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CASE REPORT

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Periodic paralysis with generalized epilepsy in a Nigerian child: A case report

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Abstract: The periodic paralyses are a rare group of muscle channel opathies characterized by intermittent attacks of episodic muscle weakness of variable duration. Typically, symptoms begin in the first or second decade of life. This case describes a 13 year-old girl with generalized epilepsy who presented with a 9- year history of recurrent attacks of inability to walk. Attacks which occurred at a frequency of 2-3 times a year with spontaneous resolution were often triggered by exposure to cold, strenuous exercise and occasionally by convulsions. At presentation, the index episode had been on -going for 2 days.
Management of the acute paralytic episode and prophylaxis were accomplished with oral acetazolamide administration. This report underscores the ease with which effective prevention of paralytic episodes in periodic paralyses could be achieved in a resource-poor setting.

Keywords: Periodic paralyses, Channelopathies, Epilepsy, Acetazolamide, Nigerian, Child.

Introduction

The periodic paralyses (PP) are a rare diverse group of muscle channelopathies characterized by intermittent attacks of muscle weakness due to anomalous sarcolemal excitability.[1]They encompass a group of diseases ensuing from mutations in the SCN4A, CACNA1S and KCNJ2 genes.[1-6]
As a rule, the majority of patients experience episodic muscle weakness lasting from minutes to days with spontaneous and total recovery.[1,4] Typically, onset of symptoms is in the first or second decade of life with some patients exhibiting significant improvement in their 40s or 50s.[5] Symptoms are often precipitated by exercise, rest following physical activity, cold, mental stress, hormones, or a heavy carbohydrate meal and some medications. They are also known to be associated with cardiac arrhythmias, essential tremor, and epilepsy.[6,7]

PP are frequently thought to be benign conditions. Nevertheless, life-threatening weakness episodes or progressive permanent weakness have been known to occur. Furthermore, the attacks create disability, disruption of school activities and in some instances lead to persistent weakness with attendant low self-esteem.[1]
The uncommonness of these diseases is underscored by the paucity of reports among African children (Nigeria inclusive). This report emphasizes the diagnostic challenges encountered in our environment, and the need to recognize the existence of periodic paralyses amongst Nigerian children. It also highlights the good outcome that may accompany early diagnosis and appropriate treatment.

Case report

A 13 year-old Fulani girl presented with a 9-year history of recurrent episodic attacks of inability to walk. The attacks were characterized by sudden onset inability to move the lower limbs, occasionally starting from one limb and eventually involving the other within a few minutes. Attacks usually began early in the mornings, triggered by cold (severity and frequency were increased during the cold harmattan season), rest after strenuous exercise and occasionally by convulsions. The attacks occurred at a frequency of 2-3 times a year, usually lasting about 4-12 hours but on rare occasions may reach durations of up to 1 week following which spontaneous resolution ensues. The index episode commenced the morning after she was flogged by the mother and had persisted for 2 days at the time of presentation. There was no family history of similar paralysis or any other neurologic disorder.

She was diagnosed with abdominal epilepsy at the age of 4 years (the electroencephalogram [EEG] showed focal slowing and epileptiform discharges). However, following a 3-year period of being seizure-free on carbamazepine, she was gradually weaned-off anticonvulsants over a 6-month period. Seizures recurred 2 years later albeit generalized tonic-clonic (EEG indicated generalized epileptic discharges). At the time of presentation, she had been seizure-free for 9 months on leveti

racetam and sodium valproate.
Physical examination revealed a fully conscious girl, who was well oriented in time, place, and person. There was no cranial nerve palsy. She had hypotonia, hyporeflexia with muscle power (in all muscle groups) of grade 1/5 in both lower limbs. Tone, muscle power, and deep tendon reflexes were normal in the upper limbs. Sensory examination, skull and spine were normal. Respiratory and cardiovascular systems as well as the abdomen were also normal.

The serum potassium (K) at the time of muscle weakness was 4.8 mmol/L (between attacks K= 5.3 mmol/L), EEG showed generalized epileptic discharges, Electrocardiogram (ECG) and Brain Magnetic Resonance Imaging (MRI) showed no abnormalities. Thyroid hormone levels were also normal. Serum creatine kinase (CPK), urineK/creatinine ratio, electromyogram (EMG), muscle biopsy for histology and genetic studies could not be done owing to unavailability of facilities.

A diagnosis of periodic paralysis with generalized epilepsy was made. She was commenced on acetazolamide at 250mg BD and maintained on the anticonvulsants. Two days later she was able to walk without support and was sustained on acetazolamide for prophylaxis. After 18 months of follow-up on acetazolamide and levetiracetam, she has been free of paralytic attacks and seizures.

Discussion

The PP are usually classified into two groups: primary or familial PP and secondary PP. The former are autosomal dominant disorders resulting from mutations in the skeletal muscle sodium channel (SCN4A), calcium channel (CACNA1S) or potassium channel (KCNJ2) genes.[7,8] The secondary group have known causes; thyrotoxicosis, chronic renal failure and drugs (angiotensin converting enzyme inhibitors, angiotensin-II- receptor blockers and diuretics).[8] The primary type is further classified into hyperkalaemic PP, hypokalaemic PP and Andersen- Tawil syndrome based on serum potassium (K), response to K administration or presence of associated anomalies.[1,7] The primary PP have a common final pathogenetic pathway: anomalous depolarization, which inactivates sodium channels and renders the muscle fibre electrically unexcitable.[1-6] Hypokalaemic PP, the commonest of all forms of PP is commoner in males and has a prevalence of 1 per 100,000 population, prevalence of the others is unknown.[9,10] Although extremely rare, these diseases affect all races.[1,4,8-10] Nevertheless, there is a dearth of reports of PP among African children. This case is perhaps the first reported in a Nigerian child.
Typical of resource-poor settings, diagnosis in this case was based mainly on clinical features.[11] The delay in onset of paralytic episodes and the drop in serum K levels during attacks is suggestive of hypokalaemic PP. Intra-ictal normokalaemia in PP has been described, this is consistent with the findings in this patient and is indicative of a primary PP.[6,7,11] The absence of a positive family history in the index case may be due to the fact that PP are genetically heterogeneous with inconsistent penetrance.[11,12] Diagnosis of PP is based on clinical features, elevated intra-ictal serum CPK, neurophysiologic studies and genetic studies.[1,6-8] Other investigations that may be useful are, nerve conduction studies, needle electromyography and long exercise testing (McManis test).[6-10]

The differential diagnoses include Myasthenia gravis (MG), Sleep attacks (SA), Transient ischaemic attack (TIA) and Todd palsy (TP). MG is usually subacute in onset and exhibits presence of distinct antibodies. SA occur at the onset or end of sleep and lasts only minutes, TP is a transient focal weakness that only follows a seizure, and TIA usually presents with hemiparesis and may have sensory symptoms.[13]
Akin to several other reports,[4,6,7] this case is associated with generalized epilepsy. The reason for this is unknown. However, there has been mounting evidence in recent years that ion-channel dysfunction is involved in the molecular basis of various forms of epilepsy. [6,7,12]
Treatment of acute episodes and prophylaxis may be accomplished with oral acetazolamide; as was done in this case. Though in use for the prevention and treatment of paralytic episodes in PP for nearly 50years, the mechanism of action of acetazolamide in this regard is largely unknown.[14] Other agents that are effective for prophylaxis in primary PP are dichlorphenamide and spironolactone.[7,8]

Conclusion

In addition to emphasizing the paucity of data on this group of diseases, this report draws attention to the relative ease with which acute paralytic episodes can be prevented.

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