CASE REPORTS AND TECHNICAL NOTES

THE CONTROL OF ACUTE SUBDURAL HEMORRHAGE BY INJECTION OF SALINE INTO THE SPINAL SUBARACHNOID SPACE

ROSS S. McELWEE, M.D., AND BRONSON S. RAY, M.D.
Department of Surgery, New York Hospital—Cornell Medical College,
New York, New York

(Received for publication August 10, 1949)

The case to be reported is unique in two respects: (a) after a relatively simple head injury subdural bleeding occurred in such degree that it threatened the patient’s life within a few hours; and (b) the bleeding was controlled by the tamponade effect of expansion of the brain through injection of saline into the spinal subarachnoid space.

Although bleeding into the subdural space may occur with any type of injury to the head the amount is usually relatively small and it is not commonly expected that important signs of its presence will occur for at least several days. Kennedy and Wortis in 1936 made a study of “acute” subdural hematoma and made a plea for more frequent use of early trephining in patients suspected of having the lesion. But this concept has not had wide popularity because the evacuation of blood from the subdural space during the early and critical period after a head injury seldom alters the situation favorably. Browder in a critical review of 289 cases of subdural hematoma found a mortality of 82 per cent in patients operated upon in the first 24 hours after injury and concluded that “the removal of hematomas during the first twenty-four hours . . . is seldom justifiable.”

The problem of obliterating the space occupied by a hematoma after its evacuation has been of some concern in the treatment of chronic subdural hematomas. Common methods employed in the past for expanding the brain have been the use of intravenous isotonic or hypotonic fluids, lowering of the head, compression of the jugular veins, and intraventricular injection of fluid. LaLonde and Gardner in 1948 reported good results in expansion of the compressed cerebral hemisphere by spinal injection of physiologic saline solution.

As far as is known the intraspinal injection of saline has not been previously described as a method of controlling acute subdural bleeding. Its effect was so successful in this case that it was thought desirable to bring the experience to the attention of others who might be confronted with a similar emergency.

NYH #503145. J. D., a 33-year-old lawyer, was first admitted to the New York Hospital in 1947 with a history of occasional generalized convulsions for the previous 2 years. At that time general physical and neurological examinations were unremarkable. The CSF was normal, the EEG was normal, and the pneumoencephalogram gave evidence of slight cerebral atrophy. On discharge from the hospital he was advised to take 30 mg. of phenobarbital 3 times a day. He followed instructions poorly and frequently omitted his medication for several days at a time. He had one brief convulsive episode 2 months before admission.

On the night of his 2nd admission, June 19, 1949, he had a generalized convolution and fell forward striking his face against a radiator. His left eye was bruised and one lip was cut. He was unconscious for about 5 minutes and on awakening complained only of generalized headache. Two hours later his headache became extreme, he lapsed into coma and was brought at once to the hospital.
CONTROL OF ACUTE SUBDURAL HEMORRHAGE

Examination. He was wholly unresponsive and his condition appeared extremely serious. Breathing was stertorous and rapid. B.P. was 100/90, pulse 95 and temperature normal. The right pupil was widely dilated. The extremities were held rigidly in extension and the deep tendon reflexes were hyperactive. There was a bilateral Babinski sign. X-ray of the skull did not reveal a fracture.

Operation. A lumbar puncture revealed clear CSF with a pressure of 180 mm. of water. A right temporoparietal trephine was made, revealing a tense bluish dura. When the dura was incised, unclotted dark blood gushed forth almost as fast as it could be sucked away. The cortex could be seen depressed about 2 cm. from the dura by the large quantity of blood. The blood appeared to be venous and it was soon evident that active bleeding was continuing, but through the small opening there was no possibility of locating and controlling the torn vessel. It seemed likely that lowering the head or the injection of intravenous fluids would only add to the venous bleeding. As the blood loss continued, the patient’s condition rapidly deteriorated and his blood pressure could not be obtained. At this point he was turned on his left side and a lumbar puncture performed. About 40 cc. of saline were injected in 3 or 4 minutes. During this time the brain steadily expanded to obliterate the subdural space and the hemorrhage ceased. The wound was closed without drainage after a few minutes’ observation.

Course. The patient’s condition improved quickly and he began to regain consciousness within 12 hours. By the 2nd day it was apparent that he had a right 3rd cranial nerve paralysis and a right hemiparesis without aphasia, sensory changes or hemianopsia. The left side of the brain was then explored through a temporoparietal trephine disclosing a small amount of clear fluid in the subdural space. The right wound was reopened but only a small collection of thin bloody fluid was encountered.

The patient improved for several days and then his condition deteriorated. Daily spinal taps revealed elevated pressures and the reduction of this pressure to normal seemed to have a beneficial effect. Intravenous fluids and feedings by gavage were necessary for 14 days and then discontinued as he regained ability to swallow. The right 3rd nerve paralysis and the right hemiparesis gradually improved during his hospitalization (Fig. 1) and he was able to care for himself on his discharge from the hospital 30 days after operation. A month later he had improved greatly and had only a slight right-sided weakness.

SUMMARY AND CONCLUSION

During a generalized convulsive attack this man sustained an injury to the front of the head. A short lucid period was followed by coma and his condition rapidly became serious. A lumbar tap revealed clear fluid under normal pressure. In the absence of other localizing signs the exploratory burr hole was made on the side of the dilated pupil. Active subdural venous hemorrhage was encountered. In all probability the bleeding was from one of the cerebral veins which cross the subdural space and was torn by the force of the head injury. There was no possibility of locating the torn vessel but the tamponade effect of the brain expanded by the
intraspinal injection of saline proved adequate. That the brain remained expanded and the hemorrhage controlled were demonstrated by re-exploration 2 days later. The homolateral hemiparesis in all probability was the result of compression of the cerebral peduncle against the incisura of the tentorium and bears witness to the degree of the hemorrhage and the resultant shift of the brain.

The intraspinal injection of saline to expand the brain and obliterate the subdural space may be a life-saving measure in the control of acute subdural hemorrhage.

REFERENCES

PROFUSE SUBARACHNOID HEMORRHAGE CAUSED BY CEREBRAL GLIOMA

Dean H. Echols, M.D., and Frederick C. Rehfeldt, M.D.
Department of Surgery, Tulane University of Louisiana School of Medicine, and Section on Neurosurgery, Ochsner Clinic, New Orleans, Louisiana

(Received for publication August 23, 1949)

Gliomas are rarely provocative of gross subarachnoid hemorrhage. In 1937 Russel and Kershman reported 1 case of their own and referred to another by Strauss, Globus and Ginsburg. Hesser, who reviewed the literature in 1948, was able to find no additional cases but added 1 of his own. In these 3 cases the spinal fluid was grossly bloody at some time during the course of the disease. Russel and Kershman’s patient had only 430 red blood cells per c.mm. in the spinal fluid on admission but after a few days in the hospital experienced a severe exacerbation at which time the spinal fluid became grossly bloody; a glioblastoma multiforme was demonstrated at necropsy. In Hesser’s case a spinal puncture done by another physician shortly after rather sudden onset of severe head pain revealed grossly bloody fluid but when the patient was examined by Hesser several weeks later, only 3 red blood cells per c.mm. were demonstrated in the spinal fluid; the diagnosis at necropsy was glioblastoma multiforme. Strauss, Globus and Ginsburg reported their case as 1 of 150 gliomas; a single spinal puncture before operation produced blood-stained fluid. Thus, the case which forms the basis of this report, that of a verified glioblastoma multiforme which produced persistently bloody spinal fluid, presenting a clinical picture of leaking aneurysm or angiomatous anomaly, would seem to be the fourth to be recorded in the American medical literature.

REPORT OF CASE

J. T. F., a 42-year-old white man, sought medical assistance when headaches which he had experienced intermittently for 8 months, became so severe that he was unable to work. The