Katherine C. Clement
Mark J. Heulitt

Not all types of asynchrony are created equal

Accepted: 13 September 2012
Published online: 26 October 2012
© Springer-Verlag Berlin Heidelberg and ESICM 2012

Dear Editor,

We read with interest the article entitled, “Asynchrony, neural drive, ventilator variability and COMFORT: NAVA versus pressure support in pediatric patients” [1]. The authors found that the use of Neurally Adjusted Ventilatory Assist (NAVA) improved patient-ventilator synchrony and patient comfort compared to pressure support whether determined by the treating physician or optimized by means of protocolized adjustments in trigger sensitivity, inspiratory rise time and termination criteria, airway pressure and applied PEEP.

First, we appreciate the citation of our previous work entitled “Neurally triggered breaths reduce trigger delay and improve ventilator response times in ventilated infants with bronchiolitis” [2]. However, the commentary on our work is not accurate. We compared NAVA to volume support rather than pressure support, and it was in human infants with bronchiolitis, not in a mechanical lung model. This difference is important because few studies have been published examining the use of NAVA in pediatric patients.

Second, in their study, the authors limited their documentation of

asynchrony to autotriggered, double-triggered and non-triggered breaths (types of trigger asynchrony) as well as an asynchrony index. In a more recent study that used the same methodology as our infant study, we also found that the use of NAVA significantly reduced the overall incidence of asynchrony, particularly trigger asynchrony in a recovering lung injury animal model. However, we also found that the incidence of flow asynchrony, short cycles and expiratory asynchrony were actually more common with neurally triggered breaths than with pneumatically triggered breaths [3]. Flow asynchrony occurs if ventilator flow does not equal patient flow. This type of asynchrony can be detrimental to patients because it can lead to auto-PEEP and other types of asynchrony. Short cycles may be viewed graphically as double triggering and are defined as inspiratory time less than half the mean inspiratory time. These asynchronous breaths can result from improperly set termination criteria such that the ventilator inspiratory time ends before the patient’s inspiratory effort is complete. The loss of ventilator support during inspiration can result in increased work of breathing. Expiratory asynchrony, in particular shortened expiratory time, can also promote air trapping and auto-PEEP [4]. We believe that these types of asynchrony should not be overlooked, as all types of asynchrony can lead to prolonged duration of ventilation [5].

References

1. de la Oliva P, Schuffelmann C, Gomez-Zamora A, Villar J, Kacmarek RM (2012) Asynchrony, neural drive, ventilator variability and COMFORT: NAVA versus pressure support in pediatric patients. A non-randomized cross-over trial. *Intensive Care Med* 38:838–846
2. Clement KC, Thurman TL, Holt SJ, Heulitt MJ (2011) Neurally triggered breaths reduce trigger delay and improve ventilator response times in ventilated infants with bronchiolitis. *Intensive Care Med* 27:1826–1832
3. Heulitt MJ, Clement KC, Holt SJ, Thurman TL, Jo CH (2012) Neurally triggered breaths have reduced response time, work of breathing, and asynchrony compared with pneumatically triggered breaths in a recovering animal model of lung injury. *Pediatr Crit Care Med* 13:e195–e203
4. Nilsestuen JO, Hargett KD (2005) Using ventilator graphics to identify patient-ventilator asynchrony. *Respir Care* 50:202–234
5. Thille AW, Rodriguez P, Cabello B, Lellouche F, Brochard L (2006) Patient-ventilator asynchrony during assisted mechanical ventilation. *Intensive Care Med* 23:1515–1522

K. C. Clement (✉)
Department of Anesthesiology, Division
of Pediatric Critical Care Medicine,
University of North Carolina at Chapel Hill,
214 MacNider, CB 7221, Chapel Hill,
NC 27599-7221, USA
e-mail: kclement@aims.unc.edu
Tel.: +1-919-8433441
Fax: +1-919-9666164

M. J. Heulitt
Department of Pediatrics, Division
of Critical Care, University of Arkansas
for Medical Sciences, 3 Children’s Way,
Slot 512-12, Little Rock, AR 72202, USA