

Variations in distribution of ventilation measured with Electrical Impedance Tomography (EIT) in pediatric patient with Acute Respiratory Failure during Non-invasive Ventilation

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In patients with Acute Respiratory Failure (ARF) due to infective respiratory pathology there is a re-distribution of ventilation towards lungs non-dependant areas. Non-invasive ventilation (NIV), offering positive pressure, should favour a better ventilation of dependant areas making ventilation more homogeneous.

Electrical impedance tomography (EIT) is a non-invasive, non-operator dependent, bedside, radiations-free diagnostic tool, feasible in paediatric patients and repeatable. The increase in chest impedance is related to the increased presence of air. There is a little body of literature in studying respiratory insufficiency in children with EIT.

Our study is a single-centre crossover physiological pilot study comparing, in children, NHF 2l/Kg, CPAP 7 cmH₂O and non-invasive ventilation (PEEP 7 cmH₂O and PS 8 cmH₂O) delivered by a turbine ventilator in a single limb configuration.

We recruited patients aged >30 days and < 2years, with ARF due to viral infection. EIT (Drager Pulmovista) belt of the proper size was placed to record the pattern of ventilation during NHF and both during CPAP and NIV.

Six patients were recorded until nowadays, with average age of 10 months, 3 were female and 3 male. All of them had viral infection detected both clinically and with swab. Their length of stay in ICU was 5 days (average).

We analyzed (with Drager EIT Data Analysis Tool 6.3) fifteen respiratory acts in every modality of ventilation. The primary end-point of the study was the variation in end-expiratory lung volume (EELV), evaluated as the percentage of variation of Z in expiration, and this was 4.6% in CPAP and 8.1% in NIV. We did the same process also for every ROI.

It was possible to see, with this study, the amount of increase in EELV. With further study and analysis of ventilator, it will be possible to estimate the regional compliance in all these patients with ARF.