

HIGH TIDAL VOLUME VENTILATION AND OUTCOMES IN INFANTS WITH SEVERE BRONCHOPULMONARY DYSPLASIA

Thomas V Isaacs¹, Natalie Villafranco², Carolyn Cannon², Amee Revana²

¹ Baylor College of Medicine, Department of Pediatrics, Pulmonology

² Baylor College of Medicine, Pediatrics, Pulmonology

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Background: Severe bronchopulmonary dysplasia (sBPD) is characterized by heterogeneous and variable pulmonary resistance and compliance. Areas with high compliance and resistance have higher time constants, leading to the need for longer inspiratory and expiratory times for adequate alveolar filling and emptying. A proposed solution to this issue is the “sBPD ventilator strategy” involving high tidal volumes (10-15 ml/kg bodyweight) with lower respiratory rates allowing for higher inspiratory and expiratory times while maintaining an adequate minute ventilation. Currently, there is little evidence as to the clinical impact of this ventilation strategy. The purpose of this study is to assess the impact of high tidal volume (Vt) ventilation on outcomes in sBPD, which we hypothesized would improve outcomes.

Materials/Methods: In this retrospective cohort study, the electronic medical record of all patients who underwent tracheostomy placement at Texas Children’s from 2013 to 2019 was manually reviewed and stored in a REDCAP database. Among these 476 patients, 95 were discharged on invasive mechanical ventilation due to sBPD. 36 of these 95 patients received a set Vt (either by VC-SIMV or AVAPS modes). These 36 patients were divided into 2 cohorts based on whether their set Vt per kilogram body weight (Vt/kg) was greater or less than 10 ml/kg. Baseline characteristics and measured outcomes between the two groups were compared with the Fischer exact test for categorical data and two tailed unpaired t-test or Mann Whitney test for continuous data.

Results: The mean Vt/kg in the lower cohort was 8.605 ml/kg and 11.12 ml/kg in the higher cohort (P-value <0.0001). There were no differences in the baseline characteristics between the two cohorts, although IPAPmax trended towards higher in the high Vt group. There was no difference in mean time to decannulation, growth parameters, the number of children who were decannulated or the number of children who were weaned off ventilatory support. There was only one mortality in both cohorts.

Conclusions: For children with sBPD, Invasive ventilation with Vt/kg higher than 10 ml/kg at discharge is not associated with worse outcomes and does not seem to be a harmful intervention. This is especially reassuring given that the high Vt cohort tended towards worse pulmonary mechanics at discharge.

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