SUBDURAL HYGROMA
A REPORT OF SEVEN CASES

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The subdural space still remains an unsolved mystery in medicine. The anatomical details and studies of the subdural space are meagre indeed.\textsuperscript{13,28} Penfield made anatomical studies of the subdural space in dogs and estimated the contents to be a few drops to one cc. per kilogram. Estimations of the normal amount of fluid in the subdural space in humans have not been made, many neurosurgeons feeling that no subdural fluid is normally present. Operations at the vertex of the skull obviously fail to reveal the fluid because of its gravitation to the base. This basal subdural fluid has been repeatedly shown to me by Dr. Temple Fay\textsuperscript{9} in his Gasserian ganglion operations by the transtemporal approach. By nicking the subtemporal dura, large quantities of subdural fluid well out of the wound, insuring ample and easy approach to the Gasserian ganglion.

The origin of excessive subdural fluid accumulations, designated subdural hydroma by Dandy,\textsuperscript{8} has likewise created heated controversies. Dandy has listed three causes. Trauma is the foremost cause, resulting in arachnoidal tears with leakage of cerebrospinal fluid into the subdural space; secondly, subdural effusions may arise secondary to infection of overlying bone, as in mastoiditis; and thirdly, accumulations are occasionally seen secondary to a communicating hydrocephalus with tearing of the arachnoid at the basal cisterns. Most neurosurgeons believe that excessive collections of subdural fluid are the result of tearing of the arachnoid, the rent acting as a ball-valve mechanism preventing the return of the cerebrospinal fluid to its original confines. Adson\textsuperscript{7} was fortunate to observe such a tear in the arachnoid in one of his cases. All cases of traumatic subdural fluid effusions are probably not due to a tear in the arachnoid. McConnell's\textsuperscript{17} case No. 7 was quite interesting. The first drill opening made 7 hours after injury failed to reveal any subdural fluid while 9 days later, on re-exploration, a copious stream of yellow subdural fluid was evacuated despite repeated spinal fluid drainages. If a tear in the arachnoid were responsible for the subdural collection in this case, it should have been found at the first exploration. The author has had a similar experience (see Case 7).

The pathology of the fluid removed has likewise offered difficulties since gross contamination with blood occurs when the dura is opened. However, the protein content as reported by various investigators varies from 30 to 5000 mgm. per 100 cc. The fluid is variously described as clear, xanthochromic, or blood-tinged. The amount may vary from 30 cc. to 2300 cc. (Cohen's case\textsuperscript{6}).
HISTORICAL REVIEW

The first descriptions of post-traumatic subdural hygromas were written by Professor Payr21 of Germany during the first World War in 1916. His original descriptions under the name of meningitis serosa traumatica are complete in every detail. Little has since been added to his classical work in the *Medizinische Klinik*. He reported 4 cases: one occurring in the frontoparietal area, two over the temporal lobe and one in the posterior fossa. These four cases were due to tangential bullet wound injuries of the skull.

Dr. Charles Mayo19 in 1894 operated upon a brain cyst which undoubtedly appears to be a true subdural hygroma. Dr. Naffziger’s report20 of 1924 was important as it stimulated a growing interest in this condition among neurosurgeons in this country. He discussed the etiology and symptomatology, and outlined the most rational treatment for the condition.

In 1927 there appeared the interesting report by Ira Cohen.6 He described a case in which a massive accumulation of subdural fluid had caused displacement and compression of the brain with focal and increased intracranial pressure symptoms.

With the exception of the writing of Dandy8 in 1932 in Dean Lewis’ *Practice of Surgery*, a decade had passed before interest was again revived by the reports of the Mayo group (Love16 in 1937, Walsh and Shelden27 in 1937, and Da Costa and Adson7 in 1941).

In England, the first and perhaps most extensive report was that of Adams McConnell15 in 1941. His 32 cases were well described and verified by operation. He divided them into 4 groups: Group 1—patients whose condition was deteriorating, usually within 48 hours of injury and characterized by an expanding lesion (8 cases); Group 2—patients who were in the process of recovery from definite general cerebral contusion, but in whom full recovery seemed to have been checked—passive space-occupying lesion (6 cases); Group 3—patients suffering from headache, dizziness, and vague symptoms of nervous instability dating from a head injury (4 cases); and Group 4—patients in whom headache and occasionally some definite nervous symptom, constant for the individual, started some time after a head injury—best operative results (12 cases).

In 1942 Scott25 reported 3 cases of prolonged stupor associated with subdural hygromas and in the following year he24 described a case of acute subdural hygroma which simulated the syndrome of an extradural hemorrhage. Sirois26 in 1942 reported a case in a 9-year-old boy which was successfully treated surgically. In the following year Ley, Roca de Vinals and Sard14 wrote on collections of the subdural space.

With the advent of World War II an interesting group of subdural effusions secondary to blast concussion has been described by Abbott, Due and Nosik.1,2,3 These authors reported a total of 37 cases stressing, in particular, the psychiatric symptoms and the pre- and postoperative responses to standard psychometric examinations. Haynes11 added three more case reports in *War Medicine* in 1944. In the same year, McConnell18 added 5 cases