EIT monitoring for COVID-19 ARDS: minimizing P-SILI and fostering lung & diaphragm recovery.

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After the first 24-48 hours of controlled mechanical ventilation, the promotion of spontaneous efforts is an important strategy to avoid muscle atrophy. By using imaging technologies, however, we have shown that the combined presence of persisting lung disease, high respiratory drive and strong diaphragmatic contraction can be disastrous during assisted mechanical ventilation. Recent research has shown an inappropriately excited respiratory drive in > 30% of ARDS patients.

Under the presence of too strong efforts, the use of conventional protective strategies does not work. Despite an apparently low tidal-volume, overstretch of dependent lung regions is common: not rarely generating dependent lung deformations with regional tidal volumes > 15 mL/kg and equivalent driving-pressures > 20 cmH_2O, concentrated at supra-diaphragmatic lung regions.

This was also quite common during volume-controlled mechanical ventilation, when VT was rigidly set at 5-6 mL/kg – a situation where conventional physiology would (erroneously) predict an adequate control of transpulmonary driving pressures.

In this conference, we will propose novel ventilatory strategies that can be implemented at the bedside with the help of EIT, involving technics like partial paralysis, novel ventilatory modes, individualized PEEP and positioning at the bed, and maneuvers to detect excessive muscle effort. All those techniques could help us to minimize driving pressure and protect the lung. Also, we will discuss new tools (using artificial intelligence) to detect dyssynchrony and to promote better patient-ventilator synchrony, optimizing lung protection.

A dual target during mechanical ventilation will be possible in the next years: lung protection in conjunction with diaphragmatic protection.