

References

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INVITED COMMENT: Space-occupying lesions which result from malformations of the central nervous system commonly present a nosological dilemma. The lesion may be designated either according to its pathological nature, such as a hamartomatous squamous cyst, or by a name that implicates putative morphogenic process(es) or primordial structure(s), such as Rathke's cleft cyst. In many circumstances, current acceptable usage is an operational combination of both designations. The name becomes a significant problem when it creates confusion between clinicopathologically distinct processes, as between a true tumor and a tissue remnant, or when the term is assumed to connote more morphogenic precision than possible. Herein lies the debate reflected by the two letters and the rebuttal by Drs. LeDoux and Faye-Petersen. "Teratomatous cyst" is not a frequently used term in current neuropathological descriptions. I feel that it should be abandoned because of the significant risk the term presents for an ambiguous diagnosis.

The term "teratomatous cyst," aside from any controversy about whether it may be distinguished on the basis of location and histopathology, poses major problems. Teratomas are clearly true neoplasms with a firmly established protocol for histopathological evaluation and grading. These tumors may be composed predominantly of a cystic element but, nevertheless, the accepted pathological evaluation of such a lesion would not be the same as for a simple maldevelopmental cyst. If the term "teratomatous cyst" is used to connote such a cystic teratoma, there is no clear merit to substituting an ambiguous term ("teratomatous cyst") for one with a clear clinicopathological meaning (teratoma). The use of "teratomatous cyst" as a more general term to describe a cyst with a mixed tissue composition is entirely inappropriate and unjustified from the pathological perspective; to apply it in that way introduces the inherent risk of confusion with a true tumor. Certainly, even by the most general criteria, the lesion described in the paper by LeDoux, *et al.*, is not a teratoma.

The term "neurenteric cyst," as applied by LeDoux,

et al., in their paper is apparently used in its broadest operational sense — to connote a spectrum of maldevelopmental lesions as postulated by Bentley and Smith¹ and Cohen and Sledge.² In both hypothetical schemes, developmental mechanisms were emphasized over a rigid set of histopathological criteria; instead, one would expect to find an array of histopathological features, with the lesion described by LeDoux, *et al.*, at one end of the spectrum. While not ideal, but for lack of a better term, LeDoux, *et al.*, have been entirely reasonable in their usage and in the discussion of their case.

SCOTT VANDENBERG, M.D., PH.D.
University of Virginia Health Sciences Center
Charlottesville, Virginia

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Near-Infrared Spectroscopy

TO THE EDITOR: At the end of their study (Gopinath SP, Robertson CS, Grossman RG, et al: Near-infrared spectroscopic localization of intracranial hematomas. *J Neurosurg* 79:43-47, July, 1993), Gopinath, *et al.*, proposed near-infrared spectroscopy to be used in the emergency room as an adjunct to computerized tomography (CT) or when CT is not immediately available. This proposition was in regard to the emergency localization of intracranial hematomas.

This technology, however, was described by the authors as presenting some overlapping values in optical density for extracerebral versus intracerebral hematomas. In addition, the paper says that the location of the hematoma could not be precisely determined in all cases. Without CT scans, my understanding is that this technique is basically capable of informing about the presence of a hematoma underneath the scalp. This could be subgaleal, epidural, subdural, or intracerebral. The latter, in turn, could be extra- or intracapsular. In order to optimize surgical decisions, it is of paramount importance that not only the size of the hematoma but also its location be precisely determined.

From the description of this technique, even the differential diagnosis between extracerebral and intracerebral hematomas is not a certainty. Furthermore, in the case of intracerebral hematomas, it is absolutely crucial to precisely determine if the clot is extra- or intracapsular (to fine-tune surgical indications). It appears to me that the resolution of near-infrared spectroscopy is not enough to provide this information.

In contrast, an old, practical and strongly informative technique, namely cerebral angiography, was not mentioned by the authors as an alternative when CT is not readily available. Cerebral angiography can rule out a subgaleal clot and define if a hematoma is epidural,

subdural, or intracerebral. Even more important, cerebral angiography can precisely inform if an intracerebral hematoma is extra- or intracapsular. In experienced hands, emergency cerebral angiography can be carried out at the bedside with portable x-ray equipment. Two anteroposterior and lateral films will provide basic information about the size and location of hematomas and the nature of bleeding as well (confirming or ruling out a primary vascular lesion).

It appears that certain technological advances may sometimes mask the real utility of old techniques, while failing to provide a true substitute for most conventional steps in the broad field of neuroemergencies.

JULIO CRUZ, M.D.
University of Pennsylvania
Philadelphia, Pennsylvania

RESPONSE: We would like to thank Dr. Cruz for his interest in our work. We agree with him that the near-infrared spectroscopy technique cannot replace the computerized tomography scan or the cerebral arteriogram. However, it does give more information than simply that there is blood beneath the scalp. Subgaleal hematomas did not cause confusion because they were obvious from the physical examination and because, with the 3.5-cm separation of the light source and detector that was used in these studies, superficial blood

in the scalp did not cause as much absorbance of light as deeper intracranial blood. Also, by using a probe with the 5-cm separation of the light source and detector, it is possible to scan the deeper tissues.

The distinction between extracerebral and intracerebral hematomas, which is the most important surgical question in a severely injured patient, was fairly clear-cut. With a difference in optical density (ΔOD) greater than 0.6, all hematomas were extracerebral. With a ΔOD less than 0.4, all of the hematomas were intracerebral. With a ΔOD between 0.4 and 0.6, there was some overlap with both types of hematomas being represented. While it was not possible to distinguish a subdural hematoma from an epidural hematoma by the ΔOD , with these extracerebral hematomas the ΔOD was clearly related to the thickness of the hematoma. In circumstances where more sophisticated studies are not immediately available and where the patient is neurologically deteriorating, the information provided by near-infrared spectroscopy could be useful to the neurosurgeon.

SHANKAR P. GOPINATH, M.D.
CLAUDIA S. ROBERTSON, M.D.
ROBERT G. GROSSMAN, M.D.
BRITTON CHANCE, Ph.D.
Baylor College of Medicine
Houston, Texas