Subdural hematoma

Experience in a general hospital

Hiroshi Mitsumoto, M.D.
Department of Neuropathology

John P. Conomy, M.D.
Department of Neurology

Gary Regula, Ph.D.*

The diagnosis of subdural hematoma (SDH) is often difficult, delayed, or not determined. A high mortality and serious morbidity are characteristic of the condition. Collected experiences of medical and neurologic services with patients harboring SDH are meager, despite the relatively large number of patients with SDH admitted to such services.[1,2] An analysis of 10 years of medical and neurologic interaction with patients having SDH was made in an attempt to identify demographic, historical, physical, and diagnostic features in patients subsequently found to have SDH and to report the outcome of the illness. Consecutive cases of SDH diagnosed in a 10-year period were collected from medical and autopsy records and analyzed according to the Statistical Package for Social Sciences.[3] During the study period, 53 patients were admitted to medical or neurologic services and 49 patients were admitted to surgical services. Thirteen additional patients were found to have significant SDH at autopsy. Significance in this instance was defined as the patient under study having at least one of the following findings: (1) appropriate clinical signs during life, (2) evidence of

* *Department of Biometry, Case Western Reserve University School of Medicine, Cleveland, Ohio.*
The patients included in this report were studied at University Hospitals of Cleveland.

cerebral compartmental shifts, or (3) secondary midbrain hemorrhages consistent with the effects of increased intracranial pressure.

Nine of the 13 patients in the autopsy group in whom SDH was not diagnosed during life had been originally admitted to medical or neurologic services. Although generally thought of as a surgical disease, more than half of all patients with SDH were admitted to medical or neurologic services initially.

The mean age of patients on the medical or neurologic services (62.7 years) was greater than those on the surgical service (52.7 years). Patients on the medical or neurologic services were most frequently referred to the hospital by physician, family, or friend, whereas patients on the surgical service were referred by family, friend, or police. Seventy-five percent of all patients were admitted to the hospital after evaluation in the emergency ward. The remainder were admitted electively.

Admission characteristics

The most common complaints of all patients on admission were headache, confusion, and stupor. The medical or neurologic patients also complained of hemiparesis, sphincter incontinence, blackouts, nausea and vomiting, or seizures with greater frequency than the surgical patients. A history of head trauma was obtained in half the patients on the medical or neurologic services. The interval between trauma and admission was frequently longer in medical or neurologic patients compared with the surgical patients. Nevertheless, nearly 10% of the patients admitted to the medical or neurologic services had histories of less than 3 days from the time of head trauma to the time of hospital admission.

On neurologic examination, abnormalities of mental status were present in 80% of patients. These abnormalities most frequently consisted of disorientation, confusion, or stupor. One of five patients was alert and fully oriented upon admission. Six percent of the medical or neurologic patients were comatose at the time of admission; 32% of the surgical patients were comatose. Hemispheric signs such as hemiparesis, hemianopsia, and aphasia were frequently found. Signs of recent head trauma were present in one fourth of the patients admitted to medical and neurologic services.

SDH mimicked a wide range of neurologic illnesses (*Table 1*), and was suspected at admission in only 27 medical or neurologic patients. Stroke was initially diagnosed in 25 patients; in 14 of these 25, SDH was not even suspected in the differential diagnosis. Patients with a diagnosis of stroke did not have clear histories of typical apoplectic onset of neurologic deficit. Instead, the history was characterized by slow progression of symptoms ranging from days to weeks before admission. The mean

Table 1. Admitting impressions on the medical or neurologic services

Diagnosis	No. of patients
SDH	27
Stroke	25
Brain tumor	8
Meningitis	3
Todd's paralysis	3
Subarachnoid hemorrhage	3
Brain abscess	2
Other neurologic diagnoses	12
No neurologic disease suspected	5

age of patients in whom stroke was suspected was 70 years, which was significantly older than the rest of the medical or neurologic group. Five patients were admitted to the medical or neurologic services without any neurologic disease being suspected.

Detection of SDH

The interval between detection and admission of patients with SDH on the medical or neurologic services was considerably longer than on the surgical service. The hematomas were evacuated more than 96 hours after admission in 43% of the medical or neurologic patients. The mean interval between admission and detection of SDH was 5 days, and the longest interval in the series was 20 days. During the observation period until detection of SDH, new neurologic signs developed in 77% of medical or neurologic patients. The mental status deteriorated in 91% of these patients. Eleven patients became hemiparetic and unilateral pupillary dilatation developed in nine. Patients who had neurologic deterioration while hospitalized prior to detection and removal of SDH had a poorer prognosis than those who did not acquire new neurologic signs.

Diagnostic studies in SDH

Extensive diagnostic studies were performed in most patients (*Table 2*). Skull roentgenogram was the initial study in most. Of 59 patients, 10 had skull films which showed pineal shifts. Skull fracture and roentgenographic signs of increased intracranial pressure were rarely found. Lumbar puncture, echoencephalogram, or radioisotopic brain scan was selected as a second diagnostic procedure. Thirty percent of the echoencephalograms showed abnormal shifts. Another 36% of these studies resulted in indeterminate abnormalities. The results of spinal fluid examination were highly abnormal in 84% of the patients, but the abnormalities found rarely led directly to the diagnosis of SDH. In decreasing order of frequency, the spinal fluid abnormalities most often consisted of increased protein content, xanthochromia, and the presence of red blood cells. Radioisotopic brain scans were focally abnormal in 80% of the patients undergoing these studies, but no patient was surgically treated on the basis of one of these abnormal scans. The electroencephalogram was generally or focally abnormal in 70% of instances in which it was obtained.

Table 2. Diagnostic studies in 59 patients with SDH admitted to medical or neurologic services

	No. of studies	Abnormalities (%)
Skull roentgenogram	59	30
Lumbar puncture	38	84
Echoencephalogram	30	30
Isotopic brain scan	29	82
Electroencephalogram	17	70
Arteriogram	30	100

Cerebral arteriography, usually performed as the last of the battery of diagnostic studies, was diagnostic in 100% of instances in which it was obtained. Two thirds of all medical or neurologic patients were operated on after SDH was diagnosed by arteriography. The remainder underwent burrhole craniectomy because of rapid neurologic deterioration.

Computed tomography (CT) was not generally available during the years included in this study (1963 to 1972), but its increasing availability may not provide a simple solution to

the problem of diagnosis in SDH. A recent study of CT showed no diagnostic abnormality in 5 of 24 patients with proved SDH.[4] As experience with CT increases, it is likely that brain scanning will become an extremely important diagnostic test for patients with SDH.

The type of SDH in each patient was defined as acute or chronic by surgical or histologic criteria, rather than based on the history of head trauma or duration of symptoms. Chronic SDH was found in 80% of the patients on the medical or neurologic services; 15% of patients had acute SDH. Five percent of the hematomas were of undetermined type. Bilateral SDH occurred twice as often among the medical as among surgical patients.

Clinical outcome in SDH

Among surgically treated patients from the medical or neurologic services, 53% had full recovery of functional capacity at the time of hospital discharge. Twenty-six percent had significant neurologic deficits, and 6% required full-time nursing care. The mortality rate of the surgically treated medical or neurologic patients was 13%.

The patients in the autopsy group resembled medical or neurologic patients demographically in terms of their referral sources, mean age, and time of hospital admission. There were some significant and substantive differences, however, between the treated medical or neurologic patients and those in whom SDH was found at autopsy. The patients in the autopsy group were more frequently admitted by private physicians, more often taking antihypertensive or cardiac drugs, and more often comatose. Underlying health conditions were generally serious and included such diseases as terminal carcinoma and leukemia. Diagnostic studies were done less frequently and arteriography was not performed in any patient in the autopsy group. Seven of the nine autopsy cases from the medical or neurologic services had cerebral herniation or secondary midbrain hemorrhages at autopsy.

Summary

More than half of all patients with SDH were admitted to the medical or neurologic services of a large, urban, general hospital. The diagnosis was usually established with difficulty and considerable delay. In this study, the emergency ward was usually the first place in which a physician would encounter a patient with SDH. When SDH is suspected at neurologic examination, early definitive studies such as arteriography and rapidly available CT should be done; misleading and potentially hazardous diagnostic tests should be avoided. The clinical features of SDH in patients on medical and neurologic services simulate many neurologic diseases, and making a diagnosis is frequently extremely difficult. The retrospective study, however, disclosed some important clues suggestive of SDH. The neurologic history and examination, the patient's age, a history of head trauma and signs of the same, the frequently detected visual and lateralizing hemispheric signs without signs of increased intracranial pressure, and the possibility of unpredictable and unsteady neurologic deterioration must be borne in mind. Repeated efforts in obtaining a thorough history of illness and repeated physical examination during an observation period are of primary importance in dealing with SDH, a dis-

ease which mimics many other neurologic disorders.

Acknowledgment

We thank Dr. Joseph M. Foley, Chairman, Division of Neurology, University Hospitals of Cleveland, for his support of this study.

References

1. Mngola EN, Aluoch JA: Retrospective study of subdural hematomas admitted to medical wards at Kenyatta National Hospital, Nairobi; a two years period. East Afr Med J **49:** 184–188, 1972.
2. Walker, ME, Esper, M: Subdural hematoma. Presentation and diagnosis on medical wards. Postgrad Med J **44:** 785–791, 1968.
3. Nie NH: Statistical package for the social sciences, ed 2. McGraw-Hill, 1975.
4. Manning EJ, Kinkel WR: Computerized tomography in subdural hematoma. (Abstr) Neurology **26:** 392, 1976.