Impact of leaks on respiratory effort during sleep in patients treated by Non Invasive Ventilation

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Abstract

Background: During NIV, unintentional leaks are usually considered as a factor increasing respiratory effort but this assumption remains poorly documented for pressure support NIV devices with a high capacity of leak compensation.

Objectives: To assess the impact of different level of induced leaks on (i) respiratory effort and (ii) pressure supplied by the NIV device during sleep.

Methods: 16 stable patients with Obstructive Sleep Apnoea Hypopnoea Syndrome (OHS) (17 male, age 56±12, BMI 35±9.6 kg/m²) treated with nocturnal NIV were studied by type-1 polysomnography (PSG) including an oesophageal pressure (POES) measurement. Two levels of unintentional leaks (24 and 60 l/min; respectively low (LL) and high leaks (HL)) were randomly induced in the circuit using a computer-controlled solenoid valve during non-REM sleep. Every period of induced leaks lasted 5 minutes. Pressure supplied by NIV (PNIV) and areas under the curve of POES were calculated for each level of leaks and reported as relative change from baseline (no leak). A generalized linear mixed model was used to estimate the variations of POES and PNIV according to the level of leaks.

Results: 8 patients had exploitable experiments. 2076 respiratory cycles with leaks were analysed. HL and LL did not induce significant modifications of POES compared to no leaks (Med(25-75); 4.3% to 26.17% vs 2.4% to 25.4%) of POES respectively for LLvSHL p=0.42). In contrast, PNIV increased significantly during leaks (2.3±0.34 to 5±6) of PNIv respectively for LLvSHL p<0.001)

Conclusion: Unintentional leaks do not systematically increase inspiratory effort in nocturnal NIV. This may be