

Supplementary Materials: NIV Is not Adequate for High Intensity Endurance Exercise in COPD

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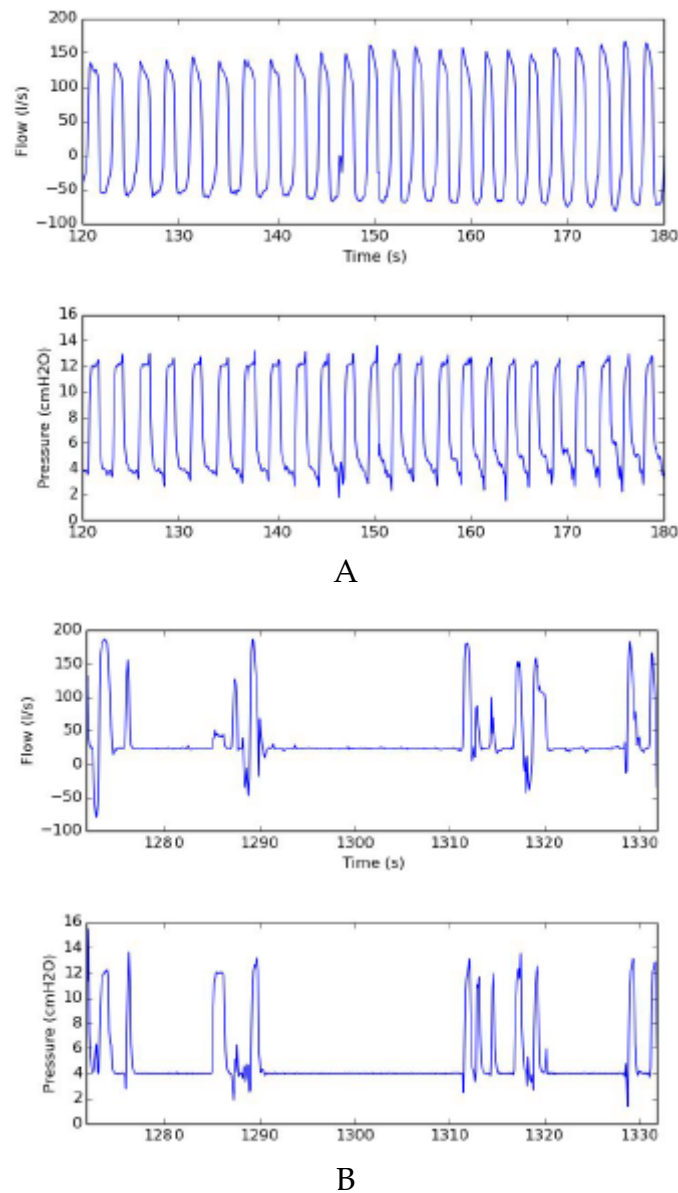


Figure S1. Comparison in ventilatory dynamic between the beginning (A) and the end (B) of exercise in a representative subject with nasal mask. The occurrence of ineffective effort at the end of exercise is in coherence with mouth leaks.

Table S1. Noninvasive ventilation settings.

Variables (Units)	Interface		Between-Group Comparison
	Oronasal Mask (<i>n</i> = 21)	Nasal Mask (<i>n</i> = 21)	<i>p</i>
Inspiratory support (cmH ₂ O)	8 (8–10)	10 (8–10)	NS
Expiratory positive airway pressure (cmH ₂ O)	4 (4–5)	4 (4–5)	NS
Slope	1 (1–3)	1 (1–2)	NS

Values expressed as medians (25th–75th percentile). NS, not significant.

Table S2. Comparison in flow and pressure between the beginning and the end of exercise.

Variable, (Units)	Moment During Exercise		Intra-Group Comparison
	First Minute	Last Minute	<i>p</i>
Fini (L/min)			
Oronasal interface, <i>n</i> = 17	33.2 (26.2–39.4) ^b	75.9 (44.6–109.2) ^b	<i>p</i> < 0.01
Nasal interface, <i>n</i> = 15	41.5 (22.2–49.0) ^b	38.0 (30.8–58.7) ^b	NS
Between-group comparison, <i>p</i>	NS	<i>p</i> < 0.05	
Fmax (L/min)			
Oronasal interface, <i>n</i> = 17	149.2 (124.7–174.7) ^b	214.0 (200.2–230.2) ^b	<i>p</i> < 0.01
Nasal interface, <i>n</i> = 15	128.1 (99.9–148.6) ^b	132.1 (110.5–179.0) ^b	<i>p</i> < 0.01
Between-group comparison, <i>p</i>	<i>p</i> < 0.05	<i>p</i> < 0.01	
Pinspi (cmH₂O)			
Oronasal interface, <i>n</i> = 17	10.0 (9.3–11.8) ^b	8.7 (8.5–10.5) ^b	<i>p</i> < 0.01
Nasal interface, <i>n</i> = 15	10.3 (2.8) ^a	10.3 (2.4) ^a	NS
Between-group comparison, <i>p</i>	NS	NS	
Pmax (cmH₂O)			
Oronasal interface, <i>n</i> = 17	13.9 (2.0) ^a	14.7 (2.1) ^a	<i>p</i> < 0.01
Nasal interface, <i>n</i> = 15	13.7 (3.1) ^a	14.3 (3.2) ^a	<i>p</i> < 0.05
Between-group comparison, <i>p</i>	NS	NS	
Pmin (cmH₂O)			
Oronasal interface, <i>n</i> = 17	4.3 (0.6) ^a	3.3 (0.7) ^a	<i>p</i> < 0.01
Nasal interface, <i>n</i> = 15	4.1 (0.6) ^a	3.8 (0.5) ^a	<i>p</i> < 0.05
Between-group comparison, <i>p</i>	NS	<i>p</i> < 0.05	
Pdiff (cmH₂O)			

Oronasal interface, n = 17	9.6 (2.1) ^a	11.4 (2.2) ^a	$p < 0.01$
Nasal interface, n = 15	9.6 (2.8) ^a	10.5 (2.9) ^a	$p < 0.01$
Between-group comparison, p	NS	NS	

^aValues expressed as means (SD). ^bValues expressed as medians (25th–75th percentile). Fini: flow at the beginning of the cycle; Fmax: maximal flow; Pinspi: mean inspiratory pressure; Pmax: maximal pressure; Pmin: minimal pressure; Pdiff: differential pressure. NS, not significant.

Table S3. Comparison of flow and pressure between subjects with IE AI $\leq 10\%$ or $> 10\%$ for nasal interface.

Variables (Units)	Proportion of Ineffective Effort Asynchrony Index (%)		Between- Group Comparison
	$\leq 10\%$ (n = 8)	$> 10\%$ (n = 7)	p
P _{inspi,beg} (cmH ₂ O)	11.3 (9.7–14.4)	8.6 (8.2–9.2)	$p < 0.05$
P _{inspi,end} (cmH ₂ O)	10.3 (8.0–13.3)	9.1 (8.9–10.0)	NS
P _{min,var} (cmH ₂ O)	−0.47 (−0.6–−0.28)	0.00 (−0.12–0.01)	$p < 0.05$
IRR _{var}	7.4 (5.5–13.0)	3.4 (−1.8–5.3)	NS
Leaks (L/min)	8.2 (4.5–14.4)	25.6 (10.8–32.1)	$p < 0.05$
F _{ini,beg} (L/min)	22.2 (19.3–23.2)	48.9 (46.2–51.8)	$p < 0.01$
F _{ini,var} (L/min)	15.0 (9.3–43.3)	−10.5 (−12.9–2.6)	$p < 0.01$
F _{ini,end} (L/min)	39.5 (29.3–58.1)	37.7 (32.9–48.9)	NS
F _{max,beg} (L/min)	142.7 (132.2–148.9)	102.8 (91.4–118.5)	NS
F _{max,end} (L/min)	179.0 (171.4–181.2)	110.5 (101.4–126.0)	$p < 0.01$
F _{max,var} (L/min)	36.3 (31.5–45.2)	1.9 (−3.6–12.5)	$p < 0.05$
F _{diff,beg} (L/min)	112.8 (106.5–126.3)	50.1 (42.9–78.0)	$p < 0.01$
F _{diff,end} (L/min)	122.3 (104.8–143.2)	72.8 (61.8–74.8)	$p < 0.01$
τ_{beg} (ms)	447.4.8 (438.1–488.8)	425.0 (376.2–461.8)	NS
τ_{end} (ms)	448.2 (403.0–496.3)	432.7 (356.9–513.66)	NS

Values expressed as medians (25th–75th percentile). Pinspi: mean inspiratory pressure; beg: outcome assessed at the beginning of exercise; Pmin: minimal pressure; var: difference between the end minus the beginning of exercise; IRR: instantaneous respiratory rate; Fini: flow at the beginning of the cycle; end: outcome assessed at the end of exercise; Fmax: maximal flow; Fdiff: differential flow; τ : pressure rise time. NS, not significant.

Table S4. Comparison of cycle time, instantaneous respiratory rate and Ti/Ttot between interfaces.

Variables (Units)	Interface		Between-Group Comparison <i>p</i>
	Oronasal Mask (<i>n</i> = 21)	Nasal Mask (<i>n</i> = 21)	
IRR _{mean}	25.5 (4.9) ^a	23.7 (4.6) ^a	<i>p</i> < 0.05
IRR _{var}	7.1 (5.2) ^a	4.3 (5.9) ^a	NS
CT _{mean}	2.2 (2.2–2.8) ^b	2.6 (2.3–2.9) ^b	<i>p</i> < 0.05
Ti/Ttot _{mean} (%)	29.2 (0.1) ^a	29.3 (0.1) ^a	NS
τ _{mean} (ms)	458.8 (419.5–530.1) ^b	477.1 (448.7–497.7) ^b	NS

^aValues expressed as mean (SD). ^bValues expressed as medians (25th–75th percentile). IRR: instantaneous respiratory rate; CT: cycle time; Ti/Ttot: ratio between inspiratory time and total time; τ: pressure rise time. NS, not significant.