Category : **Respiratory: airway management/CPAP**
A120 - *Efficacy and safety of trachflush artificial cough maneuver for fluid removal in simulated breathing*

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Introduction:

Suctioning through the endotracheal tube (ETT) to remove secretion has several side effects. TrachFlush (AW Technologies) applies a method for secretion removal by Zanella et al. [1] by artificial coughs (ACs) implemented by rapid ETT cuff deflation/inflation during inspiration. Peak airway flow (Q_{peak}) ≥60 L/min is necessary to displace secretion [2]. Zanella et al. showed at peak inspiratory pressure (PIP) of 30-40 cmH_2O AC Q_{peak}≥60 L/min and safe fluid removal with no aspiration. This study evaluated TrachFlush performance at PIP of 20-40 cmH_2O.

Methods:

Nine scenarios were simulated with 3 PIP (20, 30 and 40 cmH_2O) and 3 lung conditions (healthy, low compliance (C_{RS}) and high resistance (R_{AW})). An artificial lung (QuickLung Breather, IngMar Medical) was ventilated in pressure control (PC) (RR=7 min^{-1}, I:E=1:2, PEEP=5 cmH_2O) via a Ø=7.5 mm ETT in an artificial trachea (25 cm, Ø=19 mm PVC tube) with resistance 3.7 cmH_2O/L/s at 60L/min. Q_{peak} was measured with the trachea horizontal during 5 ACs. We analysed the middle 3 ACs. Fluid removal and aspiration at PIP 20 and 30 cmH_2O were visually assessed over 3 ACs, with trachea horizontal and 2 mL dyed saline injected between ETT cuff and lung or trachea at 45° and 2 mL saline injected above cuff, respectively.

Results:

The figure shows effect of PIP and lung condition (C_{RS} and R_{AW} in cmH_2O and L/cmH_2O/s) on Q_{peak} and AC time with Q≥60 L/min. Q_{peak}≥60 L/min for >0.5 s in all scenarios. PIP and lung condition (p<0.01) were important linear regression predictors for Q_{peak} (multivariate model adjusted R^2=0.873, p<0.001). The saline was fully removed in all scenarios, and no fluid aspiration was observed in any of the scenarios.
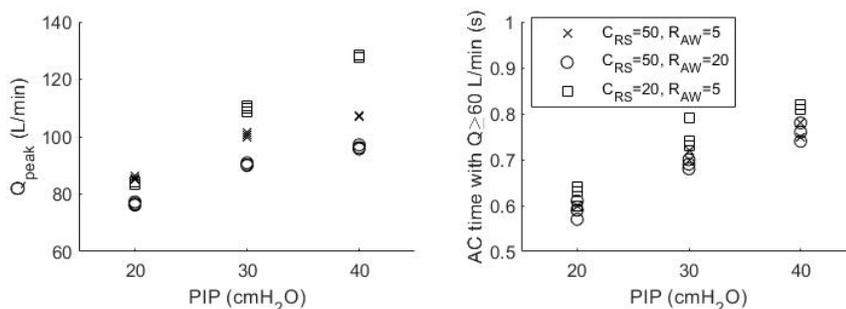
Conclusion:

The TrachFlush AC produced sustained and sufficient Q_{peak} for secretion removal and removed saline and avoided aspiration in all simulated scenarios.

References:

[1]: Zanella A et al. Respir Care 64:372-83, 2019.
[2]: Volpe MS et al. Respir Care 53:1287-94, 2008.

Image :

AC Qpeak and time with Q≥60 L/min vs PIP and lung condition (healthy (x), low compliance (o) and high resistance (squares)).