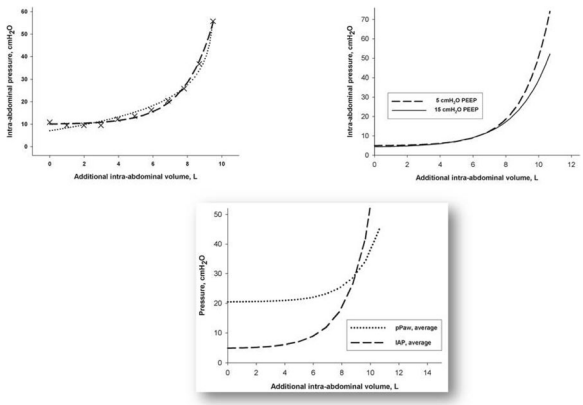

Fig. 26 (abstract P65). Legend 1: Pressure, volume and PEEP relationships in intra-abdominal hypertension

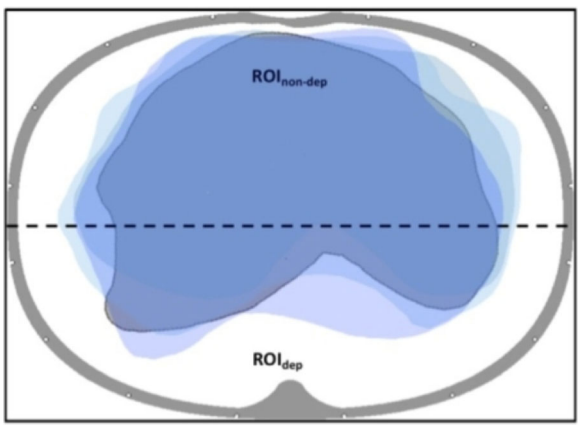

Fig. 27 (abstract P66). Legend 1: Tidal ventilation in each individual subject

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Distribution of tidal ventilation in potential lung donors: a pilot observational study

C. Spina[1], A. Bronco[2], F. Magni[2], C. Di Giambattista[1], A. Vargiolu[2], G. Bellani[1], G. Foti[1], G. Citerio[1]
[1]University of Milano Bicocca, Monza, Italy; [2]San Gerardo Hospital, Monza, Italy
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Introduction: Lung donation occurs in a limited number of potential donors due to the deterioration of lung function after brain death and the strict eligibility criteria. "Protective" ventilator strategy markedly increased lung donation rate [1]. However, to our knowledge no studies have investigated individualization of PEEP and recruitment maneuvers in this setting. Thus, we explored the use of electrical impedance tomography (EIT) in a hypothesis-generating study.
Methods: Single center observational study. Potential lung donors underwent a 10 minutes evaluation by EIT (PulmoVista 500 Dräger Medical) after neurologic determination of death. Potential donors were ventilated with a "protective" protocol. Gas analysis and respiratory system compliance (Crs) were assessed. Two regions of interest were defined: non-dependent lung zones (ROIndep) and dependent lung zones (ROIdep). We measure the Vt distending each region (VtROIn-dep, VtROIdep); the heterogeneity of Vt distribution (VtH) and regional values of compliance (CrsROInon-dep, CrsROIdep). Results are expressed as median (Q1; Q3).
Results: 5 subjects were enrolled. Vt was 7.4 (7.1; 7.7) ml/Kg IBW and PEEP was 8 (8; 8) cmH20. PF ratio was 358 (47; 560) and Crs was 43 (35; 76) ml/cmH2O. Vt was preferentially distributed in non-dependent lung zones because of higher CrsROInon-dep 26 (20; 43) ml/cmH2O vs. CrsROIdep 18 (13; 32). For clarity, VtROInon-dep was 252 (196; 285) ml while VtROIdep was 166 (143; 197) ml and VtH was 1.35 (1.09; 2.02).
Conclusions: EIT monitoring showed that ventilation is preferentially distributed in ventral lung zones when the protective ventilator strategy is employed in potential organ donors. Next step will be to verify whether PEEP titration and recruitment maneuver based on EIT findings contribute to enhance respiratory performance and suitability for lung transplantation.

References

[1] Mascia, 2010 JAMA 304:2620–7

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Pixel-level pressure-volume curves predict lung recruitability: pilot study on electrical impedance tomography (EIT) in acute respiratory failure (ARF) patients

G. Scaramuzzo[1], S. Spadaro[1], A. D. Waldmann[2], S. H. Böhm[2], R. Ragazzi[1], C. A. Volta[1]
[1]University of Ferrara, Ferrara, Italy; [2]Swisstom AG, Landquart, Switzerland
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Introduction: Recruitment Maneuvers (RM) typically consist of high airway pressures for prolonged periods of time to open closed lung units. Despite potentially positive effects, RM can cause hypotension, desaturation, or pneumothorax. Different methods have been proposed to identify patients who can benefit from a RM but conclusive recommendations are still lacking. We hypothesized that the shape of a pixel-level pressure-volume curve (PVpx) could predict recruitability defined as Recruited Volume (RV) after a RM at rising PEEP levels.
Methods: 12 ARF patients (P/F < 300 mmHg) were mechanically ventilated with TV of 6–8 ml/kg. A 5-step PEEP trial - increasing (5,10,15 cmH[sub]2[/sub]O) and decreasing (10,5 cmH[sub]2[/sub]O) limb - was performed with a RM (inspiratory hold,40 cmH2O CPAP for 40s) between PEEP10 and PEEP15. At each step, lung mechanics and EIT data were recorded during a quasi-static pressure-volume curve (PV) maneuver. The PV before the RM was adapted to an isogravitational pixel level plotting the variation of impedance in each pixel row and the variation of pressure in the respiratory system (fig. 28); 19 pixel-level PV curves (PVpx) were obtained [1] and fitted in the equation $V = a + b \cdot Pao + c \cdot Pao^2$[2]. The "c" factor derived from the fitting (C) indicates the shape of the curve: positive C is related to a compliance increase during the inflation, while negative C to its reduction. We correlated the RV after the RM with the C before the RM at each pixel level, from non-dependent (pixel 1) to dependent lung (pixel 19).
Results: The C had a significant positive correlation with RV (ml/kg/PBW) for pixel levels 13–17,19 (dependent lung); positive PVpx values predicted recruitability of the dependent lung. In the central lung, no correlation was founded. A negative (non-significant) correlation was founded in non-dependent lung indicating that a preexisting non-dependent overinflation could be inversely correlated with the effects of the RM.
Conclusions: The C factor from PVpx predicts lung recruitability at the bedside and could help to identify patients who might benefit from lung RM.