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PEEP-induced changes in lung volume in acute respiratory distress syndrome. Two methods to estimate alveolar recruitment

Submitted by Emmanuel Lemoine on Fri, 07/18/2014 - 09:40

Titre	PEEP-induced changes in lung volume in acute respiratory distress syndrome. Two methods to estimate alveolar recruitment
Type de publication	Article de revue
Auteur	Dellamonica, Jean [1], Lerolle, Nicolas [2], Sargentini, Cyril [3], Beduneau, Gaetan [4], Di Marco, Fabiano [5], Mercat, Alain [6], Richard, Jean-Christophe [7], Diehl, Jean-Luc [8], Mancebo, Jordi [9], Rouby, Jean-Jacques [10], Lu, Qin [11], Bernardin, Gilles [12], Brochard, Laurent [13]
Editeur	Springer Verlag
Type	Article scientifique dans une revue à comité de lecture
Année	2011
Langue	Anglais
Date	2011/10/01
Numéro	10
Pagination	1595 - 1604
Volume	37
Titre de la revue	Intensive Care Medicine
ISSN	0342-4642 / 1432-1238
Mots-clés	Acute respiratory distress syndrome [14], Anesthesiology [15], Emergency Medicine [16], End-expiratory lung volume [17], Functional residual capacity [18], Intensive / Critical Care Medicine [19], Lung recruitment [20], Mechanical ventilation [21], Nitrogen washout/washin [22], Pain Medicine [23], Pediatrics [24], Pneumology/Respiratory System [25], Positive end-expiratory pressure [26]

Résumé en anglais	Purpose Lung volumes, especially functional residual capacity (FRC), are decreased in acute respiratory distress syndrome (ARDS). Positive end-expiratory pressure (PEEP) contributes to increased end-expiratory lung volume (EELV) and to improved oxygenation, but differentiating recruitment of previously nonaerated lung units from distension of previously open lung units remains difficult. This study evaluated simple methods derived from bedside EELV measurements to assess PEEP-induced lung recruitment while monitoring strain. Methods Prospective multicenter study in 30 mechanically ventilated patients with ARDS in five university hospital ICUs. Two PEEP levels were studied, each for 45 min, and EELV (nitrogen washout/washin technique) was measured at both levels, with the difference (Δ) reflecting PEEP-induced lung volume changes. Alveolar recruitment was measured using pressure-volume (PV) curves. High and low recruiters were separated based on median recruitment at high PEEP. Minimum predicted increase in lung volume computed as the product of ΔPEEP by static compliance was subtracted from ΔEELV as an independent estimate of recruitment. Estimated and measured recruitments were compared. Strain induced by PEEP was also calculated from the same measurements. Results FRC was 31 ± 11% of predicted. Median [25th–75th percentiles] PEEP-induced recruitment was 272 [187–355] mL. Estimated recruitment correlated with recruited volume measured on PV curves (ρ = 0.68), with a slope close to identity. The ΔEELV/FRC ratio differentiated high from low recruiters (110 [76–135] vs. 55 [23–70]%, p = 0.001). Strain increase due to PEEP was larger in high recruiters (p = 0.002). Conclusion PEEP-induced recruitment and strain can be assessed at the bedside using EELV measurement. We describe two bedside methods for predicting low or high alveolar recruitment during ARDS.
URL de la notice	http://okina.univ-angers.fr/publications/ua3514 [27]
DOI	10.1007/s00134-011-2333-y [28]
Lien vers le document	http://dx.doi.org/10.1007/s00134-011-2333-y [28]

Liens

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Publié sur *Okina* (http://okina.univ-angers.fr)