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Less may be more: CPAP vs. APAP in the treatment of obstructive sleep apnea

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The most common first-line therapy for obstructive sleep apnea (OSA) is the use of positive airway pressure (PAP) devices during sleep. PAP directly relieves upper airway obstruction by increasing luminal pressure, thereby splinting the airway open. The use of PAP results in a clinically significant reduction in disease severity, sleepiness, blood pressure, and motor vehicle accidents, as well as improving sleep-related quality of life in adults with OSA.[1] PAP can be delivered by a fixed pressure (CPAP) during the entire sleep period or by auto-adjusting PAP (APAP) that varies the pressure according to obstructive respiratory events (airflow limitation or hypopnea/apnea) that are constantly detected by the device. Despite similar effectiveness and adherence, APAP is currently more often used than CPAP for long-term PAP treatment. In a study that assessed short-term PAP adherence in 2.62 million OSA patients, 50% of the devices were APAP devices, 41% were CPAP devices, and the remaining 9% were BiPAP devices or adaptive servo-ventilators.[2] The higher costs of APAP devices pose a special challenge to developing countries, including Brazil, where OSA is undertreated because of the lack of resources.

APAP is as effective as CPAP in terms of normalization of the apnea-hypopnea index (AHI) and improvement in sleepiness, quality of life, and neurocognitive function, with the advantage of significantly lower mean pressure applied during the night.[3] This could theoretically improve patient comfort with the device, therefore enhancing adherence. However, this is not supported by the literature. In a meta-analysis of 23 randomized controlled trials, no clinically significant difference was found between adults with OSA treated with APAP and those treated with CPAP in terms of average hours of use.[4]

As previously mentioned, a potential advantage of APAP over CPAP is the ability to automatically adjust therapeutic pressures as OSA severity changes with weight fluctuations, nighttime alcohol consumption, body position, sleep stages, and changes in upper airway anatomy. On the other hand, APAP has some disadvantages for some patients, including sleep disruption from pressure fluctuations[5] and the return of sleep-disordered breathing events when the PAP level is lowered by the device algorithms.[4] In addition, inappropriate or inadvertent increases in pressure can result in the development of treatment-emergent central sleep apnea or periodic breathing in certain patients.[6] Furthermore, in a randomized controlled trial comparing the impact of APAP with that of fixed CPAP on blood pressure in OSA patients, APAP did not reduce 24-h diastolic blood pressure as efficiently as did CPAP.[7] Other studies have found that APAP is not as effective as CPAP in reducing sympathetic tone during sleep[8] or in improving cardiovascular risk factors in OSA patients.[9] These findings might be due to microarousals caused by variations in therapeutic pressures during sleep and unintentional leakage caused by sudden increases in therapeutic pressure in response to respiratory events.[5] In one study,[10] patients on APAP were switched to CPAP if they were nonadherent, remained symptomatic, or complained of side effects. After switching from APAP to CPAP, patients showed improvement in adherence and sleepiness.[10] In comparison with those who were not switched to CPAP, those who were had more stage N1 sleep, a higher arousal index, and lower nadir oxygen saturation.[10] These results suggest that a subset of patients do better with CPAP than with APAP, possibly those with a lighter sleep and who are more prone to arousals during pressure adjustments by APAP devices.

In the current issue of the *Jornal Brasileiro de Pneumologia*, Alves et al.[11] present an interesting study carried out at a sleep medicine center in Portugal and evaluating the effectiveness and potential savings generated by the use of a protocol aimed at switching previously treated OSA patients from APAP to CPAP. They prospectively included 93 OSA patients who were well adapted to APAP therapy (i.e., who were adherent to treatment, had a normal AHI, and had no relevant air leak) to switch to fixed-pressure CPAP based on the 90-95th percentile of pressures recorded by the APAP device in the previous months. After an average follow-up of nearly two years, the authors found that only 5.4% of the patients did not tolerate switching to CPAP and had to return to APAP. Among those who tolerated CPAP, it was found that CPAP was as effective as APAP in controlling the AHI and improving sleepiness. Adherence to treatment was also similar, with CPAP having fewer adverse effects than APAP. Another striking finding was the estimated savings of more than €10,000 over the study period as a result of the use of PAP, given that the rental of CPAP equipment is cheaper than that of APAP equipment.

According to the authors,[11] the study has some limitations, including a possible selection bias, given that only patients who were well adapted and adherent to treatment with APAP were selected for CPAP therapy. Moreover, the fact that the study was carried out in only one center in Portugal can limit the external validity of the findings.

The findings of the study by Alves et al.[11] corroborate what we witness in daily practice, i.e., that most patients

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with OSA tolerate CPAP and APAP equally, with CPAP being better tolerated than APAP in some cases. Thus, CPAP may be the preferable option for a significant subset of patients.[10] What really increases adherence to PAP treatment is not the type of equipment, but educational initiatives and regular face-to-face and remote monitoring, allowing problem solving and positive reinforcement of the treatment.[12]

The study by Alves et al.[11] suggests that APAP should be used primarily as an initial therapeutic strategy for pressure titration. After a few days, switching to CPAP is as effective but cheaper. This strategy may be especially important in resource-poor settings such as Brazil. The savings generated by this approach could be used to provide therapy to a significantly larger number of patients.

CONFLICT OF INTEREST

None declared.

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