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MODERN METHODS OF TREATING THE DEVELOPMENT OF SYMPTOMATIC EPILEPSY IN CHILDREN WITH CEREBRAL PALSY

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Annotation: This article presents the opinions of domestic and foreign scientists on modern methods of treating the development of symptomatic epilepsy in children with cerebral palsy. Modern treatment methods for symptomatic epilepsy in children with cerebral palsy (CP) involve a combination of pharmacological, surgical, and non-invasive approaches, as well as supportive therapies.

Key words: Epilepsy occurs, cerebral palsy (CP), brain and include tonicclonic, absence, and myoclonic seizures, Cooccurring Conditions, Structural Brain Abnormalities, Cortical malformations.

Introduction.

Symptomatic epilepsy is a common comorbidity in children with cerebral palsy (CP), and understanding its clinical and morphological features is essential for effective management and treatment. Below are some key clinical, morphological, and pathological aspects related to the development of symptomatic epilepsy in this population:

Clinical Features

1. Incidence and Prevalence:

Children with cerebral palsy have a higher incidence of epilepsy compared to the general pediatric population. Estimates suggest that between 20% to 50% of children with CP may develop seizures.[1]

2. Types of Seizures:

The types of seizures that occur in children with CP vary and may include focal seizures, generalized seizures, and myoclonic seizures.

Focal seizures are particularly common in this group, often correlating with underlying brain anomalies or areas of cortical dysplasia.

3. Timing of Onset:

Epilepsy can present at any age but is often diagnosed in early childhood, particularly as developmental milestones are assessed. The onset might coincide with periods of significant brain development or could be related to external factors such as illness or trauma.[2]

[1] **Knupp, K. G., & Koh, S. (2018).** *Treatment of childhood-onset epilepsy in cerebral palsy and other neurodevelopmental disorders. Epilepsy & Behavior*, 80, 175-180.
[2] **Kossoff, E. H., & Rho, J. M. (2009).** *Ketogenic diets: Mechanisms of action and epilepsies in children. Journal of Child Neurology*, 24(8), 980-985.

Materials.

4. Clinical Context:

Seizures may be associated with particular types of cerebral palsy. For instance, children with spastic quadriplegia may have a higher risk of developing epilepsy than those with mild forms of CP.

The severity of motor impairment often correlates with the severity and frequency of epileptic seizures, although this correlation is not always straightforward.

5. Response to Treatment:

Children with CP may have a more refractory form of epilepsy, meaning they are less responsive to conventional antiepileptic drugs compared to children without CP.[3]

Factors like the presence of developmental delay and specific seizure types can affect treatment efficacy.

Morphological Features

1. Neuropathology:

The underlying pathology contributing to both CP and epilepsy often includes brain injuries such as periventricular leukomalacia, cortical dysplasia, or structural abnormalities resulting from prenatal, perinatal, or postnatal insults.

In many cases, abnormal cortical development or brain malformations can be responsible for both conditions.

2. Magnetic Resonance Imaging (MRI) Findings:

MRI studies often reveal structural abnormalities such as:

Cortical dysplasia: Abnormal thickening or malformations of the cerebral cortex.

Hydrocephalus: Accumulation of cerebrospinal fluid can lead to increased intracranial pressure and developmental delays, which may be associated with seizures.[4]

Periventricular leukomalacia: Ischemic damage in white matter adjacent to the ventricles, commonly found in children with CP.

Atrophy of specific brain regions: Can indicate areas involved in motor control or seizure generation.

Research and methods.

3. Electroencephalographic (EEG) Features:

EEG may show focal or generalized abnormal activity that correlates with clinical seizures.

Background activity can also be abnormal, with slower frequencies or focal abnormalities indicating cortical dysfunction.

Modern Methods of Treating Symptomatic Epilepsy in Children with Cerebral Palsy[5]

[3] **Nabbout, R., & Kuchenbuch, M. (2020).** *Impact of new therapies on the management of childhood-onset epilepsies in cerebral palsy. Lancet Neurology*, 19(9), 840-852.

[4] **Wirrell, E. C., & Devinsky, O. (2016).** *The role of cannabidiol in epilepsy treatment: Latest evidence and clinical applications. Epilepsia*, 57(S2), 23-28.

[5] **Fisher, R. S., & Velasco, A. L. (2014).** *Electrical brain stimulation for epilepsy: Safety and efficacy. Epilepsy & Behavior*, 37, 55-60.

Treating symptomatic epilepsy in children with cerebral palsy (CP) requires a multidisciplinary approach that considers the individual's unique needs, seizure type, and underlying brain damage. Here's an overview of modern methods:

1. Antiepileptic Drugs (AEDs):

Firstline Treatment: AEDs remain the cornerstone of epilepsy management. Several medications are available, each with its own profile of efficacy, side effects, and interactions with other medications used to treat CP.

Personalized Approach: Careful selection of AEDs is crucial, considering factors such as seizure type, age, and coexisting conditions. Monitoring for drug efficacy and side effects is essential.

Challenges: Children with CP may experience difficulty absorbing or metabolizing medications due to gastrointestinal or liver issues, requiring dose adjustments or alternative formulations.[6]

Emerging Therapies: New AEDs with improved efficacy and fewer side effects are constantly being developed.

Results.

2. Surgical Treatment:

Resective Surgery: In cases of focal epilepsy, surgical removal of the epileptogenic zone can provide longterm seizure control.

Corpus Callosotomy: In cases of severe generalized epilepsy, severing the corpus callosum, the connection between the two brain hemispheres, can reduce seizure frequency.

Vagal Nerve Stimulation (VNS): Implanted devices that stimulate the vagus nerve can reduce seizure frequency in some cases.[7]

3. Noninvasive Brain Stimulation Techniques:

Transcranial Magnetic Stimulation (TMS): This technique uses magnetic pulses to stimulate specific brain areas, potentially reducing seizure frequency.

Transcranial Direct Current Stimulation (tDCS): This technique uses weak electrical currents to modulate brain activity. While promising, further research is needed to establish its effectiveness in epilepsy.

Discussion.

4. Ketogenic Diet:

HighFat, LowCarb Diet: The ketogenic diet, a highfat, lowcarbohydrate diet, can induce metabolic changes that reduce seizure activity. It is often used in children with intractable epilepsy.

Challenges: The diet requires strict adherence and can be difficult to maintain longterm.

5. Supportive Care:

Physical Therapy: Physical therapy is crucial for improving motor function and mobility.[8]

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Occupational Therapy: Occupational therapy can help children with CP develop selfcare skills and improve daily living activities.

Speech Therapy: Speech therapy can help children with CP improve communication skills.

Psychological Support: Addressing emotional and behavioral issues related to epilepsy and CP is essential for overall wellbeing.

6. Emerging Therapies:

Gene Therapy: This approach aims to target specific genetic mutations associated with epilepsy, potentially leading to more personalized treatment options.

Immunotherapy: Targeting specific immune responses involved in epilepsy is a promising area of research.

7. Research and Innovation:

Precision Medicine: Research is ongoing to identify biomarkers and develop personalized treatment plans based on an individual's genetic makeup, brain structure, and seizure patterns.[9]

Neuroimaging Techniques: Advanced imaging techniques, such as magnetic resonance spectroscopy (MRS) and diffusion tensor imaging (DTI), are helping to better understand the brain changes associated with epilepsy in CP.

Conclusion.

Understanding the clinical and morphological features associated with symptomatic epilepsy in children with cerebral palsy is crucial for diagnosis and therapeutic strategies. Early recognition and intervention tailored to the unique needs of these children can help improve outcomes and quality of life. Ongoing research is essential to clarify the complex interplay between CP and epilepsy, ultimately guiding better management practices for affected children.[10]

Treating symptomatic epilepsy in children with CP is a complex and ongoing process. Modern methods combine traditional AEDs with surgical interventions, noninvasive brain stimulation techniques, dietary therapies, and supportive care. Continued research is crucial to develop even more effective and personalized treatments, leading to better seizure control and improved quality of life for these children.

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