AMOUNT OF CONDENSATION IN THE LIMB OF HIGH-FLOW NASAL CANNULA THERAPY: A BENCH STUDY

1. Medical Equipment Center, Tokushima University Hospital, Tokushima Japan
2. Faculty of Medicine, Tokushima University, Tokushima, Japan
3. Emergency and Critical Care Medicine, Tokushima University, Tokushima Japan

Yusuke Chikata¹, Kazuaki Unai², Mutsuo Onodera³, Masaji Nishimra³
Background

• High-flow nasal cannula (HFNC) therapy is popular for patients with acute respiratory failure.

• HFNC therapy provides better humidification than conventional oxygen therapy.

• Vapor is lost in an inspiratory limb as condensation resulting in inadequate humidification.

• We investigated if brand of limb, HFNC gas flow and environment temperature influenced on amount of dew condensation in the limb.
Investigated HFNC limbs

RT202
(Fisher & Paykel)

Flex 22mm single limb heating;
SLH
(Intersurgical)
Experimental settings

Environment temperature  20, 25 °C

HFNC flow  20, 40, 60 L/min
F_I O_2  0.21

invasive mode  (40 °C /-3)
Methods

1. Before starting the experiment, inspiratory limb was separated from the water chamber and prongs.
2. Sealed at both ends with cellophane wrap and weighed on digital scale.
3. After 3, 6 and 24 h, inspiratory limbs were separated from the water chamber and prongs, and the ends were sealed again.
4. Each limb was weighed so that amount of condensation in the limb was calculated.
Amount of condensation at 3, 6 and 24 h in the limbs

Temperature of 25 °C

Temperature of 20 °C

Period

(g)

3 6 24

3 6 24

(h)

(h)
Effect of HFNC gas flow on amount of condensation at 20 °C

![Graph showing the effect of HFNC gas flow on amount of condensation at 20 °C. The x-axis represents flow rates (L/min) ranging from 20 to 60, and the y-axis represents the amount of condensation in grams (g). The graph compares SLH and RT202 groups.]
Discussion 1

- Amount of condensation in RT202 was greater than in SLH at 20°C.
- Thermographic imaging (right) exhibits warm air zone between sleeve and limb in SLH.
Discussion 2

• Amount of condensation was greater at 20 °C than at 25°C significantly.
• As HFNC gas flow increased, residence time of gas in the limb decreased. Therefore, as HFNC gas flow increased, amount of condensation decreased in RT202.
Conclusions

• We investigated if brand of limb, HFNC gas flow and environment temperature influenced on amount of dew condensation in the limb.
• Low environment temperature influenced amount of dew condensation in the limb significantly.
• The limb with plastic sleeve reduced amount of dew condensation.