

## Case Report



# Liver Abscess caused by Cytomegalovirus in a Patient with Acquired Immunodeficiency Syndrome

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### Ethics statement

This study was approved by the Institutional Review Board of Kosin University Gospel Hospital (KUGH 2017-02-005) and written informed consent was given by the patient.

## ABSTRACT

Cytomegalovirus (CMV) causes severe infection in immunocompromised patients, especially those with acquired immunodeficiency syndrome (AIDS), those who have undergone organ transplantation, and/or those who are being treated with steroids. In patients with AIDS, CMV is the most common pathogen that causes opportunistic infections. Here, we present a case of liver abscess due to CMV in a 58-year-old man diagnosed with AIDS. At the time of the study, his CD4 T lymphocyte count was 39 cells/mm<sup>3</sup>, and his human immunodeficiency virus (HIV) ribonucleic acid (RNA) level was 411,000 copies/mL. Upon presentation, he complained of upper abdominal pain. Ultrasonography-guided percutaneous drainage of the liver abscess was performed, and polymerase chain reaction analysis of the drained pus was positive for CMV. He was treated with intravenous ganciclovir, after which he recovered fully. In conclusion, our patient represents, to our knowledge, the first described case of liver abscess caused by CMV in an AIDS patient, which was probably facilitated by severe immunodeficiency.

**Keywords:** Cytomegalovirus; Acquired immunodeficiency syndrome; Liver abscess

## INTRODUCTION

Cytomegalovirus (CMV) is a herpes virus that is one of the most common causes of viral infections in humans [1], and CMV antibodies are present in 100% of adults over 30 in Korea [2]. Most CMV infections are asymptomatic and subclinical in the absence of immunosuppression [3]. However, they cause severe infection and an increased mortality rate in immunocompromised patients, especially in those with acquired immunodeficiency syndrome (AIDS), those who have undergone organ transplantation, and/or those who are being treated with steroids. In AIDS, CMV is the most common cause of opportunistic infections, leading to various clinical syndromes, including hepatitis, meningitis, myocarditis, and pneumonitis [4, 5].

In patients with AIDS, liver abscess is not common, although several cases of liver abscess caused by *Entamoeba histolytica* or *Mycobacterium tuberculosis* have been reported [6]. However,

**Conflict of Interest**

No conflicts of interest.

**Author Contributions**

Conceptualization: JYP. Data curation: JWP. Formal analysis: JYP. Methodology: JYL. Resources: JWP. Supervision: JYP. Visualization: JYL. Writing - original draft: JYL. Writing - review & editing: JYP.

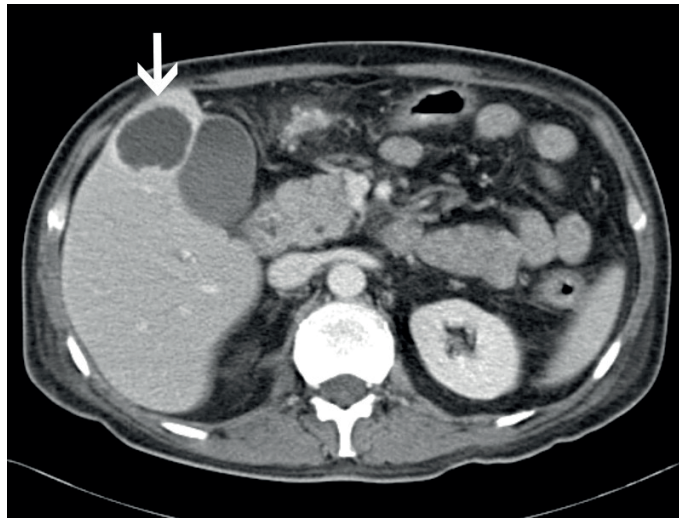
there has been no previous report of liver abscess caused by CMV in patients with AIDS. Herein is a presentation of such a case.

**CASE REPORT**

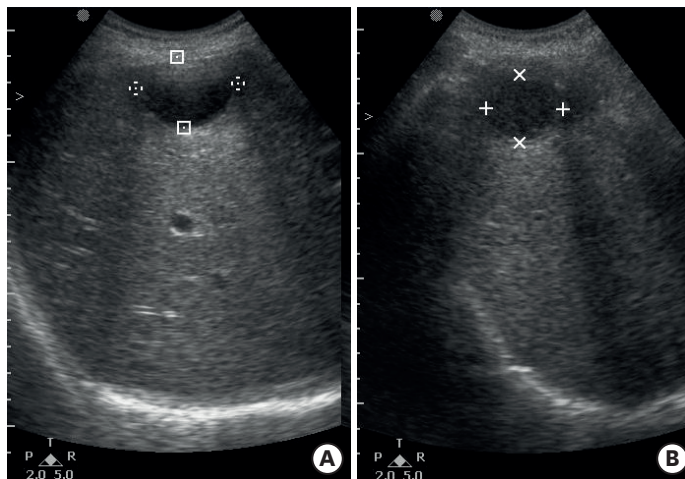
A 58-year-old man visited the emergency room presenting with diarrhea accompanied by decreased urine output. He also complained of recurrent oral ulcerations. He had been in his usual state of health before admission and he had no medical history. His blood pressure was 110/80 mmHg, pulse was 85 beats per minute, temperature was 37.8°C, and respiratory rate was 24 breaths per minute. On physical examination, his tongue was found to be dry, and his skin had decreased turgor. He was also covered with brown, red, and black colored nodules and blotches, which were especially prevalent in the mouth and on the chest and abdomen. Upon histopathological analysis of a skin biopsy, he was diagnosed with Kaposi's sarcoma. Colonoscopic examination revealed chronic colitis with several polypoid erythematous elevated lesions, and the final diagnosis from the biopsy was nonspecific colitis. Immunostaining for CD34 and Factor VIII-related antigen supported the diagnosis of Kaposi's sarcoma. Immunohistochemistry for CMV and periodic acid-Schiff (PAS) stain were both negative. He had no other signs of symptoms of gastroenteric involvement of CMV like hematochezia. Blood and sputum cultures both tested negative for bacteria. The result of anti HIV antibodies was positive. The patient's CD4 T lymphocyte count was 39 cells/mm<sup>3</sup>, and his HIV RNA level was 411,000 copies/mL. Routine testing for co-infection was positive for IgG antibodies to CMV, as measured by polymerase chain reaction (PCR), and cryptococcus antigen and negative for hepatitis B antigen and antibodies, hepatitis C antibodies, and serum CMV IgM. Serum level of CMV DNA by real-time PCR was 5,350 copies/ml. The patient did not have CMV retinitis. He was treated with efavirenz, lamivudine, and abacavir. Trimethoprim/sulfamethoxazole and azithromycin were also administered to prevent *Pneumocystis jirovecii* pneumonia and *Mycobacterium avium* complex infection. Amphotericin B was administered for 3 weeks to manage any cryptococcal infection after the day 7 of hospitalization.

One week later, the patient complained of upper abdominal pain and associated tenderness. An abdominopelvic computed tomography (CT) scan showed a focal, roundish lesion localized at the fifth segment of the liver, approximately 36 mm in diameter, which was hypodense with dishomogeneous peripheral enhancement, consistent with a hepatic abscess (**Fig. 1**).

Ciprofloxacin and metronidazole were administered for 1 week after the day 1 of hospitalization. After first CT evaluation, piperacillin/tazobactam was administered for 2 weeks after which no more antibiotics were administered. On day 14 of hospitalization, ultrasonography-guided percutaneous drainage of the liver abscess was performed. The size of the abscess was approximately 36mm in diameter on ultrasonography (**Fig. 2A**). The aspirated fluid was yellowish and turbid, and its red blood cell count was 0-1/HPF. The fluid cytologic examination was negative for malignancy. In cytology test, intranuclear inclusion body was not seen. Culture, acid fast fluorescent stain, gram stain, and fungus stain of the drained pus were all negative, but PCR analysis was positive for CMV. The quantity of CMV DNA in drained pus was not measured. Intravenous ganciclovir (650 mg/day) was administered for 1 week after the day 7 of hospitalization when the serum CMV PCR revealed positive, after which ganciclovir-induced neutropenia occurred. Therefore, a lower dose of intravenous ganciclovir (250 mg/day) was administered for 1 more week. On day 14 after aspiration, decrease in size of abscess on ultrasonography to 28mm (**Fig. 2B**). His symptoms

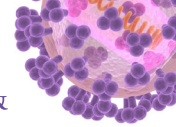


**Figure 1.** Abdominopelvic computed tomography (CT) shows a focal, roundish lesion localized at the fifth segment of the liver, approximately 36 mm in diameter, which is hypodense with dishomogeneous peripheral enhancement (arrow), consistent with a hepatic abscess.

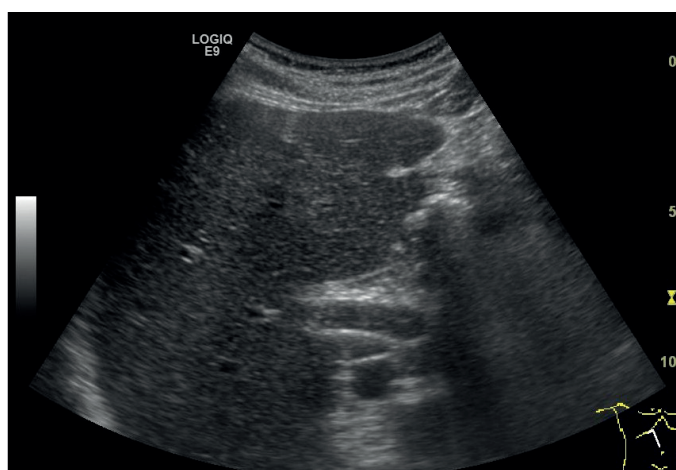


**Figure 2.** (A) Ultrasonography-guided percutaneous drainage of the liver abscess was performed. The size of the abscess was approximately 36mm in diameter on ultrasonography. (B) On day 14 after aspiration, decrease in size of abscess on ultrasonography to 28mm.

rapidly improved with resolution of the abdominal pain. Then, oral ganciclovir (900 mg/day) was administered for 3 weeks, followed by oral ganciclovir (450 mg/day) for 21 months. Abdominal contrast-enhanced CT scan, performed 5 months after the first tomography, showed a decreased liver abscess size of about 20 mm (Fig. 3). Complete resolution of the liver focal lesion on liver ultrasound was observed 22 months after the first tomography (Fig. 4). At that time, administration of ganciclovir was stopped. Both PCR and real-time PCR analyses of serum were negative for CMV after treatment. Moreover, 3 months after the initiation of antiretroviral therapy, the patient's CD4 cell count was 83 cells/mm<sup>3</sup>, and the HIV RNA level was 85 copies/mL.



**Figure 3.** Abdominopelvic computed tomography (CT) shows the same liver abscess after treatment, with a smaller size of about 20 mm.



**Figure 4.** Liver ultrasonography shows complete resolution of the liver focal lesion on liver ultrasound 22 months after the first tomography.

## DISCUSSION

Following the development of antiretroviral medications, the average survival time of patients with AIDS has increased. As a result, the early diagnosis and management of opportunistic infections have become increasingly important for good prognosis in these patients.

Symptomatic CMV infection can occur if cellular immunity is suppressed [7]. CMV infection is therefore common in patients with AIDS. Specifically, it occurs in approximately 40% of AIDS patients with a CD4 count under 100 cells/mm<sup>3</sup> [3, 8]. Diabetes, alcoholism, liver disease, and immunosuppression are risk factors of liver abscess, while 13 - 35% of liver abscesses are of unknown origin [9, 10]. Liver abscess caused by viral infection has rarely been reported; moreover, abscess caused by CMV in patients with AIDS has not previously been reported. Serologic antibody detection is the most widely used method to diagnose CMV infection, but is not helpful for early diagnosis because it detects CMV antibodies 1-2

weeks after infection, and it can yield false negative results in immunosuppressed patients who have a decreased ability to produce antibodies [11]. PCR can detect CMV infection with the greatest rapidity of any diagnostic method and is thus the best suited for preventing progression to severe infection by enabling early administration of antiviral medication. This method also has high sensitivity, but can result in false positives. Accordingly, quantitative PCR is necessary, and follow-up analyses must occur regularly. In this case, serum PCR analysis for CMV IgM was negative. However, PCR analysis for CMV was positive, and the real-time PCR results showed CMV at 5,350 copies/mL. PCR for CMV in the pus drained from the liver abscess was also positive. After treatment with antiviral medication, the CMV PCR results were negative, and the size of the liver abscess decreased as measured by subsequent abdominopelvic CT. This patient was treated with antibiotics for only 3 weeks, while intravenous and oral ganciclovir was administered for about 22 months, until the liver abscess improved. Of course, concomitant infection with varicella zoster virus, Epstein-Barr virus and CMV may occur in an AIDS patient, other pathogens except CMV were not evaluated in this study [12]. Though coinfection with bacteria, fungi such as *Pneumocystis jirovecii* and CMV also can occur in an AIDS patient, cultures for bacteria and fungi were all negative.

In conclusion, liver abscess in this case was due to CMV infection. To our knowledge, this is the first described case of liver abscess caused by CMV in an HIV-infected patient, which was probably facilitated by severe immunodeficiency.

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