TITLE: **Electrical Impedance Tomography and automated weaning system: a case report about the amazing combination of technologies and classical respiratory mechanics.**

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INTRODUCTION: Electrical Impedance Tomography (EIT) and SmartCare / PS ® are new technologies that offer the possibility of measuring respiratory mechanics parameters useful in the daily clinic, such as in the case of prolonged weaning.

CASE REPORT: A 32-year-old patient is hospitalized in intensive care for a pneumonia N/D, responsible for severe acute respiratory failure, which requires invasive mechanical ventilation on an orotracheal tube. In past medical history: intellectual disability (N/D), chronic respiratory insufficiency, bronchiectasis, pulmonary emphysema with O2 home therapy, osteoporosis with stabilized multiple vertebral collapses, under evaluation for pulmonary transplantation.

For a case of prolonged weaning, on the tenth day of hospitalization he underwent a percutaneous tracheostomy according to Frova and on the thirteenth day an SBT on tracheostomy, performed with EIT monitoring and with an automated weaning system (SmartCare / PS ®- Draeger). The latter technique is a closed loop system, designed to stabilize a patient's spontaneous breathing in a "comfortable zone" and to automatically reduce inspiratory support until the patient can be separeted from the ventilator. The SBT conducted on the patient ends with an electronic diagnosis of the impossibility of separation from the ventilator; the diagnosis of the EIT confirms the same verdict. The patient will be transferred to rehabilitation with the assignment of a home ventilator.

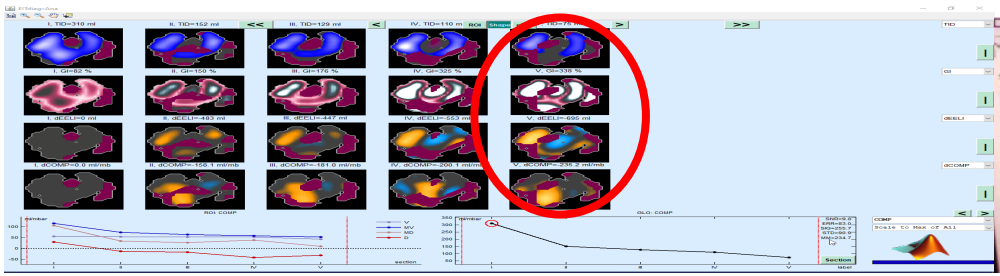
RESULTS: The instruments used are an EVITA-XL ventilator with SmartCare / PS module (Draeger ®) and a compatible transthoracic electrical impedance tomography machine (Pulmovista-Draeger ®). The SmartCare / PS ® protocol (Figure 1B) issues a diagnosis of "Hypoventilation" on the basis of a reduced spontaneous breathing frequency (SC-fspn <15 acts / min) and a high endtidal CO2 (SC-etCO2> 55mmHg), despite a initial attempt to compensate (SC-Vt> 1L) in the face of high supports that cannot otherwise be reduced (∆P ASB 40 mmHg and SC-P ASB 40 mmHg). The EIT (Figure 1A), in the comparison between the two moments of the pre-SBT and the post-SBT, shows a reduced Tidal Variation (TID) of the regions of interest (ROI) in which the representative impedance image has been decomposed, that is, a reduction in the impedance variation between end expiration and end inspiration (TID = 75 ml); an increase in the Global Inhomogeneity Index (GI 338%) ie the difference between the impedance value of each pixel and the median of the values of all pixels, normalized by the sum of the impedance values within the lung area; a negative Delta EELI value (difference between the end expiratory impedance of a given section and the reference end expiratory impedance), equal to - 695 ml; a negative value of d-COMP (the comparison of the compliance of the given section with the compliance of the reference section, calculated thanks to the driving pressure values measured by the ventilator and the changes in impedance substituing regional volume information) equal to - 235 ml / mb. It is also interesting to note how, since the beginning of the SBT, the EIT detected an alarm data, represented by a high GI (82%). The blood gas analysis at the end of SBT confirms a case of acute respiratory acidosis.

CONCLUSIONS: The combination of advanced respiratory mechanics monitoring tools, especially in bedside mode, allows not only to monitor the effectiveness of clinical maneuvers in real time, but also to predict the results.

KEY WORDS: EIT, SmartCare, Prolonged Weaning

FIGURE 1:

1A)



1B)