**Supplementary files**

**Title:**

Continuous positive airway pressure-related aerophagia in obstructive sleep apnea: results from the InterfaceVent real-life study.

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**Supplementary file S1.** Univariate logistic regression analysis on potential predictors of aerophagia.

| Variable | N | OR[1] | 95% CI[1] | p-value |
|---|---|---|---|---|
| **Age (years)** | 1 461 | 0.97 | 0.95, 0.98 | **<0.001** |
| **Age (years)** | 1 461 | | | **0.003** |
| [27,63] | | — | — | |
| (63,71] | | 0.50 | 0.32, 0.80 | |
| (71,95] | | 0.53 | 0.34, 0.84 | |
| **BMI (kg/m²)** | 1 307 | 0.96 | 0.92, 0.99 | **0.014** |
| **BMI (kg/m²)** | 1 307 | | | 0.079 |
| < 25 kg/m² | | — | — | |
| 25 to 30 kg/m² | | 0.51 | 0.28, 0.94 | |
| ≥ 30 kg/m² | | 0.52 | 0.30, 0.92 | |
| **Gender (women)** | 1 461 | 1.96 | 1.34, 2.87 | **<0.001** |
| **Diagnostic AHI (events/h)** | 1 305 | 0.99 | 0.98, 1.00 | 0.229 |
| **Diagnostic AHI (events/h) (More than 30)** | 1 305 | 0.47 | 0.30, 0.76 | **0.003** |
| **Active smokers** | 1 435 | 1.47 | 0.88, 2.47 | 0.160 |
| **Active workers** | 1 415 | 2.46 | 1.65, 3.67 | **<0.001** |
| **Presence of partner** | 1 434 | 0.90 | 0.60, 1.36 | 0.623 |
| **ESS (0-24 score)** | 1 461 | 1.07 | 1.03, 1.11 | **<0.001** |
| **RES** | 1 461 | 1.55 | 0.99, 2.44 | 0.065 |
| **Problems with mobility** | 1 405 | 0.76 | 0.47, 1.22 | 0.241 |
| **Problems with self-care** | 1 392 | 0.83 | 0.35, 1.95 | 0.660 |
| **Problems with usual activities** | 1 401 | 0.98 | 0.61, 1.58 | 0.936 |
| **Problems of pain/discomfort** | 1 410 | 1.17 | 0.80, 1.73 | 0.418 |
| **Problems of anxiety/depression** | 1 410 | 2.34 | 1.59, 3.43 | **<0.001** |
| **EQ-5D-3L health VAS (0-100 score)** | 1 367 | 1.00 | 0.99, 1.01 | 0.824 |
| **CPAP-usage (h/day)** | 1 461 | 0.86 | 0.78, 0.95 | **0.004** |
| **CPAP-usage (h/day)** | 1 461 | | | **0.001** |
| ≥ 8 | | — | — | |
| [6,8) | | 2.80 | 1.45, 5.39 | |
| [4,6) | | 3.14 | 1.57, 6.30 | |
| [0,4) | | 3.64 | 1.58, 8.38 | |
| **Non-adherence** | 1 461 | 1.49 | 0.81, 2.75 | 0.217 |
| **Current $AHI_{flow}$ (events/h)** | 1 457 | 0.92 | 0.85, 1.00 | **0.020** |
| **Treatment duration (years)** | 1 416 | 0.96 | 0.93, 1.00 | **0.042** |
| **Mean pressure ($cmH_2O$)** | 1 441 | 1.06 | 0.97, 1.15 | 0.202 |
| **Mean pressure ($cmH_2O$)** | 1 441 | | | **0.009** |
| [4,6) | | — | — | |
| [6,8) | | 2.08 | 0.95, 4.54 | |
| [8,10) | | 1.99 | 0.90, 4.38 | |
| [10,12) | | 2.85 | 1.29, 6.28 | |
| ≥ 12 | | 0.53 | 0.11, 2.54 | |
| **90th/95th pressure ($cmH_2O$)** | 1 408 | 1.08 | 0.99, 1.17 | 0.091 |
| **90th/95th pressure ($cmH_2O$)** | 1 408 | | | 0.065 |
| ≥ 12 | | — | — | |
| [10,12) | | 1.30 | 0.76, 2.23 | |
| [8,10) | | 0.90 | 0.49, 1.64 | |
| [6,8) | | 0.86 | 0.43, 1.69 | |
| [4,6) | | 0.00 | 0.00, Inf | |
| **Fixed pressure** | 1 460 | 0.79 | 0.44, 1.44 | 0.427 |
| **Comfort mode** | 1 461 | 1.35 | 0.84, 2.16 | 0.227 |
| **Heated humidifier** | 1 461 | 1.76 | 1.17, 2.64 | **0.005** |
| **Heated breathing tube** | 1 461 | 2.37 | 1.17, 4.81 | **0.028** |
| **Type of mask** | 1 461 | | | 0.335 |
| Nasal | | — | — | |
| Nasal pillows | | 0.85 | 0.49, 1.48 | |
| Oronasal | | 1.27 | 0.84, 1.92 | |
| **Mask availability since 2013, n (%)** | 1457 | 1.45 | 1.00, 2.10 | 0.053 |
| **Unintentional leaks (l/min)** | 881 | 0.97 | 0.94, 1.01 | 0.096 |
| **Unintentional large leaks (%)** | 398 | 0.96 | 0.86, 1.07 | 0.347 |
| **Global leaks (l/min)** | 148 | 1.02 | 0.96, 1.08 | 0.584 |
| **Global large leaks (%)** | 137 | 1.01 | 0.93, 1.09 | 0.881 |

[1]OR = Odds Ratio, CI = Exact Confidence Interval

**Supplementary file S2.** Multivariable logistic regression analysis on predictors of aerophagia.

| Variable | OR[1] | 95% CI[1] | p-value | VIF |
|---|---|---|---|---|
| **Mean pressure (cmH2O)** | 1.13 | 1.03, 1.24 | **0.014** | 1.10 |
| **BMI (kg/m²)** | 0.92 | 0.89, 0.96 | **<0.001** | 1.11 |
| **Age (years)** | 0.95 | 0.94, 0.97 | **<0.001** | 1.08 |
| **Gender** | | | | 1.05 |
| Men | — | — | | |
| Women | 2.07 | 1.34, 3.19 | **0.001** | |
| **Problems of anxiety/depression** | | | | 1.04 |
| no problems | — | — | | |
| problems | 2.04 | 1.33, 3.11 | **<0.001** | |
| **Heated humidifier** | | | | 1.01 |
| No | — | — | | |
| Yes | 1.83 | 1.16, 2.89 | **0.009** | |

[1]OR = Odds Ratio, CI = Exact Confidence Interval

**Supplementary file S3.** Mask related side effects according to presence of aerophagia in patient with a VAS score ≥ 1.

| Variable | No aerophagia, N = 1 340 | Aerophagia, N = 121 | p-value | q-value[1] |
|---|---|---|---|---|
| **Patient-reported leaks, n (%)** | 978 (74.15) | 105 (86.78) | **0.002** | **0.004** |
| **Partner-disturbing leaks, n (%)** | 667 (54.49) | 69 (63.30) | 0.076 | 0.076 |
| **Noisy mask, n (%)** | 762 (57.81) | 83 (69.17) | **0.016** | **0.021** |
| **Heavy mask, n (%)** | 476 (35.98) | 56 (47.06) | **0.016** | **0.021** |
| **Mask pain, n (%)** | 401 (30.20) | 57 (48.31) | **<0.001** | **<0.001** |
| **Mask injury, n (%)** | 354 (26.72) | 42 (35.29) | **0.045** | **0.048** |
| **Harness pain, n (%)** | 343 (25.95) | 49 (41.18) | **<0.001** | **0.001** |
| **Harness injury, n (%)** | 279 (21.18) | 40 (33.33) | **0.002** | **0.004** |
| **Red eyes, n (%)** | 463 (35.02) | 55 (45.83) | **0.018** | **0.021** |
| **Itchy eyes, n (%)** | 458 (34.62) | 59 (50.00) | **<0.001** | **0.002** |
| **Dry nose, n (%)** | 700 (52.95) | 83 (70.34) | **<0.001** | **0.001** |
| **Stuffed nose, n (%)** | 529 (40.41) | 65 (53.72) | **0.004** | **0.007** |
| **Runny nose, n (%)** | 458 (34.62) | 58 (48.74) | **0.002** | **0.004** |
| **Dry mouth, n (%)** | 917 (69.16) | 104 (85.95) | **<0.001** | **<0.001** |

[1]Fasle discovery rate correction

**Supplementary file S4.** Mask related side effects according to presence of aerophagia in patient with a VAS score ≥ 5.

| Variable | No aerophagia, N = 1 340 | Aerophagia, N = 121 | p-value | q-value[1] |
|---|---|---|---|---|
| **Patient-reported leaks, n (%)** | 503 (38.13) | 63 (52.07) | **0.003** | **0.005** |
| **Partner-disturbing leaks, n (%)** | 433 (35.38) | 48 (44.04) | 0.071 | 0.077 |
| **Noisy mask, n (%)** | 291 (22.08) | 36 (30.00) | **0.047** | 0.055 |
| **Heavy mask, n (%)** | 70 (5.29) | 14 (11.76) | **0.004** | **0.006** |
| **Mask pain, n (%)** | 83 (6.25) | 21 (17.80) | **<0.001** | **<0.001** |
| **Mask injury, n (%)** | 81 (6.11) | 11 (9.24) | 0.180 | 0.180 |
| **Harness pain, n (%)** | 52 (3.93) | 16 (13.45) | **<0.001** | **<0.001** |
| **Harness injury, n (%)** | 25 (1.90) | 11 (9.17) | **<0.001** | **0.001** |
| **Red eyes, n (%)** | 180 (13.62) | 30 (25.00) | **<0.001** | **0.002** |
| **Itchy eyes, n (%)** | 166 (12.55) | 23 (19.49) | **0.032** | **0.041** |
| **Dry nose, n (%)** | 321 (24.28) | 44 (37.29) | **0.002** | **0.004** |
| **Stuffed nose, n (%)** | 215 (16.42) | 34 (28.10) | **0.001** | **0.003** |
| **Runny nose, n (%)** | 175 (13.23) | 26 (21.85) | **0.009** | **0.013** |
| **Dry mouth, n (%)** | 541 (40.80) | 69 (57.02) | **<0.001** | **0.002** |

[1]Fasle discovery rate correction

**Supplementary file S5.** Literature review of potential factors influencing occurrence of aerophagia

| | **Fukutome, 2024** | **Watson et al., 2008** | **Shepherd et al., 2013** | **Shirlaw et al., 2017** | **Current study** |
|---|---|---|---|---|---|
| Type of study | Retrospective | Case-control | Prospective | Crossover | Prospective |
| Number of patients total | 753 | 44 | 477 | 56 | 1461 |
| Number (%) of patients with aerophagia | 54 (7,2%) | 22 (50%) | 130 (27%) | 56 (100%) | 121 (8,30%) |
| Demographics | | | | | |
| Male (%) | 85.2 | 50.0 | 75.0 | 69.6 | 58.7 |
| Age (years) | 51.4 | 49.3 | 54.0 ± 13.0 | 65. ± 13.0 | 63.0 (55.0; 72.0) |
| BMI (kg/m²) | 26.2 | 31.1 | 34.0 ± 7.0 | 34.2 ± 6.2 | 30.1 (27.1; 33.7) |
| Clinical characteristics | | | | | |
| Diagnostic AHI (events/hr) | 50.6 | 38.3 (31.0; 45.6) | NR | 45.0 ± 29.5 | 36.0 (30.0; 52.8) |
| GER (%) | 25.9 | 77.3 | 57.0 | 18.0 | NR |
| GER medications (%) | NR | 45.5 | 32.0 | NR | NR |
| CPAP treatment | | | | | |
| AHI residual (events/hr) | 2.3 | NR | 14.0 ± 20.0 | 4.3 (2.9; 7.5) | 1.8 (0.8; 3.0) |
| 90th/95th CPAP pressure cmH2O | 9.4 | 10.5 (9.3; 11.8) | 11.0 ± 2.0 | 14.0 (12.0; 17.9) | 10.3 (9.0; 11.9) |
| CPAP-usage ≥4h (%) | 87.0 | NR | NR | 92 | 89.3 |
| CPAP usage duration (yr) | 6.3 | NR | NR | 0.9 (0.3; 3.7) | 3.7 (1.5; 8.5) |
| Nasal mask (%) | 94.4 | NR | NR | 30.4 | 52.1 |
| Predictors of aerophagia | | | | | |
| GER | ✓ | ✓ | ✓ | NA | NR |
| GER medications | NR | ✓ | ✓ | NR | NR |
| Lower age | ✓ | ✘ | ✘ | NA | ✓ |
| Lower BMI | ✓ | ✘ | ✘ | NA | ✓ |
| No tobacco | NR | ✓ | NR | NA | NR |
| Oxygen | NR | ✓ | NR | NR | NR |
| Higher CPAP pressure | ✓ | ✘ | ✘ | NA | ✓ |
| CPAP (vs. APAP) | NR | NR | NR | ✓ | NR |
| Women | ✘ | ✘ | ✘ | NA | ✓ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Anxiety/depression | NR | NR | NR | NA | ✓ |
| | | Heated humidifier | NR | NR | NR | NR | ✓ |

AHI: Apnea–Hypopnea Index; BMI: Body Mass Index; CPAP: Continuous Positive Airway Pressure; GER: Gastroesophageal reflux disease; APAP: Autotitrating Positive Airway Pressure; NA : Not Applicable; NR: Not Reported in the study; ✓: Predictor of aerophagia, ✘: Not a predictor of aerophagia.