

# Cytomegalovirus Keratitis in Acute Myeloblastic Leukemia Report of a Case

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## Case report

**Keywords:** cytomegalovirus, acute myeloblastic leukemia, corneal herpes keratitis, Polymerase Chain Reaction

**Posted Date:** February 24th, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-230246/v1>

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# Abstract

Objectives: Here, we report a rare case of acute myeloblastic leukemia (AML) developed a bilateral dendritic epithelial keratitis without retinitis

Case presentation: A 58-year-old woman presented to the emergency department of Baqiyatallah Hospital in Tehran due to dyspnea and dry cough along with weakness, lethargy and weight loss resulting from acute myeloblastic leukemia. She was treated for systemic problem. In a while after developing pain, burning, redness of the eyes and ocular mucopurulent discharge, ocular symptoms began. The patient was initially treated with oral acyclovir with a possible diagnosis of [Herpes simplex virus Keratitis](#). [Polymerase Chain Reaction \(PCR\)](#) was performed on ocular discharge specimens collected by soft-tipped applicators reported as CMV. Then, acyclovir was discontinued and bilateral CMV keratitis treated with IV Ganciclovir and her epithelial lesions gradually disappeared.

Conclusions: CMV is capable of generating corneal epithelial engagement without corneal endothelium and retina involvement and demonstrated that CMV keratitis can be a rare cause but an emergent problem of acute myeloblastic leukemia (AML). Therefore, in any cases with bilateral corneal herpes keratitis, the patient should be evaluated for immune system deficiency.

## Introduction

As a herpes virus, the human cytomegalovirus contracts via close personal exposure and causes a subclinical, self-recovering disease in healthy individuals. In immunocompetent individuals, systemic and ocular disorders are rare, meanwhile presenting a mononucleosis like syndrome with acute conjunctivitis is not rare.[1]Acquired immunodeficiency syndrome (AIDS), Newborns, transplant recipients, and other patients with weaken immune system are prone to disseminated infectious agents that contain the retinal pigment epithelium as well as sensory retina. CMV infection also causes anterior segment manifestations, which are hardly identified. In the present study, a rare case with acute myeloblastic leukemia who developed bilateral CMV keratitis approved by Polymerase Chain Reaction is reported.

## Case Report

A 58-year-old Iranian woman was referred to the emergency department of Baqiyatallah Hospital in Tehran with a diagnosis of influenza due to dyspnea and dry cough along with weakness, lethargy and weight loss. She was treated with Levofloxacin 500 mg twice daily, N-acetylcysteine 600 mg twice daily, Bisoprolol 5 mg twice daily and Losartan 25 mg twice daily for systemic problem.

In a while after developing pain, burning, redness of the eyes and ocular mucopurulent discharge, ocular symptoms began. In ophthalmological examinations, the visual acuity of both eyes was 8/10 decimal. Both eyes had mild conjunctival hyperemia. The corneal sensation was decreased. A dendritic epithelial defect was detected at paracentral and corneal periphery of both eyes (Fig. 1). Both lesions comprised swollen epithelial cells. The basic stroma was well identified. We could not find iritis. Moreover,

ophthalmic exam revealed no retinal lesion. Treatment with oral acyclovir, 400 mg 5 times per day was initiated for presumed herpes simplex virus epithelial keratitis, however, bilateral lesions suggested that the patient may have some form of immunodeficiency.

Simultaneously computed tomography (CT) of the lung was done that revealed a ground glass opacity. Then, a PCR test from Bronchioalveolar Lavage was requested that reported positive for CMV. Three days later, Bone Marrow Aspiration test was done that reported M3-Non type acute myeloblastic leukemia (AML).

Due to the bilateral ocular manifestation's lesions, the patient's dendritic epithelium was sampled with an applicator under sterile conditions and tested for PCR for CMV, EBV and HSV. The PCR test of ocular epithelial sample reported as CMV.

Consequently, acyclovir was discontinued and the patient was treated with Ganciclovir 30mg/ kg/ IV for Bilateral CMV keratitis. The patient followed -up closely every 3 days and her epithelial lesions gradually disappeared.

## Discussion

Cytomegalovirus disease of external eye is rare and its anterior segment presentations are extraordinary. Cytomegalovirus can be latent without manifestation in immunocompromised patients and CMV-induced retinitis is an important cause of blindness in this group. One previously described an adult suffering from CMV keratitis with a history of cardiac transplant recipient suffering from acquired CMV infection due to transpalation. [2] Positive corneal culture results indicated the presence of the disease, and unilateral dendritic epithelial keratitis resolved after superficial debridement. Also, CMV epithelialithis along with endotheliitis has been reported in patients with AIDS without retinitis. [3]

Likewise, intravitreal inoculation of CMV in healthy mice showed that CMV caused a self-limiting and temporary affecting anterior segment of the eye. In contrast, in mice with suppressed immunity, necrotizing retinitis occurred. [ 4]

In our patient, CMV manifested only as dendritic epithelial lesions (see Fig. 1) akin to formerly described case who mimicked the epithelial keratitis due to herpes zoster. [ 5]. The linear lesion did not develop terminal bulbs or epithelial ulceration. PCR test of the sample taken with the applicator from dendritic epithelial lesions of both eyes confirmed CMV infection of the corneal epithelium.

Dendritic epithelial lesions can be caused by the HSV virus, and HSV-induced keratitis is also often unilateral, but in this patient bilateral dendritic manifestations was appeared. Varicella Zoster Virus can also cause these manifestations but epithelial keratitis of dendritic type is unusual, however is common in HZO. [6] In HZO, the branched and Medusa-like lesions plaques are prominent. These lesions do not have central ulcers and have minimal staining with fluorescein. Meanwhile, the bulbous end is not seen.

[7] Nevertheless, in this patient the dendritic lesions were different from those of HZO including painful skin lesions, with no distributed dermatome.

We could not identify how the patient was infected. Still, no investigational model of CMV keratitis is developed by topical challenge<sup>8</sup> although occasional intravitreal inoculation caused corneal infiltrates.<sup>9</sup> In most cases, CMV does not manifest in the cornea of AML patients, viral reactivation at a non-ocular site may extend to the anterior segment. Moreover, Viremia with conjunctival or limbal contamination and lacrimal gland involvement are probable mechanisms that the corneal epithelium can be infected throughout a systemic CMV contamination.

In this case peripheral involvement of the cornea shows a systemic CMV infection that most probably has arisen from the limbus. In other words, diminishing immune activity presumably permits infection of the ocular surface. During primary infection, CMV infects myeloid precursors CD34+. Such cells are capable of differentiating into macrophages and dendritic cells as a whole and the body allows the virus to spread. [4] Therefore, redistribution of the virus leads to a range of CMV-induced diseases, including asymptomatic diseases in patients without immunodeficiency to severe multisystem diseases and even loss of life in patients with weak immune system as well as infants.

Ocular presentations of CMV contain conjunctivitis, microphthalmos, cataract, optic nerve abnormalities, eye inflammation, retinitis and inflammation of the cornea. While CMV keratitis is rare, but its manifestation is growing. [4] Delayed diagnosis of CMV keratitis often causes serious problems including stromal keratitis and endothelialitis [10]

In summary, although, herpes simplex virus and varicella-zoster virus are usual origins of corneal infection during immunodeficiency and CMV-induced keratitis often involve endothelium, bilateral corneal epithelial keratitis manifestations will be confirmed as a newly identified consequence of AML. Therefore, investigating risk factors of the host and viral genomics can pave the way for further intuition regarding the pathogenesis of CMV keratitis in otherwise immunocompetent individuals.

## **Declarations**

## **Acknowledgements**

The authors would like to acknowledge the staffs of Baqiyatallah Hospital for their valuable help during the entire process of this study.

## **Consent for publication**

Not available

## **Funding**

The whole study was performed without any funding.

## Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available since all relevant data are included in the manuscript. The datasets are available from the corresponding author on reasonable request.

## Authors' contributions

SHD & SAM were responsible for the conception and design of the study. SAM acquired the data. SHD, SAM and MM analyzed and interpreted the data. SAM wrote the draft. SHD and MM revised the manuscript critically. All authors have read and approved the final manuscript.

## Informed consent was taken to participate the study.

## Competing interests

The authors declare that they have no competing interests.

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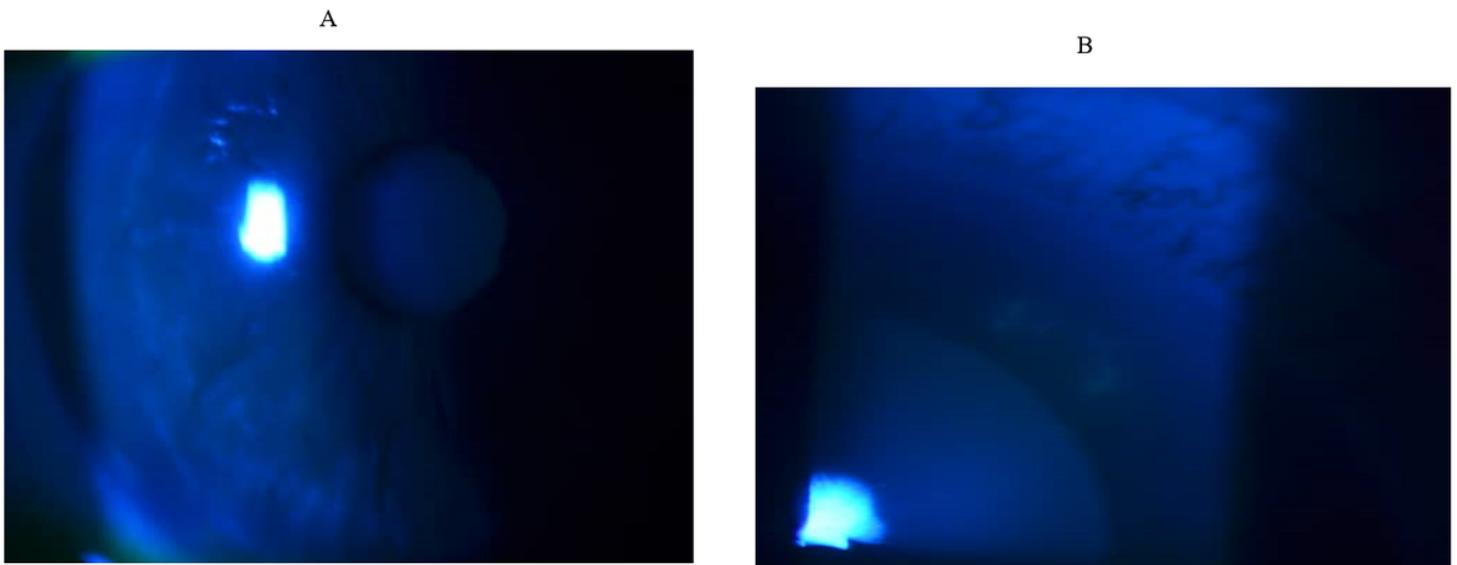
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## Figures



**Figure 1**

Bilateral cytomegalovirus dendritic epithelial keratitis in a patient with acute myeloblastic leukemia (AML). Left;A , Right eye has sinusoidal corneal epitheliopathy inferonasally along with branched linear lesion across lower cornea composed of swollen epithelial cells..B; Right, Left eye has coin-shaped or circinate configuration