Clinical Presentation, Diagnosis, and Management of Epilepsy in Children

Introduction

Seizures are a concerning disorder in children that the practitioner in the primary care setting my encounter. When a practitioner in the primary care setting encounters a patient that has had a seizure, it is vital that we be able to recognize characteristics of the disorder and utilize appropriate national guidelines to diagnose, manage and perform follow-up care of the seizure. This writing will consider the etiology, epidemiology, pathophysiology and treatment of epilepsy and seizure disorders in children according to the national guidelines established by the American Academy of Neurology (AAN), the America Epilepsy Society (AES), and the International League Against Epilepsy (ILAE).

Epidemiology

Seizure disorder and epilepsy is a prevalent disorder amongst children and adolescents. In a national profile of childhood epilepsy and seizure disorders, it is estimated that incidence rates of epilepsy in childhood and adolescents range from approximately 0.5 to 8 per 1,000 and an estimated 0.5 to 1 percent of children and adolescents will experience at least one afebrile seizure by the age of adolescence (Wilfong, 2018). In a recent nationwide cohort study that was published by the American Academy of Pediatrics, it was determined that approximately 1 out of 150 children is diagnosed with epilepsy during the first 10 years of life, with the highest incidence rate observed during infancy (Aaberg et al., 2017).

Etiology and Pathophysiology

There are several commonly recognized etiologies of seizures. The ILAE has categorized the etiology of seizures as structural, metabolic, genetic, immune, infectious and unknown (Wilfong, 2018). The ILAE recognizes that some causes of seizures can affect children of any age, whereas, others have a tendency for certain age groups. In neonates, most seizures have an identifiable etiology such as neonatal encephalopathy, a metabolic disturbance, or a central nervous system or systemic infection. In older infants and young children, febrile seizures are a common, age-dependent etiology of seizure (Wilfong, 2018). In all regards, seizures are due to the misfiring of the cortical neurons of the brain (Burns et al., 2017). When seizures are recurrent, unrelated to fever or unprovoked, the disorder is called epilepsy (Burns et al., 2017). A child can demonstrate characteristics of more than one type of seizure and different type of seizures arise from disorders in various locations throughout the brain (Burns et al., 2017).

Diagnosis

Most children with epilepsy have an idiopathic disorder with a normal neurologic examination and neuroimaging studies. Therefore, a careful history is critical in the diagnosis. A detailed account of the child's behavior preceding, during, and following a suspected seizure is important. When performing historical questioning, the practitioner should consider asking a

description of the seizure, whether it was focal or generalized, whether there was a loss of consciousness, aura, a postictal state or confusion (Burns et al., 2017). Also, it will be important to assess the length of the seizure, as well as the duration of the postictal state. Other important history to consider is whether there is any underlying medical diagnosis such as diabetes, renal disease or cardiovascular disorders as this can predispose metabolic syndromes that can cause seizures. Other considerations include, toxic exposure or drug use, recent head injury, family history of seizures, and possibility of CNS infections (Burns et al., 2017).

When a child presents with a first seizure, AES recommends the initial evaluation is directed toward uncovering a potential medical etiology (Hirtz et al., 2013). Initial diagnostics that may be performed include: complete blood count including platelets and liver function tests, comprehensive metabolic panel, blood glucose, and urinalysis with toxicology. If an acute cause cannot be found, the child may be experiencing the initial seizure of an epileptic disorder and referral to a neurologist for comprehensive diagnostics such as electroencephalogram (EEG) is endorsed (Hirtz et al., 2013). An EEG is recommended in the assessment of a child with suspected seizures or epilepsy. The EEG provides support for the diagnosis of epilepsy, helps define the epilepsy syndrome, and directs optimal management. The AAN recommends obtaining a tracing in the awake and sleep states, in close proximity to a seizure if possible, and repeating the tracing as this can increase the diagnostic value of the study (Wilfong, 2018).

Treatment and Management

The decision whether to treat a child with an antiseizure drug after an initial unprovoked seizure should be individualized, weighing the risks of recurrent seizure against the potential risks and benefits of antiseizure drug therapy (Wilfong, 2018). The term "unprovoked seizure" refers to a seizure of unknown etiology, meaning unprovoked seizures are separate from seizures due to an acute condition such as a toxic or metabolic disturbance, fever, head trauma or acute stroke (Hirtz et al., 2013). The AAN has set a practice guideline for the treatment of a child with a first unprovoked seizure, the guideline states that treatment with antiseizure drugs may be considered when the benefits of reducing the risk of a second seizure are greater than the risks of pharmacologic and psychosocial side effects (Hirtz et al., 2013). Furthermore, the ILAE recommends that children who present with a second unprovoked seizure should be started on antiepileptic drug therapy as clinical studies indicate that the patient has up to a 46% risk for developing recurrent seizures (Wilfong, 2018).

The antiseizure drug chosen for initial therapy should be one that is effective for the particular seizure type or syndrome. In general, initial antileptic seizure medications will be selected by the neurologist, however, as practitioners in the primary care setting, we will be responsible for monitoring therapeutic effects of these medications and monitoring lab values and side effects when they arise. In addition to antiepileptic medications, there are other treatment options for the management of seizure disorders. The ketogenic diet is recommended for young children with all types of seizures. The diet is considered when the side effects of the medications are intolerable, or the patient is allergic to antiepileptic medications. The ketogenic diet utilizes a high fat, adequate-protein low-carbohydrate diet that produces metabolic changes in plasma ketones, insulin, glucose, glucagon, and free fatty acids. While the exact metabolic changes that reduce seizures is not well understood, it is the theory that ketone bodies such as acetoacetate, acetone, and beta-hydroxybutyrate, act as an anticonvulsant when they cross the blood brain barrier (Kossoff, 2018).

Summary

In summary, the ILAE recommends that initial management of seizure in children start with ruling out potential medical causes for the seizure. If an underlying medical cause is determined, then treatment is focused on reversing the medical cause and antiepileptic medications are not utilized. If the child has an “unprovoked” seizure, current guidelines recommend referral to neurology to determine etiology of the seizure and the ILAE recommends considering the benefits versus the risk of starting antiepileptic drugs for the patient that has had only one “unprovoked” seizure. The ILAE states that if the patient has had a second “unprovoked” seizure, then the patient should be started on antiepileptic medications. When initiating antiepileptic medications, the initial therapy should be one that is effective for the particular seizure etiology, while also considering patient compliance, dose formulation, dose frequency, the relative risk of certain side effects, and the potential for drug interactions.

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