Neurally Adjusted Ventilatory Assist (NAVA) improves the matching of diaphragmatic electrical activity and tidal volume in comparison to pressure support (PS).

Authors : Piquilloud L1), Chiew YS2), Bialais E3), Lambermont B4), Roeseler J3), Chase JG2), Desaive T5), Sottiaux T6), Tassaux D7),Jolliet P 1), Revelly JP1)

1) Intensive care and burn unit, CHUV, Lausanne, Switzerland; 2) Department of Mechanical Engineering, -university of Canterbury, Christchurch, New Zealand, 3) Intensive Care Unit, Cliniques universitaires St-Luc, Bruxelles, Belgium ; 4) Medical intensive care unit, CHU Sart-Tilman, Liège, Belgium ; 5) Cardiovascular research center, University of Liege, Liege, Belgium,6) Intensive care unit, Clinique Notre Dame de Grâce, Gosselies, Belgium 7)Intensive Care Unit, HUG, Geneva, Switzerland

**Introduction**

Neurally adjusted ventilatory assist (NAVA) is an assisted ventilatory mode based on the electrical activity of the diaphragm (Eadi). With NAVA, Eadi triggers and cycles off the ventilator, thus improving patient-ventilator synchrony in patients both intubated and under non invasive ventilation (NIV) in comparison with pressure support (PS)(1). In each PS cycle, tidal volume (Vt) results from the contribution of patient’s inspiratory effort and ventilator fixed pressurization level. As in NAVA delivered inspiratory pressure is proportional to Eadi amplitude throughout inspiration, we hypothesized that NAVA allows a better matching between Vt and Eadi.

**Methods**
Prospective crossover study comparing PS and NAVA during NIV (20 minutes each). PS was set by the clinician while NAVA gain(proportionality factor between Eadi and delivered pressure) was set to obtain peak airway pressure (Ppeak) equal to PS inspiratory pressure (PS+ PEEP). For each respiratory cycle Eadi maximal value (Eadi max), VT, Ppeak and mean airway pressure (Pmean) were recorded. Mean ventilator respiratory rate (RR) was also determined. Comparisons were carried out by paired T-test and reported as mean ± SD. To assess the correlation between VT and Eadi, a linear regression (Rlin) was performed for every patient under both conditions. For patients with a significant Rlin under both conditions, correlation coefficients (R2) slopes and intercepts were compared with paired t-tests. The relationship between Vt and Eadi was also assessed for each breath and 5-95% range (Range 90) of Vt/Eadi max was calculated for each patient and condition. The smaller the Range 90, the better the correlation between Vt and Eadi max. Range 90 between NAVA and PS were compared by paired Wilcoxon test, and presented as the median [IQR] for all patients.

**Results**

13 patients (age 71.6±9.4 yr, SAPS II 33±7), 6/13 patients with COPD, 2/13 with mixed obstructive and restrictive disease. Ventilator settings: FIO2 35±13%, PEEP 5.9±1.3 cmH2O, PS 10±2 cmH2O. NAVA gain 0.55±0.28 µV/cmH2O, trigger NAVA 0.5 µV. Eadi max, Ppeak, Pmean, VT and RR were not significantly different between PS and NAVA. Rlin was significant for 7 patients under PS, and for all patients in NAVA. R2 was higher in NAVA than in PS: 0.36 ±0.24 vs 0.04±0.04 (p=0.01). The slope was higher in NAVA than in PS: 8.1±4.8 vs 0.3±2.0 (p=0.002), intercept in NAVA was lower than in PS: 276±157 versus 493±108 (p = 0.002). For NAVA, the median [IQR] Range 90 was 14.3 [8.3-50.8] vs 45.0 [13.4-153.9] for PS (p=0.04).

**Conclusion**

In patients undergoing NIV for acute respiratory failure, the matching between Eadi and VT was tighter under NAVA compared to PS. As Eadi is likely related to inspiratory demand, these results suggest that NAVA delivers a more physiological ventilatory support. The clinical impact of these findings warrants further investigation.

Ref: Piquilloud et al. Intensive Care Med.2011, 37:263-71