

## Infection of a Brain Abscess by *Mycoplasma hominis*

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Persistent fever in a young man after evacuation of a subdural hematoma caused by a depressed skull fracture made it necessary to carry out a computerized tomographic exam of the head that demonstrated a left frontal lobe brain abscess. *Mycoplasma hominis* was recovered from this abscess as the sole infecting organism. Serial computerized tomographic scans showed resolution after aspiration and antibiotic therapy.

Brain abscesses after trauma or a neurosurgical procedure account for 13 to 21% of cases in most reported studies (2, 7, 10, 13). In such cases bacteria are introduced by a penetrating foreign body, by disruption of adjacent tissues, or by hematogenous spread to the brain from other sites of bacterial infection. Although intact brain tissue is very resistant to infection, it has been shown that areas of ischemia and infarction are more likely to favor a variety of microorganisms, including those commonly causing brain abscesses (9).

The bacteriology of brain abscesses has been well described in recent studies. Staphylococci are the organisms most frequently isolated from abscesses in patients who have had head trauma or who have undergone a neurosurgical procedure (2, 7, 10, 13). *Haemophilus influenzae*, *Streptococcus pyogenes*, the *Enterobacteriaceae*, anaerobic streptococci, and *Bacteroides* species have also been isolated in these instances (2, 7, 10, 13). In 25 to 35% of cases, more than one organism has been isolated (2, 7, 10, 13).

Cases of brain abscesses from *Mycoplasma* species infection are distinctly rare. In neonates with cyanotic congenital heart disease and with meningomyeloceles, *Mycoplasma hominis* has been isolated from the cerebrospinal fluid (16) and in one instance from a brain abscess (4). In addition, there is one reported case of a post-traumatic brain abscess in an adult from whom a pleuropneumonia-like organism was isolated (11). As mycoplasmaemia with subsequent seeding of hematomas and other devitalized tissue sites has been documented after genitourinary tract manipulation, trauma, or surgery (15), the possibility of *Mycoplasma* species infection in neurosurgical patients should be recognized. In

this paper we report such a case, in which *M. hominis* was isolated in pure culture from a brain abscess after trauma and a decompressive neurosurgical procedure.

### CASE REPORT

A previously healthy 29-year-old white male was transferred to the Massachusetts General Hospital after a motor vehicle accident, with resultant loss of consciousness, a left temporal laceration, and a dilated left pupil. A computerized tomographic scan demonstrated a left subdural hematoma accompanied by changes consistent with intracerebral contusion. After receiving 2 g of oxacillin and 10 mg of dexamethasone intravenously, he was taken to the operating room. A left frontotemporoparietal craniotomy was performed, with evacuation of the subdural hematoma and resection of 5 cm of badly contused left temporal lobe. Postoperatively, oxacillin (8 g per day) and dexamethasone (16 mg per day) were administered intravenously for 12 and 10 days, respectively. The patient's initial hospital course was complicated by a left upper lobe aspiration pneumonia, with *Klebsiella* species being the predominant organism. The patient responded to 12 g of cephalothin per day administered intravenously for 2 weeks.

Despite a clearing chest X ray, the patient remained febrile. Multiple blood and urine cultures were negative. By week 3 of hospitalization, his craniotomy flap had become increasingly tense and bulging, without new clinical neurological findings. A contrast-enhanced computerized tomographic scan at that time revealed, in the area of the previously contused left frontal lobe, a ring with contrast enhancement and an associated mass effect. These changes were consistent with an abscess. Aspiration of the abscess in the operating room via a burr hole over the left supraorbital ridge revealed cloudy fluid. Gram stain showed cellular debris, a few erythrocytes, 20 to 50 polymorphonuclear leukocytes per high-powered field, and no organisms. The aspirated fluid was quickly transported from the operating room to the bacteriology laboratory in a sterile, capped syringe from which all air had been expelled. After 48 h of incubation in an anaerobic

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environment, abundant colonies of a *Mycoplasma* species were identified as the sole organism growing on brucella agar plates containing 5% horse blood (see below for details of bacteriological analysis). After aspiration of the abscess, the patient was treated with 8 g of nafcillin and 3 g of chloramphenicol per day, both administered intravenously. Therapy was changed to 4 g of tetracycline per day administered intravenously when *M. hominis* was identified 4 days after the aspiration. Because of a rash and spiking fever 72 h later, the tetracycline was discontinued, and the patient received a 2-week course of 4 g of erythromycin per day administered intravenously. Over the ensuing 4 weeks, the craniotomy flap became less tense and eventually became scaphoid. Computerized tomographic scans taken at 2 and 4 weeks showed diminution in size and resolution of the abscess, respectively. Clinically, the patient has continued to manifest evidence of neurological recovery.

The aspirated fluid was cultured on brucella agar plates containing 5% horse blood and MacConkey agar; these plates were incubated at 37°C in 5% CO<sub>2</sub>. In addition, the fluid was cultured on brucella agar plates containing 5% horse blood, phenylethyl alcohol agar, and kanamycin-vancomycin agar and incubated at 37°C in 10% CO<sub>2</sub>-10% hydrogen-80% N<sub>2</sub> for primary anaerobic cultures.

## RESULTS

After 48 h, abundant nonhemolytic, translucent pinpoint colonies were seen on the brucella agar plates containing 5% horse blood but not on the phenylethyl alcohol agar or kanamycin-vancomycin agar plates. Repeated Gram stains of the colonies were negative. Using the stained agar technique of Dienes (8), we identified the colonies as mycoplasmas. The mycoplasmas were further identified as *M. hominis* by the growth inhibition test performed by the method of Clyde (5), with hyperimmune sera obtained from the Bureau of Standards, National Institutes of Health, Bethesda, Md. The identity of the strain was confirmed by R. A. DelGiudice, Frederick Cancer Research Center, Frederick, Md., with the epiimmunofluorescence antibody test (6). The patient's serum was tested for evidence of systemic infection by mycoplasmas with the metabolic inhibition color test of Purcell et al. (12). Acute- and convalescent-phase serum samples taken over a 1-month period revealed a rise in antibody titer against the *M. hominis* isolate from 1:8 to 1:128.

## DISCUSSION

Bacteria reach the central nervous system by hematogenous spread from distant suppurative sites, by retrograde spread of infected thrombi through the venous system, or after direct inoculation (2, 7, 10, 13). In contused and traumatized brain tissue one can see damage to the

central nervous system capillaries, facilitating the escape of organisms into ischemic brain tissue (9). Experimental evidence has shown that vascular occlusion, with resultant ischemia, promotes the formation of brain abscesses by *Staphylococcus aureus* (9). Mycoplasmaemia has been described in patients who have undergone urinary tract catheterization or who have suffered genitourinary obstruction by calculi (15). Similarly, seeding of a traumatized focus was reported in a young man with a pelvic hematoma from which *M. hominis* was isolated (3). Our patient's history suggests a similar phenomenon: transient mycoplasmaemia resulting in the seeding of damaged brain tissue. Direct inoculation from a respiratory source at the time of surgery cannot be ruled out, however.

As in other reported cases, our patient received antibiotics before the cultures were obtained, and the concurrent presence of other aerobic or anaerobic organisms in the abscess before the antibiotic course cannot be excluded. It is unlikely that this unusual isolate is a contaminant, as in the last 12-month period at the Massachusetts General Hospital, an average of 1,100 wound cultures per month have been processed in a manner similar to this one, with no *Mycoplasma* species having been isolated.

Among adults, isolation of *M. hominis* from a brain abscess is exceedingly rare, with none being reported in four studies of 236 patients, of whom 38 (16%) had suffered trauma or had undergone a neurosurgical procedure (2, 7, 10, 13). One of the first reported cases of a pleuropneumonia-like organism in a brain abscess was in a young man who had the stem of his smoking pipe thrust into his eye after an altercation (11). Further instances of central nervous system infection by *M. hominis* have been reported for the pediatric age group. In one case a 2-week old premature infant developed meningitis and rapidly increasing hydrocephalus, with *M. hominis* being isolated from the cerebrospinal fluid (1). Siber et al. (14) reported a case of probable perinatal acquisition of *M. hominis* from infected amniotic fluid, with subsequent development of a symptomatic brain abscess 8 days after birth (14). In addition, there have been reports of a group of infants with spina bifida who developed mycoplasma meningitis, with the organism presumably entering the nervous system through the meningocele as the infant passed through the maternal birth canal (16). And finally, in a previous case at the Massachusetts General Hospital, *M. hominis* was isolated from a posttraumatic subdural hematoma in a young man (S. Madoff, unpublished observations).

The present case is of interest, as it demonstrates that infection of a brain abscess by *M. hominis* can occur and that therapy by aspiration and antibiotics can lead to resolution, as documented by serial computerized tomographic scans. Although primary isolation of *M. hominis* and some other large-colony mycoplasmas can often be made routinely in laboratories without special media, they may not be detected unless the laboratory workers are alerted to this possibility. The use of the Dienes technique to examine suspicious colonies is extremely helpful (8). Mycoplasmas can often be detected at 48 h. However, the recovery of *M. hominis* from deep-seated abscesses is abetted by the fact that specimens are cultured anaerobically and examined over a period of 7 to 10 days. A greater awareness of the possible presence of mycoplasmas in other clinical situations may lead to increased knowledge of the role of these organisms in a variety of infectious processes.

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