Individualized Peep Based On Regional Lung Mechanics (using Eit) Minimizes Driving Pressure In Patients With Ards

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RATIONALE: Driving Pressure (ΔP) is the ventilatory variable most strongly associated with survival in ARDS patients. Ventilatory management, like recruitment maneuvers associated with appropriated PEEP level, can improve respiratory compliance and reduce ΔP. Electrical Impedance Tomography (EIT) is a novel technology that allows a PEEP trial based on regional respiratory mechanics, at the bedside and in real-time. Our aim was to verify if a titrated PEEP based on EIT, preceded by a recruitment maneuver, is capable of reducing ΔP in ARDS patients.

METHODS: We selected hemodynamically stable patients with ARDS (according to Berlin´s criteria) and $PaO_2/FiO_2 \leq 250$mmHg. A recruitment maneuver (RM) was performed in pressure-controlled mode with delta-inspiratory pressure of 15cmH_2O, reaching a plateau pressure of 50cmH_2O for 15seconds (repeated three times). After RM, a decremental PEEP trial was performed in volume controlled mode with V_T=5mL/Kg of predicted body weight (PBW), starting at PEEP=23 cmH_2O and decreasing in steps of 2cmH_2O until a PEEP of 5cmH_2O. The *optimum-PEEP* was defined as the lowest PEEP keeping <5% of collapse (estimated by EIT). Another RM was performed before setting the *optimum-PEEP*, and patients were monitored for 4 hours under *optimum-PEEP*. Respiratory compliance, ΔP and blood samples were measured before intervention, and in three moments after setting PEEP: 1minute, 15minutes and 4hours. Repeated-measures ANOVA was used to analyze variations in respiratory compliance, PaO_2/FiO_2 and ΔP over time.

RESULTS: We studied seventeen patients, 60.5±9.5years old, BMI=27±4.8kg/m^2 and SAPSIII=54.6±16.4. Classification of ARDS severity: 41% were mild (PF=223±12 mmHg), 47% were moderate (PF=182±18) and 12% were severe (PF=81±15). Baseline PEEP was 8.8±1.8cmH_2O and *optimum-PEEP* was 13.8±3.3cmH_2O. The baseline respiratory compliance was 0.66±0.14mL/cmH_2O/Kg PBW. After *optimum-PEEP*, despite a ~5cmH_2O PEEP raise, plateau pressures did not change, meaning a statistically significant reduction in ΔP in all evaluated moments ($p<0.001$). At baseline, ΔP was 14.8±3.6cmH_2O, being reduced to 8.5±2.5 at 1min, 8.8±3.1 at 15 min, and 9.4±3.0 at 4 hours (Figure 1). There was a significant improvement in PaO_2/FiO_2 after 15 minutes and 4 hours (324±101 and 347±97mmHg, respectively) in comparison with baseline ($p<0.001$). Respiratory-system compliance markedly improved after 1min of optimum-PEEP (1.1±0.3mL/cmH_2O/Kg PBW, $P<0.001$ when compared to baseline), decreasing slightly (but significantly) after 15min and 4hour (1.0±0.2 and 0.9±0.2mL/cmH_2O/Kg PBW, respectively, $p<0.001$).

CONCLUSION: Individualized PEEP based on regional respiratory mechanics (using bedside EIT monitoring) is a promising strategy to minimize driving pressure in patients with ARDS.

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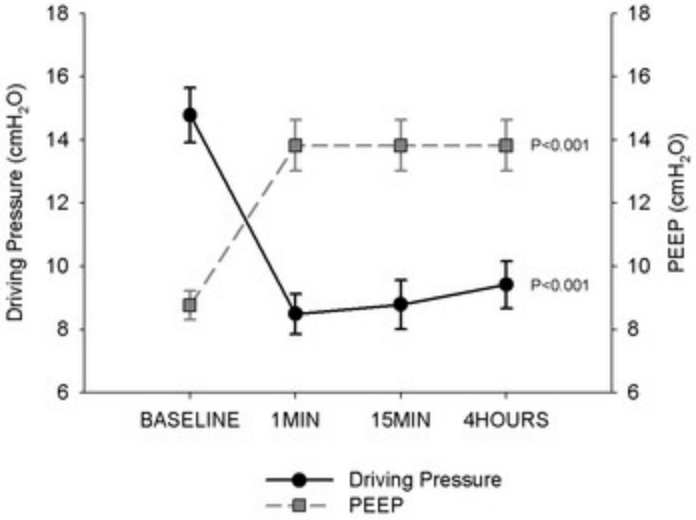

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