midline structures away from the side of the lesion. Our experience with this problem as well as a method for obviating such an error is reported.

Materials and Methods

The instrument* used was a Siemens echoencephalograph, System Krautkämper, equipped with a photographic attachment. A 2 Mc. per sec. probe was employed in the examinations of all patients. Contact between the probe and the scalp was made with lubricating jelly. Before each use the instrument was calibrated with a 2.5 cm. standard and two scales were established, one with full scale being 10 cm. and one with full scale being 20 cm. The 10 cm. scale was used to obtain the midline reflection, and the 20 cm. scale was used to obtain the reflection from the contralateral inner table of the cranium.

The patients included in this study are 15 consecutive patients admitted to the Neurosurgical Service of the University of Virginia Hospital for management of craniofacial trauma.

The following routine proved to be the most effective method for evaluation of the patients. By placing the probe above and anterior to the ear on one side of the scalp, a reflection from the midline structures was obtained. This distance, D1, was measured by means of the 10 cm. calibrated scale. The scale was increased to 20 cm., and then a reflection was obtained from the inner table of the contralateral hemip这里是cranium. Distance D2. The probe was then placed on a corresponding area on the opposite side of the scalp and the values repeated for the midline structures and the contralateral inner table, D3 and D4 respectively. Fig. 1 demonstrates these values graphically and indicates the conditions of a normal situation in which the midline structures of the brain are halfway between the inner tables of the cranium. In such a case the distances from the scalp to the midline structures measured from each side of the head are equal. Also, the distances from the scalp to the contralateral inner table measured from each side are equal. In the presence of an intracranial space-occupying lesion, for example a subdural hematoma, the appropriate shift of the midline structures can be found by measuring the distances from the scalp to the midline reflection from both sides of the head. As shown in Fig. 2, these distances are unequal, the distance on the side of the lesion being greater, and D2 is equal to D4. The importance of measuring the distances from the scalp to the contralateral inner table, D3 and D4, becomes obvious by inspection of Fig. 3.

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of these (J. B., UVH No. 387474) had a large subgaleal hematoma at the site of trauma in the left temporal area. He also had a subdural hematoma of approximately equal thickness on the opposite side. His initial echoencephalograpic studies were midline (D1 = D2). However, measurements of D3 and D4 were consistent with the presence of the subgaleal mass. Unfortunately, the significance of these findings was not appreciated until contrast studies had been obtained. The circumstances of this case are clarified in Fig. 4. A second patient (L. C., UVH No. 516870) with only a subgaleal hematoma had an apparent shift on his initial studies; however, the difference between D1 and D2 was equal to that between D3 and D4. This patient was an example of the circumstances shown in Fig. 3. A third patient (J. L., UVH No. 517769) had a subgaleal hematoma on the

Results

The echoencephalographic studies of the 15 patients were correlated with their clinical history, physical findings, results of contrast studies and course in the hospital. Table 1 contains the pertinent information concerning these patients.

Three of the 15 patients had significant subgaleal hematomas. The most interesting