A Good Night's Sleep with a Pretty Nose

Güzel Bir Burunla Rahat Bir Uyku

Billur Sezgin[1], Reha Yavuzer[1], Fatma Nur Aksakal[2]

[1]Department of Plastic, Reconstructive and Aesthetic Surgery, Faculty of Medicine, Gazi University, Ankara, Turkey
[2]Department of Public Health, Faculty of Medicine, Gazi University, Ankara, Turkey

ABSTRACT

Objective: Several studies confirm the relationship between nasal surgery and the quality of sleep, but these surgical interventions are limited to septoplasty, turbinectomy and nasal polipectomy. Rhinoplasty is not limited to functional surgical interventions therefore the outcome of cosmetic surgical procedures should also be taken into consideration.
Methods: A study was conducted to determine the effect of cosmetic rhinoplasty with or without additional septoplasty on the quality of sleep. The Pittsburgh Sleep Quality Index (PSQI) was used to determine sleep quality. A comparative analysis between preoperative and postoperative scores was performed along with a correlation analysis to test the relationship between sleep quality and nasal breathing.
Results: Although both preoperative and postoperative values were consistent with "good" sleep quality, the increase of the quality of sleep was significant for cosmetic rhinoplasty. For patients who had additional septoplasty, the improvement in sleep quality was significant and sleep quality changed from "poor" to "good". Septoplasty patients were then further evaluated according to the postoperative relief of their nasal breathing complaints. Patients who claimed they no longer had any breathing problems showed a significant change in score, while the change in score was insignificant for patients who still experienced nasal breathing problems.
Conclusion: Previous studies have demonstrated the positive impact of septoplasty on the sleep quality, but this study also shows an increase of sleep quality with cosmetic rhinoplasty without septoplasty. Structural changes resulting from rhinoplasty alone can have a positive influence in increasing nasal airflow. *(Gazi Med J 2012; 23: 59-64)*

Key Words: Rhinoplasty, septoplasty, sleep quality, PSQI

Received: 15.03.2012 **Accepted:** 21.05.2012

ÖZET

Amaç: Biyolojik ritmin en önemli bileşenlerinden uyku, birçok değişkenden etkilenmektedir. Literatürde nazal polipektomi, septoplasti ve konka rezeksiyonlarının uyku kalitesine olan etkileri incelenmiştir ancak estetik rinoplastinin uyku üzerine etkileri açısından herhangi bir çalışma bulunmamaktadır. Çalışma, rinoplastinin uyku kalitesine olan etkisini saptamayı hedeflemektedir.
Yöntemler: Tek cerrah tarafından, 2006-2009 yılları arasında kapalı teknikle primer rinoplasti yapılan olguların uyku kaliteleri değerlendirildi. Uyku kalitesi PSQI (Pittsburgh Uyku Kalitesi Ölçeği) kullanılarak ölçüldü. Hastalar estetik rinoplastiye ek olarak septoplasti yapılıp yapılmamasına göre iki grupta incelendi. Ameliyat öncesi ve sonrası ve septum müdehalesi yapılan ve yapılmayan gruplar arasında istatistiksel değerlendirme gerçekleştirildi.

This paper was presented at the Aesthetic Meeting 2010 of ASAPS, Washington D.C., USA, 2010.

Address for Correspondence / Yazışma Adresi: Dr. Billur Sezgin, Department of Plastic, Reconstructive and Aesthetic Surgery, Faculty of Medicine, Gazi University, Ankara, Turkey Phone: +90 312 202 64 18 E-mail: billursezgin@hotmail.com

doi:10.5152/gmj.2012.15

Bulgular: Estetik rinoplasti grubunda preoperatif ve postoperatif değerlerin her ikisi "iyi" uyku kalitesi ile uyumluydu ancak ameliyat sonrası kalite düzeyindeki artış anlamlıydı. Ek olarak septoplasti olan hastalarda da değişim istatistiksel olarak anlamlıydı ve uyku kalitesi "kötü" iken postoperatif dönemde "iyi" olarak değişim gösterdi. Septoplasti hastaları postoperatif dönemde nefes alma şikayetlerinin gerilemesine göre ikiye ayrılarak tekrar incelendi. Nefes alma sorunlarının ameliyat sonrası tamamen gerilediğini belirten hastaların PSQI skor değişimi anlamlı iken hala nefes alma sorunu olduğunu belirten hastalarda değişim istatistiksel olarak anlamlı değildi.
Sonuç: Bu çalışmada gösterildiği gibi ameliyat öncesinde septum deviasyonu olması ve ameliyatla bunun giderilmesi uyku kalitesinde belirgin artışla sonuçlanmaktadır. Deviasyon olmaksızın ameliyat edilen hastalarda da uyku kalitesinde artış gözlenmesi, nazal çatıya müdahelelerin de havayolundaki rezistansı azalttığını düşündürmektedir. Nefes şikayeti gerilemeyenlerde PSQI'larda değişim saptanmaması nefesle uyku arasındaki öngörülen bağlantıyı kuvvetlendirirken, bu hastalarda spreader greft gibi uygulamaların havayolunu yeniden yapılandırmada daha etkili olabileceğini düşündürmektedir. *(Gazi Med J 2012; 23: 59-64)*

Anahtar Sözcükler: Rinoplasti, septoplasti, uyku kalitesi, PSQI

Geliş Tarihi: 15.03.2012 **Kabul Tarihi:** 21.05.2012

INTRODUCTION

As a vital component of the biological rhythm, sleep is affected by many different factors. Breathing, being one of them, has been the main focus of several studies concerning sleep quality. Breathing disturbances during sleep can vary in a broad spectrum, from snoring to obstructive sleep apnea (OSA). Obesity, male gender, smoking, thick neck circumference, craniofacial dysmorphia, hypothyroidism and nasal obstruction are among the risk factors for OSAS in adults (1, 2). The physiology of breathing during sleep differs with an open nasal passage versus an obstructed nasal passage. An open nasal passage coincides with a lower nasal airway resistance. The low resistance allows for nasal breathing with the jaw in closed position which, in return, stabilizes the upper airway. The nasal airway resistance is elevated with an obstructed nasal passage. This increase in nasal resistance leads to oral breathing and an increase in inspiratory negative pressure, which can result in the collapse of the upper airway, leading to sleep disturbances which are not encountered with an open nasal passage.

Beyond its role as an aesthetic unit of the face, the nose is a functional organ. Previous studies demonstrate the effect of nasal surgery on the quality of sleep, but these surgical interventions are limited to septoplasty, turbinectomy and nasal polypectomy. To our knowledge, there are no studies in the literature evaluating the effect of cosmetic rhinoplasty on the quality of sleep. Cosmetic rhinoplasty candidates also frequently complain of impaired nasal breathing. Surgery for this group of patients is not limited to functional surgery, therefore the outcome of cosmetic surgical interventions should also be taken into consideration. The direct relationship between nasal breathing and sleep quality suggests the theory that sleep quality can be a good way to assess nasal breathing. In this study, we aimed to determine the effects and differences produced by cosmetic rhinoplasty with or without additional septoplasty on the quality of sleep.

METHODS

In order to establish the relationship between rhinoplasty and the effect it has on sleep quality, a retrospective study was conducted. Patients who underwent closed-technique primary rhinoplasty with or without septoplasty between January 2006 and February 2009 were sent self-administered questionnaires via e-mail. All patients chosen for the study were operated on by a single surgeon for consistency in operative techniques. Standard surgical procedures for closed-technique primary rhinoplasty were performed. The operative technique basically consisted of hump reduction, partial cranial excision of the lower lateral cartilage for nasal tip definition and rotation, adjustment of tip projection with a caudal septum excision and tip grafts and median and lateral osteotomies. The extent or even the existence of each step of the surgery was defined according to the patients' individual needs. For those patients who had additional septoplasty, minimal cartilage excision from the base of the septal cartilage and excision from the osseous septum were carried out. To avoid variation in techniques, no patients who had spreader grafts, fold-in flaps or open-technique rhinoplasty were included in the study population. All patients underwent a similar postoperative period in which nasal packaging was not used and all patients had a nasal splint for the first postoperative week.

The instrument used to measure the quality of sleep was the Pittsburgh Sleep Quality Index (PSQI). Described in 1989 by Daniel Buysse and al. (3), the PSQI is used in many sleep centers throughout the world and is utilized by many literature studies as an effective and reliable instrument for the measurement of sleep quality. It can be used both for initial assessment and ongoing comparative measurements. PSQI differentiates "poor" from "good" sleep by questioning seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication and daytime dysfunction. Patients are asked to score these areas of sleep through 18 specific questions using a 0 to 3 Likert Scale. The scores are added up and the global PSQI score, ranging between 0 and 21, is attained. A score of "5" and above reflects poor sleep quality with a sensitivity of 89.6%, and a specificity of 86.5%. The internal consistency and reliability coefficient (Chronbach's alpha) is 0.83, which implies high consistency and reliability for the PSQI.

Patients were asked to complete a questionnaire consisting of 26 questions, the first 8 regarding patient characteristics (age, height, weight, medical history, preoperative and postoperative nasal breathing quality) and the remainder being the Turkish-translated questions of the PSQI (Table 1). Patients who had not completed the postoperative 6th month, who had a body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) over 30, who suffered from chronic lung disease such as asthma and patients or who had other factors contributing to poor sleep, such as pregnancy, were excluded from the study. The answers to the questions were analyzed and the PSQI score was calculated for the preoperative and postoperative state. Finally, a comparative analysis was conducted between preoperative and postoperative PSQI scores

Table 1. Sleep quality questionnaire for rhinoplasty patients

General Questions	
Age:	
Weight / Height:	
Do you have an allergic condition (e.g. rhinitis, hay fever) for which you use medication	
Do you suffer from any pulmonary diseases (e.g. asthma, chronic bronchitis, emphysema)?	
Do you suffer from any other illnesses?	
Do you have any other conditions that might interfere with your sleep?	
Do you use any medications?	
How has your nasal breathing changed following surgery?	
The Pittsburgh Sleep Quality Index	
1. When have you usually gone to bed?	
Prior to your rhinoplasty surgery, ……. o'clock	
For the past month, …… o'clock	
2. How long (in minutes) has it taken you to fall asleep?	
Prior to your rhinoplasty surgery, ……. minutes	
For the past month, …… minutes	
3. When have you usually got up in the morning?	
Prior to your rhinoplasty surgery, ……. o'clock	
For the past month, …… o'clock	
4. How many hours of actual sleep do you get at night? (This may be different from the number of hours you spend in bed)	
Prior to your rhinoplasty surgery, ……. hours	
For the past month, …… hours	
The following questions were rated as;	
I did not experience this (0), Less than once a week (1), Once or twice a week (2), Three of more times a week (3)	
(A) prior to rhinoplasty	
(B) for the past month	
5. How often had you had trouble sleeping because you…?	
Cannot get to sleep within 30 minutes	
Wake up in the middle of the night or early in the morning	
Have to get up to use the bathroom	
Cannot breathe comfortably	
Cough or snore loudly	
Felt too cold	
Felt too hot	
Have bad dreams	
Have pain	
Other reasons (please describe)	
6. How often have you taken medicine (prescribed or over-the-counter) to help you sleep?	
7. How often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	
8. How much of a problem has it been for you to keep up enthusiasm to get things done?	
9. How would you rate your sleep quality overall?	
Very good (0), fairly good (1), fairly bad (2), very bad (3)	
Scoring of the PSQI	
Component 1: #9 score	C1
Component 2: #2 (<15min=0, 16-30min=1, 31-60min=2, >60min=3) + #5a score (if sum is equal to 0=0, 1-2=1, 3-4=2, 5-6=3)	C2
Component 3: #4 score (>7=0, 6-7=1, 5-6=2, <5=3)	C3
Component 4: (total # of hours asleep/ total # of hours in bed) x 100	
(>85%=0, 75-84%=1, 65-74%=2, <64%=3)	C4
Component 5: sum of scores #5b to #5j (0=0, 1-9=1, 10-18=2, 19-27=3)	C5
Component 6: #6 score	C6
Component 7: #7 score + #8 score (0=0, 1-2=1, 3-4=2, 5-6=3)	C7
Add the seven component scores together, Global PSQI score:	
The first 8 questions refer to general patient characteristics, while the following 18 questions are the specific questions of the Pittsburgh Sleep Quality Index	

along with a correlation analysis to test the relationship between sleep quality and nasal breathing. The Wilcoxon signed-rank test was used for comparative studies while Kendall's coefficient of concordance was used for correlation studies. All statistical measurments were calculated using SPSS software version 15.0. Values of $p<0.05$ were considered statistically significant.

RESULTS

A total of 250 consecutive, closed-technique primary rhinoplasty and septorhinoplasty patients operated on by a single surgeon were sent questionairres. A response was obtained from 98 patients. After the elimination of patients according to the exclusion criteria, 66 patients were included in the study. Fifty nine patients were female (89.4%) and 7 were male (10.6%). The mean age of the study population was 28.7 years (range 20-52 years) while the mean BMI was 20.8 (range 17-28). The average time that had passed since surgery was 18 months (range 6-48 months). These patients were analyzed within two groups. The first group was composed of 22 patients who did not suffer from significant breathing complaints and had no septal deviation and only underwent cosmetic rhinoplasty. The second group of 44 patients had some degree of breathing complaints preoperatively and septal deviation upon examination and therefore also had additional septoplasty.

The mean preoperative PSQI score of all the patients was 6.53±3.47, while the mean postoperative PSQI score was 4.16±2.83. The decrease in the score was significant (p=0.0001) as well as the improvement in sleep quality (Table 2). The evaluation of patients who underwent cosmetic rhinoplasty alone demonstrated that the mean preoperative PSQI score of 4.62±3.27 decreased significantly to 2.95±2.08 postoperatively. Although both values were consistent with "good" sleep quality, the increase of the quality of sleep was significant (p=0.021). Mean PSQI scores of patients who underwent additional septorhinoplasty were 7.54±3.18 preoperatively and 4.70±3.01 postoperatively. The decrease of the score was significant (p=0.0001) and sleep quality had changed from "poor" to "good".

The last set of patients who had additional septoplasty were then further evaluated according to the postoperative relief of their nasal breathing complaints (Table 3). Patients who claimed that they no longer had any breathing problems had a mean preoperative PSQI score of 8.17±2.97 which decreased significantly to 3.76±2.17 postoperatively (p=0.0001). Again the change in score was significant along with the increase in sleep quality. Patients who still experienced impaired nasal breathing had a mean preoperative PSQI of 6.33±3.41 and postoperative PSQI score of 6.53±3.60. As expected, the change in score was insignificant (p=0.905) and both scores were consistent with "poor" sleep quality.

Finally, the correlation between the change in breathing complaints and the PSQI score was analyzed. Kendall's coefficient of concordance showed direct significant correlation between the two parameters.

DISCUSSION

As a complex biological state, sleep is affected by many different aspects such as physiological, anatomical, psychological and environmental factors. Nasal breathing, being one of them, has been the subject of various literature studies. The nose is responsible for approximately half of the total resistance of the upper airway (4), and increased nasal resistance leads to an elevation in the inspiratory negative pressure in the unstable pharyngeal segments. If the negative pressure reaches the critical closing pressure this results in collapse and obstructive apnea (5). This is the main portal on which nasal surgery has an impact on breathing quality. Verse and Pirsig (5) state that there are possible ways that nasal pathologies may lead to the occurence of sleep-disordered breathing. The first is switching to unstable oral breathing during sleep. Under normal circumstances, when the nasal resistance is within normal limits, the closed jaw and dental occlusion stabilize the upper respiratory airway. This helps to maintain nasal breathing and prevent the collapse of pharyngeal segments, which is the main cause of a spectrum of events ranging from snoring to obstructive sleep apnea (OSA). Another way that nasal pathologies reflect on sleep-disordered breathing is increased inspiratory suction. Pathologically elevated nasal resistance is balanced by increased respiratory effort, which results in increased intrathoracic negative pressure. The transmission of the increased negative pressure to the upper airway again leads to obstructive symptoms.

Table 2. Mean PSQI scores

Groups	Number of patients	PSQI		Statistical analysis of PSQI score change
		Preoperative	Postoperative	
Septorhinoplasty	44	7.54±3.18	4.70±3.01	p=0.0001*
Rhinoplasty	22	4.62±3.27	2.95±2.08	p=0.021*
Total	66	6.53±3.47	4.16±2.83	p=0.0001*

* The analysis of the preoperative and postoperative PSQI scores in the rhinoplasty and septorhinoplasty patients and in all patients showed significant increase in sleep quality (Wilcoxon signed-rank test)

Table 3. Mean PSQI scores of septorhinoplasty patients according to the resolution of breathing complaints

Postoperative breathing complaints after septorhinoplasty	Number of patients	PSQI		Statistical analysis of PSQI score change
		Preoperative	Postoperative	
No complaints	29	8.17±2.97	3.76±2.17	p=0.0001**
Continuation of complaints	15	6.33±3.41	6.53±3.60	p=0.905***

**Patients whose complaints resolved postoperatively demonstrated a significant increase in sleep quality. (Wilcoxon signed-rank test)
***There was no significant change in sleep quality for patients who still had breathing complaints. (Wilcoxon signed-rank test)

Dayal and Phillipson (6) found significant improvement in the apnea/hypopnea index in patients with OSA who underwent nasal valve correction. A study by Schwentner et al. (7) demonstrated a significant improvement in nasal symptoms, sleep dysfunction, overall medical state and health-related quality of life after nasal septal surgery. Li et al. suggested that correction of an obstructed airway resulted in the relief of daytime sleepiness (8). Similar results were confirmed by the studies of Kramer et al. and Arunchalam et al. (9, 10). The literature supports the view that the correction of a deviated septum results in better sleep quality (8-10). This is mainly the result of an increase in nasal airflow due to decreased nasal resistance, which in return results in better sleep after septorhinoplasty. In general, studies show that patients who had nasal septal surgery for problematic nasal breathing show significant improvement in their daytime and night-time breathing, which results in an increase in sleep quality and quality of life (6-10).

Through the results of these studies it seems rational that improved nasal patency alleviates sleep-disordered breathing. As nasal obstruction in patients with sleep-disordered breathing may be caused by septal deviation, hypertrophied turbinates and nasal polyps, surgical correction of these problems seems to be a p correct treatment option. These studies demonstrate a relationship between sleep quality and nasal surgery, but they are limited to turbinectomy, nasal polypectomy and septoplasty. Cosmetic rhinoplasty patients also frequently complain of impaired nasal breathing and therefore this study was conducted to determine the effects and differences brought about by cosmetic rhinoplasty, with or without septoplasty, on the quality of sleep.

The results of our study showed that the improvement in nasal breathing for patients who underwent additional septoplasty was in correlation with the increase in their sleep quality. Similarly, for patients whose breathing complaints did not improve, neither did their sleep quality. This direct relationship was also supported by the direct significant correlation between the change in sleep quality and nasal breathing found in this study.

Although a change in the nasal airway is not an expected outcome of cosmetic rhinoplasty, the study showed improved sleep quality in this group of patients also. Within this study, the decrease in PSQI scores was found to be in correlation with improved nasal breathing. Although these patients had no breathing complaints preoperatively or postoperatively, the dynamics of nocturnal breathing is sometimes not fully comprehended by the patient, as is the case in OSAS patients who are unaware of their apnea and usually complain of excessive daytime sleepiness (11). This supports the theory that even small adjustments to the nasal frame and soft tissues, such as an increase in tip projection, can have an impact on improving nasal breathing, allowing better airflow through the nose.

CONCLUSION

From time to time we come across patients who complain of the continuation of impaired nasal breathing after rhinoplasty. Is this the result of the execution of poor technique, or can this occur even if all goes smoothly on the operating table? In other words, to what extent does a well-executed, complication-free rhinoplasty affect nasal breathing?

The purpose of our study was to answer this question, in other words, to determine the effects of rhinoplasty on the quality of sleep through its effect on nasal breathing.

This study demonstrated that patients who underwent septorhinoplasty had significant increase in sleep quality. Patients who had breathing complaints after septorhinoplasty also continued to have poor sleep quality and the change in PSQI scores was insignificant. The correlation between the change in nasal breathing and PSQI scores was found to be significant, which shows that if nasal surgery solves the breathing problem, this has a direct positive impact on sleep quality. What was more interesting is that, although both the preoperative and postoperative states were consistent "good" with sleep, patients who only underwent cosmetic rhinoplasty also demonstrated a significant increase in sleep quality.

Through the findings of this study, we can conclude that;

1. Sleep quality is directly affected by the quality of nasal breathing, and changes in breathing are proportional to the change in the quality of sleep. The significant correlation between the change in PSQI scores and nasal breathing shown in this study demonstrates that the PSQI is a good instrument for evaluating nasal breathing.
2. It can be concluded that septorhinoplasty results in an increase in nasal airflow due to decreased nasal resistance, which in return results in better sleep.
3. Not every problem can be solved with nasal surgery. Although a certain degree of nasal airway correction was performed, there was no detectable change in breathing for a subset of patients. During the follow-up period, these patients are evaluated for other reasons that could lead to impaired nasal breathing, such as hypertrophic turbinates, mucosal problems like rhinitis or weakness of the internal nasal valve. Weakness of the internal valve may be corrected with the help of spreader grafts or fold-in flaps. However, even providing for all these assessments, there is a small group of patients that continue to have impaired nasal breathing in whom we fail to detect any anatomical problem. This shows that, although nasal surgery benefits the majority of patients with impaired nasal breathing, there is a small subset of patients who do not benefit from surgical interventions.
4. Although a change in the nasal airway is not an expected outcome of cosmetic rhinoplasty, the study demonstrates improved sleep quality in this group of patients. We all know that cosmetic procedures, including rhinoplasty, result in improved confidence and self-esteem and reflect positively on the patient's quality of life. Since there is a psychological aspect to sleep, the increase in sleep quality in cosmetic rhinoplasty patients might be regarded as a result of this improved self-esteem. However, among these patients, there were those who liked, and those who disliked, the appearence of their new nose. Yet the quality of sleep still increased for those patients not satisfied with the cosmetic result. This shows that within this study, the effect of psychological state was not a major determinant of sleep quality. Therefore, we can conclude that aesthetic adjustments to the nasal frame and soft tissues, such as an increase in tip projection, can have an impact on improving nasal breathing, allowing better airflow through the nose. This improvement reflects as an increase in sleep quality. Further studies evaluating nasal air flow and pressure changes may be undertaken for a more objective perspective.

Conflict of Interest
No conflict of interest was declared by the authors.

REFERENCES

1. Stradling JR, Crosby J. Predictors and prevelence of obstructive sleep apnea and snoring in 1001 middle-aged men. Thorax 1991; 46: 85-90. [CossRef]
2. Liistro G, Rombaux P, Belge C, Dury M, Aubert G, Rodenstein DO. High mallampaty score and nasal obstruction are assosciated risk factors for obstructive sleep apnea. Eur Resp J 2003; 21: 248-52. [CossRef]
3. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res 1989; 28: 193-213. [CossRef]
4. Rohrich RJ, Krueger JK, Adams WP Jr, Marple BF. Rationale for submucous resection of hypertrophied inferior turbinates in rhinoplasty: An evolution. Plast Reconstr Surg 2001; 108: 536-44. [CossRef]
5. Verse T, Pirsig W. Impact of impaired nasal breathing on sleep-disordered breathing. Sleep Breath 2003; 7: 63-76. [CossRef]
6. Dayal V, Phillipson E. Nasal surgery in the managment of sleep apnea. Ann Otorhinolaryngol 1985; 94: 550-4.
7. Schwentner I, Dejakum K, Schmutzhard J, Deibl M, Sprinzl GM. Does nasal septal surgery improve quality of life? Acta Otolarygngol 2006; 126: 752-7. [CossRef]
8. Li HY, Lin Y, Chen NH, Lee LA, Fang TJ, Wang PC. Improvement in quality of life after nasal surgery alone for patients with obstructive sleep apnea and nasal obstruction. Arch otolaryngol head neck surg 2008; 134: 429-33. [CossRef]
9. Kramer MF, Rasp G, Kastenbauer E. Health-related quality of life in rhino surgery. Am J Otolaryngol 2003; 24: 97-105. [CossRef]
10. Arunchalam PS, Kitcher E, Gray J, Wilson JA. Nasal septal surgery: evaluation of symptomatic and general health outcomes. Clin Otolaryngol Allied Sci 2001; 26: 367-70. [CossRef]
11. Riha RL. Clinical assessment of the obstructive sleep apnoea/hypopnea syndrome. Ther Adv Respir Dis 2010; 4: 83-91. [CossRef]