Infected Ventriculoperitoneal Shunt Due to *Cryptococcus neoformans*: the Case Report

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**ABSTRACT**

**Background:** Cryptococcal infection usually occurs in HIV-infected patients with low CD4 count. The clinical manifestations typically involve central nervous and pulmonary systems. We reported a case of a 49-year-old HIV-infected man with infected ventriculoperitoneal (VP) shunt due to *Cryptococcus neoformans*.

**Methods:** A retrospective review of medical record of the patient, who was hospitalized at King Chulalongkorn Memorial Hospital (KCMH), Bangkok, Thailand, was analyzed.

**Results:** A 49-year-old Thai man was hospitalized at KCMH on April 27, 2013 due to the alteration of consciousness and a few months old abdominal mass. He was diagnosed with HIV infection in 1995, and his last CD4 count and HIV viral load were 730 (25%) cell/mm³ and less than 20 copies per milliliter, respectively. Six months prior to admission, a diagnosis of tuberculous meningitis with obstructive hydrocephalus due to basal arachnoiditis was made, and the patient was treated with standard short-course anti-tuberculous therapy and emergent VP shunt. Physical examination revealed a man with drowsiness but without focal neurological deficits. Abdomen examination revealed a non-tender cystic mass with rubbery consistency, 10 cm in size, at suprapubic area. There was no instant refill of the reservoir of the VP shunt at right temporal area. Abdominal computed tomogram showed a huge cystic mass measure, 20 cm in size, located at mid to lower abdomen around the tip of VP shunt. Ultrasound-guided drainage of the cyst yielded 800 mL of yellow clear fluid which had white blood cells of 19 cells/mm³ (neutrophil 60%), sugar of 80 mg/dL, protein of 1,400 mg/dL, and positive India ink stain and cryptococcal antigen. The shunt was then removed. The fluid and tip of VP shunt finally grew *C. neoformans*. He gradually improved 1 week after treatment with intravenous fluconazole of 400 mg daily, but unfortunately died 18 days after hospitalization due to superimposed bacterial pneumonia.

**Conclusions:** Cryptococcal infection typically occurs in HIV-infected patients with low CD4 cell counts (<100 cells/mm³) and usually positive cryptococcal antigen assays. The clinical manifestations mostly present in central nervous system and pulmonary system. In our patient with high CD4 count, this was an unusual presentation, with slow development of neurological sign and negative for serum and cryptococcal antigen test in CSF. Only a large volume of abdominal fluid and tip culture from VP shunt were detected organism loculated infection. A large-volume tap may have increased the yield of detected organism. (*J Infect Dis Antimicrob Agents* 2014;31:181-5.)

**Keywords:** Cryptococcus neoformans, ventriculoperitoneal shunt, HIV, infected ventriculoperitoneal shunt

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INTRODUCTION

Cryptococcus neoformans is pathogenic encapsulated yeast that causes widely clinical manifestations in HIV-infected patients. Especially, central nervous system and pulmonary system. About 6%-10% of AIDS patients will develop cryptococcal meningitis, and in about 40% of these patients, it is the first AIDS-defining opportunistic infection. Cryptococcal infection in patients with AIDS is usually associated with CD4 cell count less than 100 cells/mm³. We reported a case of a 49-year-old HIV-infected man with infected ventriculoperitoneal (VP) shunt due to C. neoformans.

CASE REPORT

A 49-year-old Thai male was admitted in King Chulalongkorn Memorial Hospital on April 27, 2013 presenting with alteration of consciousness and a 2 month old abdominal mass. He was diagnosed with HIV infection in 1995; his risk factor was high risk unsafe sex with multiple partners and had history of opportunistic infection such as PCP. He experienced a rapid decrease of CD4 count 54 (5%) cells/mm³ with viral load of 129,464 copies per milliliters in 2002, at which time he started lamivudine, stavudine and efavirenz. Two weeks after starting medication he had a low grade fever, night sweats and lymphadenopathy. His diagnosis was disseminated tuberculosis and MAC. He was treated with isoniazid, rifampicin, ethambutol, pyrazinamide for 12 months and antiretroviral drug was changed from stavudine to zidovudine. In 2007, He had dyslipidemia and lipoatrophy, his antiretroviral medications were modified to tenofovir, lamivudine and efavirenz.

Six months PTA, he had right renal calculi and was admitted for right percutaneous nephrolithotomy. Nine days after surgery he developed general tonic clonic seizure. Cranial computer tomogram (CT) showed diffused dilatation of ventricle systems, communicating hydrocephalus. Lumbar puncture revealed an opening pressure of 23 cm H₂O, white blood cell of 90 cells/mm³ (lymphocyte 98%), sugar of 26.3 mg/dL, protein of 127.6 mg/dL, negative Gram stain, cryptococcal antigen and PCR for Mycobacterium tuberculosis. The patient was treated for tuberculosis meningitis with hydrocephalus with anti-tuberculous drugs, prednisolone, and VP shunt.

Two months prior to admission, he presented with chronic watery diarrhea and progressive abdominal distension. A few days prior to admission, the patient was confused and a relative brought him to our hospital.

At admission, his CD4 count was 730 (25%) cell/mm³, and HIV viral load was less than 20/mL. Physical examination revealed a man with drowsiness but without focal neurological deficits.
His vital signs included blood pressure of 98/60 mmHg, heart rate of 98/minute, and temperature of 36°C. Abdominal examination revealed a non-tender cystic mass with rubbery consistency, 10 cm in size, at suprapubic area. There was no instant refill of the reservoir of the VP shunt at right temporal area. Cranial computed tomogram (CT) showed post ventriculoperitoneal shunt with its tip located in left lateral ventricle (Figure 1), unchanged subdural hyperdense fluid collection along bilateral cerebral convexities with interval development of hyperdensity on the right side. An abdominal CT scan showed a huge cystic mass measuring about 9.5×16.5×18.5 centimeters occupied at mid to lower abdomen. Evidence of VP shunt insert and its tip located in mass (Fig. 2) caused a pressure effect to the adjacent bowel loop and caused bilateral hydronephrosis and hydroureters. Lumbar puncture was performed, and the CSF showed white blood cell of 14 (lymphocyte 100%), sugar 99.2 mg/dL, protein 521.8 mg/dL, and negative India ink and Gram stains. Cultures were negative for bacteria, fungus, or mycobacteria. Ultrasound-guided drainage of the cyst yielded 800 mL of yellow clear fluid which had white blood cells of 19 cells/mm³ (neutrophil 60%), sugar of 80 mg/dL, protein of 1,400 mg/dL, and positive India ink stain and cryptococcal antigen. The shunt was then removed. The fluid and tip of VP shunt finally grew *C. neoformans*. He gradually improved 1 week after treatment with intravenous fluconazole of 400 mg daily, but unfortunately died 18 days after hospitalization due to superimposed bacterial pneumonia.

**DISCUSSION**

CSF shunts are used to manage hydrocephalus. Various types of CSF shunt were available. Infection associated with a CSF shunt is a severe complication with high morbidity and mortality. Incidence of shunt infection in adults has a range of 1%-18%.4,5 The highest rate of shunt infection occurs early after shunt placement or revision especially within 1 month; therefore, most contamination with microorganisms form intraoperation. There were 2 types of infected VP shunt including early (within a week after neurosurgery) and late infections. The
early infection is typically caused by the skin flora such as coagulase-negative *Staphylococcus* (50%), *Staphylococcus aureus* (33%), and *Propionibacterium acnes* (10%). In contrast, the late infection (several months after neurosurgery) is usually caused by *Streptococcus* (49%), Gram-negative bacilli such as *Pseudomonas aeruginosa* (6%) and mixed organism (26%). Other rare pathogens include *Candida albicans*, *C. neoformans*, and *Mycobacterium*. Cryptococcal infection typically occurs in HIV-infected patients with low CD4 cell counts (<100 cells/mm<sup>3</sup>) and usually positive cryptococcal antigen assays. The clinical manifestations mostly present in central nervous system and pulmonary system. Cryptococcal VP shunt infections with abdominal cyst formations have been reported in only 2 cases. One was a 54-year-old woman with no underlying disease who presented with gait disturbance, and slight dysarthria. Tuberculous meningitis with hydrocephalus was diagnosed, and VP shunt was done. A few weeks after the operation, she developed a fever, and abdominal distension. Abdominal CT scan was performed and revealed an abdominal cyst. The cyst was punctured and *C. neoformans* was identified by culture. Intravenous fluconazole 400 mg per day was continued for 6 months and the patient recovered. The second was a 34-year-old HIV-infected patient who presented with slow speed and cognitive dysfunction. MRI of brain showed communicating hydrocephalus and nodular enhancement of the leptomeninges and pachymeninges. Patient was empirically treated with Anti TB drugs and VP shunt was done. One year after operation, he presented with abdominal distension, and afebrile. Abdominal CT scan showed large cystic mass at VP shunt insertion site, and the shunt was removed. Intravenous liposomal amphotericin B and 5-FC were started for 6 weeks, followed by fluconazole and 5-FC for an additional 8 weeks. The patient recovered although gait abnormalities persisted.

In our patient, high CD4 count was an unusual presentation, with slow development of neurological sign and negative for serum and cryptococcal antigen test in CSF. Only a large volume of abdominal fluid and tip culture form VP shunt were detected organism loculated infection. A large-volume tap
may have increased the yield of detected organism by providing the minimum number of organisms necessary for growth if the organisms were few or scattered. The prognosis depends on early diagnosis and treatment, since late detections are often associated with higher rate of morbidity and mortality.11

References