# Uses of Sonography in Neuroradiology

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# Editorial

## Uses of Sonography in Neuroradiology

Since the initial publication of Leksel [1] in 1956, when echoencephalography was thoroughly described and recommended to determine the position of the midline of the brain, there have been various attempts to explore the applications of this noninvasive technique in the head. However, the absorption of sonographic waves by the skull has until now represented an important barrier to their application. Although the use of B-mode sonography was demonstrated in the middle fifties [2, 3], the available apparatus for this type of sonographic imaging was cumbersome and not really practical. In 1964, Brinker and Taveras [4] reported the first experience with the use of a pivotal arm scanner in the head at the Seventh International Neuroradiological Symposium in New York. The development of this unit (Physionics Engineering, Colorado) represents a true milestone in sonographic imaging in that it was the first unit of this type, and every subsequent unit now available on the market was patterned after it.

Excellent cross-sectional images of the intracranial structures were produced by this approach. However, there was no consistency in our ability to reproduce them, probably owing to the variation in thickness of the skull bones from patient to patient.

Efforts to increase the role of sonography in neuroradiologic evaluations continued and there was some progress in the development of apparatus for echoencephalography up to 1973 and even later [5]. However, it was obvious after the development of computed tomography (CT) that sonography was going to be replaced by this new noninvasive technique. Additional efforts to produce real-time sonographic images of the adult brain continued, but without success because of the limitations imposed by the skull.

In the last few years it has become apparent that real-time sonographic instruments are excellent to study the brain in the infant where the fontanelles are large enough to permit the placing of transducers with ease, preferably in the region of the anterior fontanelle, but also in the posterior fontanelle or in the lateral, temporal suture areas. A number of articles has appeared in various journals and four new articles dealing with the use of sonography in infancy (one in utero) appear in this issue of the *AJNR*.

Although the depiction of the anatomic structures by sonography is not nearly as easy to follow as that seen with CT, the pictures contain all of the necessary anatomic detail; familiarity with the images facilitates interpretation. The fact that the sonographic examination can be repeated without fear of exposure to ionizing radiation and that it can be carried out at the patient's bedside is a real advantage. The ease with which sagittal, coronal, and oblique cross-sectional images can be obtained is another. It is evident that, in the newborn, sonography of the head has now replaced CT as the primary mode of investigation and that CT scanning should be reserved for special situations such as the confirmation of intracranial hemorrhage of all types and to determine the presence of a tumor that may have been suspected by sonographic examination.

I can envision further improvement in instrumentation, possibly involving signal processing by computers to overcome some of the limitations imposed by the skull. The day of sonographic cross-sectional imaging of the brain in adults may yet come and the promise of those early cross-sectional pictures of 1964 may yet be fulfilled.

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