SciMedCentral

Annals of Pediatrics & Child Health

Case Report

A Newborn with Eventration of Diaphragm and Diabetes Insipidus

Swosti Joshi*, Mopelola S. Akintorin, and Vanessa Davis

Department of Pediatrics, John H Stroger Jr hospital of Cook County, USA

***Corresponding author**

Swosti Joshi, Department of Neonatology, John H Stroger Jr hospital of Cook County, 1901 West Harrison, Chicago, Illinois 60612, USA, Tel: 630-965-2398; Email: swostijoshi@gmail.com

Submitted: 25 August 2017

Accepted: 27 November 2017

Published: 30 November 2017

ISSN: 2373-9312

Keywords

- CMV
- Thrombocytopenia
- Eventration
- Diabetes insipidus

Abstract

Cytomegalovirus (CMV) is the most common cause of congenital infection. It is the leading infectious cause of infant hearing loss and neurologic deficits. Besides these, CMV infection has a wide spectrum of manifestations including thrombocytopenia, hepatitis, chorioretinitis, sensorineural hearing loss, intrauterine growth retardation and intellectual disability. Sometimes rare features like muscular paralysis of diaphragm and diabetes insipidus have been associated with CMV infection. Few cases of diaphragmatic eventration in a newborn with CMV infection have been reported. The CMV-infected neonate presented in this report had diaphragmatic eventration and later developed diabetes insipidus. With subsequent treatment of the CMV infection, the infant showed spontaneous resolution of the diabetes insipidus. This is a rare case of a CMV infected neonate who had hearing impairment, intra-uterine growth retardation, diaphragmatic eventration and diabetes insipidus.

ABBREVIATIONS

CMV: Cytomegalovirus; US: Ultrasonography; PPHN: Pulmonary-hypertension

INTRODUCTION

Cytomegalovirus infection is prevalent worldwide. It is the most common congenital viral infection affecting 0.2% to 2.5% of all live births [1]. Congenital Cytomegalovirus (cCMV) results from the transplacental transmission of infection from mother to the fetus.

Fetal transmission can occur as a result of both primary and secondary maternal infection. About 1-4% of CMV seronegative mothers get infected during pregnancy. In 30-40% of women with primary infection the virus gets transmitted to the fetus. Secondary infection occurs due to reactivation of latent infection or re-infection with a new strain in seropositive women. Secondary infection occurs in about 10- 30% of seropositive women. About 1-3% of women with secondary infection will transmit infection to the fetus [2]. In utero transmission of infection is much higher during a primary maternal CMV infection than in secondary infection. Infection during early gestation has higher chances of severe infection of fetus.

Approximately 10-15 % of infected infants exhibit symptoms of CMV infection. The most common manifestations are thrombocytopenia, hepatitis, chorioretinitis, sensorineural hearing loss, intrauterine growth retardation and intellectual disability. Most of the affected infants (~ 90%) are asymptomatic at birth. However, even some of these asymptomatic infants can develop symptoms later on in life. Of symptomatic infants, about 40-60% may develop permanent sequelae like hearing loss being the most common followed by cognitive impairment, retinitis, and cerebral palsy. About 10-25% of asymptomatoc infants may develop permanent sequelae [3].

In the absence of routine newborn CMV screening, CMV testing is rarely performed in the absence of symptoms like hearing loss, microcephaly, periventricular calcifications, liver abnormalities. Sometimes however, the patient may present with unusual manifestations like diabetes insipidus or eventration of diaphragm.

We present a case of a neonate with congenital CMV who presented with eventration of diaphragm and also developed diabetes insipidus.

CASE PRESENTATION

A 2180-gram female neonate was born at 42 weeks gestation to a 21 year-old Gravida 2 Para 0010 mother who had scant prenatal care. Maternal prenatal labs were unremarkable.

The baby was vigorous at birth with Apgar score 8 and 8 in 1 and 5 minutes of life respectively. Birth weight: 2180gm (below 3rd percentile), length: 49 cm (10th percentile) and head circumference: 30cm (below 3rd percentile). The physical examination was otherwise unremarkable. After few hours of

birth, the patient was noted to have mild respiratory distress. Oxygen was provided through nasal canula.

Chest radiograph showed elevation of the right hemi diaphragm. Echocardiography was unremarkable. Ultrasonography of the abdomen (US) showed eventration of diaphragm. Initial complete blood count (CBC) showed mild thrombocytopenia of 107000/uL. After 3 days, platelet count decreased to 56 000/uL. Liver enzymes were alanine transaminase (ALT): 11U/L and aspartate transaminase (AST): 57 U/L. Head ultrasonography showed mild ventriculomegaly. Serum Immunoglobulin M level was elevated at 25mg/dl (3-13). Urine culture for cytomegalovirus on admission was positive.

On the third day of life, the patient was noted to have increased urine output of about 6 ml/kg/hr. Serum sodium gradually increased with maximum of 152 mg/dl on the fifth day of life. On the same day, urine specific gravity was 1.002, urine osmolality was 76 mOsm/kg and serum osmolality was 300 mOsm /kg consistent with the diagnosis of diabetes insipidus. The patient was managed with free water (dextrose 10% water). Meanwhile the patient was weaned off to room air by fifth day of life.

She failed the initial newborn hearing screen. Auditory brainstem response revealed no recognizable waveforms in right ear and lower intensity stimulation at 50 decibels in left ear. Ophthalmological examination was unremarkable. Karyotype confirmed a normal female with no numerical abnormalities of chromosomes X, 13, 18 or 21.

The patient was then started with Valganciclovir on the ninth day of life, according to protocol [4]. By 11 days of life, intravenous fluids were weaned off as serum sodium had trended down. The urine output decreased to 2ml/kg/hr by the 13th day of life and serum sodium level remained within normal range. Hence, desmopressin was not administered. Repeat US of the diaphragm showed elevation of right hemi-diaphragm with symmetrical diaphragmatic movement. The baby remained in room air without any respiratory distress. Baby was discharged home with Valganciclovir for 6 months.

DISCUSSION

Diabetes insipidus is a disorder characterized by hypotonic polyuria either due to lack of vasopressin (central diabetes insipidus) or lack of sensitivity of vasopressin in renal tubule (secondary diabetes insipidus). When patient continues to have high urine output inspite of increasing serum osmolarity, there arises the concern about diabetes insipidus. In this case, our patient had hypotonic urine inspite of elevated serum osmolarity and hypernatremia. These symptoms resolved after initiation of treatment with Valganciclovir. Mena et al., reported 5 patients with diabetes insipidus in the cases with cCMV. Out of 5, 4 required treatment with desmopressin and 1 had resolution of diabetes insipidus after initiation of Ganciclovir [5]. The mechanism through which DI occurs in neonate infected with CMV in unknown. In conditions like meningitis and encephalitits, the patients tend to develop DI. Cytomegalovirus infection may also induce diffuse inflammatory process like meningitis and encephalitis and may result in DI. However other pituitary hormones like cortisol and thyroid hormones were are not involved in this case. In adults with HIV infection, some case reports showed association of diabetes insipidus with cytomegalovirus infection. Sano et al., in his study involving 49 AIDS adult patients with cytomegalovirus infection found anterior pituitary involvement in five cases and posterior pituitary involvement in two cases [6]. In our case, dilute urine output with hypernatremia was transient and resolved without use of desmopressin. DI might have been present in other cases of CMV and gone unrecognized due to its transient nature and resolution with treatment with Ganciclovir as inflammation subsides. DI might have been noticed in our patient due to admission in intensive care and monitoring of urine output. Not only in cases with CMV, has diabetes insipidus also been described in the infants with congenital toxoplasmosis [7].

When newborn presents with diabetes insipidus, in addition to endocrinological work up, diagnosis of congenital infections like Cytomegalovirus and Toxoplamosis should be considered. Treatment of the DI should be aimed at the underlying CMV infection that will lead to resolution of the symptoms. Some cases may need treatment with desmopressin as well.

Intrauterine CMV could also affect the development of myotomes of diaphragm leading to eventration of diaphragm or muscular paralysis. Wayne et al showed that congenital CMV infection could interfere with development of diaphragm muscle rather than phrenic nerve [8]. In our case, we could not differentiate between muscle involvement and nerve involvement as nerve conduction study and electromyography was not performed. Other studies have shown that CMV can interfere with neuronal differentiation and migration resulting into brain malformations like polymicrogryria, schizencephaly. Diaphragm is derived from cervical myotomes. CMV may interfere with differentiation or migration of cervical myotomes resulting into diaphragmatic dysfunction [9]. In our case, the patient had unilateral eventration of diaphragm with mild respiratory distress. However, some of the other cases described in literature had worse respiratory outcomes needing prolonged intubation and tracheostomy [10]. In a patient with CMV infection, if there is unexplained respiratory distress, diaphragmatic dysfunction should be considered as one of the differential diagnoses.

Generally CMV testing is ordered in newborn when they are symptomatic like failed hearing screen, thrombocytopenia, IUGR. However, it may have rare manifestations like eventration of diaphragm and diabetes insipidus. So having high index of suspicion for cytomegalovirus is extremely important as treatment with Ganciclovir can alleviate symptoms and prevent long-term sequelae. Neonatal infection can be diagnosed by PCR or antigen testing (p65 antigen) in saliva within the first 3 weeks of life [11]. For women of reproductive age group, exposure to urine and saliva of young children is the main risk factor for CMV infection [12]. Diagnosis in pregnant women is made by serological testing. Fetal infection can be diagnosed by viral culture or PCR of amniotic fluid.

CONCLUSION

A CMV infected patient can have unusual manifestations like eventration of diaphragm and diabetes insipidus in addition to the wide spectrum of usual clinical features. A high index of suspicion is needed to diagnose these cases. As suggested in

previous case reports, initiation of treatment of CMV infection could lead to resolution of symptoms of diabetes insipidus.

REFERENCES

1. Cannon MJ, Schmid DS, Hyde TB. Review of cytomegalovirus seroprevalence and demographic characteristics associated with infection. Rev Med Virol. 2010; 20: 202-213.
2. Nyholm JL, Schleiss MR. Prevention of maternal cytomegalovirus infection: current status and future prospects. Int J Womens Health. 2010; 2: 23-35.
3. Britt W. Cytomegalovirus. In: Remington JS, Klein JO, Wilson CB, Baker CJ, editors. Infectious diseases of the fetus and newborn infant. 7th edn. Philadelphia: W.B. Saunders Company, 2011: 704-753.
4. Kimberlinn DW. Valganciclovir for Symptomatic Congenital Cytomegalovirus infection. N Engl J Med. 2015; 372: 933-943.
5. Mena W Royal S, Pass RF, Whitley RJ, Philips JB 3rd. Diabetes insipidus associated with symptomatic congenital cytomegalovirus infection. J Pediatr .1993; 122: 911-913.
6. Sano T, Kovacs K, Scheithauer BW, Rosenblum MK, Petito CK, Greco CM. Pituitary pathology in acquired immunodeficiency syndrome. Arch Pathol Lab Med. 1989; 113: 1066-1070.
7. Sara Mohamed. Congenital toxoplasmosis presenting as central diabetes insipidus in an infant: a case report BMC res Notes. 2014; 7: 184.
8. Wayne ER, Burrington JD, Myers DN, Cotton E, Block W. Bilateral eventration of diaphragm in a neonate with congenital cytomegalic inclusion disease. J Pediatr. 1973; 83: 164-165.
9. Sutsui Y, Kosugi I, Kawasaki H. Neuropathogenesis in cytomegalovirus infection: indication of the mechanisms using mouse models. Rev Med Virol. 2005; 15: 327-345.
10. Izumi K, Hokuto I, Yamaguchi S, Uezono A, Ikeda K, Rice L, et al. Diaphragm dysfunction with congenital cytomegalovirus infection. J Perinatol. 2010; 30: 691-694.
11. Bhatia P, Narang A, Minz RW. Neonatal cytomegalovirus infection: diagnostic modalities available for early disease detection. Indian J Pediatr. 2010; 77: 77-79.
12. Hyde TB, Schmid DS, Cannon MJ. Cytomegalovirus seroconversion rates and risk factors: implications for congenital CMV. Rev Med Virol. 2010; 20: 311-326.

Cite this article

Joshi S, Akintorin MS, Davis V (2017) A Newborn with Eventration of Diaphragm and Diabetes Insipidus. Ann Pediatr Child Health 5(4): 1137.