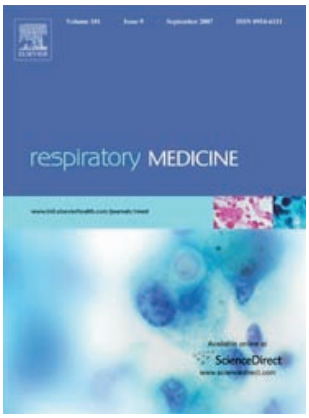
Impact of AVAPS on sleep quality in OHS

Bi-level positive pressure ventilators (BiPAP) are the treatment of choice in patients with obesity hypoventilation syndrome (OHS). This has been the case for the last 20 yrs. This study evaluated whether average volume-assured pressure support (AVAPS) may have a deleterious effect on sleep structure and patient comfort.



Materials and methods

12 patients with OHS (body mass index (BMI) ≥30 kg per m^2 and diurnal arterial carbon dioxide tension ≥45 mmHg) from an academic sleep laboratory in Switzerland who were being treated with BiPAP were randomised to receive either BiPAP with usual ventilator settings or AVAPS on the first night and then crossover to the alternate ventilatory modality on the second night. Patients were included if they were in a stable clinical condition, were home treated with a Synchrony BiPAP ventilator for ≥2 months (S/T modus) and demonstrated ≥4 h daily use of a ventilator. Nine out of 12 patients started BiPAP due to an episode of acute respiratory insufficiency. Recommended target volumes were 7–8 mL per kg (or 8–12 mL per kg).

Results

Included patients were morbidly obese and were treated for a median of 30 months. Three patients had supplemental oxygen. As expected, mean inspiratory positive airway pressure was significantly higher with AVAPS compared with BiPAP, as well as mean tidal volume and total ventilation. Patients slept better without AVAPS: total sleep time and stage 2 sleep were greater and wake after sleep onset was shorter. The number of awakenings (>20 s) was also lower. No difference was found in rapid eye movement sleep, deep sleep or in the micro-arousal index. Overall, ventilation was less comfortable with AVAPS, with more frequent perception of overventilation and increased leaks, leading to worse sleep quality.

Conclusion

In stable OHS patients treated with BiPAP, AVAPS improved control of nocturnal hypoventilation at the expense of a slight decrease in objective and subjective sleep quality and comfort of ventilation.

Message

It appears that acceptance of BiPAP with AVAPS is less in patients already familiar with BiPAP in a conventional mode. Although benefits of AVAPS are improvement in gas exchange and symptoms, we should also pay attention to the quality of sleep.

Competing interests
None declared.

Original article
Janssens JP, Metzger M, Sforza E. Impact of volume targeting on efficacy of bi-level non-invasive ventilation and sleep in obesity-hypoventilation. Respir Med 2009; 103: 165–172.

Editorial comment

One limitation of BiPAP is the absence of a guaranted volume delivered to the patient. BiPAP machines with AVAPS combine the advantages of pressure and volume-limited modes of ventilation into one ventilatory mode (hybrid mode), ensuring a more consistent tidal volume. JANSSENS *et al.* achieved improved ventilation at the expense of a slight reduction in objective and subjective sleep quality and comfort. This could be explained by the higher mean inspiratory pressures, leading to an increase in leaks. Since the included patients already had high inspiratory pressures without AVAPS, it is not surprising that they experienced discomfort after further increasing these pressures, which was reflected by a lower appreciation for AVAPS.

AVAPS may improve suboptimal ventilation without sacrificing too much sleep. JANSSENS *et al.* reported only a slight reduction in sleep quality, but it could be wondered whether a drop in sleep of 60 min or an increase in sleep latency by 50% is "slight". Moreover, it has previously been shown that the occurrence of awakenings is strongly associated with lower quality of sleep and worse quality of life.

The data in this study are in conflict with a previous study in OHS patients [1] that did not demonstrate a significant impact of AVAPS on sleep quality. The inclusion criteria in the study by STORRE *et al.* [1] were however different from this study: patients were not responding to continuous positive airway pressure and were naïve to any ventilatory treatment. Furthermore, the applied pressures were significantly lower and the apnoea-hypopnoea index was less controlled. It therefore seems that the optimal balance between sleep quality, apnoea control and gas exchange was not reached. Conversely, JANSSENS *et al.* reported that the suggested target tidal volume (*V*T) for obese patients is, at least initially, too high, and a lower target *V*T of 8 mL per kg of ideal body weight could be used. Another recommendation was that implementation of AVAPS in patients already under BiPAP should be performed progressively. This could lead to improved patient perception and long-term compliance to noninvasive positive-pressure ventilation (NIPPV).

A weakness of the study was that polysomnography recordings were performed without pneumotachography, and hence a detailed report on respiratory events occurring during NIPPV was unavailable. The oxyhaemoglobin desaturation index was however used as a surrogate marker, which was not significantly altered during AVAPS. This study opens new perspectives to the approach of OHS, but reminds us that there are no guidelines regarding the optimal balance between ventilation and sleep.

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Reference

1. Storre JH, Seuthe B, Fiechter R, *et al.* Average volume-assured pressure support in obesity hypoventilation. A randomized crossover trial. *Chest* 2006; 130: 815–821.

DOI: 10.1183/18106838.0602.162