Late-breaking abstract: High flow oxygen therapy decreases endotracheal intubation requirement in patients with ALI or ARDS

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High flow oxygen (HFO) therapy is able to deliver up to 60L/min of a heated and humidified air-oxygen mixture through nasal cannulae and to provide small amount of positive end-expiratory pressure. Our objective was to assess the outcome of patients admitted for acute lung injury (ALI) or acute respiratory distress syndrome (ARDS) who were treated by HFO and to determine if HFO could decrease endotracheal intubation rate.

We retrospectively selected 38 consecutive patients (median age 57 yrs) admitted in ICU for ALI (n=5, 13%) or ARDS (n=33, 87%) and who underwent HFO (Optiflow®; Fisher & Paykel, France) at admission (PaO2 = 65 mmHg, PaO2/FiO2...
In vivo performance of an improved collapsible holding chamber (CHC) for the delivery of bronchodilators to patients receiving mechanical ventilation

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Bronchodilator delivery by pressurized metered-dose inhaler (pMDI) to patients on mechanical ventilation is best achieved without breaking the breathing circuit. We describe an evaluation of an improved CHC (AeroVent Plus™, Trudell Medical International, London, Canada) in five devices, 1 measurement/device), in which the pMDI canister receptacle is offset from the CHC axis to reduce internal impaction, and can also accept GSK pMDI canisters having a dose counter. Delivery of 3 actuations of salbutamol (HFA Ventolin™, GSK Canada; 100 µg/actuation) was assessed with the expanded CHC inserted in the inspiratory limb of an adult breathing circuit equipped with a 7-mm diameter endotracheal tube (ETT). An adult test lung (Michigan Instruments) was used to simulate the patient. The circuit was humidified near to body conditions (T = 36°C, 100%RH), and tidal breathing (600 mL, duty cycle = 33%, 10 breaths/min) was simulated by a servo ventilator (Simens, model 900C). A filter was placed between the distal end of the ETT and test lung to collect the aerosol. Total mass (TM) of salbutamol after 6 respiratory cycles was determined by HPLC-UV spectrophotometry. Similar measurements were performed for an Aerovent Plus CHC (Armstrong Medical), providing benchmark data from a European marketed CHC having the pMDI receptacle in-line with the axis of the device. TM (mean ± S.D.) from the AeroVent Plus and Spirale CHCs was 22.7 ± 3.1 and 4.7 ± 0.7 µg/actuation respectively. Clinicians using these devices should be aware of the implications of the difference in drug output between these apparently similar devices.

In vitro P1986

Performance of an improved collapsible holding chamber (CHC) for the delivery of bronchodilators to patients receiving mechanical ventilation

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Objective: To evaluate the impact of a ventilator bundle and the control of process measures on the rate of VAP in our Intensive Care Unit.

Methods: A prospectively ventilator bundle have applied to every patient who received mechanical ventilation (MV). Daily control of the application of ventilator bundle was registered and weekly control of ventilator bundle compliance was registered. We compare the VAP rate of two periods, 25 months before the implementation of the bundle and 11 months after. The Poisson regression test was used. The methodology of the NHSN (National Healthcare Safety Network) was used for infection surveillance and the methodology of IHI (Institute of Healthcare Improvement) was used for compliance control.

Results: The MV use rate was (ventilator days/patients day) higher during the bundle period compared to the previous period (1.61 ± 0.0001), the MV average days was also higher during the bundle period (8.52±0.07 vs. 7.03±0.61, p<0.0001). The VAP rate was lower during the bundle period compare with the previous one (3.62% MV days vs. 12.32% MV days p=0.001) with a reduction of the VAP of 70.61%. The compliance to the ventilator bundle was 97.91% and the fulfillment of the ventilator bundle was 90.13%.

Conclusion: The use of a ventilator bundle and control of ventilator bundle compliance was associated with a diminishment of the VAP rate.

High-frequency oscillatory ventilation – A safe procedure for COPD patients?

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Introduction: High-frequency oscillatory ventilation (HFOV) is an alternative type of mechanical ventilation. HFOV is usually considered as not indicated in patients with obstructive lung disease because of the theoretical risk of air trapping and hyperinflation.

Aim and objectives: Intention of this study was to establish if HFOV can safely be applied in patients with exacerbation of chronic obstructive pulmonary disease and hypercapnic respiratory failure.

Methods: Ten patients with acutely exacerbated chronic obstructive pulmonary disease (GOLD stages II-IV) requiring intensive care treatment who failed on non-invasive ventilation were studied. After confirmation of adequate mechanical ventilation (CMV) of less than 72 hours all patients were transferred to HFOV for 24 hours and then back to CMV.

Main results: Regional lung aeration and ventilation were assessed by electrical impedance tomography. HFOV was tolerated well, no adverse effects were observed. Effective CO2 elimination and oxygenation were achieved. Arterial partial pressure of CO2 was 52±13 mmHg (mean ± SD) during CMV before transition to HFOV and 47±9 mmHg by the end of the 24-hour period of HFOV. Ventilation was more homogeneously distributed during HFOV than during initial CMV. No signs of hyperinflation induced by HFOV were identified. Higher respiratory system compliance and tidal volume were found during CMV after 24 hours of HFOV than before.

Conclusions: Contrary to present recommendations on the use of HFOV in adult patients our pilot study indicates that this type of mechanical ventilation can safely be used in patients with chronic obstructive lung disease.

P1991

Efficacy of a ventilator bundle for the prevention of the ventilator-associated pneumonia (VAP)

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Introduction: Several specific and general strategies have proven effectiveness for prevention of ventilator-associated pneumonia (VAP).

Objective: To evaluate the impact of a ventilator bundle and the control of process measures on the rate of VAP in our Intensive Care Unit.

Methods: A prospectively ventilator bundle have applied to every patient who received mechanical ventilation (MV). Daily control of the application of ventilator bundle was registered and weekly control of ventilator bundle compliance was registered. We compare the VAP rate of two periods, 25 months before the implementation of the bundle and 11 months after. The Poisson regression test was used. The methodology of the NHSN (National Healthcare Safety Network) was used for infection surveillance and the methodology of IHI (Institute of Healthcare Improvement) was used for compliance control.

Results: The MV use rate was (ventilator days/patients day) higher during the bundle period compared to the previous period (1.61 ± 0.0011), the MV average days was also higher during the bundle period (8.52±0.07 vs. 7.03±0.61, p<0.0001). The VAP rate was lower during the bundle period compare with the previous one (3.62% MV days vs. 12.32% MV days p=0.001) with a reduction of the VAP of 70.61%. The compliance to the ventilator bundle was 97.91% and the fulfillment of the ventilator bundle was 90.13%.

Conclusion: The use of a ventilator bundle and control of ventilator bundle compliance was associated with a diminishment of the VAP rate.

P1990

Effects of N-acetylcysteine in lipopolysaccharide-induced acute lung injury in the rat: Treatment after acute lung injury

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Introduction: As it has been known that N-Acetylcysteine (NAC) which is a free radical scavenger and antioxidant reduces acute lung injury of rats stimulated by endotoxin, studies on NAC are being executed recently as a way of treatments of acute lung injury. This study was to elucidate effect of NAC in LPS-induced acute lung injury in rats.

Methods: Six weeks old SD rats were divided into 4 groups (1 group: saline, 2: NAC group, 3: LPS, 4: LPS+NAC). LPS was intravenously injected at the rate of 5mg/kg. NAC of 20mg/kg was injected into abdominal cavity 3, 6 and 12 hours after the injection of LPS. BAL fluids and lung tissues were obtained from individual rats. Using 100mg of lung tissues, the levels of NF-κb and lipid peroxidation (LPO) were measured.

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Results: Neutrophilic inflammations of the lung tissues and BAL fluids were the most severe in the LPS group. The amounts of NF-κB in the group 0 (3.2±0.23 ng/μl) showed statistically significant differences compared with the group 1 (p = 0.16±0.12 ng/μl, p < 0.003) and 4 (0.25±0.11 ng/μl) (p = 0.05). The amounts of LPO in the group 3 (5.29±3.76 mmol/ml) showed statistically significant differences compared with the group 1 (4.35±4.27 mmol/ml), 2 (4.99±5.06 mmol/ml) (p < 0.001) and 4 (7.65±6.24 mmol/ml) (p < 0.01). The calculated AUC of CRP values and SOFA scores on admission and 3rd day were 0,57 (CI:0.48-0,66); 0,72 (CI: 0,63-0,80); 0,72 (CI: 0,64-0,81); 0.81 (CI: 0.71-0.88) respectively. Sepsis due to nosocomial infection, on 3rd day CRP values especially >100mg/L are better mortality predictor than first day CRP and as valuable as SOFA scores in patients with severe sepsis.

Conclusion: N-Acetylcysteine has a protective effect to reduce acute lung injury stimulated by endotoxin and it is considered that the mechanism appears in relation to neutrophils that are mainly involved in lung injuries.

P1992
Mechanical properties of ALI/ARDS lung may be heterogeneous
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Introduction: ARDS is characterized by lung collapse which is partly reversible by the application of PEEP; it is common belief that recruited lung units resume normal gasto/tissue ratio and mechanical properties so that optimal PEEP can be set according to EELV and compliance changes.

Methods: We retrospectively analyzed 68 ALI/ARDS patients CT scans performed at 5 and 15 cmH2O PEEP [1]. Assuming that lung expansion while increasing PEEP is homogeneous, we divided each lung along the transverse, sagittal and coronal axes in order to obtain 125 parallelepipeds compartments with an average weight of 5 g and we estimated a surrogate compliance per gram of tissue as: (Δ Volume of gas/Δ PEEP)/gram of tissue. Each lung compartment was classified according to its gas/tissue ratio as shown in Table 1.

Results: In Table 1 we summarize the surrogate compliances as median [interquartile range]. As shown the median compliance of the well inflated tissue was almost double the compliance of the poorly inflated tissue while the surrogate compliance of the recruited lung units was between the surrogate compliance of well inflated and poorly inflated tissue.

Table 1. Specific lung tissue compliances

<table>
<thead>
<tr>
<th>Surrogate compliance</th>
<th>5-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not inflated (g/h &lt; 1)</td>
<td>0.00 [0.00 to 0.00]</td>
</tr>
<tr>
<td>Recruited 5-15</td>
<td>0.04 [0.02 to 0.10]</td>
</tr>
<tr>
<td>Poorly inflated (g/h &lt; 1)</td>
<td>0.033 [0.00 to 0.08]</td>
</tr>
<tr>
<td>Well inflated (1 g/h &lt; 9)</td>
<td>0.061 [0.00 to 0.15]</td>
</tr>
<tr>
<td>Over inflated (g/h &gt; 9)</td>
<td>0.132 [0.11 to 0.18]</td>
</tr>
</tbody>
</table>

Conclusions: As recruited regions while increasing PEEP reach a lower gas tissue ratio and a smaller compliance than well inflated tissue changes in compliance may not be used to estimate lung recruitment at bedside.


P1993
Lactate and lactate clearance were associated with higher mortality in patients with septic shock
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Introduction: An elevated lactate level is associated with higher mortality in patients with severe sepsis. Also, lactate clearance is a surrogate for magnitude and duration of global tissue hypoxia. However, the utility of the lactate clearance after ICU admission as an indicator of outcome in patients with septic shock is still limited.

Objectives: The purpose of study is to evaluate the advantage of lactate level and clearance in predicting mortality of patients with septic shock.

Methods: We prospectively enrolled 38 patients with septic shock in ICU at Phramongkutklao hospital. Measurements of venous lactate and ScvO2 were obtained at 0, 2, 6, 24, 48, and 72 hours after ICU admission. Lactate clearance was defined as the percent change in lactate levels after 2 or 6 hours from the baseline value.

The primary outcome was 28-day mortality rate.

Results: The 28-day mortality rate was 55.3%. There was no significant difference in 28-day mortality rate between normal ScvO2 (< 70%) group and low ScvO2 (< 70%) group at initial presentation. Using cut off value of 3 mmol/L, higher initial lactate level was significantly associated with higher 28-d mortality (p = 0.017). There was, also, significant association between lactate non-clearance (lactate clearance < 10%) at 2 and 6 hrs and higher 28-d mortality (p = 0.029 and 0.014).

Conclusions: Early lactate clearance may indicate a resolution of global tissue hypoxia and is associated with decreased mortality. Patients with higher lactate clearance after 2 and 6 hrs of ICU admission have improved outcome compared with those with lower lactate clearance. Also, initial lactate level was independently associated with 28-day mortality rate.

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