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MEETING ABSTRACTS

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Best abstracts

000200

Protective mechanisms of CPAP on lungs and diaphragm in experimental Patient Self-Inflicted Lung Injury

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Introduction: Strong respiratory effort is recognized as a potential "second hit" in acute lung injury (ALI), introducing the concept of "patient self-inflicted lung injury" (P-SILI). We have previously reported that continuous positive airway pressure (CPAP) attenuates lung and diaphragm injury in P-SILI model.
Objectives: We aimed to investigate the effects of CPAP on respiratory distress symptoms, regional lung strain, and diaphragmatic contraction kinetics, in a preclinical ALI model.
Methods: Lung injury was induced in Sprague Dawley rats by surfactant depletion (saline lavage), followed by 3 h of unsupported or supported spontaneous breathing (Unassisted- and CPAP-groups). Respiratory distress symptoms, gas exchange, diaphragmatic ultrasound, micro-CT scans, and morphometric analysis of lungs and diaphragms were assessed.
Results: Compared with Unassisted-group, CPAP-group had: (1) Lower respiratory rate, nasal flaring, sternocleidomastoid and abdominal muscles use, minute ventilation (VE) and higher SpO2 at the end of the study (all $p < 0.05$). (2) A trend towards less volumetric strain progression in basal regions of the lungs. (3) A trend towards longer expiratory time and lower diaphragm contraction velocity. (4) Higher morphometric lung aeration ($p < 0.05$). (5) Higher morphometric diaphragm muscle area, and lower interstitial area ($p < 0.05$).
Conclusions: Unassisted spontaneous breathing induced lung and diaphragm structural damage, consistent with P-SILI and load-induced diaphragm injury models. CPAP reduced lung and diaphragmatic injury and improved respiratory distress symptoms and oxygenation. The reduction in respiratory distress symptoms and VE, the decrease in strain progression in juxta-diaphragmatic regions, and better diaphragm contraction kinetics, suggest that CPAP effectively reduced the respiratory drive.

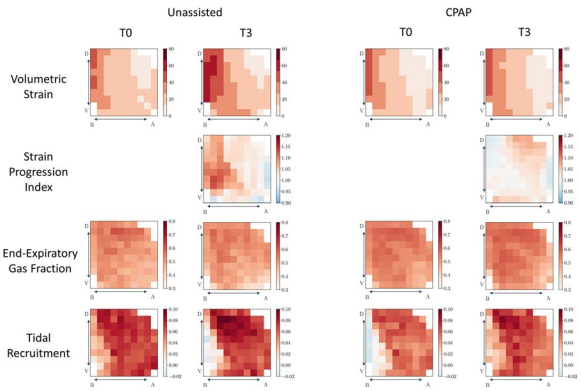

Fig. 1 (abstract 000200) Regions-of-interest (ROI) array heat maps in the apical–basal (A-B) and ventral–dorsal (V-D) directions at the beginning (T0) and the ending (T3) of the study. A) Regional volumetric strain. B) Strain progression index. C) Regional end-expiratory gas fraction. D) Regional tidal recruitment

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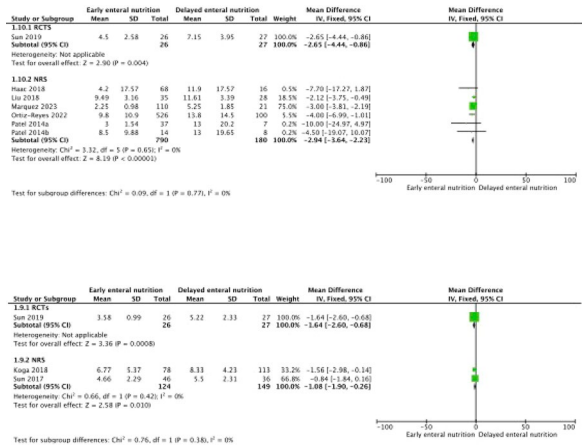

Topic: Metabolism, endocrinology, liver failure and nutrition

000017

The International, Prospective COSMOS (CytOSorb® TreatMent of Critically Ill PatientS) Registry: Interim results from the first 150 patients

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Introduction: The International COSMOS Registry tracks utilization patterns and clinical outcomes with real world use of the CytoSorb® (CS) hemoadsorption device in critical care settings.
Methods: Since July 2022, the International COSMOS Registry has been prospectively enrolling consecutive critically ill patients, including children, who undergo CS treatment as part of their standard care. Data was systematically gathered at multiple intervals, including 24 h before CS start, during CS treatment and 24 h post-CS treatment, upon intensive care unit (ICU) and hospital discharge, and final follow-up on day 90. Continuous variables were subjected to analysis via T-tests if the normal distribution assumption was met or Wilcoxon rank sum tests if not met, with findings presented as either mean ± standard deviation or median [interquartile range]. A p-value < 0.05 was used as the threshold for statistical significance.
Results: A total of 150 patients (33% female, age 59 ± 17 years) from 16 sites in Germany, Italy and Spain were included in this analysis. Indications for CS (multiple indications may apply for certain patients) included septic shock (57.6%), cardiogenic shock (12.9%), rhabdomyolysis (10.6%), acute/acute-on-chronic liver failure (10.6%), acute respiratory distress syndrome (6.8%), and others (9.1%). Median number of CS adsorbers used per patient was 2 [1, 3]. The platform used for integration of CS was renal replacement therapy (82.8%), standalone hemoperfusion (9.8%) and extracorporeal membrane oxygenation (7.4%).
Baseline median APACHE II score was 23 [17, 29] and median SOFA score was 12 [9, 15] with a median ICU-stay of 20 [11, 33] days. Compared to baseline, significantly lower plasma levels of lactate (p < 0.0001) and creatinine (p < 0.0001) were observed after CS, whereas albumin did not change (p = 0.574). In the septic shock cohort, median lactate decreased from 3.3 [1.8, 6.7] to 1.6 [1.2, 2.9] mmol/L (p < 0.0001). In patients with rhabdomyolysis (data from n = 9), median myoglobin also significantly decreased after CS from 18,976 [1934, 34275] to 835 [623, 5925] µg/L (p = 0.027). In the liver failure group, the decrease in bilirubin after CS from 7.28 [4.2, 15.5] to 6.11 [4.7, 8.6] mg/dL did not reach statistical significance (data from n = 12, p = 0.110). Median platelet count dropped significantly in the septic shock and liver failure cohorts whereas showed no significant change in the rhabdomyolysis cohort (p = 0.722). Median fluid balance decreased from + 1386 [220, 3168] mL in the 24 h period before CS treatment to + 275 [− 768, 1846] mL in the 24 h post CS treatment (p < 0.0001). Median norepinephrine dosage was reduced significantly from 0.31 [0.19, 0.55] to 0.20 [0.10, 0.36] µg/kg/min (p < 0.0001) (see Fig. 1). Also, oxygenation significantly improved over course of treatment, with a median PaO2/FiO2 ratio increase from 132 [68, 208] to 189 [115, 260] mmHg (p < 0.0001).
ICU-mortality rate was 35.0% in the overall cohort and 37.5% in the septic shock cohort and therefore lower than expected according to SOFA score.
Conclusions: The International COSMOS Registry provides real-world data showcasing a diverse range of indications and platforms for integrating the CS device. Compared to baseline, CytoSorb® treatment in addition to standard therapy was associated with significant reductions in lactate, creatinine, myoglobin, and the requirement for norepinephrine, leading also to significant improvements in fluid balance and arterial oxygenation. Observed mortality in the septic shock cohort compared favorably to risk score-based predicted values.
Trial registration: NCT05146336 on December 6, 2021.

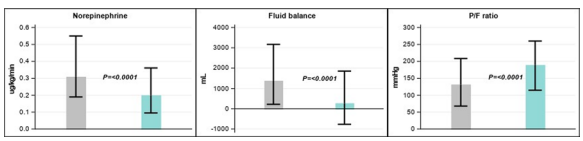

Fig. 1 (abstract 000017) Changes in norepinephrine, fluid balance and P/F ratio in 24 h periods before (grey) versus after CytoSorb® treatment (blue), data are presented as median and interquartile range

Reference(s)
1. COSMOS Registry is a company sponsored registry by CytoSorbents Corporation and CytoSorbents Medical Inc. TK and JS are full time employees of CytoSorbents Europe GmbH. WF and END are full time employees of CytoSorbents Inc.

Topic: Sepsis

000018

Sedation practices in patients intubated in the emergency department compared to the intensive care unit

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Introduction: Excessive sedation has been associated with adverse outcomes in critically ill patients. A previous study of mechanically ventilated patients in the emergency department (ED) revealed a high frequency of deep sedation in the ED which continued throughout the first 48 h of intensive care unit (ICU) admission.
Objectives: This study aimed to compare sedation management during and after intubation in the ED versus the ICU.
Methods: This was a single-center retrospective cohort study of adults intubated in the ED or in the ICU and received mechanical ventilation between Jan 2018 and Feb 2022. We collected data from the electronic medical record. The primary outcome was duration from intubation to first documentation of light sedation, defined as Sedation Agitation Scale score (SAS) of 3–4.
Results: The study included 264 patients (median age 63 yr, 58% male), with 95 (36%) intubated in the ED and 169 (64%) in the ICU (Table 1). Rapid sequence induction was significantly more frequent in the ED compared to the ICU (82.1% vs. 30.2%, $p<0.001$). Higher doses of sedatives and neuromuscular blocking agents were used for intubation in the ED, while no significant difference in opioid dosage was found. Regarding anesthetic agents used for intubation, ketamine was the most commonly used drug in the ED and was used more frequently than in the ICU (61% vs 40%, $p=0.001$). Propofol was the predominant sedative used in the ICU, with a higher prevalence compared to the ED (50% vs 33%, $p=0.01$). After intubation, opioids were less commonly used (25.3% vs. 68.6%, $p<0.001$), while ketamine and benzodiazepines were more frequently used (16.8% vs 4.7%, $p=0.001$; and 33.7% vs. 8.3%, $p<0.001$, respectively) in the ED compared to the ICU (Table 2). Within 24 h after intubation, 68% (65/95) ED patients and 82% (138/169) patients intubated in ICU achieved light sedation, with median durations of 13.5 h and 10.5 h. Patient location in the ED at intubation was associated with decreased probability of achieving light sedation at 24 h (adjusted odds ratio 0.64, $p=0.04$) (Fig. 1). Furthermore, deep sedation (SAS 1 or 2) was more frequently observed in the ED group at all time points, especially at 12 and 48 h (60.2% vs. 46.3%, $p=0.03$; and 26.5% vs. 13.0%, $p=0.02$, respectively) (Fig. 2).

Table 1 (abstract 000018) Baseline patient characteristics

Variables	ED (*N* = 95)	ICU (*N* = 169)	*P* value
Age (year), mean (SD)	56 (21)	63 (15)	0.004
Male sex, *n* (%)	55 (58)	98 (58)	0.99
BMI (kg/m^2), median (IQR)	26 (21–28)	26 (23–31)	0.30
APACHE II, median (IQR)	22 (17–27)	22 (17–27)	0.80
baseline GCS <, = 8, *n* (%)	61 (68)	36 (25)	< 0.001
Reason for intubation, *n* (%)	8 (8)	11 (7)	0.56
Airway obstruction	25 (26)	107 (63)	< 0.001
Respiratory failure	4 (4)	4 (2)	0.40
Cardiogenic shock	46 (48)	22 (13)	< 0.001
Neurological dysfunction	3 (3)	24 (14)	0.004
Sepsis			

Table 2 (abstract 000018) Anesthetic agents used for peri-intubation in the ED versus ICU

Drug types	ED (*N* = 95)	ICU (*N* = 169)	*P* value	ED (*N* = 95)	ICU (*N* = 169)	*P* value
Intubation period	During			After		
Opioids	9 (9.5)	115(68)	< 0.001	24 (25.3)	116 (68.6)	< 0.001
Ketamine	58 (61.1)	68 (40.2)	0.001	16 (16.8)	8 (4.7)	0.001
Propofol	31 (32.6)	85 (50.3)	0.01	48 (50.5)	110 (65.1)	0.02
BZD	6 (6.3)	66 (39.1)	< 0.001	32 (33.7)	14 (8.3)	< 0.001
Rocuronium	44 (46.3)	64 (37.9)	0.18	–	–	–

Data are shown as N (%) or median (IQR), BZD = benzodiazepine.

Conclusions: Critically ill patients intubated in the ED are at risk of deeper sedation and a longer time to achieve light sedation compared to patients intubated in the ICU.

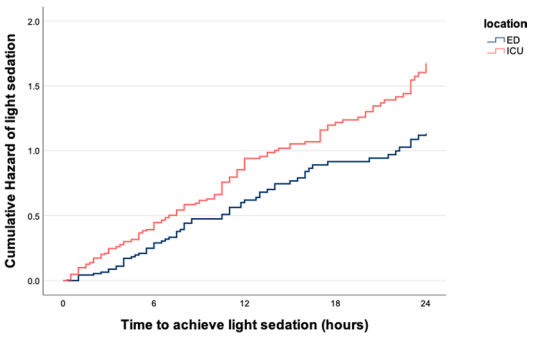

Fig. 1 (abstract 000018) Cumulative hazard of the time to achieve light sedation at 24 h, by patients' location of intubation