

# Pattern of Accessory and Expiratory Muscles Activation by Surface Electromyography During Weaning Trial

Dott. MATTEO POZZI (1), Dott. ALFIO BRONCO (1), Dott. VITTORIA SALA (1), Prof. FRANCESCA RABBONI (2), Prof. ALICE GRASSI (2), Prof. GIUSEPPE FOTI (2)(1), Prof. GIACOMO BELLANI (2)(1)

(1) UOC Anestesia e Rianimazione, ASST Monza, Via Pergolesi 33, Monza (mb), Italia.

(2) Università degli Studi di Milano Bicocca, Monza, Italia.

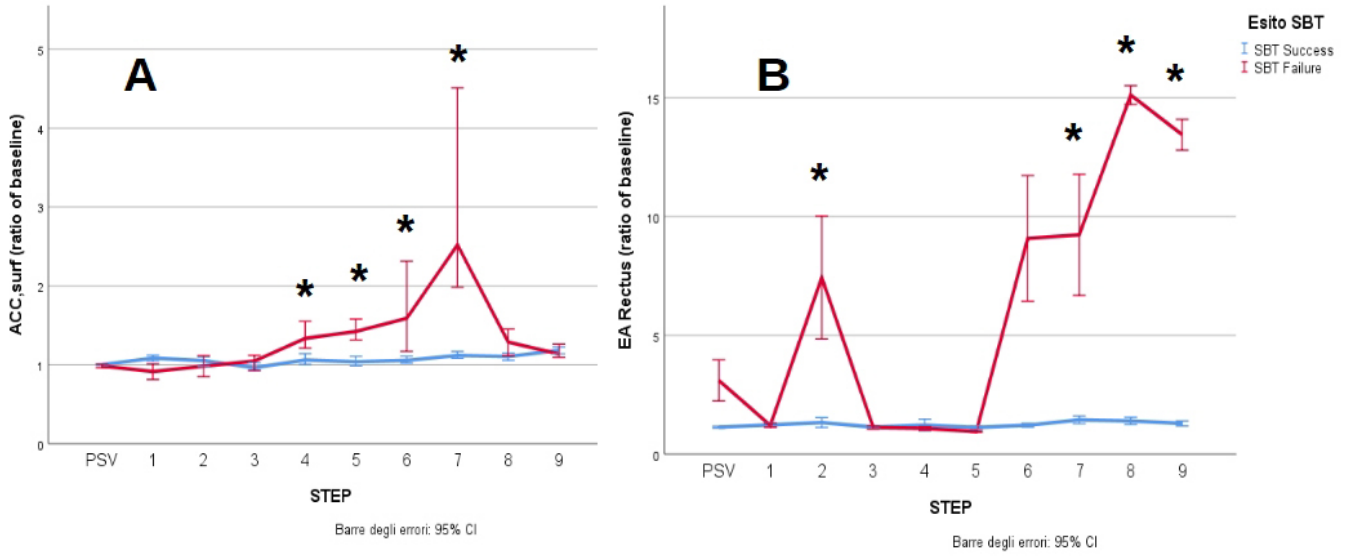
Argomento: Insufficienza respiratoria acuta e ventilazione meccanica

**Background.** Surface Electromyography (sEMG) allows non invasive measurement of electrical activity (EA) of different respiratory muscles. We describe sEMG patterns of inspiratory (diaphragm and accessory muscles) and expiratory muscles activation during a CPAP trial in intubated patients, in the weaning phase, undergoing pressure support ventilation (PSV).

**Methods.** Thirty-eight adult and clinically stable patients on assisted mechanical ventilation were studied during PSV (baseline) and during a 2-hours weaning trial in CPAP. sEMG of diaphragm, accessory muscles (intercostal and sternocleidomastoid) and expiratory muscles (rectus abdominis) were recorded with a dedicated device (Dipha 16, Inbiolab, Groningen, The Netherlands) simultaneously with ventilator waveforms. Weaning failure was defined with standard clinical criteria. A patient was excluded from the analysis for poor signal quality. A total of 7297 respiratory cycles were manually sampled and each signal was expressed, on a patient basis, as the ratio with the signal during baseline (PSV).

**Results.** Eight patients failed the trial. Electrical activity of inspiratory muscles increased during the trial ( $p < 0.001$ ), irrespective of the trial outcome. In patients failing the trial accessory muscles activity increased more than the activity of the diaphragm ( $p < 0.001$ , figure A), reflecting accessory muscles recruitment. Accessory muscles recruitment begun after one hour of CPAP and reached its peak at the end of the trial. Activation of expiratory muscles during inspiration was stable and negligible during the trial in patients who passed the trial, but significantly increased in those who failed ( $p < 0.001$ , figure B).

**Conclusions.** Weaning failure is associated with accessory muscles recruitment and inspiratory activation of expiratory muscles. sEMG monitoring during assisted mechanical ventilation and weaning trial allows monitoring of respiratory group other than diaphragm whose differential activation is clinically associated with weaning failure.



A: Pattern of Accessory Muscles activation (EA ACC<sub>surf</sub>) during weaning trial according to outcome. B: Pattern of Expiratory Muscles activation (EA Rectus) during trial according to outcome. \*  $p < 0.001$ .