Introduction: Recent studies have indicated that obstructive sleep apnea syndrome (OSAS) is associated with hypertension. OSA is a common cause of sympathetic nervous activity. Increase of sympathetic nervous activity causes hypertension. Continuous positive airway pressure (CPAP) is the most useful treatment for OSAS. Good CPAP adherence treatment improve the risk of hypertension. This study examined the effect of intervention of medical staff on the adherence of CPAP, heart rate and sleep stages in patients with OSA.
Methods: All patients diagnosed with OSA and undergoing subsequent CPAP were clinically followed for 12 months to examine CPAP adherence, as well as longitudinal changes in blood pressure, average heartrate of 24 hours and sleep stages. They were divided into 2 groups, Group A: patients who had individual consulted in person by sleep physician and technicians before start using CPAP and Group B: patents who did not have individual consulted. Patients in both groups were consulted by sleep physician and technicians after start CPAP with utilizing tele-monitoring. If the adherence were poor, the patients were recommended to stop CPAP. We provided 3D accelerometer and an optical pulse photoplethysmography to all the patients and analyzed the data of heart rate and sleep stages.
Results: A total of 30 OSA patients underwent CPAP, were enrolled in the study and assessed for changes in mean heart rate and body weight during the study period. We found a significant reduction in mean heart rate in both group A and B compared with baseline ($p<0.05$). The patients aged under 50 years old and whose AHI<20 times/hour have higher ratio of dropout CPAP therapy. There was no significant difference between Group A and Group B on the persistency rate of CPAP therapy. Also, no significant association was found between group A and B on the adherence of CPAP.
Conclusion: We showed the importance of the effect of intervention of medical staff on the adherence of CPAP and heart rate in patients with OSA the consultation after starting CPAP for a while with utilizing tele-monitoring data would be more effective compared with that in person before start using CPAP.
Support (if any):

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LONG TERM EFFECTS OF CONTINUOUS POSITIVE AIRWAY PRESSURE ON THE WEIGHT OF OBSTRUCTIVE SLEEP APNEA PATIENTS IN THE SOUTHEAST USA.

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Introduction: Obesity has been linked to exacerbating Obstructive Sleep Apnea in patients. Paradoxically however, effective CPAP therapy has been noted to lead to weight increases even while improving hypersomnia and daytime neurocognitive functioning. Prior studies have demonstrated inconsistent results regarding weight changes while on CPAP therapy. Our study aims to clarify these inconsistencies and provide specific recommendations for CPAP compliant patients to prevent weight gain.
Methods: 393 OSA patients were seen for multiple follow ups since initiation of CPAP therapy at a single center sleep clinic. Every visit their weight would be updated along with CPAP compliance. Data was assessed on 1 month, 6 month, and 12 month intervals. Exclusion criteria include diuretic use, diet/exercise additions, and discontinuation of CPAP therapy before the full observation window.
Results: Patients with long term use of their CPAP devices had an average increase of 2.68±11.29 lbs after a year. 233 participants gained weight (an average of 9.8±7.3 lbs) while 141 participants lost weight (an average of -8.5±7.2 lbs) with 19 participants showing no weight change. This weight change could be observed starting as early as one month after CPAP initiation.
Conclusion: CPAP therapy is most likely linked to a lasting increase in weight. Recommendations and patient education for OSA patients should be modified to include an exercise component (10,000 steps/day) and/or caloric restriction (2200 low carb diet) to offset this weight increase. Further study is needed to assess the impact such recommendations could have in long term OSA care beyond the southeast USA.
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EVALUATING THE IMPACT OF SLEEP DISORDERED BREATHING ON ADVERSE CARDIOVASCULAR OUTCOMES AFTER BARIATRIC SURGERY

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Introduction: Sleep disordered breathing (SDB), including obstructive sleep apnea (OSA) and obesity-associated sleep hypoventilation (OASH), has well-characterized adverse effects on the cardiovascular system and increases morbidity and mortality. Long-term impact on cardiovascular outcomes post-bariatric surgery, however, remains unclear. We hypothesize that patients with SDB have increased frequency of major adverse cardiovascular events (MACE) post-bariatric surgery than those without.
Methods: Patients undergoing polysomnography (PSG) prior to bariatric surgery at The Cleveland Clinic from 2011–2018 were retrospectively examined and followed up from date of last surgery to 2019, including the perioperative period. Primary predictors include moderate-severe OSA, i.e. apnea hypopnea index(AHI)>15, and OASH, i.e. body mass index (BMI)≥30kg/m2 and either end-tidal CO2≥45mmHg or serum bicarbonate≥27mEq/L. MACE (coronary artery events, cerebrovascular events, heart failure or atrial fibrillation)-free probability was compared using hazard ratios estimated from Cox proportional hazards models on four groups: OASH with moderate-severe OSA (N=492), OASH-only (N=442), moderate-severe OSA-only (N=203), and a reference group without OASH or moderate-severe OSA (N=243). Multivariable Cox proportional hazards models adjusting for age, sex, BMI were fit on MACE survival. Analysis was performed based on an overall significance level of 0.05, using SAS software (version 9.4, Cary, NC).
Results: The sample comprised 1380 patients: age: 43.5±12 years, BMI: 49±9 kg/m2, 17.7% male, 63.7% White. Risk of MACE across the groups bordered significance ($p=0.051$). Compared to the reference group, the OASH with moderate-severe OSA group had higher risk of MACE (HR2.53, 95%CI:1.07–6.00,$p=0.035$). Patients with moderate-severe OSA had higher risk of MACE than those with AHI<15 (HR1.94, 95%CI:1.20–3.13,$p=0.007$). Patients with severe OSA had higher risk of MACE than those AHI<30 (HR2.01, 95%CI:1.28–3.14,$p=0.002$). For every 5-unit AHI increase, risk of MACE increased by 6% (HR1.056, 95%CI:1.029–1.084,$p<0.001$) with slight reduction in point estimates in adjusted models.

Conclusion: Preliminary data from this largest-to-date sample of systematically phenotyped patients with SDB undergoing bariatric surgery show significant differences in risk of MACE and MACE-free survival mitigated after consideration of obesity. Further investigation to elucidate effect modification by obesity and metabolic factors is needed.
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TRANSVENOUS PHRENIC NERVE STIMULATION FOR CENTRAL SLEEP APNEA: A SYSTEMATIC REVIEW

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Introduction: RespiCardia™ remedē® System, a transvenous phrenic nerve stimulator, is indicated to treat central sleep apnea (CSA) in certain patients. CSA involves disruption of the normal breathing pattern during sleep; CSA is associated with decreased patient quality of life and worsens cardiovascular outcomes. Existing therapies for CSA are often complicated by poor patient adherence to therapy and occasional adverse effects. The remedē® System uses electrical stimulation of the phrenic nerve to cause diaphragmatic contraction and attempts to restore normal breathing during sleep.
Methods: Systematic review was conducted according to the Preferred Reporting of Systematic Reviews and Meta-Analysis (PRISMA) guidelines. Databases were queried by two independent reviewers for English-language studies published between 2000 and 2020. The initial search screened for all occurrences of "remede" then was further refined to include studies evaluating use of the RespiCardia™ remedē® System as a treatment for CSA in multiple patients.
Results: Two hundred twenty-seven articles were identified from initial search results. Fourteen articles were identified through screening of title and abstracts from initial results. Seven additional articles were identified through reference review. Full-text review of all the articles was then completed. All articles were published after 2010. Of the 21 articles, a total of 1621 patients underwent device implantation. We sought to summarize the available evidence regarding patient selection for implantation, immediate and delayed complications, adherence to therapy, and polysomnographic evidence of efficacy.
Conclusion: The remedē® System has been demonstrated to improve sleep and respiratory parameters including AHI, CAI, arousal index, REM sleep, and ODI with few complications. This device proves to be a safe and effective treatment for moderate to severe CSA in adult patients, especially those with HF. Future studies examining long-term outcomes and delayed complications are needed.
Support (if any):

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POSITIVE AIRWAY PRESSURE TRACKING SYSTEMS: OUTCOMES OF POLYSOMNOGRAPHIC TESTING PROMPTED BY THE RESIDUAL APNEA HYPONEA INDEX

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Introduction: To assess positive airway pressure (PAP) adherence and efficacy, tracking systems have been developed to monitor hours of CPAP use, mask leak, and residual apnea-hypopnea index (AHI) while patients are on treatment. No formal guidelines however have been developed on how to interpret and utilize this information. We looked at treatment outcomes after an in-laboratory sleep study reevaluation was made based on clinical symptoms and the residual AHI.
Methods: We performed a retrospective chart review of adult patients evaluated with an in-laboratory polysomnogram (PSG) based on a clinical concern for inadequately treated obstructive sleep apnea (OSA) and the residual AHI obtained from the PAP tracking system. We documented the outcomes of the repeat study and follow-up AHI after the new intervention (if recommended). We excluded patients non-adherent to PAP.
Results: Nine patients were identified between January 2015 and 2020 at the McGovern Medical School Outpatient Sleep Clinic. All nine patients were male with an average age of 69.2 years (range 44–84). The average AHI on the diagnostic study (CMS criteria) was 37.1 events/hour (range 17.4–67.1). The average residual AHI prompting reevaluation was 9 events/hour (median 15.9). All patients had a change in treatment based on recommendations made after their sleep study. The clinical suspicion for central events on the tracking system was confirmed on PSG on three patients who were subsequently switched to adaptive servo-ventilation. Two patients were found to have central events without a previous suspicion for central events. Four were prescribed a higher pressure or BPAP for suspected untreated OSA confirmed on the repeat PSG. All of the patients had a decreased residual AHI (average 6.3 events/hour) after treatment changes were made.
Conclusion: Reevaluation with a PSG after concerns of the residual AHI led to a change in diagnosis (complex sleep apnea) or the need for higher treatment pressures in our cohort. This lead to the optimization of therapy and a decrease in AHI on the tracking system post-intervention, hence justifying the repeat PSG. Exact guidelines however need to be set to standardize the recommendations with a potential cut-off residual AHI after which a repeat PSG is the standard.
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OPTIMIZING TREATMENT OF THE INTRA-ORAL NEGATIVE AIR PRESSURE FOR OBSTRUCTIVE SLEEP APNEA

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Introduction: The intra-oral negative air pressure device (iNAP) is designed to develop a negative pressure gradient in the oral cavity of the user. The pressure gradient provides a force to move the tongue and soft palate forward. Previous works show the treatment response rate of intra-oral pressure therapy varying between 25–79%. However, for those OSA patients with very high BMI or AHI, they may need higher pressure to achieve optimizing treatment outcome.
Methods: To provide an optimizing treatment of intra-oral pressure, 30 patients treated with iNAP successfully completed one baseline PSG and one treatment PSG with in-laboratory pressure adjustment. When conducting the iNAP titration PSG, the initial treatment pressure is 40mmHg. iNAP pressure should be increased by at least 10mmHg an interval no shorter than 15 min. In order to eliminate obstructive respiratory events, iNAP pressure should be increased when observe obstructive apnea or hypopnea or unambiguous snoring.
Results: A total of 30 patients presented their consent to participate in this study. The mean age of the patients was 51.2 ± 13.97 years, and their mean body mass index (BMI) was 25.87 ± 3.41 kg/m2. The mean baseline AHI was 39.59 ± 20.05 events/h, which decreased significantly to 8.17 ± 8.11 events/h. No significant change in sleep efficacy, and percentage of N1 stage was found in the treatment PSG. However, significant improvements in the percentage of N3 stage, Min SpO2, and arousal index were observed in the treatment PSG.