Preliminary report of a safety and feasibility study of setting Tidal Volume scaled on End Expiratory Lung Volume

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Argomento: Insufficienza respiratoria acuta e ventilazione meccanica

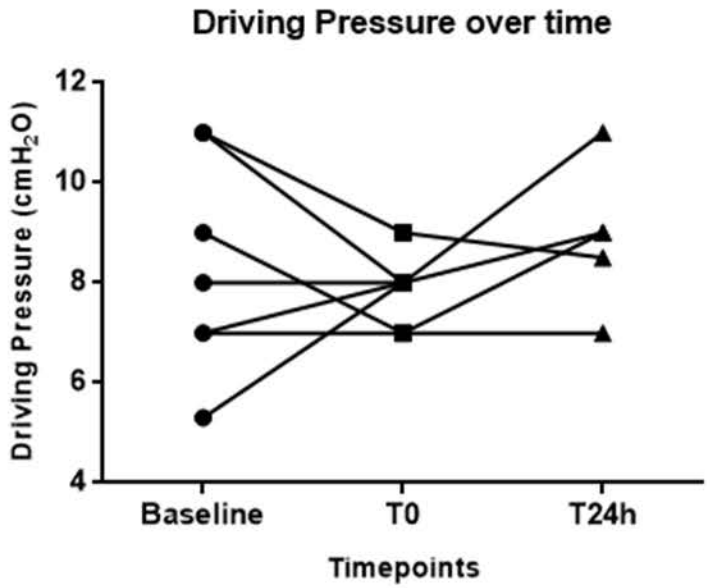
INTRODUCTION: Low tidal volume (TV) ventilation improves survival of ARDS patients. Currently, TV is set on the size of patient's healthy lung (calculated on ideal body weight). However it is well known that only a small part of ARDS lungs is functionally active (the "baby lung"). Measuring the End Expiratory Lung Volume (EELV) might allow to scale the TV on the actual size of the lung volume exposed to ventilation

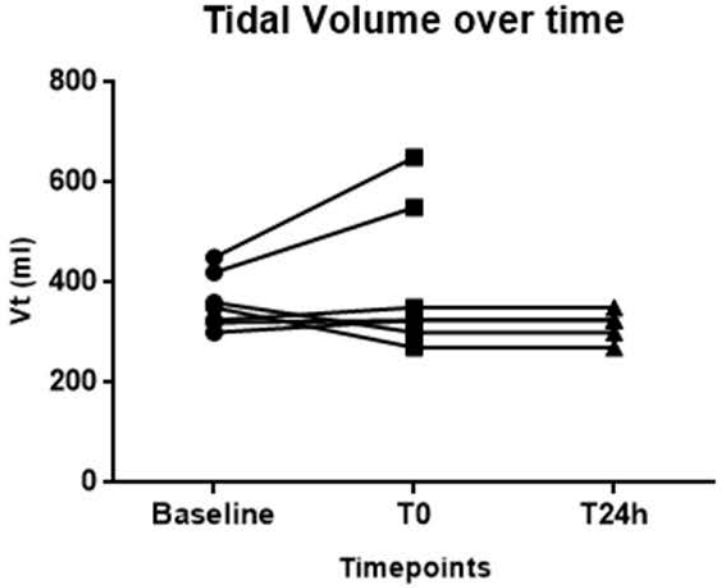
OBJECTIVE: To determine the feasibility of setting TV=0,25*EELV in ARDS patients for 24h

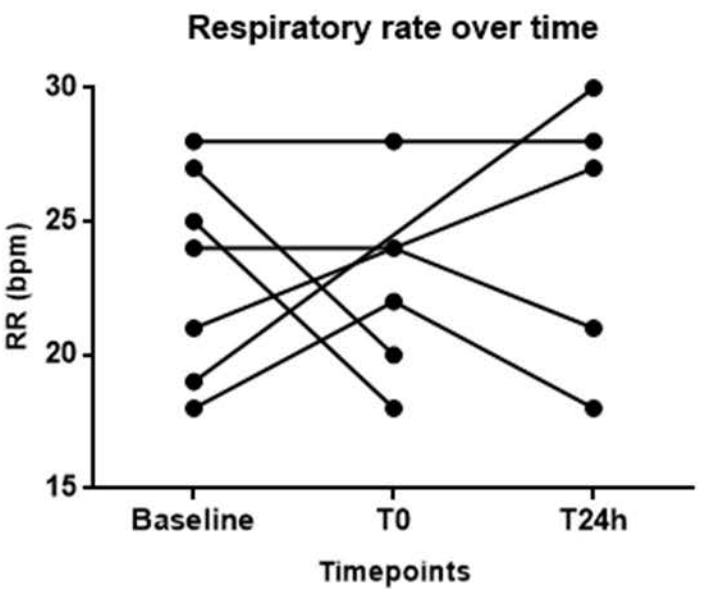
METHODS: We included ARDS patients intubated since less than 96h. Exclusion criteria were conditions that did not allow to measure EELV (i.e. air leaks). EELV was measured by the "oxygen wash-in wash-out technique" (GE Carescape R860 ventilator). TV was set as 0.25*(measured EELV–PEEP related strain), up to 8ml/kg IBW. Target TV was set and kept for 24h unless one of the following occurred: need to increase the RR>35 bpm to achieve the target pH, desaturation requiring an FiO_2 change >20%, development of a plateau pressure>30cmH_2O. At the enrolment time, we also measured driving pressure (DP) at different levels of lung strain (increasing TV/EELV)

RESULTS: We enrolled seven ARDS patients. The target TV was kept for 24h in 5 out of 7 patients, maintaining pH into a safe range and RR below 30 (Fig.1). Mean set TV was 396±195ml, not different from baseline TV (361±55ml).DP slightly decreased from 8.6±1,.8 to 8±0.8cmH_2O (p=n.s., Fig.1). Two patients dropped out because TV exceeded the safe limit of 8ml/kg. As a secondary result, we found a strict correlation between the strain applied to the lungs (Vt/EELV) and DP (R=0.97)

CONCLUSION: Preliminary results show that targeting a TV set as 0.25*EELV is feasible in the majority of ARDS patients enrolled. Moreover, in these patients DP is a surrogate measurement of lung strain


Driving Pressure over time
Driving Pressure (cmH2O)
12
10
8
6
4
Baseline
T0
T24h
Timepoints


Tidal Volume over time
Vt (ml)
800
600
400
200
0
Baseline
T0
T24h
Timepoints


Respiratory rate over time
RR (bpm)
30
25
20
15
Baseline
T0
T24h
Timepoints