THE ELECTROENCEPHALOGRAM IN SUBDURAL HEMATOMA

WITH A REVIEW OF THE LITERATURE AND THE PRESENTATION OF SEVEN CASES

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THE PATHOLOGY and treatment of subdural hematoma is well understood but the clinical picture is subject to great variance. The writers are impressed, both in clinical experience and in the review of the literature, by the difficulty with which an early diagnosis is made.4,6 Most publications on subdural hematoma are prefaced by statements that emphasize the inconsistent symptomatology and difficulty in diagnosis. It is the attitude of some surgeons that whenever subdural hematoma is suspected a simple and expedient method of proof is to perform bilateral trephines.3 With such a routine the percentage of negative explorations increases. It is desirable to place the trephine openings in only those patients having a surgical lesion. This feeling gains added strength since trephine openings have an implication in the patient’s industrial, insurance and psychic future.

For these reasons additional diagnostic procedures have been employed. Pneumoencephalography is not without risk and is considered contraindicated by some authorities.9 In the study of subdural hematoma, as in all neurological disease, diagnostic tests have been directed mainly toward disturbances of anatomical relations. With the confirmation of Berger’s observation that the electrical activity of the brain followed a certain rhythmical pattern, and that in pathological states this fundamental pattern was altered, a useful diagnostic aid was placed in the hands of the clinician. The electroencephalograph offers a new and different approach in that alteration in the physiologic (electric) activity of the brain can be studied directly as well as indirectly. With subdural hematoma the abnormalities in electrical activity of the brain are shown to be altered dependent on: (1) the amount of the bleeding, (2) the location, and (3) the time interval between the bleeding and the EEG.

There are reported in the literature several clinical and experimental observations on the EEG in subdural clot that appear conflicting. The EEG has been described as showing (1) increased voltage and slow wave pattern

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on the side of the lesion; (2) decreased voltage and slow wave pattern on the side of the lesion with normal pattern on the contralateral side; (3) decreased voltage and slow wave pattern on the side of the hemorrhage with increased voltage and fast wave activity on the contralateral side; or (4) normal electrical activity.

Walter in 1939,14 who was the first to report focal abnormal electrical activity of the brain with subdural hematoma, concluded that a “silent area” existed over the site of the hematoma. He apparently used the term “silent area” as meaning an area of decreased electrical activity (amplitude).

Cohn,7 in a carefully executed experiment with cats, produced subdural hemorrhages by instilling the animals' own blood into the subdural space. He was able to produce varied EEG findings by taking recordings at intervals up to 21 days. The abnormal electrical activity of the brain in these animals correlated directly with the extent and duration of the hemorrhage, which in turn caused varying degrees of injury to the cortical neurones. With the experimentally produced subdural hematoma there was decreased electrical activity over the site of the hematoma after the first 30 minutes, which persisted for at least 1 week. He found that subdural hematoma of 1 week or more in duration may show: (1) focal decreased activity (amplitude) over the site of the hematoma; (2) generalized slow waves with a focus of abnormality; or (3) the tracing may be normal.

Cohn et al.,7 in reporting 6 clinical cases, stated that the EEG showed one of two primary characteristics; a maximum of high voltage slow waves over the lesion (3 cases) or slow wave activity of reduced amplitude over the site of the disturbance (2 cases). He was unable to explain the absence of electrical changes in 1 case of surgically proved subdural hematoma.

Gurdjian and Webster,5 in their article on intracranial hemorrhage, commented that the EEG may be of important assistance in the diagnosis of subdural hematoma and stated that correct localization had been accomplished by this technique in 40 per cent of their cases. They did not describe the criteria used for localization except to state that their records showed “disorganization of electrical pattern on the affected side.” Of the 3 tracings that they showed, each case appeared to us to show decreased amplitude over the hemisphere underlying the hematoma. They failed to comment on this amplitude variation.

Ulett12 produced subdural hematomas in dogs experimentally and concluded that decreased voltage occurred over the site of the hematoma with no changes being observed over the contralateral side. This abnormality persisted until the dogs were killed 2 days later.

Heersema and Freeman6 reported that of 25 cases of subdural hematoma the EEG was helpful in one-half and disclosed unilateral delta waves. They stated that the delta waves were so extensive in some instances that the EEG was not an aid to localizing the lesion. In 12 per cent of their cases the EEG findings were normal but these were considered erroneous. From their article it is impossible to draw any definite conclusions. They failed to give