Progress Toward a Clearer Understanding of the Role of Bilevel Positive Airway Pressure Therapy for Obstructive Sleep Apnea

Commentary on Schwartz et al. Correlates of a prescription for bilevel positive airway pressure for treatment of obstructive sleep apnea among veterans. *J Clin Sleep Med* 2013;9:327-335.

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COMMENTARY

Sullivan first described continuous positive airway pressure (CPAP) for the treatment of OSA in 1981.¹ Saving patients from a disfiguring tracheostomy or an inconsistently effective uvulopalatopharyngoplasty, CPAP was nothing short of a revolution in OSA therapy. By 1985, there was a large and rapidly growing commercial market for CPAP. Although many patients with obstructive sleep apnea benefited from CPAP, some patients experienced difficulty tolerating it and a leading reason why was difficulty exhaling against the expiratory pressure load. Sanders and colleagues in 1990 addressed this problem with the development of bi-level positive airway pressure (BPAP), a positive pressure modality where the inspiratory and expiratory pressures were independently adjustable and the expiratory pressure load could be lessened compared to that experienced with continuous therapy.² Sanders went on to show that BPAP was an effective therapy for OSA. Since then, BPAP has been used as a second line therapy in OSA for patients unable to tolerate CPAP treatment. Largely because BPAP is more expensive than CPAP, many sleep medicine clinicians will start treatment of OSA with CPAP treatment. If this is not tolerated, they will switch to either an auto-adjusting CPAP device (which will lower mean pressure) or to a BPAP, providing a lower expiratory pressure.³

One of the unresolved problems in the sleep apnea field, however, has been which patients truly benefit from BPAP vs. CPAP. Given the high prevalence of sleep apnea and the poor tolerance of CPAP by some patients, it is surprising we do not have a clearer sense about which patients are likely to be better treated with BPAP as an alternative to CPAP. One explanation may be that there are few comparison trials between these treatments and the earliest and largest comparative trial showed no significant difference between CPAP and BPAP for new OSA patients.⁴ However, the way in which BPAP is commonly used is as a “salvage” therapy for patients unable to tolerate CPAP, not as a first line therapy, as has been the focus of only a few studies.^{5,6}

The study by Schwartz and colleagues in this issue of the *Journal of Clinical Sleep Medicine* provides a new look at BPAP therapy in a group of OSA patients in whom BPAP was used as a second line study.⁷ This retrospective analysis of BPAP therapy in a large number of patients at busy VA sleep

laboratory provides some interesting insights into the question of which patients benefit most from BPAP.

Using comprehensive VA administrative databases about clinic and sleep lab encounters, they were able to develop a dataset of 2,513 patients who received CPAP or BPAP. In a retrospective analysis, these subjects had baseline covariate factors determined and subsequent adherence to therapy measured objectively. The authors had the following main objectives for their study:

1. Determine correlates of an initial BPAP prescription among patients diagnosed with OSA in a sleep laboratory.
2. Determine correlates of being switched from CPAP to BPAP.
3. Determine whether adherence was better with BPAP vs. CPAP, controlling for patient differences.

The authors found that baseline higher BMI, diagnosis of congestive heart failure, increased blood CO₂, higher severity of OSA, lower nadir SpO₂, a diagnosis of COPD, a greater number of comorbid conditions, as measured by the Charlson Comorbidity Index, and a higher Epworth Sleepiness Scale score were significantly correlated with both receiving BPAP initially and with being switched from CPAP to BPAP after an initial CPAP prescription. Further analysis through step-wise logistic regression analysis found BMI, apnea-hypopnea index, COPD, age, and nadir SpO₂ to be independent predictors of receiving BPAP as the initial prescription or a second prescription after receiving CPAP first. The presence of a neurological diagnosis and higher blood CO₂ were independent predictors of a later change from CPAP to BPAP.

When examining adherence to therapy, the authors found that BPAP patients had better adherence than CPAP users. At each time point, from 2 weeks to 30 months, the BPAP users used their therapy approximately 10 percentage points more than those patients receiving CPAP. This was equally true for patients initiated on BPAP as their first prescription and for patients switched to BPAP after “failing” CPAP. It should be noted that the metric chosen for this comparison was percent of patients using therapy greater than 4 hours per night and not average nightly use.

What does this study mean for clinicians treating OSA? First, clinicians should ask “are these patient similar to mine?” The

answers will vary with the site of one's practice. This study was performed as a retrospective analysis of the CPAP and BPAP experience of one of the largest VA hospitals in the country, and the mean age of the population was nearly 60 years. It was also overwhelmingly (95%) male and Caucasian (86%). This is a population with a larger number of COPD and CHF patients than the average non-VA sleep laboratory may see. This population may be older and "sicker" than community based sleep laboratories are accustomed to seeing. The study is also retrospective and therefore subject to biases that can be minimized through prospective randomized trials.

Nonetheless, this study highlights several important points clinicians should consider in deciding which therapy is best for their patients. This study is the largest to date to try to clarify the role of BPAP in patients being treated for OSA. The previous BPAP literature has left many clinicians with the message that BPAP and CPAP are essentially equivalent and, since CPAP is less expensive, it is preferred over BPAP.^{3,4} However, the earlier literature of CPAP vs. BPAP focused on new patients and not on patients who were likely to benefit from BPAP over CPAP. The present study does not answer the question "is BPAP better than CPAP?" But it does inform our thinking about for whom BPAP may be a better choice of PAP therapy either initially or later on, if a trial of CPAP does not provide adequate therapy.

At this point, it seems reasonable to consider BPAP for patients who are heavier, older, have COPD or who have oxygen desaturation to a greater degree than other OSA patients. These patients seem to have better treatment adherence to BPAP than to CPAP. The importance of this study is it highlights a well-defined group of OSA patients for whom it makes clinical sense to start BPAP early on in the course of therapy rather than waiting for them to fail CPAP, which is the current approach. This gets at the issue of efficiency of treatment. Cost of equipment is an issue to consider in the choice of treatment, but so is the delay in getting the best treatment available to the patients as quickly as possible.

Initiating BPAP therapy in OSA patients as first-line therapy is outside of current clinical guidelines.³ Therefore caution in implementing this approach to PAP is warranted. However, if further research confirms the findings of Schwartz and colleagues, it may be wise to update the PAP therapy guidelines.

Of course, that will take time and further research. However, thanks to Schwartz and colleagues, we now have a clearer sense of when to use BPAP therapy in patients with OSA.

CITATION

Atwood CW. Progress toward a clearer understanding of the role of bilevel positive airway pressure therapy for obstructive sleep apnea. *J Clin Sleep Med* 2013;9(4):337-338.

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DISCLOSURE STATEMENT

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