Title: Diaphragm electromyographic activity as a predictor of weaning failure

Body: Purpose: To compare breathing pattern descriptors and diaphragm electromyographic activity (EAdi)-derived indices obtained from a Neurally Adjusted Ventilatory Assist (NAVA) catheter during a spontaneous breathing trial (SBT) in patients successfully (SP) and unsuccessfully (UP) separated from the ventilator and to assess their performance to discriminate these two categories of patients. Methods: 57 ready-to-wean patients were included in a prospective observational study (35 SP and 22 UP separated from the ventilator). During a 30 minutes SBT (pressure support 7 cmH2O, zero end expiratory pressure), tidal volume (VT) and respiratory rate (RR) were obtained from the flow signal at 3, 10, 20 and 30 minutes. EAdi-derived indices were simultaneously computed: maximum of the EAdi (EAdimax), area under the inspiratory curve of EAdi (EAdiAUC), the difference between EAdimax and EAdimin (ΔEAdi), EAdimax/VT, EAdiAUC/VT and ΔEAdi/VT. Results: At baseline, breathing pattern was similar in the two groups whereas EAdimax and EAdiAUC were significantly lower in the success group (p<0.05). In the failure group, RR and RR/VT increased significantly during the trial, VT decreased, whereas EAdimax and EAdiAUC did not change. At 3 minutes, the areas under the receiver operating characteristic-curve of RR/VT and EAdi-derived indices to predict weaning outcome were: RSBI (0.83), EAdimax/VT (0.84), EAdiAUC/VT (0.80) and ΔEAdi/VT (0.82). During the SBT, the coefficient of variation of VT decreased in the failure group while the one of EAdimax remained unchanged. Conclusion: EAdi-derived indices provide reliable and early predictors of weaning outcome. However, the performance of these indices is not better than the RR/VT.