OBSERVATIONS ON ENCEPHALOGRAPHIC FINDINGS IN CEREBRAL TRAUMA

CHARLES E. TROLAND M.D.,* DONALD H. BAXTER M.D.,† AND RICHARD SCHATZKI, M.D.‡
McGuire General Hospital, Richmond, Virginia

(Received for publication May 8, 1946)

The authors have had opportunity for studying encephalograms done in an Army Hospital serving as a neurological and neurosurgical center over a period of nine months. The majority of cases were post-traumatic. It is believed in view of the rather limited data available in the literature on similar studies the findings at this installation are of sufficient value to be recorded.

MATERIAL STUDIED

During the period mentioned above, 261 patients were examined by lumbar encephalograms. Of these, 177 had head injury with skull defects, while 29 had closed head injuries, making a total of 206 cases, or 79 per cent. There were 32 with idiopathic epilepsy, and in 23 cases examination was made for other lesions of the central nervous system. The x-ray reports were available in all cases, and the actual films were available for review and for special measurements used in this study in 193 cases, 159 of which were cases of head injuries. In some instances the clinical records were not available at the time of study.

DESCRIPTION OF TECHNIQUE

Encephalographic procedures at this hospital have been carried out entirely in the radiological department.

Examinations were done in the afternoon. The patient was prepared by omitting the noon meal and giving pre-anesthetic medication in appropriate dosage one to two hours prior to the procedure. Premedication usually consisted of morphine, gr. ½ and scopolamine, gr. 1/150. All encephalograms were done under intravenous anesthesia. Sodium pentobarbital (3½ per cent solution) was used, the total dose varying with the individual.

When ready for the procedure, the patient was placed on a support attached to an ordinary radiographic tilting table with the table in vertical position. The support consisted of a board fastened to metal arms which could be attached to the table in the manner of the usual foot-board. The patient was arranged in the sitting position with his left side against the surface of the table, arms extended and resting on a small bedside table, which could be adjusted to the proper height. The head was placed with the chin resting on a U-shaped support on the bedside table.

The two-needle method of drainage of the cerebrospinal fluid was used, one needle being inserted between the 2nd and 3rd lumbar vertebrae and the second one between the 3rd and 4th lumbar vertebrae. The fluid was permitted to escape freely, each 20 cc. of fluid being replaced with 30 cc. of air. As much fluid was removed as possible, usually 100 to 150 cc.

* 1200 East Broad St., Richmond 19, Virginia.
† Shreveport Charity Hospital, Shreveport, Louisiana.
‡ Massachusetts General Hospital, Boston, Massachusetts.
ENCEPHALOGRAPHIC FINDINGS IN CEREBRAL TRAUMA

being withdrawn. It was not felt necessary to resort to manipulation of the head. This method was used because it was believed that a freer interchange of fluid and air was possible and that more complete and somewhat quicker drainage could be obtained.

After drainage was completed, anesthesia was discontinued, the table was returned to horizontal position, the support removed and radiographs were taken immediately.

In all cases a complete series of roentgenograms was made, consisting of anteroposterior, posteroanterior, and both lateral stereoscopic views. Except in unusual cases where it was felt that further information might be obtained, the vertical position was not used. During the taking of the films a standard head-support attached to the radiographic table was employed to maintain position and fixation of the head. Wedge-shaped supports were used beneath both shoulders for the PA view and beneath the contralateral shoulder for the lateral view.

The usual radiographic technique consisted of the use of the Potter-Bucky diaphragm, intensifying screens and a target film distance of 36 inches. Radiographic factors were: Kilovoltage, 70; Milliamperes, 100. The time was varied in individual cases as indicated, the average patient requiring 0.4 second for lateral views and 0.8 second for AP and PA views.

The films were developed immediately and checked for the necessity of any further study as well as for technical quality before the patient left the department.

INDICATIONS AND CONTRAINDICATIONS

I. Indications

(A) Any head injury with sequelae
   1. Penetrating head wound
   2. Depressed fracture
   3. Simple fracture
   4. Post-traumatic symptoms without demonstrable injury to vault

(B) Convulsive seizures
   1. Epilepsy with deterioration
   2. Focal seizures
      a) Focal tracings in electroencephalogram
      b) Localizing neurological signs
   3. Convulsive seizures beginning after the age of 30
   4. Post-traumatic convulsive seizures

(C) Signs or symptoms of degenerative cerebral disease

(D) Suspicion of brain tumor without signs of increased intracranial pressure

II. Contraindications

(A) Absolute—presence of choked disc

(B) Usually—other clinical or x-ray signs of increased intracranial pressure

METHOD OF MEASUREMENT

Early in the course of this study it became obvious that some objective method of measurement of ventricular size would be useful. It was felt that measurement would (1) aid in obviating the factor of personal judgement in analyzing encephalograms for evidence of dilatation, (2) form a basis of comparison between cases, and (3) provide comparison between repeat examinations in the same case.