



Case Report

The first documented case of hemorrhagic stroke caused by Group B streptococcal meningitis



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ABSTRACT

We report the case of a 47 year-old female with *Streptococcus agalactiae* (Group B beta-hemolytic streptococcus) meningitis complicated by hemorrhagic stroke. The patient presented to the emergency department with altered mental status, agitation, confusion, respiratory distress and fever of one-day duration. Labs showed left shift leukocytosis. CSF exhibited a high white blood cell count with a predominant population of polymononuclear cells, high glucose and protein concentration. CSF cultures grew *S. agalactiae*. Despite appropriate antimicrobial treatment, her mental status did not improve and head CT showed two hemorrhages, diffuse cerebral edema and a right to left midline shift. After completing the course of her therapy, her mental status improved and the patient was discharged.

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Introduction

Group B streptococcal disease in nonpregnant adults especially diabetics has been on the rise in the last 20 years and may present as many different disease manifestations [1,2]. The reported annual incidence of Group B streptococcus in nonpregnant adults in general population is between 4 and 7/100,000 [3]. It is a rare, but serious cause of adult meningitis that can lead to neurological complications and case fatality. In this report, we describe an adult case of *Streptococcus agalactiae* complicated by a hemorrhagic stroke and respiratory distress. To date, no literature has linked hemorrhagic stroke with Group B streptococcal infection. We believe that this case represents the first case of hemorrhagic stroke with Group B streptococcal infection.

Case report

A 47 year-old Caucasian female came to the emergency department with altered mental status, agitation, confusion, fever and respiratory distress of one-day duration. Her family stated that

she had been behaving oddly and was not responding to questions appropriately for the past 24 h prior to presentation. They reported that she had positive recent history of sinusitis. Her past medical history included chronic sinusitis status post nasal polyp removal and diabetes mellitus type II. She had no history of tobacco, alcohol or illicit drug use. On initial examination, the patient had a rectal temperature of 106.2 °F, a heart rate of 141 beats per minute, a blood pressure of 107/59 mmHg, and a respiratory rate of 32 breaths per minute. The patient was alert but not oriented to time, place and person. The patient was in respiratory distress using accessory muscles of respiration. Her skin was diaphoretic and she was agitated. Her pupils were equal and reactive to light. The patient had no lesions in the nares or nasal drainage. She was noted to have nuchal rigidity and photophobia. The right upper quadrant was tender to palpation, distended and rebound tenderness was observed. Cardiac examination was unremarkable.

Laboratory findings included a chemistry panel with a sodium of 135 mmol/L, potassium of 3.3 mmol/L, chloride of 98 mmol/L, bicarbonate of 23 mmol/L, blood urea nitrogen of 12 mg/dL, creatinine of 0.6 mg/dL and glucose of 542 mg/dL. Complete blood count included a white blood cell count of 35.1×10^9 cells/L with 95.7% granulocytes, hemoglobin was 12.1 mg/dL with an MCV of 75.5 fL, the hematocrit was 40.3%, platelets were 258,000/mcL. She was started on empiric antibiotics with ceftriaxone, vancomycin and acyclovir. Lumbar puncture revealed an opening pressure of 46 mm H₂O and cerebrospinal fluid (CSF) was cloudy and bloody in

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appearance. CSF exhibited a WBC (granulocyte) count of 820/mm³, a red blood cell count of 5500/mm³, a glucose concentration of 177 mg/dl, a protein concentration of 672 mg/dl and Gram stain showed gram-positive cocci in chains. The CSF glucose to blood glucose ratio was 0.375. A head computed axial tomography (CT) was unremarkable. Blood cultures were negative. The patient was admitted to the intensive care unit. CSF culture grew *S. agalactiae* that was sensitive to gentamicin and ampicillin. Antibiotics were then appropriately changed to gentamicin and ampicillin.

Four days into antimicrobial treatment and no change in mental status, a repeat CT of the head was performed and showed a 4 cm acute intracerebral hemorrhage in the right frontal convexity with surrounding edema and mass effect. Patient was extubated after a week and was opening her eyes to verbal stimuli but not following commands. Patient's mental status did not improve, went in respiratory distress and was reintubated. A repeat head CT showed intraparenchymal hematoma increased in size and new 1.7 cm hematoma in the left frontal lobe, diffuse cerebral edema and a right to left midline shift. Neurosurgery did not recommend draining the hemorrhages because she was improving clinically. She also developed *Clostridium difficile* associated diarrhea and was treated with metronidazole. Antibiotics course for meningitis was successfully completed and her mental status improved significantly. She developed a health care associated pneumonia for which she was treated and later discharged at her baseline mental status.

Discussion

Group B streptococcal infections have been extensively studied in the setting of neonatal meningitis. Screening of pregnant mothers and prenatal maternal treatment [4] has reduced disease prevalence. Invasive infections, in adults, however, have been on the rise. Despite the common association with neonatal meningitis, adult cases with *S. agalactiae* infections are more common than neonatal cases due to successful screening measures. Serious infections occur in healthy adults however the majority of cases have comorbid conditions. Conditions included cirrhosis, history of stroke, breast cancer, decubitus ulcer, nursing facility residents and especially diabetes mellitus [5] as our patient had. Our patient had uncontrolled diabetes and presented with a glucose level above 500 mg/dL. The patients' uncontrolled diabetes put her at an increase risk of infection with Group B streptococcus.

Adults affected with *S. agalactiae* have different clinical presentations depending on the tissue involved. Invasive infections include skin and bone, pneumonia, urosepsis, endocarditis and meningitis. Meningitis is extremely rare, but case fatality is 27–34% [6]. In a study by Domingo et al., 12 cases of adult meningitis caused by Group B streptococcus were reviewed [6]. They identified that all the patients had one or more comorbid condition. This finding confirms the importance of uncontrolled diabetes in our case. Out of the 12 patients, 11 developed both neurological and extra-neurological complications. Some of the complications included sepsis, coma, consumption coagulopathy, acute renal failure, acute respiratory failure, and rhabdomyolysis. Our patient presented in respiratory distress and required intubation thus increasing morbidity in this patient. Although Domingo et al. found that several subjects had a distant foci of infection none was found in our patient. The CSF remained the sole source of our patients' infection. We believe that hemorrhagic stroke in Group B streptococcus meningitis has not been documented before, making our patient's complication of hemorrhagic stroke noteworthy.

In contrast, other causes of bacterial meningitis like *Streptococcus pneumoniae* and *Neisseria meningitidis* in adults have been associated with causing ischemic and hemorrhagic stroke. In fact, ischemic stroke is a well known complication of bacterial

meningitis and is believed to be caused by vasculitis or vasospasm of the arterial vessels of the brain [7]. Intracranial hemorrhage is a less common complication but still important in acute bacterial meningitis although has never been documented in *S. agalactiae* meningitis. It is estimated that intracranial hemorrhage affects 2–9% of patients with bacterial meningitis [8,9]. In a study on intracerebral hemorrhage during acute bacterial meningitis, parenchymal hemorrhages were the most common [10]. In our case report, we identified two different parenchymal hemorrhages in the frontal lobe.

Group B streptococcus remains susceptible to penicillin G and ampicillin [11]. Resistance to clindamycin and erythromycin is increasing and can be present in up to 20% of isolates [12]. Aminoglycosides have no activity when used alone against Group B streptococcus but are synergistic when combined with ampicillin [11]. In our patient we adjusted the antimicrobial regimen once the susceptibilities were established and gave a synergistic combination of ampicillin and gentamicin for duration of two weeks.

Conclusion

Group B streptococcus is an infrequent cause of adult meningitis. To date none of these cases have resulted in hemorrhagic stroke. Patients presenting with comorbid conditions as well as neurologic and extra neurologic complications are common. In this case report, we link the first association of *S. agalactiae* meningitis and the development of hemorrhagic stroke. Early recognition of infection, a search for a foci of infection and appropriate antimicrobial treatment are essential for successful management of Group B streptococcus associated meningitis.

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