P0102
Poster Session I
Animal models: treatment

PREVENTION OF ENDOTRACHEAL TUBE BIOFILM DEVELOPMENT THROUGH A NOVEL CLOSED SUCTIONING CATHETER IN A PIG MODEL OF PSEUDOMONAS AERUGINOSA SEVERE PNEUMONIA

L. Fernandez-Barat[1], G. Li Bassi[1], E. Aguilera[1], J.D. MartÌ[1], D. Wyncoll[2], G. Ntoumenopoulos[3], M. Rigol[1], T. Comaru[1], F. De Rosa[4], A. Torres[5]

[1]Applied Research in Respiratory Diseases, Ciberes-IDIBAPS Hospital Clinic, Barcelona, Spain ; [2]NHS Foundation Trust, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom ; [3]Australian Catholic University, School of Physiotherapy, Sydney, Australia ; [4]Università degli studi di Milano, Dipartmento di Anestesia e Rianimazione, Milano, Italy ; [5]Pneumology Service at Thorax Institute and Applied Research in Respiratory Diseases, Hospital Clinic IDIBAPS Ciberes, Barcelona, Spain

OBJECTIVES. We tested the efficacy of a novel closed suctioning catheter (CSC) developed to mechanically remove endotracheal tube (ETT) biofilm through high-pressure jets of sterile saline and an inflatable balloon, in a pig model of severe *Pseudomonas aeruginosa* pneumonia (1).

METHODS. We studied 14 pigs (32.6±2.8 Kg). In 7 animals (control group) we performed tracheal suctioning through the KIMVENT* CSC (Kimberly Clark, USA); in 7 animals (study group) tracheal suctioning was carried out with the novel CSC (Airway Medix Closed Suction System, Biovo Technologies, Israel). Upon suctioning, the novel CSC was advanced up to the proximal trachea to aspirate retained secretions. Then, the CSC was pulled back to the tip of the ETT and the balloon inflated to adhere against the ETT wall. Finally, the CSC was withdrawn, while saline jets and aspiration operated simultaneously. Upon autopsy - following 76h from intubation and mechanical ventilation - the animal was extubated and the ETT longitudinally cut open. Two 1 cm-long hemi-sections of the distal part of the ETT were dissected for qualitative and quantitative analyses of representative biofilm accumulations, through confocal laser and scanning electron microscopy (CLSM and SEM). Biofilm maximal and minimal thickness were computed (ImageJ, NIH, Bethesda, MD, USA) through CLSM and SEM analysis. Biofilm area was computed through analysis of CLSM cross-section ETT images. Biofilm stage (I-IV) was assessed through SEM. During the analyses, investigators were blind to treatment allocation.

RESULTS. In the control and study group 7.9±4.7 and 7.8±3.5 tracheal aspirations/day were performed, respectively (p=0.97). 14 ETTs were analyzed through CSLM. We found, in the control group, a mean biofilm area of 4.3±0.5, vs. 3.7±0.9 log μm^2 in the study group (p=0.01). In the control and study groups, the CSLM maximal biofilm thickness was 151.2±250.8 and 92.7±112.9 µm, respectively (p=0.08). The CSLM minimal biofilm thickness in the control group was 51.9±120.8 µm and 23.3±71.3 µm, respectively (p=0.01). 12 ETTs were analyzed through SEM. The SEM maximal biofilm thickness in the control and study groups were 74.6±57.2 and 53.1±57.9 µm, respectively (p=0.29). The SEM minimal biofilm thickness in the control group was 33.9±30.9 µm and 10.1±14.5 µm in the study group (p=0.01). Biofilm stage in the control group was 3.0±0.8; whereas in the treatment group was 2.3±1.3 (p=0.02)

CONCLUSIONS. During severe *P.aeruginosa* pneumonia, the novel CSC substantially decreases ETT biofilm formation, limiting biofilm development to the initial stages.

REFERENCES. 1) Luna CM et al. Chest 132(2):523-31.

GRANT ACKNOWLEDGMENT. Biovo Technologies Inc.