

Assessment of inspiratory effort in spontaneously breathing Covid-19 patients: a comparison between esophageal, transdiaphragmatic and central venous pressure swing.

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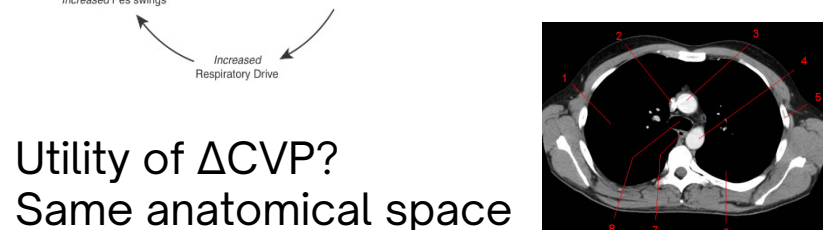
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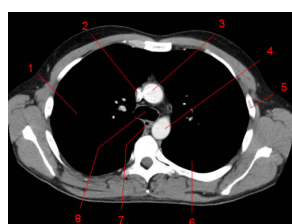


Pathophysiology

Monitor the inspiratory effort (ΔP_{es}) can prevent p-SILI



Utility of ΔCVP ?
Same anatomical space of esophagus
Passive-compliant structure
Easily available at bedside

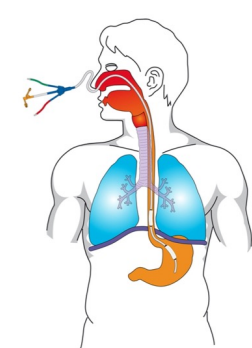


Purpose

The aim of the study was to assess whether a bedside-available index such as the tidal swing in central venous pressure (ΔCVP) was a reliable estimate of inspiratory effort.

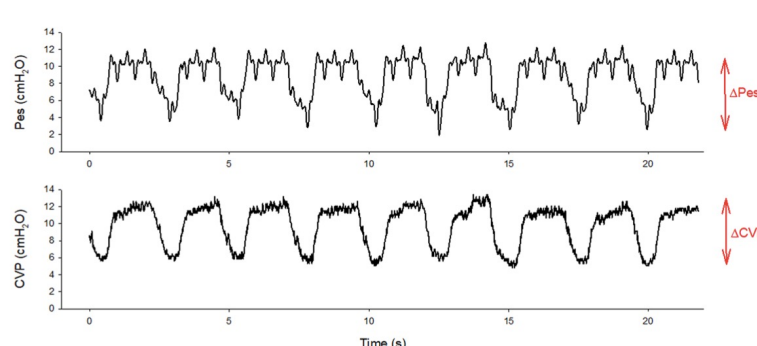
Method

Thirty consecutive spontaneously breathing patients with helmet CPAP within 48 h of ICU



Esophageal and gastric balloon catheter (ΔP_{es} and ΔP_{di}); central venous catheter (ΔCVP)

A trial of three levels of CPAP (0-5-10 cmH₂O)

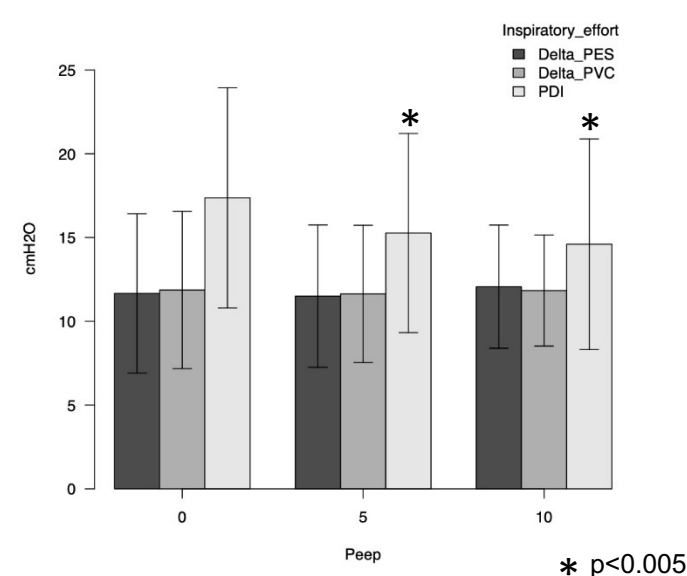


Result

Clinical characteristics and outcomes

	N=30
Anthropometric measures	
Male Sex (n - %)	18 (60)
BMI (kg/m ²)	29.5±6.9
Age (years)	65.6±9.8
Comorbidities	
Hypertension (n - %)	17 (60)
Diabetes (n - %)	5 (16.7)
Cancer (n - %)	2 (6.7)
Cardiac failure (n - %)	1 (3.3)
Respiratory disease (n - %)	4 (13.3)
Immunosuppression (n - %)	4 (13.3)
ICU severity scores	
SAPS II	30.8±5.9
SOFA	3.6 ± 1.1
Parameters at enrolment	
Temperature (C°)	36.6±0.66
FiO ₂	0.61±0.14
P/F (mmHg)	128±45.9
PaCO ₂ (mmHg)	40±5.6
PaO ₂ (mmHg)	75 ± 20.3
pH	7.41± 0.05
Respiratory Rate (1/min)	22.5 ± 4.9
Diaphragm thickening ratio (%)	29.6 ± 17.3
Outcome	
Endotracheal intubation (n - %)	20 (66.7)
ICU Non-survivors (n - %)	10 (33.3)
Hospital length of stay (days)	29[18-36]
ICU length of stay (days)	16[8-29]

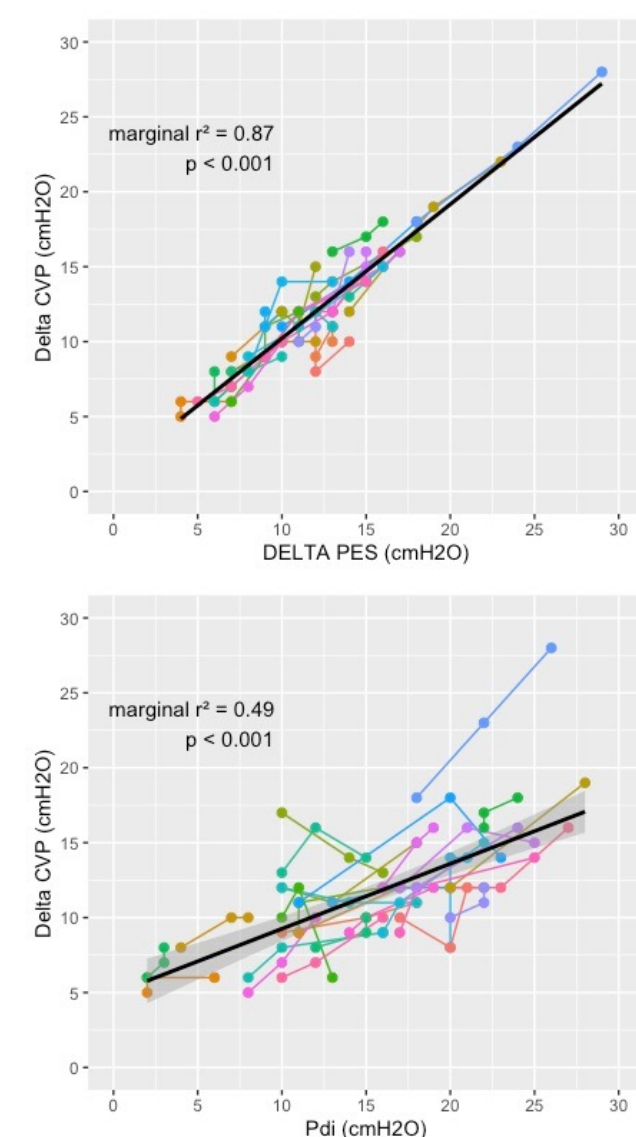
indices of inspiratory effort at different CPAP levels



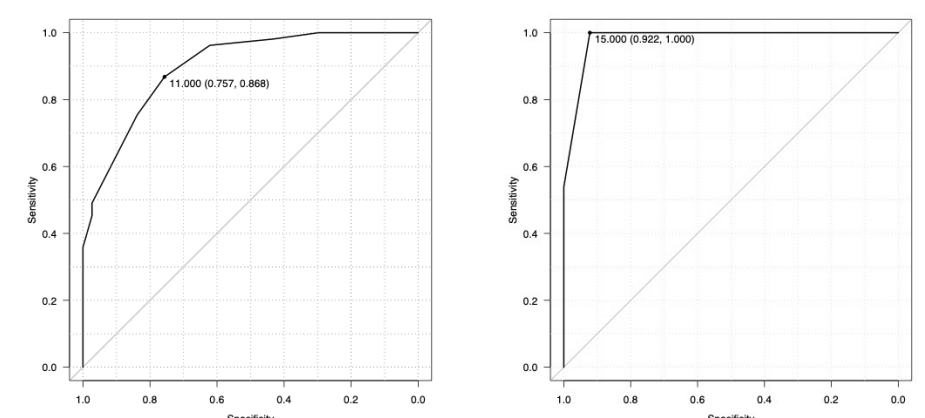
Hemodynamic and clinical parameters at different CPAP

Variable	PEEP 0	PEEP 5	PEEP 10	P value
Heart rate (bpm)	79 ± 13.3	76.5 ± 12.6°	76 ± 13.6°	<0.001
Mean arterial blood pressure (mmHg)	93.5 ± 12.5	93.5 ± 12.7	93.7 ± 12.5	0.871
Transmural vascular pressure (mmHg)	3 ± 5.9	2 ± 6.1°	2 ± 6.1°	<0.001
Respiratory rate (bpm)	22.5 ± 4.9	19.5 ± 4.5°	19 ± 4.2°	0.006
SpO ₂ (%)	91 ± 4.2	93 ± 3.6°	94.5 ± 3.1°	<0.001
Borg scale	1 (0-2)	1 (0-2)	2 (1-2.5)	0.222

ΔCVP - ΔP_{es} and ΔCVP - ΔP_{di} relationship



Diagnostic performance of ΔCVP for detecting a low ($\Delta P_{es}<11$) or a high ($\Delta P_{es}>15$) inspiratory effort



Conclusion

- The bedside-available ΔCVP is significantly related to the level of patient inspiratory effort, as assessed by both the ΔP_{es} and the ΔP_{di} values in spontaneously breathing patients with helmet CPAP
- ΔCVP is an easily available and reliable surrogate of ΔP_{es} in detecting a low or a dangerously high inspiratory effort, as defined by specific thresholds of esophageal pressure
- ΔCVP is better related with ΔP_{es} than with ΔP_{di}
- The increase of PEEP, in this setting of early C-ARDS, was associated with an increased oxygenation and a reduced respiratory rate, while ΔP_{es} and ΔCVP , indices of inspiratory effort, were unchanged.