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Case Report

Prenatal Diagnosis and Postnatal Outcomes in a Case of Primary Maternal Cytomegalovirus Infection

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Abstract

Cytomegalovirus (CMV) is the most common congenital viral infection, affecting 0.5–2% of all live births worldwide. Primary maternal CMV infection in the first trimester carries a high morbidity and mortality for the fetus. Herein, we present a case of a 27-year-old primigravida who tested positive for primary CMV infection in the first trimester. The patient experienced fever, fatigue at 8 weeks of gestation. Laboratory investigation revealed elevated inflammatory markers, and CMV serology was consistent with a recent infection (CMV IgM and IgG were positive). She was started on high-dose valacyclovir till amniocentesis then stopped by her self she cannot tolerate and sent for serial fetal evaluations. Fetal CMV was indicated by positive PCR of amniotic fluid at 16weeks. However, ultrasonographic monitoring during pregnancy revealed no structural anomalies other than quarry unilateral cataract at 26weeks. The patient gave birth to a healthy female newborn at term by induced vaginal delivery. Fetal Urinary CMV PCR was positive postnatally. Audiology examination showed bilateral hearing impairment, and the baby commenced on oral valganciclovir. This case highlights the importance of early detection of maternal CMV infection, treatment with antivirals, and the necessity of multidisciplinary antenatal and postnatal monitoring to optimize neonatal outcomes in CMV infection.

Keywords: Cytomegalovirus, congenital infection, prenatal diagnosis, valacyclovir, amniocentesis, neonatal outcome.

1. INTRODUCTION

Human cytomegalovirus (CMV), which belongs to the herpesvirus family, is the most frequent cause of congenital viral infection worldwide. Its world-wide distribution and capacity for severe perinatal morbidity render it a significant problem in perinatal medicine. Congenital CMV infection is estimated to affect 0.5–2% of all live-born infants and represents the most common non-genetic cause of SNHL and neurodevelopmental abnormalities in children [1,2]. Notwithstanding this, CMV infection frequently goes undiagnosed as a result of its nonspecific clinical picture and the absence of routine screening programs during pregnancy.

Prenatal primary CMV infection, in particular during the first trimester, confers the highest risk for vertical transmission and serious fetal sequelae. These may include intrauterine growth restriction (IUGR), cerebral calcifications, microcephaly, chorioretinitis, and hepatosplenomegaly. The clinical presentation, however, could be very different, ranging from being asymptomatic early in life to late-onset sequelae, such as hearing loss and developmental delay [3,4].

Maternal CMV infection is diagnosed by serological testing for CMV-specific IgG and IgM antibodies and testing for IgG avidity to differentiate between primary and non-primary maternal infection. Definitive diagnosis of fetal infection is established by polymerase chain reaction (PCR) of amniotic fluid, which is usually taken by amniocentesis at 16 weeks gestation and at least 6-8 weeks post maternal infection, to enable reliable virus detection [5,6].

The management options are consistent fetal surveillance with serial ultrasound, searching structural anomalies and maternal antiviral therapy, valacyclovir for maternal infection and valganciclovir for

symptomatic neonate. It had been demonstrated, in recent studies, that maternal treatment with high-dose valacyclovir may decrease the rate of congenital infections and improve the prognosis, especially if it is initiated early [7,8].

The present case underscores the need for early detection, correct diagnosis, and multidisciplinary management of primary maternal CMV infection. It describes the symptoms and signs of the infected fetus, along with those of the newborn, and follows the pregnant woman infected by CMV in the first trimester as she attended to the hospital and the conclusion of the case when the infant has reached the age of 9 months. The case contributes to the increasing literature that is highlighting the need for recognition, targeted screening, and therapeutic strategy to reduce the burden of congenital CMV.

2. CASE PRESENTATION

2.1 History of Present Illness and Initial Presentation

A 27-year-old woman, a primigravida, visited the emergency room (1/8, 2024), at 6 weeks and 4 days of gestation, complaining of dizziness, nausea, abdominal discomfort, and back pain. She was negative for vaginal bleeding, fever and respiratory symptoms. Her vital signs were normal (BP 111/71 mmHg, Pulse 84 bpm, T 37 °C). A transabdominal sonogram was consistent with a single viable intrauterine pregnancy with normal growth for gestational age.

One week later, the patient presented to the ED complaining of continued low-grade fever, chills, mild nausea, and a backache. She did not report urinary symptoms, symptoms of URTI, bowel disturbance or vaginal discharge. There was no sick contact history. Her travel background was only of recent travel to Poland preconception June/2024 for 1 month which aroused the possibility of viral etiology imported from abroad.

2.2 Laboratory and Imaging Investigations

The inflammatory parameter C-reactive protein (CRP) was elevated to 40.4 mg/L, the erythrocyte sedimentation rate (ESR) was 37 mm/h and the procalcitonin reached 0.23 ng/mL in initial laboratory diagnostics. Hemoglobin was decreased (10.9 g/dL) and hyponatremia (129 mmol/L) was present.

Wide viral and bacteriological tests were performed to discover the etiology of fever. No evidence of dengue virus, influenza, corona, malaria, or a respiratory PCR panel was found. Blood culture, renal function, liver function test and complete urinalysis were also unremarkable and the common causes of fever during pregnancy were also ruled out.

Serological testing for CMV was positive for IgM and IgG antibodies, which reflected recent or primary infection with CMV. These results were crucial in determining the subsequent work-up and treatment.

Table 1: Initial Laboratory Findings

Parameter	Result	Reference Range	Interpretation	Test Date	Unit	Specimen	Clinical Relevance
CRP	40.4 mg/L	<5.0 mg/L	High	1/13/2024	mg/L	Blood	Inflammation marker
Procalcitonin	0.23 ng/mL	<0.05 ng/mL	High	1/13/2024	ng/mL	Blood	Bacterial infection marker
Hemoglobin	10.9 g/dL	12.0-15.0 g/dL	Low	1/13/2024	g/dL	Blood	Anemia assessment
ESR	37 mm/hr	<13 mm/hr	High	1/13/2024	mm/hr	Blood	Chronic inflammation
CMV IgG	Positive	Negative	Recent Infection	1/13/2024	-	Blood	Immune status
CMV IgM	Positive	Negative	Recent Infection	1/13/2024	-	Blood	Recent infection

2.3 Diagnosis and Management

Primary CMV infection was defined according to the serologic pattern. The suspected gestational age was still early, and there was a high risk of vertical transmission and severe fetal damage. The patient was hospitalized for monitoring and started on oral valacyclovir 2 g four times daily. Hydration was maximized and baseline liver and kidney function tests were checked frequently for possible antiviral toxicity.

The infectious disease unit was consulted and fetal maternal medicine unit (FMMU) referral facilitated. The patient underwent extensive counselling about the effects of CMV during pregnancy, possible fetal sequelae of infection and the diagnostic and therapeutic options.

2.4 Fetal Monitoring

First Trimester

A bedside scan was performed at 9 weeks gestation and a viable intrauterine gestation was confirmed with a positive fetal heart rate. At 13 weeks nuchal translucency (NT) scan measured 1.0 mm, which was normal. There was no evidence of structural defects at this time.

Second Trimester

The amniocentesis was done at 16 weeks gestation after the timing was appropriate from

suspected maternal infection. PCR investigation of amniotic fluid identified fetal CMV infection. Nonetheless, serial ultrasonography showed normal fetal growth, amniotic fluid volume, and no structural defects until 22 weeks of gestation.

A solitary fetal right eye cataract was suspected at 26 weeks gestation with concern about potential visual privation and developmental delay. No other abnormalities were noted.

GTT: negative
3rd trimester: FMMU antenatal high risk pregnancy follow up
GPS 35week: negative

Table 2: Ultrasound Findings Summary

Gestational Age	Findings	FHR (bpm)	CRL (mm)	Placental Position	AFI (cm)	Estimated Fetal Weight (g)	Observations
13+3 weeks	Normal NT	150	74	Anterior	13.5		Normal scan
16 weeks	Normal anatomy	145	121.9	Anterior	14.2		No anomalies
22 weeks	Growth appropriate Normal anatomy	148	150.7	Anterior	13.8	500	Appropriate for GA /No anomalies
26 weeks	Suspected right eye cataract	138	270	Anterior	12.6	1200	Quarry Unilateral cataract
34 weeks	No gross anomaly Normal doppler	138	300	Anterior	13	2200	Continued normal growth/normal doppler

2.5 Delivery and Postnatal Course

She was closely monitored and received valacyclovir high dose stopped by herself at 16 weeks after amniocentesis as she cannot tolerate. She was clinically stable and subsequent FMMU ultrasound at 20, 26, 30, 34, weeks demonstrated no new abnormality. The patient's previous CMV infection and the necessity of early newborn assessment led to induction of labor at 38+5 weeks. She had an uneventful vaginal delivery of a healthy phenotypic female with APGARs of 9 and 10 at 1 and 5 minutes, respectively. The infant was born weighing 2.6 kg with no immediate complications.

Urine CMV PCR was positive postnatally, and the congenital infection was confirmed. Neonate had normal liver and renal functions.

2.6 Neonatal Findings

An audiological examination was performed, and the otoacoustic emissions (OAE) test result was “REFER” bilaterally. Fail retesting also did not resolve, leading to the suspicion of SNHL. Neonate was diagnosed of congenital CMV infection with bilateral hearing loss and was started on oral valganciclovir suspension at a dose adjusted according to body weight.

The baby was transferred to pediatric audiology and neurology clinic for further developmental assessment and follow-up.

Table 3: Postnatal Investigations

Test	Result	Reference Range	Interpretation	Test Date	Specimen	Next Steps
Urine CMV PCR	Positive	Negative	Confirmed congenital CMV	3/15/2025	Urine	Start antiviral
Audiology Screening	Bilateral REFER	Pass	Probable hearing loss	4/2/2025	Ear canal	Schedule audiology follow-up
CMV IgG (infant)	Positive	Negative	Seropositive	3/20/2025	Blood	Monitor IgG trend

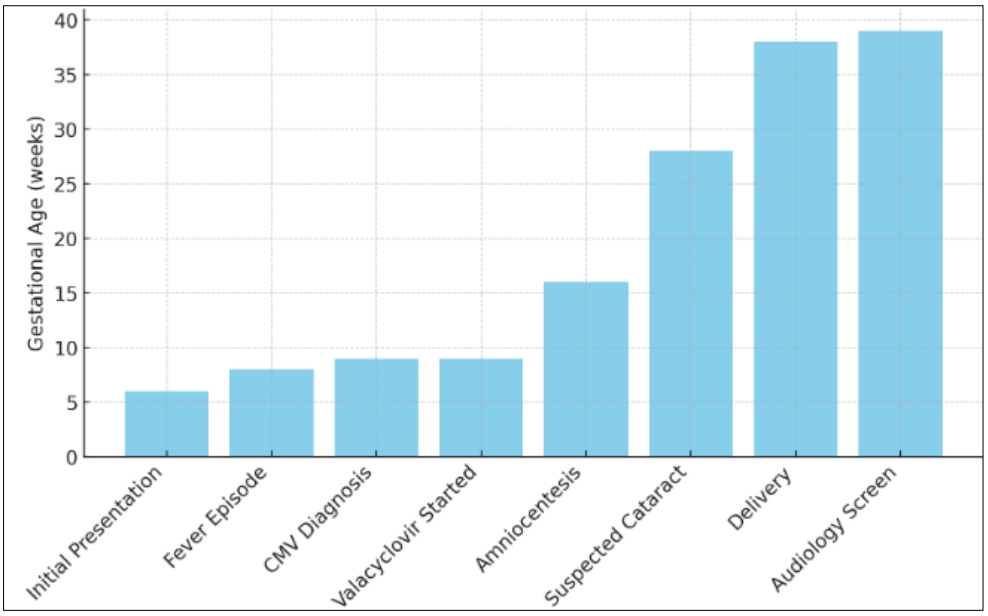

Figure 1: Timeline of Clinical Events

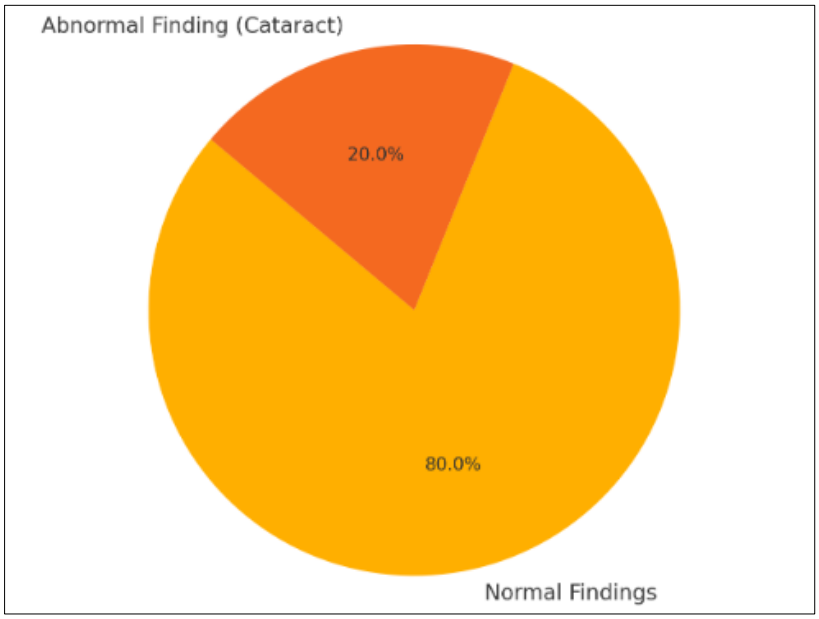

Figure 2: Summary of Fetal Ultrasound Findings

3. DISCUSSION

This case report demonstrates a therapeutic regimen for primary CMV infection in pregnancy. CMV continues to be underdiagnosed owing to maternal symptoms that are not specific and the lack of universal screening. Our patient was symptomatic at an early stage and was fortunate to be symptomatic.

The early use of high-dose valacyclovir in the first 8 weeks of infection, guided by current UpToDate July 2024 recommendations, may have prevented worse fetal sequelae [10]. Another fetus was infected (positive amniotic PCR), even though the ultrasound was mostly normal with only a suspected ocular involvement (in the form of unilateral cataract).

The effect of CMV upon the CNS and auditory system is frequently not detectable before birth. This is consistent with a later postnatal finding of bilateral hearing loss despite unremarkable prenatal imaging. This clinical paradox underlines that prenatal diagnostic tools are unable to detect subtle or functional anomalies as sensorineural hearing loss, which became evident postnatal. It highlights the need for postnatal surveillance in such cases of known in utero exposure.

The literature nowadays recommend valganciclovir for treatment of symptomatic congenital CMV in neonates to enhance the auditory and developmental outcomes [11, 12]. In such a situation, early commencement of oral valganciclovir to the

neonate is a best-practice strategy to prevent viral replication and sequelae.

Additionally, this case illustrates challenges in the complex decision-making process associated with congenital infections. Moral, cultural and legal issues – particularly in areas with restrictive abortion laws further complicate patient counseling and clinical planning. The readiness of the patient and her health care team to optimize a pregnancy with complete monitoring and care depicts the importance of a multidisciplinary approach.

Novel investigations are considering maternal immunotherapy, vaccines, and prophylactic measures during pregnancy in hopes of preventing congenital CMV transmission. But such methods are still experimental, and unavailable in many places. Thus, careful antenatal monitoring, prompt and accurate serologic diagnosis and initiation of early antiviral treatment are the most powerful means currently available to prevent the devastating effects of this congenital infection.

The impact on the psychological well-being for pregnant women who are informed they have CMV cannot be overemphasized. Both maternal stress and anxiety are increased because of repetitive imaging, Uncertainty regarding fetal wellbeing / Long history to invasive diagnostic procedures such as Amniocentesis. Patients need psychological counseling in addition to medical treatment.

Lastly, this case reflects a pressing public health demand: improved provider and patient knowledge of CMV infection, how it is transmitted, and the importance of preventive hygiene. Educational interventions would be highly effective in lowering the numbers of infections, especially in seronegative women of childbearing age.

Limitations

- CNS involvement was not confirmed by MRI.
- Prenatal detection of hearing loss remains unreliable.
- Long-term neurodevelopmental outcomes are pending.

4. CONCLUSION

The early diagnosis and treatment of maternal CMV infection is of primary importance in order to prevent fetal and neonatal sequela. This case illustrates the potential role of virologic suppression and structured follow-up in having a good perinatal outcome of a neonate with proven fetal infection though the pregnancy. The promotion of exercise and a healthy diet and advice women to avoid sharing utensils with anyone else during pregnancy is still needed.

Moreover it highlights the importance of multidisciplinary management including obstetricians, fetal medicine specialists, infectious disease physicians and pediatricians in treating congenital CMV. Analysis of the addition of antiviral therapy, fetal surveillance, and neonatal monitoring is a construct that can impact positively on the outcome. Due to the absence of routine screening for maternal CMV, a high index of clinical suspicion particularly in symptomatic patients in early pregnancy is essential.

Because the long-term course of this infant is not yet known, this case is also a reminder that congenital CMV can be a highly unpredictable condition. Long-term pediatric and developmental follow-up is important to evaluate hearing, neurodevelopment and general development. Further work is needed to optimize early biomarkers of fetal involvement and to assess the cost implications of population-based CMV screening in pregnancy.

Patient Consent

Informed written consent was obtained from the patient for the publication of this case and related clinical information.

Conflict of Interest and Funding Disclosure

The authors declare no conflicts of interest. No financial support was received for this study.

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