A new Spacer for pMDI and nebulizers in mechanical ventilation.

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Introduction

To administer aerosol medication in mechanical ventilation, different devices can be used either nebulizers or pressurized metered dose inhaler (pMDI). The pMDI is recommended to be used with a spacer and nebulizer is used with a T-adapter. A new chamber has been developped avoiding different connectors for different aerosol generators and to increase aerosol delivery.

The objective of this study was to evaluate the effectiveness of a inhalation chamber prototype called Combihaler compared to a T piece for nebulizer and pMDI.

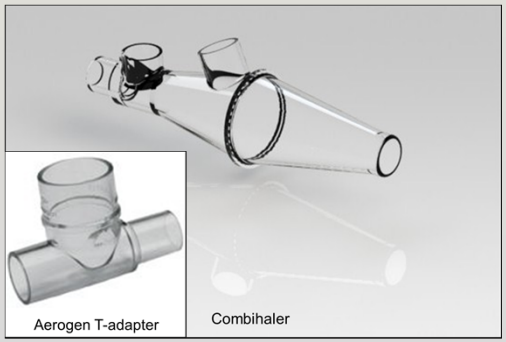
Materials

In this study, two devices were compared for nebulization:

-Aerogen T-adapter (Aerogen, Ireland).

-Inhalation chamber prototype called Combihaler.

1g of amikacin/8ml was loaded into the Aeroneb Solo (Aerogen, Ireland) nebulizer reservoir.



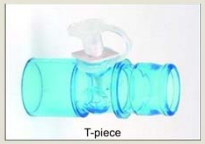
Materials

In addition, two devices were compared for use with a pMDI :

- T-piece (Allegiance Healthcare Corporation, USA).

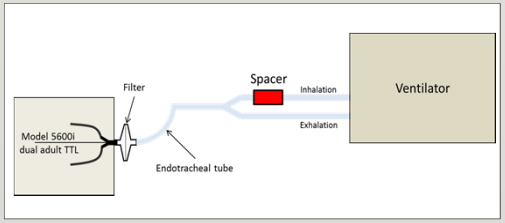
- Inhalation chamber prototype called Combihaler.

- Ventoline 100 µg/dose (GlaxoSmithKline, France).



Method

-To assess the Combihaler chamber in clinical conditions, assembly below including a Servo ventilator 300 (Siemens, France) (Volume controlled, Vc = 450mL, f = 15/min, PEEP = 6, P max = 19, ratio between the inspiratory time and the expiratory time = 40/60) and a model of adult lung Dual TTL model 5600i (Michigan Instruments) was used.

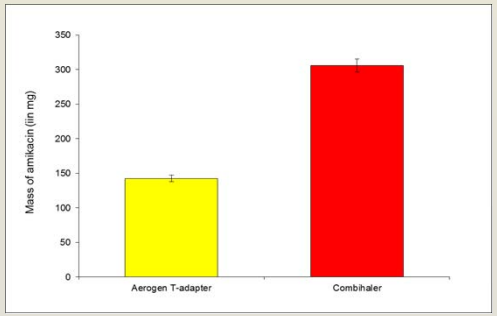


- A filter was placed after the endotracheal tube to measure the delivered aerosol

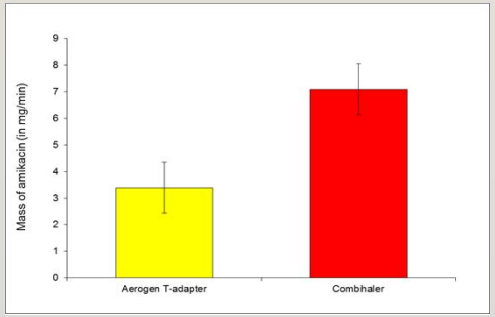
-Values, expressed as mean +/- SEM, were compared using one-way ANOVA.

Results

After nebulization, the mass of amikacin deposited on the filter was twice higher with the Combihaler chamber compared with the Aerogen T-adapter (305.6±9.3 mg vs 142.4±4.9 mg).



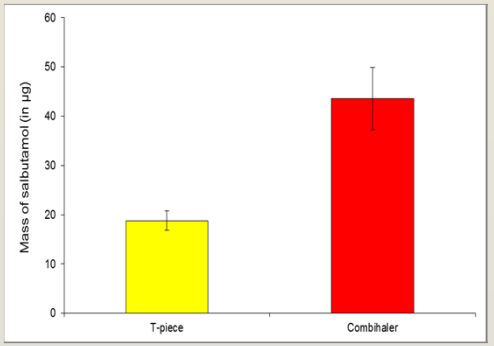
The nebulization time was identical with the spacer and the T-adapter.



In addition, the output rate of amikacin was higher with the Combihaler chamber compared to the Aerogen T-adapter (7.1±0.2 mg/min vs 3.4±0.2 mg/min).

Results

The mass of salbutamol deposited on the filter was higher with Combihaler chamber in comparison with T-piece (43.5±6.3 µg vs 18.8±1.9 µg).



Discussion

The results shown that an inhalation chamber was more effective than a T-piece for nebulizer and pMDI,

Conclusion

In conclusion, the new prototype of inhalation chamber allows the efficiency of aerosol delivery for both pMDI and nebulizer in invasive mechanical ventilation.

The use of the new prototype of inhalation chamber increases by a factor 2 the aerosol delivery by mesh nebulizer and pMDI in comparison with the use of a standard T piece.