Levosimendan pretreatment improves systemic hemodynamics and metabolism during acute hypoxia in dogs
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Background and Goals: Impairment of patency of airways by blood and sputum in patients with Pulmonary Contusion (PC) reduces regional lung ventilation with increase of lung dyslectasis and intrapulmonary shunt. It creates conditions for infection. The most effective strategy of maintenance of patency of airways and prevention of atelectasis is the Fiberoptic bronchoscopy (FOBr) (1). The purpose of our research was estimation the role of early FOBr in prevention of nosocomial pneumonia (NP) in patient with PC.

Material and Methods: 158 patients with PC were observed. We used early FOBr (in first 3 days) in 82 patients. In 32 patients FOBr was done in deferred term (more than 3 days). The analysis of incidence of NP was done. Statistical analysis included Chi-square test, Kaplan&Meier method and Cox’s F-Test, p-value less than 0.05 was considered to indicate statistical significance.

Results: Total rate of NP was 14.6% (23 pts): 9.6% (8pts) in early FOBr group did not differ between groups (3.1 vs 0.4; etCO$_2$ 0.1 mmol/L), whereas lactate significantly increased (83 vs 41 mmol/L). The animals were randomized to undergo hypoxia (FiO$_2$ = 0.1) with or without LEVO pretreatment. LEVO pretreatment significantly improved systemic hemodynamics (CO = 104 vs 83 ml/kg/min), VO$_2$ = 35 mmHg), arterial lactate and lactic acid stress index (%E2) were 1.8 vs 1.7 mmol/L, whereas lactate significantly reduced in the noisy ventilated animals (p < 0.05).

Conclusion(s): Chaotic variation of tidal volumes adds further benefit to protective ventilation according to the open lung approach.

12AP1-6
Chotic variation of tidal volumes adds further benefit to the open lung approach in experimental acute lung injury

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Background and Goal of Study: Biological systems seems to benefit from chaotic variability. We tested if chaotic variation of tidal volumes (noisy ventilation) adds further benefit to a lung protective ventilatory strategy aimed at keeping the lungs open after a recruitment maneuver (open lung approach) in experimental acute lung injury.

Materials and Methods: Acute lung injury was induced in 12 pigs by repetitive saline lung lavage. Following injury, animals were randomly assigned to a standard lung protective therapy with (n = 6) or without (n = 6) administration of chaotic variable tidal volumes (mean VT = 6 ml/kg). Gas exchange, lung mechanics and hemodynamics were assessed. After 6 h, animals were killed and lung damage was evaluated histologically. Gas exchange and lung mechanics were tested with univariate analysis of variance, histological results were tested by means of the Mann-Whitney-U-Test.

Results and Discussions: Groups were comparable at baseline and after injury. Variables of gas exchange (PaO$_2$, PaCO$_2$, SvO$_2$), hemodynamics as well as peak and mean airway pressures did not differ significantly between groups. Mean lung elastance and alveolar stress index (%E2) were significantly reduced in the noisy ventilated animals (p < 0.05). Histological analysis of diffuse alveolar damage showed a trend toward better lung protection with noisy ventilation (p = 0.08), and less inflammatory infiltration was observed in noisy ventilated lungs (p < 0.05).

Conclusion(s): Chaotic variation of tidal volumes adds further benefit to protective ventilation according to the open lung approach.

12AP1-7
Livosimendan pretreatment improves systemic hemodynamics and metabolism during acute hypoxia in dogs

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Background and Goal of Study: Livosimendan (LEVO) improves regional tissue oxygenation under physiological, normoxic conditions, as we demonstrated recently [1]. It is unclear, however, if LEVO exerts beneficial effects also under pathological, hypoxic conditions, particularly in respect to systemic hemodynamics and metabolism. Thus we studied the effects of LEVO pretreatment during acute hypoxia on systemic hemodynamics and metabolism.

Materials & Methods: Chronically instrumented dogs (bodyweight ~30 kg, n = 10 experiments) were anesthetized (sevoflurane, 1.5 MAC) and mechanically ventilated (FiO$_2$ = 0.3; etCO$_2$ = 35 mmHg). The animals were randomized to undergo hypoxia (FiO$_2$ = 0.1 for 15 min) with or without LEVO pretreatment [1]. To assess systemic hemodynamics we measured cardiac output (CO), stroke volume (SV) and the iontopore marker dP/dTmax. To assess systemic metabolism, we measured O$_2$-consumption (VO$_2$, DeltatracII) and arterial lactate levels. Data are mean ± sem.

Results & Discussions: Hypoxia (FiO$_2$ = 0.1) reduced arterial PO$_2$ from ~130 mmHg to ~30 mmHg in both groups, i.e., hypoxia with and without LEVO pretreatment. LEVO pretreatment significantly improved systemic hemodynamics during hypoxia, i.e., CO (104 ± 4 vs 83 ± 5 ml/kg/min), SV (25.2 ± 1.7 vs 19.8 ± 1.2 ml) and dP/dTmax (553 ± 41 vs 377 ± 36 mmHg/sec). Interestingly, LEVO pretreatment prevented an increase in arterial lactate during hypoxia (1.8 ± 0.1 to 1.9 ± 0.1 mmol/L), whereas lactate significantly increased in the group without LEVO (1.7 ± 0.1 to 2.1 ± 0.1 mmol/L).

Conclusion(s): LEVO pretreatment markedly improved systemic hemodynamics during acute hypoxia, without increasing oxygen consumption. Furthermore, LEVO pre-treatment prevented the increase in arterial lactate levels during acute hypoxia, indicating an optimized O$_2$-distribution and/or utilization by LEVO. Thus, if our data apply to the clinical setting, LEVO pretreatment is a promising option to improve systemic hemodynamics without
increasing VO₂ and furthermore to optimize lactate balance in patients at risk of hypoxia.


12AP1-9
Comparative effect of acute hypoxia on contractile and energetic properties of diabetic diaphragm
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Background and Goal of Study: Hypoxia adversely affects respiratory muscle function. In the rat diaphragm, diabetes results in an increase in low (Type I) myosin heavy chain characterized by an aerobic metabolism. Therefore, a different effect of acute hypoxia between diabetic and control rat diaphragm could be hypothesized.

Materials and Methods: In vitro contractile and energetic properties were measured with ventral diaphragm strips obtained from 2 months streptozotocin-induced diabetic (4 mo old, n = 12) and control (4 mo old, n = 12) male Wistar rats submitted to acute hypoxia (Po₂ ~ 6 kPa). Data are mean ± SD and comparison between groups was performed using ANOVA.

Results and Discussions: Compared to control animals, diabetic rats were characterized by an increase in active force (100 ± 6 vs 79 ± 10 n m mm⁻²) associated with an increase in the total number of cross-bridges per sectional area (11.1 ± 1.2 vs 8.5 ± 1.3 10⁹ mm⁻²). Moreover a decrease in maximal unloaded shortening velocity was observed between diabetic and control rats (6.3 ± 0.9 vs 7.9 ± 1.0 Lmax x s⁻¹). Under hypoxia, diabetic rats were characterized by a slower decrease in active force and a faster recovery in re-oxygenation conditions (Figure).

Conclusion(s): These results suggest that diabetic induced modifications in diaphragm contractility are associated with a better resistance to acute hypoxia.

12AP2-1
High dependency care unit after major cancer surgery: medical and economic impact
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Background and Goal of Study: The intensity of care is part of a better post-surgery rehabilitation (1,2). The aim of this study was to evaluate the impact of the events which occurred were analysed in detail according to type, frequency, timing, etc.

Results and Discussions: Total 688 alerts generated over this period (9,88%), including 64 hard limit alerts (0,91%); nearly 10% of all events were for infusions attempted above hard max. limits, insulin and cordarone had ~68% of them. Analysis of events by day time, by week days and by months of study timeframe revealed typical risky periods, demanding modifications of working conditions. On the other hand our system prevented successfully all of 64 severe medication errors, including e.g.: 7 overdosing of cordarone 10–50 times the max. dose; 3 of vancomycin incl. one of 10 times the max. dose; 1 of morphine 5 times the max. dose; and 5 of dobutamine, one of 5 times the max. dose.

Conclusion: According to our data prevalence of IV medication errors is substantially high at an ICU. As without an automated documentation system far most of errors remain undiscovered and therefore unavailable, our data probably support the use of intelligent monitoring and warning devices as mandatory for prevention of potential harm of patients(3).

References:

12AP2-4
Weaning from mechanical ventilation: protocol vs physician decision
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Background and Goal of Study: Due to the increased risk of complications associated with prolonged mechanical ventilation (MV), early liberation from the ventilator is important and protocol directed weaning seems to be the answer (1). We decided to evaluate a ventilator weaning protocol in our intensive care unit (ICU) in terms of length of MV, ICU stay and reintubation rate.

Materials and Methods: After Ethical Committee approval, 103 patients starting MV (EVITA IV Dräger) were included over a 6 months period, being