Abstract:
This study was undertaken to document the effectiveness of sleep positioning as a treatment for obstructive sleep apnea and to impress the importance of a positional monitor on at home sleep studies. Five consecutive patients with moderate to severe obstructive sleep apnea that had a strong positional component were offered the Side Sleeper Delight Pillow (Positional Therapy Pillows LLC). After a 7 day adjustment period a repeat sleep study was performed to document change in Apnea Hypopnea Index and oxygen saturation. All sleep studies were done using the WatchPat-200 home sleep study.

Results: Three of the five patients were able to complete the study while two patients found they were unable to complete the 7-day adjustment period. Of the three remaining patients, all three had normalization of their AHI and Oxygen saturation and went on to purchase the pillow as a comfortable and non-invasive treatment.

Conclusion: Positional therapy is an effective treatment for some patients with sleep apnea. Home sleep studies should always include a positional monitor to identify which patients can be treated with positional therapy.

Keywords: Sleep Apnea, Snoring, Pillow, Positional Therapy

Obstructive sleep apnea (OSA) is an increasing prevalent disease now up to 16% of the adult population [1] . It has significant short term complications including increased motor vehicle accidents, workplace accidents, depression, chronic fatigue and hypersomnolence, work absenteeism, and impotence[2]. Long term complications include a disease specific increased risk of cardiovascular disease, stroke, hypertension, diabetes, CHF, pulmonary hypertension, and overall increased 18 year mortality[1, 3-6] . This caries a heavy burden on the individual and on society.

OSA is due to a multi-level, multi-factorial obstruction to airflow[7-9]. Multiple studies have used varying techniques in attempt to identify the sites of obstruction however this has been fraught with difficulty. Airway anatomy depends extensively on airway tone, which changes during sleep. Only the Friedman tongue position score has been helpful in predicting success of single site surgery[10]. Current studies are attempting sleep endoscopy under pharmacologically induced sleep[11]. Not only is this in its infancy, it is not available at most centers. Although it is now accepted that the vast majority of patients with OSA have multilevel obstruction, the clinical examination and investigations have not been successful in reliably identifying the sites of obstruction in a given patient.

The gold standard treatment of sleep apnea is CPAP (continuous positive airway pressure). This device takes delivers room air to a patient under increased pressure though a mask interface. The pressure effectively stents open the airway simultaneously treating all levels of obstruction. It is the most effective and least invasive treatment for OSA[7]. The success of this device (if worn) is greater than

95%. Compliance with CPAP however is at best between 70% and may be as low as 46% according to current literature [12-15]. This leaves 30% to 56% of patients with sleep apnea requiring other forms of 'salvage' treatment.

Cartwright defined Positional Patients as those with at least twice as many apneas/hypopneas during sleep in the supine position[16]. In their study 58.3% of OSA patients met this definition and 33.3% (8/24) had a respiratory disturbance index (RDI) under 10 in the lateral position. Oksenberg at al. confirmed these results in a large study of 574 patients with obstructive sleep apnea [17]. With their numbers they were able to show patients with less severe sleep apnea and those with a lower body mass index (BMI) were more likely to be Positional Patients. As well, the average apneic events in the supine position were longer, resulted in lower oxygen saturations, and a more significant change in heart rate. Positional therapy may be a simple, effective and highly tolerated single treatment option for properly selected patients. It may also be an important adjunctive therapy in other patients.

All level one sleep studies, and most level 3 sleep studies (home sleep studies) continuously record body position and score the apnea hypopnea index in the supine versus the lateral position. In Canada, primary care providers are interpreting most sleep studies and the effect of positional therapy is often overlooked.

The SideSleeperDelight™ (Positional Therapy Pillows LLC) is a sleep-positioning pillow designed to maintain the lateral position. It is manufactured from memory foam with a 25 degrees elevation and reinforced side arms that will not allow the sleeper to role onto their back. The pillow has an added 1.5" of memory foam at the concaved shoulder area to provided additional comfort for the user. Pillow comes in 3 sizes (small, medium & large) to fit 100 lbs to approximately 350 lbs. This pilot study objectively documents the effect of positional therapy on sleep apnea and examines the ability the SideSleeperDelight™ to maintain a lateral decubitus position.

Methods

Five consecutive patients who met the inclusion criteria were offered to be part of the study. The criteria used were a documented supine dependant obstructive sleep apnea using a home sleep study, weight between 150 to 210 lbs, and height from 65 inches to 78 inches. The height and weight criteria were selected based on information provided by the manufacturer on the 'ideal' body type for the pillow.

Exclusion criteria were the use of alcohol or sedatives, a co-existing sleep disorder, mental impairment preventing the understanding of the study, and the inability to sleep in a lateral decubitus position. Patients recruited into the study were given a description of the study and provided informed consent.

Patients were loaned the SideSleeperDelight™ for 2 weeks. The first week was used as an acclimatization period. If patients tolerated the pillow after 7 days, a repeat sleep study was done with the same device as the original sleep study. The maximum time lapse between the first and second sleep study was 4 weeks. Patients were than asked an open-ended question about their experience with the pillow.

Results

Five patients were recruited into the study, three were male and two were female. One woman suffers from back and shoulder pain and was unable to stay in one position for the entire night. The other woman found herself off the pillow for 3 consecutive nights and gave up on the pillow. Both patients were therefore excluded from the study.

Discussion

This was a pilot study to determine the effectiveness and tolerance of a new positional pillow, the SideSleeperDelight™. Although the numbers are very small, the study demonstrated its effectiveness in maintaining the lateral decubitus position throughout the night. In the patients studied, this normalized the AHI and oxygen saturation and provided a comfortable, safe, and effective treatment for the patients in this study. Two out of 5 patients were unable to use the pillow, one because of pre-existing back and shoulder pain. The ability to use the pillow may be the greatest predictor of success.

The effects of body position on sleep apnea has been known since the first articles discussing breathing abnormalities in sleep. At least half of all patients with sleep apnea have a strong positional component making positional treatment an attractive option [16,17]. There are few studies documenting the efficacy of positional studies and fewer still has been well summarized in a review article by Oksenberg and Silverberg [18]. This literature review demonstrated 2/3 patients are able to sleep on their sides without a device and 1/3 will need an assistive device to maintain the lateral position.

There are multiple devices now marketed for sleep apnea. Several are used to maintain a more upright position during sleep and to maintain the head in a neck extended position. These devices are based on anatomical studies looking at the effect of positioning on airway size and ease of intubation[19-22]. Many of these devices are marketed without objective studies examining their effectiveness. Published articles have shown a variable and unpredictable improvement and selection criteria is not well-defined[23, 24].

The most common device used for side sleeping is the tennis ball technique (TBT) where a tennis ball is attached to a belt worn by the patient.

Positional therapy

This study serves as a reminder for physicians practicing sleep medicine and for primary providers reading home sleep studies to consider the effect of posture when reading sleep study results. Positional therapy can provide an effective and safe treatment of sleep apnea. I would caution that not all devices are effective and not all patients are able to use positioning devices. A home sleep study done while using the device will ensure the device is effectively treating sleep apnea. Future studies are necessary comparing positioning devices and looking at long-term results.

Conflict of Interest
The manufacturer provided the pillows used in the study. No financial incentives were offered to patients and no funding was provided to the investigator. There is no financial interest in the product discussed.

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