PATIENT-VENTILATOR ASYNCHRONY DURING WEANING ON PROPORTIONAL ASSIST VENTILATION VERSUS PRESSURE SUPPORT

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Introduction: For patients undergoing mechanical ventilation (MV), patient-ventilator asynchrony can occur when the patient's spontaneous respiratory efforts are no longer congruent with the ventilator’s. The degree of ventilator asynchrony can be denoted by the Asynchrony Index (AI), where an AI>10 is considered to be significantly high and is associated with prolonged duration of MV. Proportional Assist Ventilation, with load adjustable gain factors, (PAV+™, Covidien, Boulder, USA), is a spontaneous breathing mode that offers assistance to the patient in proportion to the patient's effort and thus should promote patient-ventilator synchrony.

Objectives: This study was carried out in order to examine whether or not patients tolerating partial ventilatory support experience less asynchrony using a PAV+ weaning algorithm comparedto a conventional Pressure Support Ventilation (PSV) weaning algorithm.

Methods: Patients first tolerating partial ventilatory support, were screened, and if eligible, were assigned to either a PAV+ or PSV weaning algorithm as part of a pilot observational study (13 patients) or pilot randomized controlled trial (52 patients). Ventilator tracings of flow, and airway opening pressures were recorded for 30 minute intervals using ICU-lab (KleisTek, Bari, Italy) pre-(baseline) and post-algorithm initiation. Asynchrony was detected by visual inspection of the flow and pressure signals. Respiratory recordings were subcategorized according to mode, level of assistance, and pre- or post-algorithm initiation. Continuous non-normal variables were analyzed using the Wilcoxon signed rank tests and categorical variables using the χ2 or Fisher exact test.

Results: Patients were well matched at baseline in terms of age, gender, BMI, and APACHE II score. There was a higher incidence of COPD/asthma in the PSV group (p=0.04). Overall incidence of AI>10 at baseline was 14/65 (22%), with 7/35 in the PAV+ group, and 7/30 in the PSV group having an AI>10 (p=0.77). After initiating weaning algorithms, 0/32 patients in PAV+ group experienced AI>10 vs. 3/29 on PSV (p=0.10). Median (IQR) AI decreased post algorithm initiation in both the PAV+ and PSV groups: from 3.4(1.2-6.4) to 1.4 (0.6-2.2) on PAV+ (p10 with levels of ventilator assistance

Conclusion: Both weaning protocols showed comparable reductions in AI compared to baseline. A small sample size, as well as the fact that the majority of patients (80% of PAV+, and 77% of PSV) were not experiencing AI>10 at baseline made it difficult to determine differences in treatment effect of PAV+ compared to PSV in reducing asynchrony. Furthermore, many patients required less than 10cmH2O of support at baseline, which in previous studies, has been associated with lower AIs. In summary, a larger sample size, with more patients experiencing
significant asynchrony at baseline may be necessary to see a significant difference between the two weaning algorithms.

References: