May 14th, 12:30 PM - 12:45 PM

Neurally Adjusted Ventilatory Assist in Neonates with Congenital Diaphragmatic Hernia

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☐ Resident/Psychology Intern (≤ 1 month of dedicated research time)
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X Fellow

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IRB Number: 11120563 (Infant Pulmonary Data Repository)

Describe role of Submitting/Presenting Trainee in this project (limit 150 words): Dr. Kurland was the lead investigator and took primary responsibility for all aspects of the study with feedback and guidance from senior investigators. The study represents primarily his work encompassing study design, data collection, statistical anaylsis (with assistance from a statistician), abstract creation and platform presentation at a national conference.

Background, Objectives/Goal, Methods/Design, Results, Conclusions limited to 500 words

Background:
Neurally adjusted ventilatory assist (NAVA) has potential advantages over pressure-control or volume-control ventilation due to the use of a neural trigger to increase patient-ventilator synchrony. NAVA use in neonates has been correlated with decreased PIP, respiratory muscle load, FiO2, respiratory rate and tidal volumes. Several small studies and case series have described the role of NAVA in Congenital Diaphragmatic Hernia (CDH), and our study seeks to expand this literature base over a longer follow-up period and understand the impact of an abnormal diaphragm on ventilator indices.

Objectives/Goal:
The purpose of this study is twofold: to assess the feasibility of NAVA in neonates with CDH and to compare NAVA levels and electrical diaphragm activity (Edi) between patients with CDH to those without.

Methods/Design:
From 2010-2018, a cohort of 16 neonates with CDH and managed with NAVA was identified. First, ventilator indices, medication use, vital signs and blood gases were compared prior to initiating NAVA, and for 72 hours while on NAVA. Second, a matched case-control study (1 case: 2 controls) was performed to compare NAVA level and Edi. Case and controls were matched on post menstrual age, weight and Respiratory Severity Score (MAP x FiO2).

Results:

14 of the 16 infants (88%) were successfully managed with NAVA support. Two failed within six hours (clinical deterioration, lack of trigger). Median day of post-surgery NAVA initiation was day six and median duration on NAVA was four days. 11/14 (79%) were successfully extubated from NAVA. Over the monitoring period of 72 hours, there was a significant decrease in PIP (Wilcoxon p=0.045), Respiratory Severity Score (p=0.001), benzodiazepine use at 24 hours (p=0.035) and respiratory rate (p=0.037) (figure 1). There was no worsening of other ventilator indices, narcotic use, vital signs or blood gases. Compared to the control group there was no difference in NAVA level (Median 1.75 [IQR 1.5-2.4] vs 1.85 [1.5-2], Wilcoxon p=0.881), Edi Peak (7.7 [6.6-9] vs 9.5 [6.4-11.5], p=0.24) or Edi Min (1.7 [0.8-2.8] vs 1.8 [1.2-2.8], p=0.769) (figure 2).

Conclusions:

Our study extends the current literature base regarding the feasibility of NAVA for patients with CDH by demonstrating improved physiologic parameters and sedation medication use over a follow-up period of 72 hours. Additionally, our study provides insight into the functioning of NAVA in neonates with an abnormal diaphragm by demonstrating minimal differences in NAVA level and Edi compared to a matched control group.