

Topic: Respiratory monitoring

Title: Effect of various Neurally adjusted ventilatory assist (NAVA) gains on the relationship between diaphragmatic activity (Eadi max) and tidal volume

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INTRODUCTION: Neurally Adjusted Ventilatory Assist (NAVA) is an assisted ventilatory mode in which the ventilator is driven by the electrical activity of the diaphragm (Eadi). NAVA improves patient-ventilator synchrony⁽¹⁾ but little is known about how to set the NAVA gain i.e., how to choose the ratio between Eadi and delivered pressure. The aim of the present study was to assess the relationship between Eadi and tidal volume (Vt) at various NAVA gain settings and to evaluate whether modifying the gain influenced this relationship in non-invasively ventilated (NIV) patients.

METHODS: Prospective interventional study comparing 3 values of NAVA gain during NIV (20 minutes each). NAVA100 was set by the clinician according to the manufacturer's recommendations. In NAVA50 and NAVA150 the gain was set as -50% and +50% of NAVA100 gain respectively. Vt and maximal Eadi value (Eadi max) were recorded. The ratio Vt/Eadi was then assessed for each breath. 5-95% range (Range90) of Vt/Eadi was calculated for each patient at each NAVA gain setting. Vt/Eadi ratio has the advantage to give an objective assessment Vt/Eadi max relationship independently from the nature of this relationship. A smaller Range90 indicates a better matching of Vt to Eadi max.

RESULTS: 12 patients were included, 5 had obstructive pulmonary disease and 2 mixed obstructive and restrictive disease. For NAVA100, the median [IQR] Range90 was 32 [19-87]. For NAVA150 Range90 was 37 [20-95] and for NAVA50 Range90 was 33 [16-92]. That means that globally NAVA100 allowed a better match between Eadi max and Vt than NAVA50 and 150. However, by patient, NAVA100 had the lowest Range90 value for only 4 patients (33%), NAVA150 for 2 (17%) and NAVA50 for 6 (50%) patients, indicating that NAVA100 was not the best NAVA gain for minimizing Range 90 in every patients.

Comparing the lowest Range90 value to the next lowest for each patient, showed that 3 patients had differences of less than 10% (one each for NAVA50, NAVA100 and NAVA150). The remainder had differences from 17-24%, indicating that most patients (9/12 or 75%) had a clear better match between Eadi and Vt for one specific NAVA gain.

CONCLUSIONS: Different NAVA gains yielded markedly different ability to match Vt to Eadi max. This approach could be a new way to determine optimal NAVA gain for each patient but require further investigations.

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