

## **Impact of awake prone positioning on inspiratory effort: a physiological study in healthy subjects.**

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**Rationale:** The use of awake prone position has shown to improve gas exchange, decrease respiratory rate, and reduce the risk of intubation in patients with acute respiratory failure. However, there is still concern about its potential consequences on self-inflicted lung injury specially when excessive efforts are present. The effect of awake prone position on inspiratory effort remains unknown.

**Objective:** To compare the inspiratory effort in prone versus supine position in healthy volunteers subjected to an incremental inspiratory load protocol.

**Methods:** Prospective, randomized crossover trial in healthy subjects. All subjects were equipped with an esophageal balloon and a flow sensor connected to a pneumotachograph (Fluxmed.Bs. Argentina). After evaluation of the maximal inspiratory pressure (MIP), each volunteer was randomly allocated to initiate an incremental inspiratory load protocol in prone or supine position. Subjects had to breathe consecutively for 3 min or 30 breaths at baseline (no extra load), 10%, 30% and 50% of the MIP (POWERbreathe K5 threshold valve) separated by 3 min between different load levels. The level of inspiratory effort was determined by the swing in esophageal pressure (Pes swing) and the pressure time product (PTPbreath and PTPmin). Comparison of different respiratory variables (respiratory rate, tidal volume), and inspiratory effort between different positions and different inspiratory loads were performed.

**Results:** A total of 14 subjects were enrolled. Median age (IQR) was 30.5 (25-34) years, 8 (57%) were men, and median BMI of 25.4 (21.6-27.7) kg/m<sup>2</sup>. The median MIP was 114 (100-129) cmH<sub>2</sub>O. Median values of Pes swing were significantly smaller in prone than supine position at baseline (8.2 vs 9.3 cmH<sub>2</sub>O; p=0.02) and under 10% inspiratory load (16.5 vs 21 cmH<sub>2</sub>O; p=0.021), but no differences were observed during 30 and 50% of MIP (Figure). PTP per breath and PTPmin were also significantly lower in prone as compared with supine position during 10% inspiratory load [35 vs 44 cmH<sub>2</sub>O·s (p=0.049); and 332 vs 403 cmH<sub>2</sub>O·s·min<sup>-1</sup> (p=0.013), respectively]. Tidal volume and respiratory rate did not differ between positions at any inspiratory load.

**Conclusion:** As compared with supine, awake prone position may reduce the level of inspiratory effort during breathing at rest and with low inspiratory load. This effect is not observed at higher levels of inspiratory load.

Figure

