# The Forgotten TORCH

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## BACKGROUND AND OBJECTIVE

We aim to assess and increase awareness to congenital lymphocytic choriomeningitis virus (LCMV) infection, and its neurological sequelae. LCMV is a lesser known virus that can cause birth defects. It was once suggested that LCMV be added to the TORCHES (toxoplasmosis, rubella, cytomegalovirus, herpes simplex virus, enteroviruses, and syphilis). Despite multiple epidemic outbreaks in the last century, awareness of the virus is lacking. Transmission of this arenavirus is usually from the common house mouse (Mus musculus), and can be aerosolized. LCMV has predominantly been linked to congenital intrauterine infection, hydrocephalus, and chorioretinitis. Neuroimaging abnormalities included microcephaly, periventricular calcifications, ventriculomegaly, pachygyria, cerebellar hypoplasia, porencephalic cysts, periventricular cysts, and hydrocephalus.

## METHODS

We present clinical and radiographic findings of three confirmed cases of congenital LCMV. Clinical histories are detailed for each patient to summarize comparative symptoms. Imaging is provided to accompany the clinical briefs. We provide data from a brief standardized survey of child neurologists, neonatologists, and radiologists to determine the likelihood of recognizing this diagnosis.

## RESULTS

Our standardized survey among child neurologists, neonatologists, and radiologists supports congenital LCMV is likely under-recognized and under-diagnosed. Twenty five physicians filled the survey, 12 neonatologists, 6 radiologists and 7 pediatric neurologists. 18 of them attendings, 7 fellows. 80% reported that among 5 congenital viral disorders - CMV, Rubella, HSV, Toxoplasma and LCMV - they are least familiar with LCMV. When asked to rank the highest concern of infectious etiology in a patient with congenital hydrocephalus, microcephaly and periventricular calcifications, none of the participants considered LCMV a top concern, and only 16% considered if for a second consideration.

## RESULTS cont.

Radiographic findings, including hydrocephalus, microcephaly, and periventricular calcifications are demonstrated in the varying clinical cases.

Patient "A" is a 3 year old female who presented with first time seizure activity of status epilepticus; she had an early left hand predominance with normal developmental and growth history otherwise. Subsequent imaging showed lateral and third ventriculomegaly asymmetrically affecting the left lateral ventricle, and a cerebellar CSF collection. Her diagnosis was seropositive for LCMV IgG antibodies (IgM negative). Her seizures are controlled on Keppra.

Patient "B" is an 8 year old female born prematurely at 28 weeks gestation with complications of maternal HELLP syndrome and preeclampsia. She also has microcephaly, hydrocephalus, hearing loss. Congenital LCMV diagnosis was confirmed on positive serology in infancy. She has severe developmental disability and intractable epilepsy since age 4 months (managed on carbamazepine, phenobarbital, and ketogenic diet). MRI and CT imaging showed subependymal calcifications; cystic dilation of the ventricles, particularly the 4th ventricle; schizencephaly.

Patient "C" is a 7 year old male was born prematurely at 31 weeks complicated by necrotizing enterocolitis and chorioretinitis. Imaging revealed hydrocephalus, right occipital porencephaly, left occipital lobe atrophy, and periventricular calcification. Congenital LCMV diagnosis was confirmed on positive serology in infancy. VP shunt was placed at 6 months old. He is managed on carbamazepine with good seizure control. He has mild left hemiparesis, started ambulating independently at 16 month old, vision impairment due to chorioretinitis, learning disability.

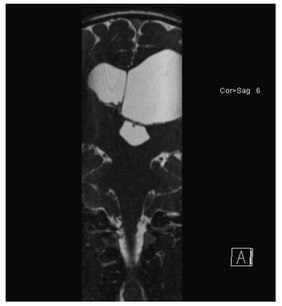


Figure A1: Coronal MPR CISS showing left greater than right ventriculomegaly

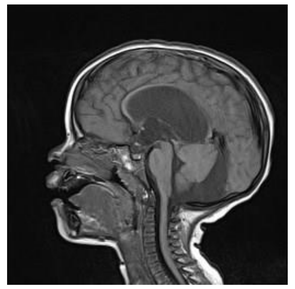

Figure A2: Sagittal T1 demonstrates a posterior fossa arachnoid cyst

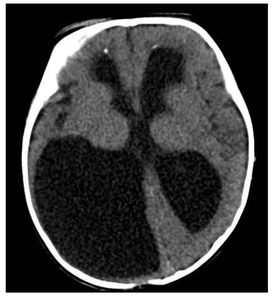

Figure B: CT scan showing hydrocephalus, right occipital porencephaly, left occipital lobe atrophy, and periventricular calcification

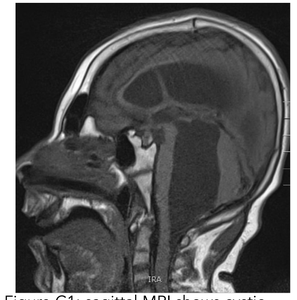

Figure C1: sagittal MRI shows cystic dilation of ventricles, particularly the 4th ventricle causing mass effect upon the brainstem and cerebellum, and schizencephaly.

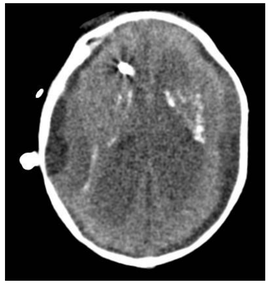

Figure C2: CT imaging shows subependymal calcifications

## DISCUSSION

The exact timing of infection is unclear in each case. Congenital LCMV can lead to a variety of structural brain abnormalities, probably related to differences in gestational timing of infection. The outcomes of infected children are diverse, as seen in our three case studies. Patient A had normal head circumference and development, in contrast to Patient B with microcephaly, severe developmental disability and early onset of intractable epilepsy, and Patient C with shunted hydrocephalus, vision and hearing loss, and early onset seizures, but well controlled seizures and mild to moderate developmental disability.

## CONCLUSION

Despite it causing substantial neurological manifestations, clinicians across multiple specialties are frequently unfamiliar with LCMV. The possibility of LCMV infection should be considered in all patients with evidence of congenital microcephaly, periventricular calcifications, and hydrocephalus. Increased awareness among medical providers may reduce exposure during pregnancy, and therefore reduce risks of congenital LCMV.

## REFERENCES

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