6-2019

NICU Poster - 2019

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Recommended Citation  
Alix, Veronica MD; James, Mansi DO; Jackson, Anthony MD; Visintainer, Paul; and Singh, Rachana MD, "NICU Poster - 2019" (2019). Research and Education Posters. 6.  
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This Book is brought to you for free and open access by the Presentations and Posters at Scholarly Commons @ Baystate Health. It has been accepted for inclusion in Research and Education Posters by an authorized administrator of Scholarly Commons @ Baystate Health.
OBJECTIVE: To compare the efficacy of fosphenytoin and phenobarbital as first-line anti-epileptic drug (AED) for neonatal seizures treatment and to assess neurodevelopmental outcomes at 18 months of age.

METHODS: A single center retrospective cohort review of all neonates admitted to a Level III NICU during the study period with clinical and electroencephalographic (EEG) diagnosis of seizures. Data collection included maternal antenatal complications as well as neonatal baseline characteristics and clinical outcomes, including details pertaining to seizure diagnosis and management. The primary outcome variable was long-term neurodevelopmental status determination by a pediatric neurologist and/or developmental-behavioral specialist at 18 months of age.

RESULTS: Infants in both groups had similar baseline characteristics for neonatal variables (gestational age, birth weight, gender, mode of delivery and 5-minute APGAR score) as well as maternal antenatal complications. For outcome variables there was no difference in EEG/neuroimaging findings, time to seizure control, recurrence of seizures, need for a second-line AED, and discharge home on AED. However, we did find significantly fewer infants in the fosphenytoin group vs phenobarbital group (4.8% vs 30%, p=0.02) with moderate to severe neurodevelopmental delay at 18-month assessments.

CONCLUSIONS: Fosphenytoin as well as phenobarbital are equally efficacious as first-line AED in neonatal seizure control but neonates treated with fosphenytoin have significantly better neurodevelopmental outcomes at 18 months of age. Further multicenter studies are recommended to confirm our findings.
Abstract

- OBJECTIVE: To compare the efficacy of fosphenytoin and phenobarbital as first-line anti-epileptic drug (AED) for neonatal seizures treatment and to assess neurodevelopmental outcomes at 18 months of age.
  - METHODS
  - RESULTS
  - CONCLUSIONS

Introduction

Neonatal seizures are common in both term and preterm infants, ranging with a risk of seizures being highest in the neonatal period (1.8 to 3.5/1000 live births in the United States). They are often indicative of an underlying pathological process such as hypoxic ischemic encephalopathy, intracranial hemorrhage, stroke or sepsis. Neonatal seizures are associated with high morbidity and mortality. While outcome is strongly influenced by etiology, there is evidence that uncontrolled seizures can exacerbate brain injury and have a negative impact on neurodevelopment. The question of which therapy to initiate is highly disputed, as some AEDs may have negative effects on the developing brain.

Currently the most commonly used first line treatment in new onset neonatal seizures is phenobarbital in most clinical settings, despite known negative impact on the developing neonatal brain. Phenobarbital binds to the GABA receptor, improving the effect of GABA by extending the duration of chloride channel openings and allows increased flow of chloride ions across the membrane. This causes neuronal hyperpolarization and is in fact excitatory in nature in neonates. When neuronal activity is abnormally suppressed, the timing and sequence of synaptic connections can be disrupted and it causes nerve cells to receive signals to self-destruct resulting in apoptosis. Fosphenytoin, a phosphate ester prodrug, is equally efficacious with no known neurocognitive side effects, though cardiac side effects are well known.

Methods

A single center retrospective cohort review of all neonates admitted to a Level III NICU during the study period with clinical and electroencephalographic (EEG) diagnosis of seizures. The primary outcome variable was long-term neurodevelopmental status at 18 months of age.

References

- Clinical Characteristics for First-line Anti-Epileptic Drugs
- Outcome Variables for First-line Anti-Epileptic Drugs
- Comparative effectiveness of Fosphenytoin and phenobarbital
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Results

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However, we did find significantly fewer infants in the fosphenytoin group vs phenobarbital group with moderate to severe neurodevelopmental delay at 18-month assessments.

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Introduction

• Neonatal seizures are common in both term and preterm infants, often indicative of an underlying pathological process and associated with high morbidity and mortality.
• While neurodevelopmental outcome is strongly influenced by etiology, uncontrolled seizures themselves can exacerbate brain injury.
• The question of which therapy to initiate as first line is highly disputed, as some Anti-epileptic drugs (AEDs) may themselves have negative impact on the developing brain.

Efficacy of Fosphenytoin as First-line Anti-epileptic for Neonatal Seizures as Compared to Phenobarbital

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Results

Infants in both groups had similar baseline characteristics for neonatal variables (gestational age, birth weight, gender, mode of delivery and 5-minute APGAR score) as well as maternal antenatal complications as shown in Table 1.

For outcome variables there was no difference in EEG, neuroimaging findings, recurrence of seizures, need for a second-line AED, time to seizure control and discharge home on AED as shown in Table 2 and Figure 1.

However, we did find significantly fewer infants in the fosphenytoin group vs phenobarbital group (4.8% vs 30%, p=0.02) with moderate to severe neurodevelopmental delay at 18-month assessments as demonstrated in Figure 2.

Conclusions

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- Further multicenter studies are recommended to confirm our findings.

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Figures/Graphs

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