A Case Report of *KCNT1* Mutation Presenting as Isolated Apnea and Bradycardia Events

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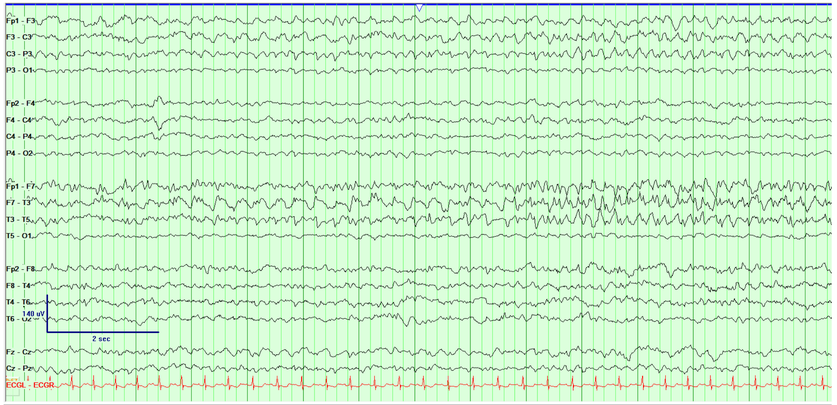
INTRODUCTION

KCNT1 **encodes for a sodium-gated potassium channel and is expressed diffusely in the nervous system. It has been implicated in multiple pathogenic mutations with phenotypic variants including epilepsy of infancy with migrating focal seizures (EIMFS), autosomal dominant sleep-related hyper-motor epilepsy (ADSHE), and more broadly as developmental and epileptic encephalopathies (DEE). In EIMFS and DEE, the seizures are typically focal and asynchronous with early seizure onset followed by developmental plateau or regression. EIMFS is also commonly associated with ictal autonomic manifestations, including perioral cyanosis, flushing, or apnea. Seizures of this subtype tend to be refractory toward medications and ultimately require multiple anticonvulsants and may even progress to become near-continuous by age six to nine months (1).**

FIGURE 1

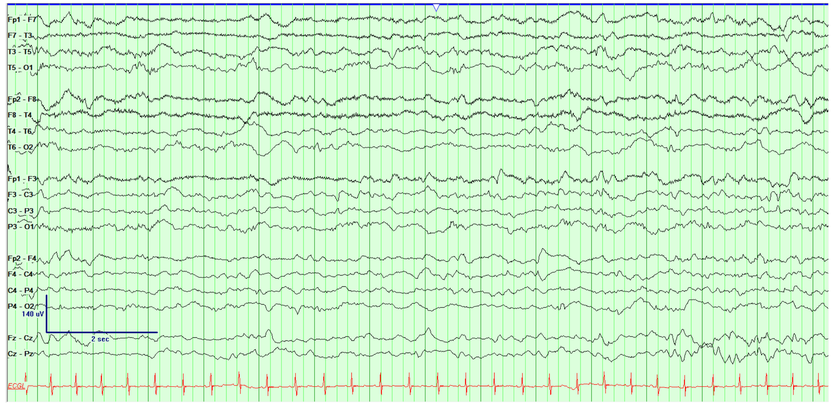


Electroencephalogram utilizing a bipolar montage depicting focal seizure originating in the left temporal lobe.

CASE

This is a 5-day old male with no known perinatal complications who presented with subclinical seizures as well as independent episodes of apnea and associated bradycardia occurring both while awake and asleep. EEG evaluation noted focal electrographic only seizures originating from the left frontotemporal lobe. Apnea and bradycardia episodes were not associated with electrographic seizure activity. MRI brain identified no intracranial abnormalities. Genetic evaluation noted a heterozygous likely pathogenic variant in *KCNT1* (c.800T>C p.Met267Thr) suggesting causation of early infantile epilepsy and autonomic dysfunction. Interestingly, his seizures resolved with the initiation of levetiracetam. At follow-up at 5 months of age, the patient has remained seizure-free on levetiracetam monotherapy and has not been noted to have any developmental regression or plateauing.

FIGURE 2



Electroencephalogram utilizing a bipolar montage depicting a patient event of isolated apnea without epileptic correlate

CONCLUSIONS

Traditionally, the differential diagnosis for full term neonatal apneic events include an immature nervous system, cerebral hemorrhage, respiratory compromise, infection, or seizure. This case emphasizes consideration for *KCNT1* as an alternative cause of recurrent apnea and bradycardia episodes in neonates. It also implicates levetiracetam as a possible successful treatment in early diagnosis of pathogenic *KCNT1* mutations. While this particular genetic mutation of c.800T>C p.Met257Thr, although rare, has been found in several individuals with early infantile epileptic encephalopathy, two of which have been reported as de novo, and again emphasizes the phenotypic variability within pathogenic mutations highlighting difficulties in prognostication of early identified genetic epilepsies.

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