Onchocerciasis Associated Epilepsy (OAE) in Children Immigrated to the United States

Mahesh Chikkannaiah,[1,2] Laura D. Fonseca,[1] Rajkumar Agarwal, [1,2] Samuel Dzodzomenyo, [1,2] Gogi Kumar [1,2]

[1]Department of Neurology, Dayton Children's Hospital, Dayton, OH

[2]Department of Pediatrics, Wright State University Boonshoft School of Medicine, Dayton, OH

INTRODUCTION

- Onchocerciasis, also known as "river blindness," is caused by *Onchocerca volvulus,* a filarial parasite, transmitted through bites of blackflies predominantly in sub-Saharan Africa, with limited infections appearing in South America and in Yemen in the Middle East.[1]
- Onchocerciasis-associated epilepsy (OAE) is a unique neuroinflammatory disorder associated with *O. volvulus* or its co-symbiotic bacteria, *Wolbachia* induced immune response and possible cross-reactivity with host neuron surface proteins.[2,3]
- Seizure onset is between 3 and 18 years of age.
- OAE may be categorized into 4 groups:
  - Group 1 – Epilepsy without other associated neurological abnormalities
  - Group 2 – Epilepsy associated with other neurological abnormalities (i.e., focal neurological deficits, intellectual delay, etc.)
  - Group 3 – Nodding syndrome (characteristic head nodding seizures) and
  - Group 4 – Nakalanga syndrome (associated with severe growth retardation).[4]

CASE SERIES SUMMARY

- We describe OAE in three children immigrated to the United States.
- Two of the patients are siblings:14-year old girl (patient 1) and 10-year old girl (patient 2) immigrated from Burundi, Africa. Both presented with non-intractable focal epilepsy, normal exam and characteristic brain MRI findings (Figures 1A-1E and Figures 2A-2E) who can be classified into Group 1.
- The third patient is a 15-year-old boy, born in Eritrea, Africa who later moved to Ethiopia. He presented with intractable focal with secondarily generalized epilepsy, suspected autism, intellectual delay and typical brain MRI findings (Figures 3A -3E) and can be classified into Group 2.
- Our index patient 1 was initially evaluated for focal epilepsy at 10 years of age.
- EEG showed bilateral synchronous parieto-occipital epileptiform discharges. Seizures were well controlled on Levetiracetam. MRI brain was abnormal (Figures 1A-1E).
- Family history included, sister (patient 2) diagnosed with focal epilepsy at 5 years of age and well controlled on Oxcarbazepine. Given our index patient's sister also had similar abnormal MRI brain findings (Figures 2A-2E), we pursued MRA head/neck for patient 1 and it was negative. Etiology for epilepsy for both patients was initially unclear until we reviewed an article on OAE.[3]
- After diagnosis of OAE, patient 1 was evaluated by an Infectious Disease specialist. Filarial antibody testing was negative. Ophthalmologic examination showed bilateral optic atrophy thought to be secondary to bilateral occipital lesions on MRI rather than active infection. Slit lamp exam was negative.
- Per Centers for Disease Control and Prevention (CDC), Onchocerca specific serologic tests, OV-16 antigen antibody test and the OV luciferase immunoprecipitation system (LIPS) assay, are currently only available in research settings and are not approved for diagnosis in the United States,[1] thus further testing was not pursued as there were no signs of active infection and epilepsy was thought to be a sequelae of prior Onchocerciasis infection rather than active disease.

IMAGING

Figure 1. MRI brain findings in 3 of our patients with OAE

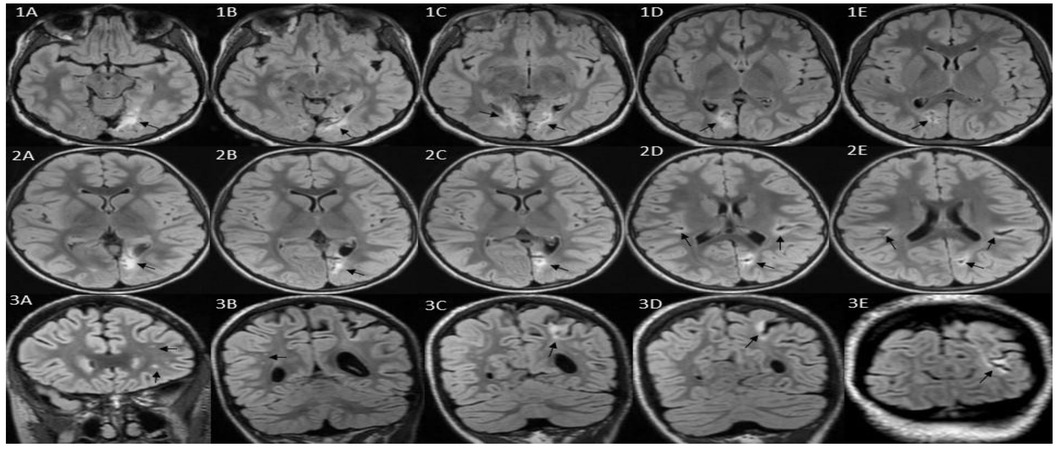

Figure 1A-1E : T2 hyperintense signal in the bilateral occipital lobes associated with volume loss.

Figure 2A-2E : T2 hyperintense signal and parenchymal loss in the medial left occipital cortex and subcortical white matter & in the bilateral fronto-parietal subcortical white matter.

Figure 3A-3E : T2 hyperintense signal in the left frontal, right parietal subcortical white matter, and T2 hyperintense signal and volume loss in the left parieto-occipital cortex and subcortical white matter.

DISCUSSION

- Onchocerciasis infection is characterized by skin rash, nodules under the skin, visual impairment and permanent blindness.
- Onchocerciasis has also been associated with epilepsy.
- OAE is clustered in certain families and villages close to rapid-flowing black-fly-infested rivers.
- The characteristic brain MRI abnormalities in OAE include cerebral and cerebellar atrophy, hippocampal sclerosis, gliotic lesions & subcortical signal abnormalities in the parietal, occipital, parieto-occipital, frontal, fronto-parietal > temporal head regions.[3,5]
- Prevention of Onchocerciasis in endemic areas is by community-directed treatment with Ivermectin.

CONCLUSION

- OAE is a major public health problem in many onchocerciasis endemic regions with high ongoing onchocerciasis transmission.
- With international travel and global immigration, clinicians even in non-endemic countries should consider OAE in their differential diagnosis of epilepsy.

REFERENCES

1. https://www.cdc.gov/parasites/onchocerciasis/gen_info/faqs.html
2. Galán-Puchades MT. Onchocerciasis-associated epilepsy. Lancet Infect Dis. 2019;19(1):21-22. doi:10.1016/S1473-3099(18)30713-8
3. Mazumder R, Lubowa SK, Salamon N, et al. Comparison of Structural Changes in Nodding Syndrome and Other Epilepsies Associated With Onchocerca volvulus. Neurol Neuroimmunol Neuroinflamm. 2022;10(2):e200074. Published 2022 Dec 21. doi:10.1212/NXI.0000000000200074
4. Colebunders R, Njamnshi AK, van Oijen M, et al. Onchocerciasis-associated epilepsy: From recent epidemiological and clinical findings to policy implications. Epilepsia Open. 2017;2(2):145-152. Published 2017 Apr 26. doi:10.1002/epi4.12054
5. Winkler AS, Friedrich K, Velicheti S, et al. MRI findings in people with epilepsy and nodding syndrome in an area endemic for onchocerciasis: an observational study. Afr Health Sci. 2013;13(2):529-540. doi:10.4314/ahs.v13i2.51

For questions contact
Mahesh Chikkannaiah, MD at
ChikkannaiahM@childrensdayton.org

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