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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: 10 stable patients with Obesity Hypoventilation Syndrome (OHS) (6males, age:56±12, BMI:35±5kg/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 60L/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 leaks). 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[Q1;Q3]) (-4.3[-26.2;17.0]vs-2.4[-32.4;25.4])% of Poes respectively for LLvsHL p=0.42). In contrast, PNIV increased significantly during leaks (2.3[1.6;3.4]vs5.8[4.1;8.7])% of PNIV respectively for LLvsHL; p<0.001]

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

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explained by an overcompensation of the ventilator when leaks occur.

Mechanical ventilation - interactions and complications Adults

Footnotes

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