Supratentorial and parafalcial subdural empyema diagnosed by computerized tomography

Case report

BERNARDO BOROVICH, M.D., JACOB BRAUN, M.D., SILVIA HONIGMAN, M.D., HENRY Z. JOACHIMS, M.D., AND ELI PEYSER, M.D.

Departments of Neurosurgery, Diagnostic Radiology, Neurology, and Ear, Nose, and Throat, Rambam Medical Center, Technion Medical School, Haifa, Israel

A case is presented in which computerized tomography (CT) demonstrated a supratentorial and parafalcial purulent collection. However, neither carotid angiography nor CT revealed the small scattered pockets of pus that were found over the convexity at operation. The entire subdural space was exposed by a wide craniectomy, permitting adequate subdural drainage and decompression of the brain. It is thought that thorough drainage of the entire subdural space is crucial for the attainment of a successful result in a single-stage operation.

KEY WORDS □9 sinusitis □9 subdural empyema □9 supratentorial lesion □9 parafalcial lesion □9 computerized tomography □9 surgical treatment □9 empyema

Accumulation of pus in the posterior part of the subdural space has been described in the neurosurgical literature in 1948. With the patient in the supine position, the purulent fluid gathers posteriorly over the tentorium. In cases treated with antibiotic therapy and incomplete surgical drainage of the subdural space, a paratentorial empyema may become subchronic or chronic. Paratentorial collections have been demonstrated by the injection of Thorotrast into a parafalx empyema, and by pneumoencephalography. We believe that, in the present case, diagnosis by computerized tomography (CT) of the paratentorial abscess was decisive in the planning of the operation. If we had been unaware of this paratentorial pouch and consequently had failed to drain it, we might not have been able to treat this serious disease successfully, and we might have been forced to perform multiple operations, as in the case of Botterell and Drake, and perhaps in the cases of Joubert, et al.

Case Report

This 16-year-old girl was admitted on October 7, 1979, to the Ear, Nose, and Throat Department of the Rambam Medical Center. She complained of continuous frontal headache and fever of 2 weeks' duration.

Preoperative Course. A diagnosis of pansinusitis with bilateral frontal sinus empyema was made. She was placed on antibiotic therapy and operated on on October 10. External drainage of the frontal sinuses and washing of the maxillary sinuses was performed. Staphylococcus aureus was cultured from the purulent discharge. Headache and high fever continued unabated, and the following day neurological examination revealed neck stiffness. Lumbar puncture yielded cerebrospinal fluid (CSF) with pleocytosis. A direct smear did not reveal any bacteria. On October 12, slight left-sided hemiparesis, predominant in the leg, was observed.

The patient was transferred to the Neurological Department and a CT scan was obtained. It showed two very thin areas of decreased density, anteriorly and posteriorly along the right side of the falx, without any mass effect. Injection of sodium methylglucamine salts of diatrizoate (Urographine) did not produce any enhancement. A right carotid angiogram revealed a thin avascular area between both peri-
B. Borovich, et al.

FIG. 1. Computerized tomography scans after contrast-medium injection. Left: An area of decreased density with a slightly dense rim of enhancement (black arrow) is seen above the tentorium (white arrow). Center Left: Higher slice shows the supratentorial abscess still present (white and black arrows). There is discrete displacement of the lateral ventricles. Center Right: Two areas of decreased density are seen anteriorly and posteriorly alongside the falx. The posterior area is to the right of the sinus rectus at the angle formed between the falx and the tentorium. The margin is sharply enhanced (arrows). Right: Areas of low density adjacent and to the right of the opacified falx are demonstrated. There is a moderately dense outline of enhancement adjacent to the brain.

callosal arteries. The patient was given high doses of intravenous chloramphenicol and penicillin. Her temperature and headache diminished, but she started to have left-sided motor seizures and became somnolent. On October 15, the CT scan was repeated. This time it showed that the hypodense areas in the parafalcral area had increased in size and a further focus had developed over the tentorium. After Urographine injection a clear outline of enhancement was seen (Fig. 1).

Operation. The patient was transferred to the Neurosurgical Department and operated on the same day. A large frontoparietotemoral flap was turned, extending from the midline to almost the base of the skull. On opening the dura mater, large subdural pockets of thick yellow pus were found along the falx and above the tentorium. Scattered small collections were also found over the convexity. The brain was moderately swollen, showing several small foci of localized leptomenigitis and pus along the cortical veins. No venous thrombosis was seen. The subdural space was washed with saline and bacitracin. Eight latex tubes were left in place around the exposed cerebral hemisphere, and the dura mater was closed. The bone flap was not replaced. Culture of the pus showed three different microorganisms: Streptococcus B hemolyticus, Bacteroides, and Bacillus fusiformis.

Postoperative Course. Chloramphenicol and bacitracin were injected through the tubes daily for 10 days. Antibiotics were given intravenously for 4 weeks. The patient made an uneventful recovery and was discharged 5 weeks after surgery without any neurological deficit. She underwent two further operations to treat the frontal sinus empyema. It was ultimately controlled after total resection of the osteomyelic anterior wall. Control CT showed signs of moderate ventricular dilatation on the side of the operation. Four months after her discharge, she resumed her studies at high school.

Discussion

Subdural empyema is most often a complication of frontal or pansinusitis. Modern antibiotic therapy alone is not enough to cure this complication. Antibiotics combined with incomplete surgical drainage transform the acute form of subdural empyema into chronic suppuration. The freely moving, easily drained subdural pus organizes into separate pouches that are difficult to drain. They tend to collect in inaccessible regions above the tentorium and parafalcral area. The present case is a typical example. After long and intense antibiotic therapy, the pus in our patient collected above the tentorium and along the falx.

The parafalcral collection of pus has been the subject of many publications, and its angiographic and CT diagnosis is already well known. However, supratentorial accumulation has rarely been mentioned. It should be emphasized that sometimes even the most sophisticated diagnostic methods cannot demonstrate small collections of pus in the subdural space. This was true of the small pouches of pus over the convexity found at operation in our patient.

We consider it essential to drain all subdural purulent pockets in one single operation, and to achieve this, unrestricted access to the whole subdural space is mandatory. Consequently, a large craniotomy...
Supratentorial and parafacial subdural empyema

should be performed, as was carried out in our patient.\textsuperscript{1,2,4,8,12,15}

We believe that the high mortality rate associated with subdural empyema is at least in part the result of: 1) iatrogenic transformation of an acute subdural empyema into multiple subchronic subdural abscesses by combined antibiotic therapy and incomplete drainage; 2) failure to diagnose and drain occult subdural purulent pockets; and 3) failure to find small collections of pus with the multiple-burr-hole technique. Diagnosis by CT of paratentorial accumulations of pus and disclosure of small purulent pouches during operation by using a large craniotomy, as in the present case, should help to improve the prognosis of this serious illness.

References


Address reprint requests to: Bernardo Borovich, M.D., Department of Neurosurgery, Rambam Medical Center, Haifa, Israel.