

Update of respiratory care in ICU

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A large number of novelties exist in the domain of respiratory care in the ICU. We will discuss a few with clinical relevance.

Airway Closure

Complete airway closure can make alveolar pressure different from airway pressure. This has been described in ARDS and is highly prevalent in obese patients. Alveolar pressure beyond the collapse is no longer measurable at the airway opening. The closure of the small airways impedes gas entry within the lungs before an airway opening pressure is reached. It favors lung collapse by denitrogenation atelectasis. It can be estimated at bedside by a low-flow pressure time curve.

Alveolar recruitment

The importance of lung recruitability for PEEP has been well demonstrated. We recently provided a new tool – the recruitment-to-inflation (R/I) ratio – for assessing lung recruitability at bedside. Calculation of R/I requires identification of airway opening pressure. Abruptly releasing PEEP increases expired volume: the difference between this volume and the volume predicted by compliance at low PEEP estimates the recruited volume by PEEP. Ratio of recruited volume divided by pressure change (compliance of the recruited lung) to the compliance at low PEEP gives the Recruitment-to-Inflation ratio.

Monitoring respiratory drive and inspiratory effort

Physiological and epidemiological evidence shows that monitoring respiratory drive and inspiratory effort might be useful to prevent potentially injurious ventilation for lung and diaphragm. It can help titrating sedation. Since breathing spontaneously might be beneficial. The right timing to control drive and effort remains to be elucidated but integration of simple, non-invasive techniques to detect potentially injurious drive and effort such as P0.1 and Pocc into clinical practice is recommended.

Reverse Triggering, a frequent asynchrony

Not only the strength of effort is relevant, but also the relationship in terms of timing. Reverse triggering (RT) dyssynchrony is a patient-ventilator interaction where respiratory muscle contraction occurs secondarily to a machine-triggered breath, often with patterns of entrainment, i.e. a fixed repetitive temporal relationship between the neural and mechanical respiratory cycles. RT is frequent in ARDS and general ICU patients. It seems to indicate a transition phase between deep sedation and patient-triggering.

Integrating all these notions at the bedside should improve the management of mechanically ventilated patients.

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