The Sleep Position Trainer: a new treatment for Positional Obstructive Sleep Apnoea

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Background
Positional Obstructive Sleep Apnoea (POSA), defined as a supine Apnoea–Hypopnoea Index (AHI) twice or more as compared to the AHI in the other positions, occurs in 56% of obstructive sleep apnoea patients. Positional Therapy (PT) is one of several available treatment options for these patients. So far, PT has been hampered by compliance problems, mainly because of the usage of bulky masses placed in the back. In this article, we present a novel device for treating POSA patients.

Methods
Patients older than 18 years with mild to moderate POSA slept with the Sleep Position Trainer (SPT), strapped to the chest, for a period of 29±2 nights. SPT measures the body position and vibrates when the patient lies in supine position.

Results
Thirty-six patients were included; 31 patients (mean age, 48.1±11.0 years; mean body mass index, 27.0±3.7 kg/m²) completed the study protocol. The median percentage of supine sleeping time decreased from 49.9% [20.4–77.3%] to 0.0% [range, 0.0–48.7%] (p<0.001). The median AHI decreased from 16.4 [6.6–29.9] to 5.2 [0.5–46.5] (p<0.001). Fifteen patients developed an overall AHI below five. Sleep efficiency did not change significantly. Epworth Sleepiness Scale decreased significantly. Functional Outcomes of Sleep Questionnaire increased significantly. Compliance was found to be 92.7% [62.0–100.0%].

Conclusions
The Sleep Position trainer applied for 1 month is a highly successful and well-tolerated treatment for POSA patients, which diminishes subjective sleepiness and improves sleep-related quality of life without negatively affecting sleep efficiency. Further research, especially on long-term effectiveness, is ongoing.

Study objectives
To investigate effectiveness, long-term compliance and effects on subjective sleep of the Sleep Position Trainer (SPT) in position-dependent obstructive sleep apnea (POSAS) patients.

Methods
Prospective, multicenter cohort study. Adult patients with mild and moderate POSAS were included. Patients would use the SPT for 6 months. At baseline and after 1, 3 and 6 months questionnaires would be filled in: Epworth Sleepiness Scale (ESS), Pittsburgh Sleep Quality Index (PSQI), Functional Outcomes of Sleep Questionnaire (FOSQ) and questions related to SPT use.

Results
145 patients were included. SPT use and SPT data could not be retrieved in 39 patients. In the remaining 106 patients, median percentage of supine sleep decreased rapidly during SPT’s training phase (day 3 to 9) to near total avoidance of supine sleep. This decrease was maintained during the following months of treatment (21% at baseline vs. 3% at 6 months). SPT compliance, defined as more than 4 hours of nightly use, was 64.4%. Regular use, defined as more than 4 hours of usage over 5 nights per week, was 71.2%. Subjective compliance and regular use were 59.8% and 74.4%, respectively. Median ESS (11 to 8), PSQI [8 to 6] and FOSQ [87 to 103] values significantly improved compared to baseline.

Conclusions
Positional therapy using the SPT effectively diminishes percentage of supine sleep and subjective sleepiness and improves sleep-related quality of life in patients with mild to moderate POSAS. SPT treatment is long-lasting in its effects. SPT has a high compliance and regular use rate. Subjective and objective compliance data correspond well.

Long-term effectiveness and compliance of positional therapy with the Sleep Position Trainer in the treatment of positional obstructive sleep apnea syndrome

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Study objectives
To investigate effectiveness, long-term compliance and effects on subjective sleep of the Sleep Position Trainer (SPT) in position-dependent obstructive sleep apnea (POSAS) patients.

Methods
Prospective, multicenter cohort study. Adult patients with mild and moderate POSAS were included. Patients would use the SPT for 6 months. At baseline and after 1, 3 and 6 months questionnaires would be filled in: Epworth Sleepiness Scale (ESS), Pittsburgh Sleep Quality Index (PSQI), Functional Outcomes of Sleep Questionnaire (FOSQ) and questions related to SPT use.

Results
145 patients were included. SPT use and SPT data could not be retrieved in 39 patients. In the remaining 106 patients, median percentage of supine sleep decreased rapidly during SPT’s training phase (day 3 to 9) to near total avoidance of supine sleep. This decrease was maintained during the following months of treatment (21% at baseline vs. 3% at 6 months). SPT compliance, defined as more than 4 hours of nightly use, was 64.4%. Regular use, defined as more than 4 hours of usage over 5 nights per week, was 71.2%. Subjective compliance and regular use were 59.8% and 74.4%, respectively. Median ESS (11 to 8), PSQI [8 to 6] and FOSQ [87 to 103] values significantly improved compared to baseline.

Conclusions
Positional therapy using the SPT effectively diminishes percentage of supine sleep and subjective sleepiness and improves sleep-related quality of life in patients with mild to moderate POSAS. SPT treatment is long-lasting in its effects. SPT has a high compliance and regular use rate. Subjective and objective compliance data correspond well.
Sleep Position Trainer vs Tennis Ball Technique in Positional OSA

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Introduction
Standard tennis ball techniques like the Positional Band (PB) can be as effective as CPAP in Positional OSA (POSA) but compliance is low.

Objectives
Can compliance of Positional Therapy in POSA be improved with a new device, the Sleep Position Trainer (SPT) and have the same effectiveness as PB?

Therapies
The SPT is a small in supine position vibrating device, placed on the ventral thorax. Body position and temperature sensors are build in, data can be stored and read out giving hours of use and supine position time. The PB is a belt with three inflatable airbags worn on the back preventing supine position. Methods: 55 new patients with POSA were randomized to SPT (29) or PB (26). Standard home-PSG was done at baseline and after 1 month therapy. Quebec Sleep Questionnaire (QSQ), ESS and VAS scores were taken. The SPT device was, in a non-vibrating mode, also build in the PB to measure daily compliance in both groups.

Results
Comparing PSG: AHItot, AHIsup, %supTST was respectively 11.4, 30.7, 27.9% for SPT and 13.2, 37.3, 31.1% for PB. After 1 month the same parameters were respectively reduced to 3.9, 0.0, 0.0 for SPT and 5.8, 0.0, 0.0 for PB. After 1 month therapy also no differences in QSQ, ESS, PSG sleep parameters were observed, however perceived therapeutic effectiveness by means of VSAS was 74.5 for SPT and 55.2 for PB (p=0.02). Compliance decreased in both groups with time. At 1 month compliance was 70% for SPT, 42% for PB. Compliance expressed as use >4 hours/night for >5 days/week was 76% for SPT, 42% for PB (p=0.01). Dropouts were 7% in SPT, 28% in PB.

Conclusions
SPT and PB effectively treat POSA when used. Only the SPT does have an acceptable compliance after 1 month.

Effect of Sleep Position Trainer and Mandibular Advancement Devices on residual Positional Sleep Apnea under MAD therapy: a randomized clinical trial

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Introduction
Positional Obstructive Sleep Apnea (POSA), defined as having a supine Apnea/Hypopnea Index (AHI) of at least twice as high as compared to the non-supine AHI, occurs in about 56% of patients with obstructive Sleep Apnea (OSA). Body position during sleep is known to affect the severity of OSA in many, although not in all patients with OSA. The aim of this prospective randomized controlled trial was to investigate the additional effect of a new Sleep Position Trainer (SPT) in patients with residual POSA under Mandibular Advancement Device (MAD) therapy.

Methods
In 17 patients (age: 51±11y; Male/Female: 10/7; AHI: 22±12/h) with residual POSA under MAD therapy, the additional effect of a chest-worn SPT (NightBalanceTM, Delft, The Netherlands) was studied. The SPT continuously monitors sleep position, vibrating as long as in supine position. After baseline polysomnography (PSG) and PSG with MAD, the patients with residual POSA under MAD therapy were invited for 2 PSGs in randomized order: with SPT alone and with the combination of SPT and MAD.

Results
Both MAD and SPT were individually effective in reducing the total AHI significantly when compared to baseline, from 22.2 ± 11.5/h to 11.4 ± 5.2/h and to 11.6 ± 8.7/h respectively. Combination of SPT with MAD therapy further reduced the OSA severity to an AHI of 5.3 ± 3.1/h. This was significantly lower when compared to baseline (p=0.001), MAD alone (p=0.001) and SPT alone (p=0.004). The SPT was found to be effective in reducing the time spent in supine position during sleep compared to baseline and compared to MAD, from 31.4 ± 27.0% to 2.3 ± 7.3% [p=0.001] respectively. The time spent in supine position during sleep with combination of SPT and MAD was 0.8 ± 1.7, and was significantly lower than baseline [p=0.001] or MAD alone [p<0.001].

Conclusions
The results of this randomized controlled trial indicate that the combination of the Sleep Position Trainer with MAD therapy leads to a lower time spent in supine position during sleep. The Positional Therapy used in this study effectively reduced the AHI in patients with residual POSA under MAD treatment.


Preliminary study results were presented at the World Congress on Sleep Apnea, Rome 2012 & at the European Respiratory Society (ERS), Barcelona 2013 (poster discussion session).