Cerebral cyst infection with *Micrococcus sedentarius*

Case report

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A 7-year-old boy with congenital hydrocephalus and a left septate cerebral cyst presented with a shunt infection due to *Micrococcus sedentarius*, resistant to all penicillins. The shunt infection was persistent despite several courses of parenteral, intraventricular, and intracyst antibiotics. Evaluation of the ventricular fluid revealed adequate "killing power" against the patient's microorganism. No extracranial focus of infection could be found. Computerized tomographic scanning, along with air ventriculography, identified a noncommunicating area of the cerebral cyst. Only when communication between this location and the rest of the cyst was established were the antibiotics efficacious. Undercirculated areas of cerebrospinal fluid should be sought when shunt infections and ventriculitis persist in spite of adequate parenteral and local therapy in patients with brain cysts.

Key Words: cerebral cyst • infected cyst • shunt infection • *Micrococcus sedentarius* • surgical drainage

Bacterial infection or colonization of cerebrospinal fluid (CSF) shunting devices is difficult to treat, and the device may have to be removed. Ventriculitis can occur as a complication of such infections, and mandates intraventricular antibiotics. The presence of loculations of poor CSF circulation complicates local therapy of ventriculitis. The problem is further compounded if the causative organism is unusual and/or resistant to commonly used antibiotics.

This report documents the treatment and eventual cure of a child with a CSF shunt infection and ventriculitis associated with an infected noncommunicating area of a left cerebral cyst. Communication between the major portion of the cerebral cyst and hydrocephalic ventricles had been established previously by surgery. The causative organism was *Micrococcus sedentarius*, which is resistant to all penicillins.

Case Report

This baby boy had been delivered by Cesarean section because of congenital hydrocephalus. On the 2nd day of life, the infant was transferred to the University of California Irvine Medical Center (UCIMC). Ventriculography revealed hydrocephaly and a large left cerebral cyst. A ventriculoatrial (VA) shunt was placed on the 20th day of life. The child was readmitted several times for shunt revision. He had a mild right hemiparesis and seizures which were controlled by medication. Pneumoencephalography revealed the cyst to have multiple septae and some communication with the ventricular system. At 3½ years of age, communication between the cyst and the left ventricle was established surgically.

When the patient was 7 years of age, the cyst began enlarging, and it was drained to a right VA shunt already in place via a Y connector. One month after this procedure, the patient was brought to UCIMC with complaints of several days of temperatures spiking to 39.5°C, as well as increasing lethargy and abnormal behavior. Physical examination revealed a lethargic child with slightly slurred speech, and paresis and hyperactive reflexes of the right leg. The CSF shunt was functioning well. Laboratory studies on admission included: erythrocyte sedimentation rate of 7 mm/hr; hemoglobin concentration of 11.9 gm/dl; white blood cell (WBC) count of 8300 cu mm with 56% neutrophils, 7% band forms, and 28% lymphocytes; and normal urinalysis. Examination of the CSF from the shunt demonstrated one lymphocyte/cu mm, a protein content of 44 mg/dl, a glucose level of 80 mg/dl, and a chloride level of 123 mEq/liter. Cultures of this CSF grew *Micrococcus sedentarius*, resistant to methicillin but sensitive to cephalothin, erythromycin, kanamycin, tetracycline,
Cerebral cyst infection

Fig. 1. Lateral (left) and anteroposterior (right) views of the skull. Upper: X-ray films with air in the ventricles and cyst spaces. The outline of the ventricles and cysts is inked in. Lower: Drawings of same views to show the ventricles and cysts. Dashed lines: cyst drained; dotted areas: cysts already connected to the ventricles; heavy dotted areas: lateral ventricles.

chloramphenicol, and vancomycin. Blood cultures were sterile.

Therapy was initiated with intravenous vancomycin, 40 mg/kg daily. Audiometric studies became abnormal at 7 days and this therapy was discontinued. Intravenous cephalothin, 100 mg/kg daily, was begun. After 13 days the cephalothin was discontinued, and the shunt replaced. Cultures obtained at surgery of CSF from the ventricles and cyst were positive. The patient again developed spiking temperatures. Therapy was reinstated with oral chloramphenicol, 25 mg/kg daily; intravenous cephalothin, 100 mg/kg daily; and cephalothin administered into the cyst, 15 mg every 12 hours for 7 days. The patient remained afebrile after this, and cultures of the CSF were sterile.

Three weeks later he again developed spiking temperatures, and cultures of CSF from the cyst and right ventricle were again positive for *M. sedentarius*. There were 164 WBC (80% polymorphonuclear cells) in the lumbar CSF, and 40 to 60 WBC (50% polymorphonuclear cells) in the CSF from the right ventricle and left cyst. Therapy included 14 days of intravenous cephalothin, 100 mg/kg daily, and 7 days of intraventricular cephalothin, 25 mg every 12 hours, administered through bilateral ventriculostomies. On this regimen, CSF from both ventricles was bactericidal at a dilution of 1:80 against the patient’s *Micrococcus*. A bone scan, sinus and mastoid x-rays, and echocardiogram were negative. Following this, the patient remained afebrile for 72 hours and was discharged.

The patient was readmitted 3 weeks later with recurrent fever and headache. *M. sedentarius* was again cultured from the CSF. The cystoventriculoatrial shunt was removed and bilateral ventriculostomies were placed. There were 180 to 250 WBC (50% polymorphonuclear cells) in the CSF bilaterally. Intravenous cephalothin, 100 mg/kg daily, and bilateral intraventricular gentamicin, 4 mg every 12 hours, were given. An additional left cerebral cyst was discovered on computerized tomographic (CT) scanning. An air study demonstrated that this cyst had minimal communication with the main cyst (Fig. 1).
Communication was established between this loculation and the ventricular system. The CSF from the loculation was positive on culture. Antibiotics were discontinued after 13 days, and a new cystoventriculoperitoneal shunt was placed. Cultures from this procedure were sterile. Bactericidal levels were 1:40 bilaterally. The patient has remained afebrile and maintained an even state of health during the 2 years following discharge.

Discussion

Unlike porencephalic cysts, which communicate with the ventricular system, subarachnoid space, or both,4 cerebral cysts are discontinuous with the usual CSF flow pathways and produce their own fluid which creates pressure and progressive neurological deficits until treated adequately.5 Infections of such cystic spaces are difficult to treat.6 Infection has long been recognized as a complication of CSF shunts;10 the shunt often has to be removed and the patient treated with parenteral and intraventricular antibiotics (via ventriculostomy) until cultures are negative, when a new shunt is placed.7,8,10 McLaurin,2 however, was able to effect a cure in 11 of 25 patients with shunt infections by a combination of systemic and intraventricular antibiotics without shunt removal. In another study, the shunt was externalized and used for sampling CSF and for the instillation of antibiotics.6

The usual infecting organisms are Staphylococcus epidermidis and Staphylococcus aureus.2 Culture of CSF from shunt reservoirs has been found very useful in confirming such infections.3 Intraventricular cephalothin seems to be effective and safe in the treatment of ventriculitis.11

Micrococcus sedentarius is a rare cause of CSF shunt infections. In the study by Schoenbaum, et al.,7 Micrococci were responsible for only three of 102 shunt infections, and one of 27 infections reported by Myers and Schoenbaum.8 Micrococci and S. epidermidis are coagulase-negative, and are differentiated because S. epidermidis ferments glucose and Micrococci do not.1 Micrococci may be confused with S. epidermidis in clinical specimens if this test is not done.

Our patient demonstrates the usefulness of cultures from the shunt reservoir, as well as all autonomous areas of CSF, when poorly circulating pools of CSF may be contributing to antibiotic failure. After ventricular instillation of antibiotics, bactericidal levels in the patient's CSF against the organism indicated adequate "killing power." Ventricular CSF bactericidal levels should be evaluated with persistent positive cultures in ventriculitis. Patients with brain cysts who develop persistent CSF shunt infections and ventriculitis should be suspected of having an infected or colonized CSF loculation. Computerized tomography scans may demonstrate separate cysts, but usually only air studies will establish if such areas are loculated. Only after complete communication of all cystic compartments is established, can systemic and local antibiotics be efficacious.

References


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