Movement Disorders
CLINICAL PRACTICE

REVEALING IMAGES

Pons Calcifications and Striatal Necrosis in ADAR1 Aicardi-Goutières Syndrome

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Aicardi-Goutières is an inherited encephalopathy characterized by acquired microcephaly, basal-ganglia calcification, leukodystrophy, cerebral atrophy, and CSF with chronic lymphocytosis and raised interferon-alpha.[1] The neuroimage is usually diagnostic, showing basal ganglia and subcortical calcifications on CT and abnormal white matter signal on MRI. The lesions tend to be stable and no treatment is available. A 19-year-old male presented a neurologic condition with pyramidal and extrapyramidal signs associated with cardiomyopathy, livedo, and chilblains that appeared after acute episodes of encephalopathy (age of 2 and 10) precipitated by meningitis vaccine and salmonellosis, followed by neurologic regression and posterior recovering. CT scan (Fig. 1) identified brainstem calcifications (almost confined to the pons), without evident basal ganglia, internal capsule, white matter or dentate nucleus calcifications (faint calcifications could be seen on right putamen). Brain MRI (Fig. 2) showed T2 and T2 FLAIR bilateral hyperintensity on the putamina with atrophy (striatal necrosis), with no white matter signal intensity alterations. The genetic study—WES based gene panel designed for Aicardi-Goutières (including the analysis of *MYORG* gene)—identified two heterozygous, likely pathogenic, variants in *ADAR1* (NM_001111.4:c.577C > G and c.3116A > G). Compound heterozygosity was confirmed by testing both parents, establishing the diagnosis of *ADAR1*-related Aicardi-Goutières syndrome (Fig. 3).

The absence of white matter involvement is described in ADAR1 mutations and further help us to suggest the diagnosis based on image.[1,2]

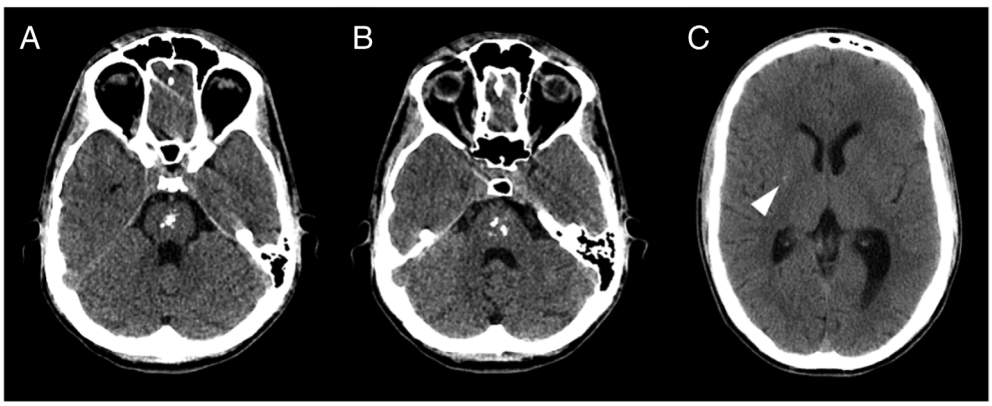

FIG 1. Axial CT scans showing multiple calcifications on the pons. There was a subtle calcification on right putamen (arrowhead). The remaining basal ganglia, internal capsule, white matter and dentate nucleus showed no calcification.

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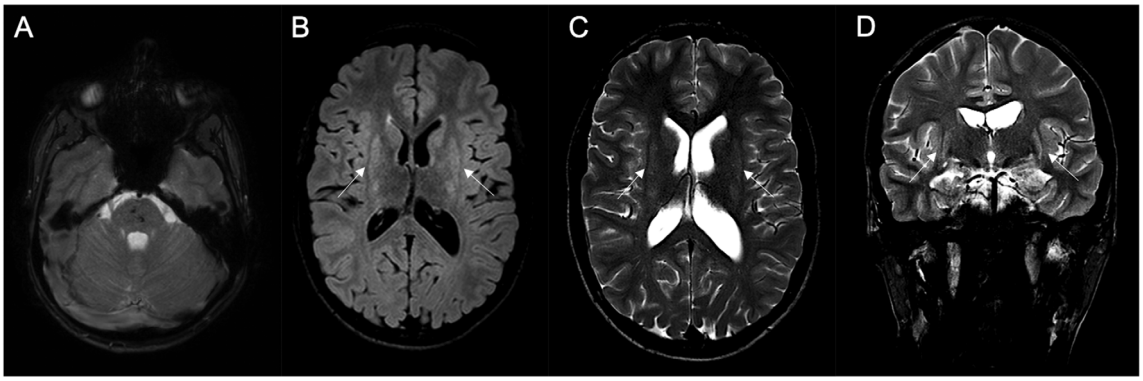

FIG 2. (**A**) Axial MRI T2*-weighted image revealing hypointensity consistent with calcifications; (**B**) axial T2 FLAIR image and (**C**) axial T2 image showing symmetric hyperintensity in the putamina with associated atrophy; (**D**) coronal T2 image showing symmetric hyperintensity in the putamina with associated atrophy. No changes were present in the white matter.

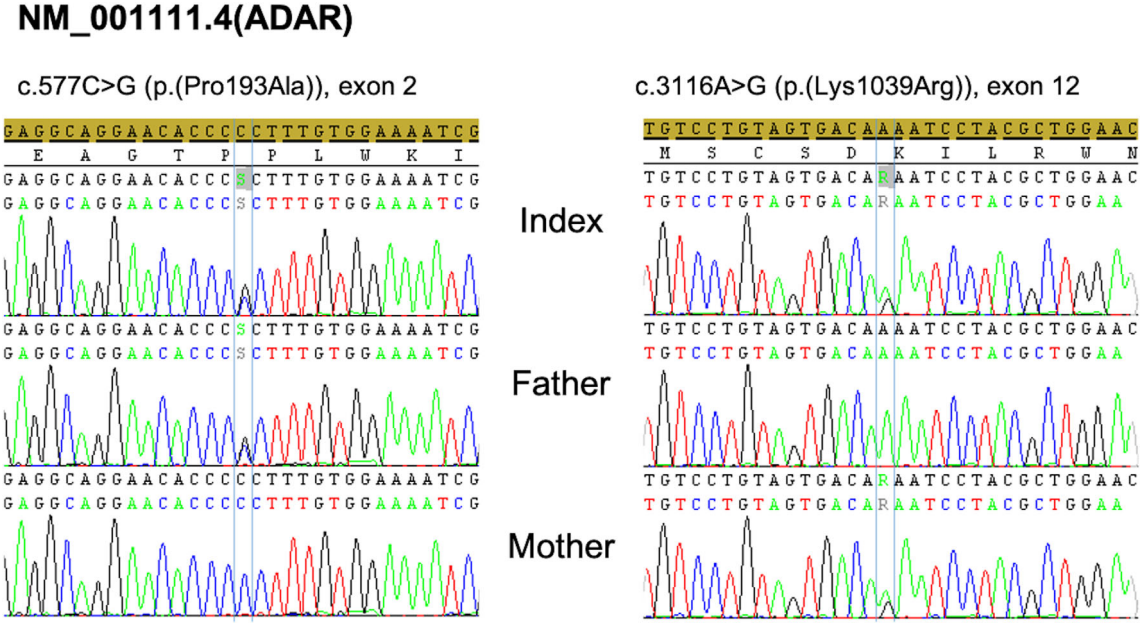

FIG 3. Electropherogram of the identified causative variants in the index and both parents. The c.577C > G (p.(Pro193Ala)) variant was paternally inherited, while the c.3116A > G (p.(Lys1039Arg)) was present in the mother.

Author Roles

(1) Research Project: A. Conception, B. Organization, C. Execution; (2) Statistical Analysis: A. Design, B. Execution, C. Review and Critique; (3) Manuscript: A. Writing of the First Draft, B. Review and Critique.

C.P.: 1A, 1C, 2A

A.F.B.: 3B

J.F.: 3B

M.M.: 1B, 3B

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References

1. La Piana R, Uggetti C, Roncarolo F, et al. Neuroradiologic patterns and novel imaging findings in Aicardi-Goutières syndrome. *Neurology* 2016; 86(1):28–35.
2. Livingston JH, Lin J-P, Dale RC, Gill D, Brogan P, Munnich A, Crow YJ. A type I interferon signature identifies bilateral striatal necrosis due to mutations in ADAR1. *J Med Genet* 2013;51(2):76–82.