The role of MRI in predicting neonatal sequelae in fetal CMV infection

Elkan Miller T, Weissbach T, De-Castro H, Duvdevani N, Katorza E, Yinon Y, Lipitz S, Weisz B

Sheba Medical Center, Tel-Hashomer, Ramat Gan, Israel

Objective

Cytomegalovirus (CMV) is the most common perinatal viral infection. Congenital CMV occurs in 0. 2-2. 2 of birth and can lead to serious neonatal and childhood sequelae including hearing loss and mental retardation. The risk of long term disability is higher when prenatal imaging findings are detected. The aim of this study is to assess the ability of a prenatal MRI examination to predict long and short-term neonatal sequelae in cases with proven fetal primary CMV infection.

Methods

In cases of maternal primary infection, as detected by seroconversion, fetal CMV infection was confirmed by viral DNA amplification using polymerase chain reaction in amniotic fluid obtained by amniocentesis. Prenatal evaluation included monthly detailed US scans and 3rd trimester fetal MRI scan at 30-34 weeks of gestation. Pregnancy outcome was obtained and long term outcome was assessed using the Vineland II adaptive behavior scales.

Results

206 patients with proven fetal CMV infection and both fetal sonographic and fetal brain MRI evaluation were included in the study. Altogether, 73 patients had abnormal MRI or US findings. Of the patients with normal repeated sonographic examinations 16. 5% had an abnormal MRI. In 33% of cases where extra-cerebral findings were observed by US additional neurological findings were detected by MRI. 18 patients had termination of pregnancy, of which 6 had abnormal findings detected only by MRI evaluation. Postnatal follow-ups were obtained for 183 patients. 27. 8% of these patients had abnormal postnatal brain US, 11. 1 had neurological impairment (1. 1% severe) and 14. 4% had hearing loss. Abnormal postnatal US was associated with first trimester infection (OR 2. 4, p=0. 044), abnormal fetal US (OR=6. 8, p=0. 009), fetal sonographic US findings (OR=17, p<0. 001) and abnormal fetal neurological MRI (OR=15, p<0. 001; either anatomical or H/I signals). However, using multiple regression analysis only prenatal sonographic findings were associated with postnatal sonographic findings (p=0. 025). Neurological impairment was associated with an abnormal MRI (OR=4. 28, p=0. 005). This association remained significant for fetuses with only isolated hyper-intense signal (HIS) findings on fetal MRI (OR=4. 6, p=0. 12). On the other hand, hearing loss was associated only with first trimester infection (OR=1. 9, p=0. 039) and did not show an association to either imaging modality. It should be noted that when we applied multiple regression analysis only first trimester infection was associated with postnatal neurological impairment (p=0. 049). Long term outcome, as assessed by the Vineland II adaptive behavior scores, demonstrated a significant association to first trimester infection (p=0. 05) but not to fetal sonographic or MR findings.

Conclusion

MRI is a useful diagnostic tool in the evaluation of women with proven fetal CMV infection. In our dataset, 16% of patients with normal US will present "new" anatomical findings. Abnormal finding are significantly associated with abnormal postnatal US findings and neurological impairment. However, we did not find it to be associated with hearing loss or to long term outcome.