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Automatic Pressure Titration with APAP Is as Effective as Manual Titration with CPAP in Patients with Obstructive Sleep Apnea

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For editorial comment see p. 276

Key Words
Autotitrating positive airway pressure · Continuous positive airway pressure · Sleep apnea

Abstract
Background: The optimal approach to initiate positive-pressure therapy in patients with obstructive sleep apnea is still debated. Current options are autotitrating positive airway pressure (APAP) or manual titration with continuous positive airway pressure (CPAP). Procedures differ by parameters and by algorithms used for adapting pressure. ***Objectives:*** To evaluate the efficacy of attended automatic titration in a randomized crossover study compared with manual titration over 2 nights where the sequence of the titration mode was changed. Therapy outcome was controlled after 6 weeks. ***Methods:*** 21 sleep apnea patients were treated using manual CPAP versus automatic APAP titration. The mode used during the 2nd night was continued for 6 weeks. Cardiorespiratory polysomnography, Epworth Sleepiness Scale (ESS), SF-36 score and compliance were assessed. ***Results:*** Apnea-hypopnea index reduction was equally effective at similar effective pressure independent of the titration mode. If APAP was applied during the 1st night, total sleep time was longer (384 vs. 331 min, $p < 0.01$) and sleep efficacy was higher (91 vs. 81%, $p < 0.01$) than after starting with manual titration with CPAP. Compliance was comparable in both groups (4.6 ± 1.9 h). The ESS improved in both groups (from 12.9 to 6.5). SF-36 scores and therapeutic pressure did not much change. ***Conclusions:*** Taking the sequence of titration into account, we found equal effectiveness of CPAP and APAP. Sleep quality was better with initial application of APAP – which favors attended automatic titration if only 1 titration night is possible. Both modes are comparable after 6 weeks regarding therapeutic pressure, efficacy, compliance and quality of life.

Introduction

Application of nasal continuous positive airway pressure (CPAP) is the gold standard in the treatment of the obstructive sleep apnea syndrome. Positive pressure therapy eliminates nocturnal breathing difficulties, enhances sleep quality, improves the patient's subjective feeling of health, and reduces cardiovascular risks. Technical advances in positive-pressure therapy have led to the development and application of automatic systems for autotitrating positive airway pressure (APAP). These tech-

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niques are now applied both for initiating and first adaptation to positive-pressure therapy, as well as for long-term therapy [1]. The APAP equipment continually adapts the effective pressure according to the patient's requirements.

The therapeutic principle of APAP is simplicity and cost-effectiveness [2], being equally effective as conventional CPAP therapy. Fletcher et al. [3] and Planes et al. [2] have demonstrated these benefits for at-home titration. Similar benefits have been demonstrated for attended autotitration in the sleep laboratory [4–7].

To detect sleep-related breathing disorders, automatic and manual titration differs not only by the algorithms being applied, but also by the signals being recorded and interpreted. Manual titration is based, for example, on the recording of oronasal airflow using nasal prongs, and thoracic and abdominal respiratory movements using belt transducers. Automatic titration systems use pneumotachographic signals to derive oronasal airflow, or they determine airway resistance by forced-oscillation technology. Various systems for attended and unattended CPAP titration determine effective therapy pressure (P_{eff}) in such cases, in a quite comparable manner, even with manual titration [8]. When comparing these approaches, the main problem is the lack of standardization for manual titration and for the various decision algorithms used in automatic systems. Nevertheless, it may be possible that titration based on a fixed standardized machine algorithm is more effective than a non-standardized manual titration carried out by the attending personnel with different levels of expertise.

In addition to titration, long-term therapy with automatic CPAP systems also demonstrates results comparable to conventional manual CPAP therapy with respect to the elimination of breathing disorders, enhancement of subjective feelings of good health and choice of the effective therapy pressure [9]. The goal of our study was to determine whether attended automatic titration in the sleep laboratory with the REMstar® Auto device (Respironics, Murrysville, Pa., USA) is as effective as manual CPAP titration with regard to sleep characteristics and optimal nocturnal pressure. In order to objectively determine the influence of the 1st titration night on the 2nd titration night being part of 2 consecutive titration nights, we selected a crossover design for our study.

After 2 nights of therapy in the sleep laboratory, the patients were sent home for long-term therapy, each with the therapy mode used in the 2nd titration night (CPAP or APAP). Outpatient follow-up took place 6 weeks after initiating therapy in order to determine compliance as a function of therapy mode, and to compare the effective therapy mode, residual breathing disorders, as well as the patient's subjective assessment of health.

Methods

Design of the Study

We admitted 21 patients (20 men and 1 woman) aged 54.2 ± 11.7 years to the study (mean body mass index, BMI, 30.9 ± 5.7 kg/m^2). Before study entry, patients underwent a diagnostic evaluation program.

In patients with suspected sleep apnea, an unattended cardiorespiratory polygraph recorded sleep apnea at their home. All patients with an apnea-hypopnea index (AHI) >10/h and symptoms of excessive sleepiness as well as all patients with an AHI >20/h underwent attended cardiorespiratory polysomnography (PSG) in our sleep laboratory. Patients with an AHI ≥10/h were included in our study. Patients with an AHI >10/h in the home recording and an AHI <10/h in the sleep laboratory were also included if they had excessive sleepiness. Only patients with a BMI <40 kg/m^2 aged 35–70 years met the inclusion criteria. Exclusion criteria were the presence of other sleep disorders, especially periodic leg movement syndrome or restless leg syndrome; acute cardiac, pulmonary or other internal medicine-related disorders; acute psychiatric or neurological disorders, or abuse of sleep-inducing agents or other drugs. Patients with suspected or confirmed central sleep apnea syndrome were also excluded, as well as patients who had earlier undergone similar treatment (e.g. CPAP, oral devices or uvulopalatopharyngoplasty).

Course of the Study

After a diagnostic night (baseline) in the sleep laboratory, patients were treated with PAP therapy during the following 2 nights: the 1st (T1) and 2nd (T2) titration nights. Using a crossover study design in a randomized sequence, we applied 1 night with APAP therapy and the other night with CPAP using manual titration. We used the REMstar Auto CPAP system for both titration techniques. Compared to other APAP systems, the REMstar Auto device provides a similar or partially better response to pathological breathing events and mask leaks [10].

During the subsequent course of therapy, each patient used the mode being applied during the 2nd titration night (T2). One patient group (n = 10) received automatic APAP therapy (APAP group) and the other patient group (n = 11) received CPAP (CPAP group). We conducted a follow-up evaluation for each group after 6 weeks. Automatic continuous positive-pressure therapy was set for all patients within the same pressure limits: between minimum and maximum values of 4 and 16 cm H_2O. In the CPAP group, therapy was performed at the effective therapeutic pressure determined in manual titration (T2). Manual titration was conducted by a stepwise increase in pressure every 10–20 min, starting with an initial pressure of 4 cm H_2O. The pressure was increased until reaching effective pressure in increments of 1 cm H_2O. Criteria for a pressure increase were the occurrence of apneas or hypopneas, oxygen drops below 3% or respiratory-related arousals [11]. Automatic titration was based on continuous pneumotachographic measurement and on the assessment of the respiratory-flow plot. The APAP system detects flow limitations,

Table 1. Demography and diagnostic PSG data of both study groups

	APAP group	CPAP group
Patients	10	11
Males/females	10/0	10/1
Age, years	56.9 ± 9.3	51.8 ± 13.5
BMI, kg/m^2	32.6 ± 6.6	29.4 ± 4.4
Apnea index, n/h	28.1 ± 29.5	25.2 ± 25.6
Hypopnea index, n/h	15.2 ± 12.2	17.1 ± 12.5
AHI, n/h	43.3 ± 30.2	40.4 ± 26.1
Respiratory arousal index, n/h	33.0 ± 35.3	28.7 ± 27.4
Movement arousal index, n/h	1.9 ± 1.6	4.3 ± 5.9
Periodic leg movement index, n/h	26.8 ± 16.1	12.5 ± 10.9
Falling-asleep latency, min	17.7 ± 13.6	11.2 ± 6.4
TST, min	355.7 ± 27.9	379.5 ± 63.8
Sleep efficiency, %	88.2 ± 7.5	93.2 ± 6.0*
NREM-I, % – TST	50.1 ± 27.2	54.9 ± 15.6
NREM-II, % – TST	25.9 ± 16.1	22.2 ± 8.8
SWS, % – TST	10.1 ± 10.6	7.8 ± 6.9
REM, % – TST	14.0 ± 8.2	15.1 ± 6.8

Values are means ± SD. * $p < 0.04$ vs. APAP group. The other values were non-significant.

snoring, breathing disorders (apneas or hypopneas) and leakage. The device adapts the therapy pressure according to the detected results. We chose the 90th percentile of all individual pressure results to describe the effective CPAP pressure for the night.

After 6 weeks, all patients were checked by an unattended cardiorespiratory home study (Embletta® polygraph, Flaga hf, Reykjavik, Iceland). We recorded nasal airflow by nasal pressure transducers, thoracic and abdominal respiratory efforts, pulse rate, oximetry, snoring signal, body position and activity. In addition, we collected the scores of the Epworth Sleepiness Scale (ESS) on a weekly basis. We assessed quality of life using the SF-36 questionnaire at the time of diagnosis and after 6 weeks.

Recording and Evaluation of PSG

Cardiorespiratory PSG was performed with the Embla system (Flaga hf). Sleep stages were visually evaluated according to the criteria of Rechtschaffen and Kales [12]. In order to minimize the interrater variability in the analysis, two experts scored the sleep stages. The following parameters were calculated: falling-asleep latency, total sleep time (TST), sleep efficacy and the percentage of TST in non-rapid eye movement sleep stage (NREM)-I, NREM-II, slow wave sleep and REM. We visually classified arousal with durations of 3–15 s as either respiratory or movement arousal [13].

We scored apneas and hypopneas according to standard criteria [11]. Consequently, apnea was defined as the cessation of oronasal airflow for at least 10 s. Hypopnea was defined as a reduction in oronasal airflow or thoraco-abdominal respiratory excursion ≥50% for at least 10 s, if accompanied by a drop in oxygen ≥3% and/or its termination by an arousal.

Analysis and Statistics

Data were tested to check for normal distribution using the Kolmogorov-Smirnoff test for goodness of fit. Since data were not normally distributed, we applied nonparametric tests, with a 95% confidence level ($p < 0.05$). We compared PSG parameters between the APAP and CPAP groups at the time of diagnosis (baseline) and during the 1st and 2nd therapy nights (T1 and T2, respectively), as well as therapy effectiveness during the course of therapy (by polygraphy, hours of CPAP use and questionnaires) with non-connected random samples using the Mann-Whitney U test.

We applied the Friedmann test and, subsequently, if significance was reached, the Wilcoxon rank sum test for intra-individual comparison in the APAP and in the CPAP group at baseline, during the 1st and 2nd titration nights and also for the mean weekly hours of device usage.

Results

Patient characteristics with respect to age, BMI, degree of nocturnal breathing disorder and sleep quality at baseline are given in table 1. There are no differences between the APAP and the CPAP group. The mean AHI of all patients included in our study was 41.8 ± 27.4/h (range: 7.1–96.9/h) derived from diagnostic PSG. During the 2 consecutive nights, we successfully titrated all 21 patients with one mode of CPAP therapy. Independent of the titration mode, AHI was reduced in the 2 titration nights to a mean value of 9.0 ± 6.4/h ($p < 0.01$; 1st night) and 11.2 ± 16.6/h ($p < 0.01$; 2nd night). Both APAP and CPAP titration demonstrated effective reduction in the AHI (fig. 1). In the APAP group, the mean AHI decreased

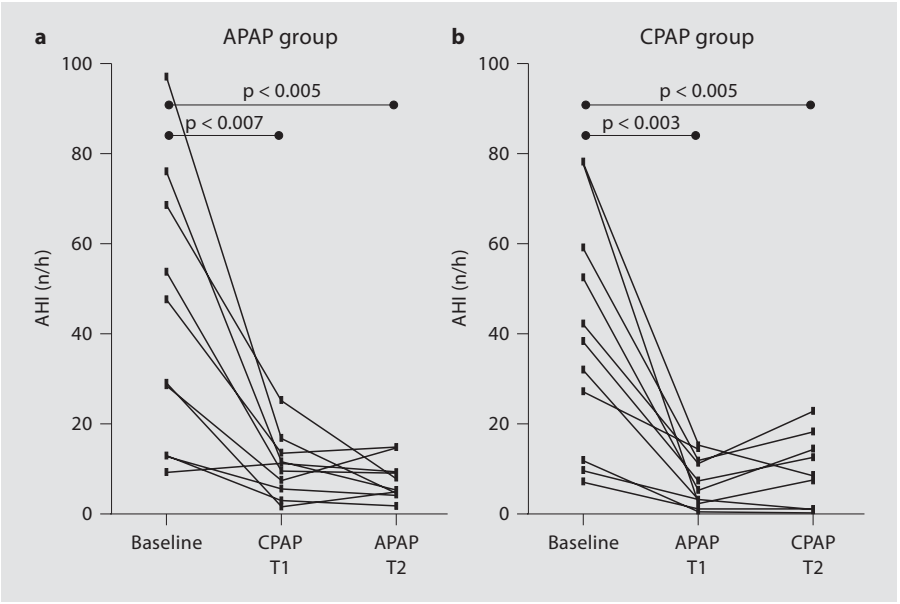

Fig. 1. Reduction in the AHI with positive-pressure ventilation in 2 consecutive nights in 10 patients receiving CPAP during T1 and APAP during T2 (**a**) and in 11 patients receiving APAP in T1 and CPAP in T2 (**b**).

Table 2. Comparison of CPAP and APAP for the 1st (left) and 2nd titration night (right) of PSG data from 21 patients receiving positive-pressure ventilation

	T1		T2	
	CPAP titration APAP group	APAP titration CPAP group	CPAP titration CPAP group	APAP titration APAP group
Patients	10	11	11	10
Pressure, cm H_2O	8.9 ± 1.4	8.3 ± 3.4	9.5 ± 1.9	9.1 ± 3.6
Apnea index, n/h	4.5 ± 4.5	3.0 ± 3.7	11.5 ± 22.5	2.7 ± 2.0
Hypopnea index, n/h	6.6 ± 4.1	3.8 ± 2.9	3.6 ± 4.0	4.5 ± 3.6
AHI, n/h	10.1 ± 7.0	6.8 ± 5.6	15.1 ± 22.4	7.2 ± 4.4
Respiratory arousal index, n/h	3.0 ± 1.8	4.1 ± 3.7	10.8 ± 22.2	6.3 ± 6.7
Movement arousal index, n/h	1.6 ± 1.0	5.8 ± 9.7	9.2 ± 13.3	3.2 ± 3.0
Spontaneous arousal index, n/h	5.9 ± 4.0	4.5 ± 3.3	4.0 ± 3.1	4.1 ± 3.6
Falling-asleep latency, min	45.9 ± 62.0	23.2 ± 13.2	23.2 ± 14.6	16.5 ± 12.4
TST, min	331.1 ± 51.7	384.1 ± 44.0*	349.7 ± 61.2	370.4 ± 35.0
Sleep efficiency, %	81.5 ± 9.9	91.0 ± 4.0**	83.1 ± 13.8	89.9 ± 6.6
NREM-I, %-TST	32.3 ± 15.7	28.3 ± 16.7	42.3 ± 24.2	29.7 ± 10.5
NREM-II, %-TST	28.8 ± 8.0	33.5 ± 14.2	30.7 ± 14.5	32.7 ± 9.9
SWS, %-TST	17.4 ± 7.9	17.0 ± 11.8	10.2 ± 7.4	14.7 ± 10.4
REM, %-TST	21.5 ± 6.9	21.1 ± 9.4	16.7 ± 11.1	23.6 ± 5.5

Values are means ± SD. * $p < 0.01$, ** $p < 0.008$ vs. APAP group. The other values were nonsignificant.

from 43.3 ± 30.2 1/h during the diagnostic night to 10.1 ± 7.0 ($p < 0.01$; T1, CPAP) and to 7.2 ± 4.4 ($p < 0.01$; T2, APAP). In the CPAP group, the mean AHI decreased from 40.4 ± 26.1 1/h during the diagnostic night to 6.8 ± 5.6 ($p < 0.01$; T1) and to 15.1 ± 22.4 ($p < 0.01$; T2). Three patients in the CPAP group still had an AHI ≥15/h during manual titration in the 2nd night. Subsequently, these patients underwent an extended titration to determine the effective therapy pressure to eliminate all respiratory events throughout the entire night. Opti-

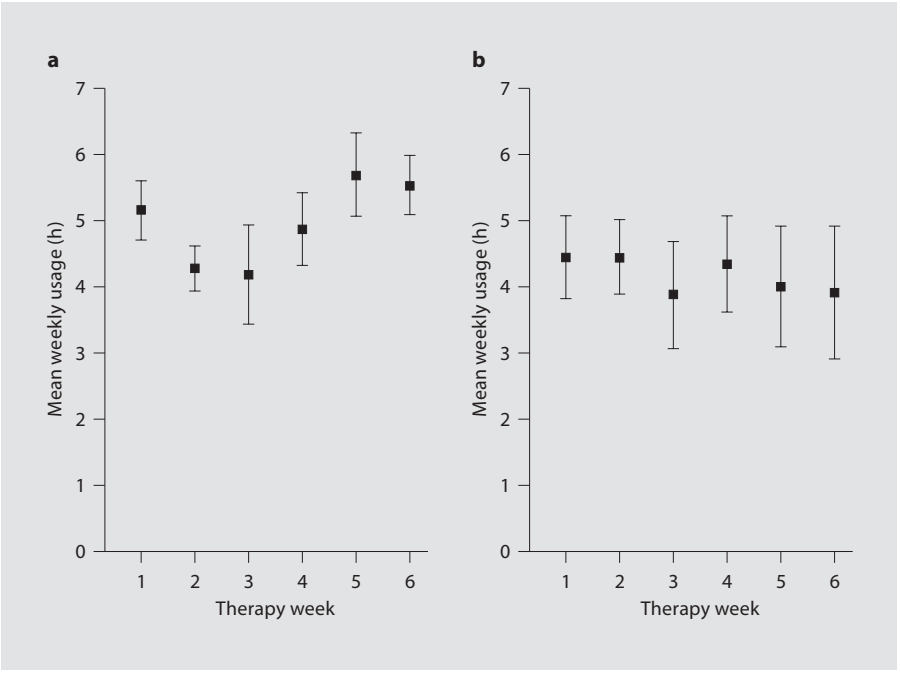

Fig. 2. Mean weekly usage of the positive-pressure ventilation therapy in a time course of 6 weeks in the patient group receiving APAP (**a**) and CPAP (**b**).

mal manual titration was achieved with the other patients in the first half of the night.

Automatic versus Visual Titration

Comparison of the results from PSG for titration nights T1 and T2 revealed, independently of the titration mode, no significant differences with respect to the respiratory and sleep parameters investigated. Table 2 shows a comparison between the two titration nights, in accordance with the respective titration modes. When APAP was conducted during T1, TST ($p < 0.01$) and sleep efficacy ($p < 0.01$) were higher than for the group with manual titration. This favors the APAP titration in the 1st titration night. If a CPAP night preceded an APAP night, the results of this sequence become evident only in the trend of results.

Upon investigation of sleep during the CPAP nights in accordance with the sequence of application – e.g. CPAP during T1 for 10 patients and/or during T2 for 11 – no significant differences were found, too. The same applies for APAP nights T1 and T2.

The mean effective therapy pressure determined was the same in both groups, regardless of the titration mode as well as titration sequence. For 35% of the patients, pressure obtained by manual titration was at least 1 cm H_2O higher than by automatic titration. For an additional 35%, the effective pressures for manual and automatic titration were the same. For 30%, the pressure was greater with automatic titration.

Follow-Up after 6 Weeks

After 6 weeks, the AHI in the CPAP group was 3.9 ± 4.3/h, being 4.4 ± 3.4/h (nonsignificant) in the APAP group. On average, therapy was used during 77 ± 25% of all nights, with a nocturnal usage duration of 4.6 ± 1.9 h (5.0 ± 1.6 h in the APAP group and 4.2 ± 2.2 h in the CPAP group). Figure 2 shows the course of usage duration, averaged over 1 week. Weekly comparison reveals no differences in the APAP group, but a trend toward lower values is apparent during the 2nd and 3rd weeks. Compliance is higher in the 5th and 6th therapy weeks compared to the 1st week. In the CPAP group, usage duration demonstrates only slight, nonsignificant changes during the observation period. Also, there were no significant differences in the course of compliance between the two patient groups.

Therapeutic pressure was 9.4 ± 1.9 cm H_2O in the CPAP group. For APAP patients, we determined 9.1 ± 3.6 cm H_2O during titration, and 10.4 ± 1.4 cm H_2O averaged over 6 weeks (90th percentile for each). For constant BMI, the effective APAP pressure did not change during the initial weeks of therapy.

For the entire population, ESS scores decreased from baseline scores of 12.9 ± 5.6 already during the 1st week

of therapy to 9.8 ± 4.4 ($p < 0.01$). Scores decreased further during the following weeks of therapy to a score of 6.5 ± 4.3 ($p < 0.01$). SF-36 data demonstrated a trend to somewhat higher values when comparing baseline with the follow-up after 6 weeks: both in the psychic (from 50.7 ± 6.5 to 52.3 ± 9.1) as well as in the bodily sum scales (from 46.4 ± 11.8 to 49.0 ± 10.2).

ESS and SF-36 scores did not differ at any point in time between the CPAP and APAP groups.

Discussion

We found the same efficacy of automatic attended titration compared with manual titration regarding AHI and quality of sleep over 2 nights when we consider the sequence of titration mode too. Previous studies also determined no significant differences between the two modes with regard to elimination of breathing disorders, respiratory-related arousal and improvement in sleep as a function of the titration mode [7]. However, taking just the 1st titration night into consideration, we could detect a better sleep quality (higher TST and sleep efficacy) during APAP in comparison to CPAP. Based on the selected study population and considering the cost-effectiveness of nocturnal positive-pressure ventilation, we can conclude that a single-night laboratory study using the APAP mode is more effective than the manually titrated CPAP mode. This may be important if the management of patients with obstructive sleep apnea has to be based on only 1 attended titration night.

From the standpoint of long-term compliance, there are no significant differences between CPAP and an APAP application [14]. Our data confirm these findings and evidence – considering the limited number of patients – that manual and attended automatic CPAP titrations are equally effective during the 6-week study period.

It is noteworthy that a slight difference with respect to sleep quality became apparent during the first 2 titration nights: i.e. as a function of the point in time of autotitration this is a novel finding. Sharma et al. [7], who first conducted manual and subsequently automatic therapy in 20 patients, were not able to detect differences with respect to sleep. However, they report lower minimum SaO_2 values during APAP, possibly due to the device-specific titration algorithm based on the airway vibration pattern. We could not check this because the REMstar Auto algorithm is based on the pneumotachographic principle. Another important difference compared with Sharma et al. [7] is the crossover design of our study. If we used first manual CPAP titration and then APAP we also found no difference regarding sleep quality. Randerath et al. [5] determined that sleep was better, at least subjectively, in the APAP titration night. Teschler et al. [15] noted that TST during manual titration was greater than during APAP. All these studies, however, did not control the effect of the sequence of study nights.

With respect to pressure settings, we compared the effective CPAP pressure with the mean effective therapy pressure for the APAP mode. We determined no differences here: either in the 2 titration nights or for pressure in the 6-week follow-up. A recent meta-analysis [1] and some single studies [2, 4, 5, 16] have reported slightly higher pressures in CPAP titration. In contrast, Ficker et al. [17] and Boudewyns et al. [18] reported lower CPAP than APAP pressures. Stammnitz et al. [19] compared three automatic CPAP systems with manual titration, and reported comparable (Horizon®) or lower (AutoSet®, Virtuoso®) mean APAP pressure. We did not compare the maximum-required CPAP values, since we exclusively titrated upward during manual titration, until reaching the effective pressure. Effective pressure is, accordingly, also the maximum pressure. Sharma et al. [7] have reported higher maximum pressures for manual titration.

We did not consider the effects of body position or medication on the effective therapy pressure. We minimized differentiating effects of the mask on titration pressure by furnishing all patients with the same nasal mask. Finally, consideration must be taken in such studies of whether technical intervention would be permissible during intervention. In our study, in contrast to that by Sharma et al. [7], nocturnal intervention at the patient's bed was not permissible.

In the elimination of breathing disorders, attended autotitration is equally effective as manual titration both in acute as well as in long-term tests. Only Scharf et al. [20], Sharma et al. [7] and Stammnitz et al. [19] have reported a tendency toward a higher hypopnea index or AHI for APAP titration compared with a fixed CPAP pressure. Our patients had a residual AHI of 6.8–15.1/h with a tendency toward higher AHI under manual titration. A higher AHI was observed when the manual titration night followed the APAP night. Some studies have reported similar residual AHIs for the two modes [1, 2], whereas others have disclosed [21] a significant reduction in AHI [5–7, 20, 22]. Planes et al. [2] explain the residual AHI by postulating an overestimation of hypopneas. We assume that manual upward titration does not cause the

residual AHI in the titration night. The number of residual breathing disorders still occurring throughout the night depends on the practical procedures associated with manual titration. We increased the CPAP pressure only upon repeated occurrence of apneas and hypopneas. Each new level was kept to check the occurrence of more apneas and hypopneas. In addition, respiratory-related arousals, snoring and oral closure were used as criteria for pressure optimization in our manual titration procedure.

During our 6-week follow-up, the residual AHI is lower (~7/h) than in the 1st (T1 CPAP: 10/h) or 2nd CPAP nights (T2 CPAP: 15.1/h). With 7/h for CPAP, and ~4/h for the APAP group, residual AHI is comparable to other follow-up studies [23]. The main reason for the higher values in the CPAP group is the bias of the comparison. The AHI under a fixed optimal CPAP pressure should be lower than the residual AHI under titration conditions. It can be speculated that APAP may contribute to the stabilization of the upper airway under long-term treatment.

Compliance in our patients was 4.6 ± 1.9 h of CPAP use. No significant differences were found between manual titration and APAP. A trend to somewhat higher values was seen in the APAP group (mean difference of approximately 48 min). Analysis of compliance in the 1st-week interval revealed slightly less utilization in the 2nd and 3rd weeks, followed by a rise in weeks 4–6. In the APAP group, compliance was even higher after 6 weeks than in the 1st week. The reason for the equivalent compliance development for CPAP and APAP, at least in the weeks 1–3, could be initial nasal and oral irritations, or mask pressure points. In general, our compliance rate concurs with those of other studies, which report short-term compliance in an interval between 3 weeks and 2 months using APAP [2, 3, 19, 23, 24] or CPAP [2, 23, 24] modes. Fitzpatrick et al. [16] reported better compliance in a 5-week crossover design, with usage periods for CPAP of 6.4 ± 1.2 h and 6.7 ± 1.7 h for APAP. A comparable design [14] revealed CPAP compliance of 5.5 ± 0.3 h and APAP compliance of 6 ± 0.3 h. In a crossover design throughout 2 months, Teschler et al. [25] provided evidence of compliance for CPAP of 6.1 ± 0.5 h and for APAP of 6.3 ± 0.4 h. Konermann et al. [6] reported 5.6 ± 2.5 h for CPAP and 5.9 ± 1.6 h for APAP, throughout 3–6 months. For investigations over the course of 3 weeks, Meurice et al. [21] obtained similar compliance data.

Whereas compliance is apparently not dependent on the APAP device type [26], it does assumably depend on the effective pressure [27]. The effective pressure, however, did not change during our study period, and was similar to the CPAP pressure. Therefore, we could confirm previous studies where pressure remained the same or was somewhat lower with APAP [20].

In addition to the objective parameters, therapeutic success became evident on a subjective basis in ESS results: both for the CPAP as well as for the APAP group, and in both cases after initial titration. Compared to CPAP, Ayas et al. [1] also found no significant advantage of APAP in reducing sleepiness in a meta-analysis. During therapy duration of 6 weeks, ESS decreased further. Planes et al. [2] and Boudewyns et al. [18] described a decrease in the ESS after 2 months of APAP or CPAP, which was not significant. Other authors reported a significant ESS decrease after 6 weeks of APAP [3], and for APAP and CPAP a decrease after 3 [28], 6 [29] and 12 weeks [14] of therapy.

Concerning the SF-36 we demonstrated for the first time that data do not differ compared to baseline – either under CPAP or under APAP therapy – throughout an investigation period of 6 weeks. Previous APAP studies did not apply SF-36.

Our results confirm that APAP is an effective therapy for mild/severe obstructive sleep apnea in patients without concomitant diseases. APAP is well tolerated and improves the AHI as effectively as CPAP. Sleep quality under APAP is slightly better than under CPAP especially, if only 1 titration night is possible, which is important regarding the cost-effectiveness of attended titration. The mean pressure required for effective treatment is the same for APAP and CPAP titration. APAP pressure, moreover, did not change throughout the first 6 weeks of treatment. Compliance is comparable, although it is slightly higher for the APAP group than for CPAP group.

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