

## **Respiratory drive and effort in patients with** sepsis and septic shock: determinants and modulation by High Flow Nasal Cannula



0

 $r^2 = 334$ 

p=.010

300

200

r<sup>2</sup>=.060

p = 298

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Background: Experimental and pilot clinical data suggests that spontaneously breathing patients with sepsis and septic shock may present increased respiratory drive and effort.

## **Methods:** 25 non-intubated patients with sepsis or septic shock 3 steps (30'):

- Low Flow Oxygen (LFO)
- High Flow Nasal Cannula (HFNC)
- LFO again

Measures ad the end of each step:

- arterial blood gas
- negative esophageal pressure swing ( $\Delta Pes$ )
- slope of the negative swing during the first 500ms ( $P_{0.5}$ )
- EIT-based tidal volume (Vt)
- dynamic compliance (Vt/ $\Delta$ Pes)

**Results:** Median age was 69 [interquartile range 54-79], BMI was 24.2 [21.6-27.1] kg.m<sup>-2</sup>. At enrollment, 13 patients (52%) were in septic shock, with a SOFA score of 5 [4-9] and a lactate concentration of 2.9 [2.4-4.7] mEq.L<sup>-1</sup>.

During LFO at baseline, respiratory drive  $(P_{0,5})$  and effort ( $\Delta Pes$ ) were elevated and significantly correlated with arterial lactates and inversely with dynamic lung compliance, but not with PaCO<sub>2</sub> (Figure).

induced HFNC significant а decrease of respiratory effort (8.0 [6.0-11.5] vs. 5.5 [4.5-8.0] vs. 7.5 [6.0-12.6] cmH<sub>2</sub>O between the 3 steps, p<0.001) and drive (6.0 [4.4-9.0] vs. 4.3 [3.5-6.6] vs. 6.6 [4.9-10.7] cmH<sub>2</sub>O, p<0.001), whereas





40 60 80 20 PaCO<sub>2</sub> during the LFO-Baseline phase (mmHg) PaCO<sub>2</sub> during the LFO-Baseline phase (mmHg) Figure. Correlations between respiratory effort (ΔPes, full circles) and drive (P0.5, open circles) during the low flow oxygen initial phase (LFO-

baseline) and lactate blood concentration at enrollment, dynamic respiratory system compliance (Vt/ $\Delta$ Pes) and PaCO<sub>2</sub> during the same study phase. p and r<sup>2</sup> are calculated by a simple linear regression.

there was no significant change in PaO<sub>2</sub>/FiO<sub>2</sub> (257 [228-331] vs. 329 [280-367] vs. 308 [246, 356] mmHg, p=0.160) and PaCO<sub>2</sub> (33.8 [30.9-41.3] vs. 33.9 [29.9-39.1] vs. 34.1 [32.1-41.2] mmHg, p=0.151).

Conclusion: Increased respiratory effort and drive in septic patients is associated with higher plasmatic lactate concentration and lower dynamic compliance, and can be reduced by HFNC effectively.

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