

Recent Advances in Diagnosis and Management of Obstructive Sleep Apnea

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Editorial

OSAS is one of the main risk factors for cardiovascular disorders including ischemic heart disease, pulmonary and systemic hypertension.

Many patients with COPD experience disturbed sleep. This may occur for a variety of reasons, such as changes in respiration during sleep, use of nocturnal oxygen and co-morbid obstructive sleep apnea.

N.CPAP reduces OSAS induced hypoxia and generation of inflammatory mediators, therefore serving as a potential approach to decrease the risk of progression of OSAS induced cardiovascular disorders.

The present study was conducted at the sleep laboratory of Assiut University Hospital chest department during the period from 2007 till December 2010 aiming at detection of best methods for early diagnosis and management of OSA disorders.

It was done on 128 persons who were classified into four groups (n=32 each)

Group (A): Matched control group with simple snoring.

Group (B): Pure obstructive sleep apnea (OSA) syndrome.

Group (C): Obesity hypoventilation syndrome (OHS) with OSA.

Group (D): Chronic obstructive pulmonary disease COPD with OSA (overlap syndrome).

All patients were subjected to the following

Detailed medical history, thorough clinical examination with body mass index calculation, laboratory investigations including random blood sugar level, lipogram, thyroid function tests, kidney function tests, arterial blood gases analysis as a baseline, plain chest X-ray, postero-anterior view, full-night polysomnographic study, lung function tests and echocardiography.

Patients who were proved to have OSAS were subjected to an overnight nCPAP titration study with the patients connected to the polysomnogram and measuring all the available polysomnographic parameters.

MRI of the upper airway had been done to 20 patients with OSA and 10 persons as a control group during wakefulness and after sleep.

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Pulmonary function tests were normal in control group; patients with OSA group (B) had variable extra thoracic obstruction. Patients with OHS and OSA (c) had restrictive pulmonary dysfunction while patients with COPD and OSA had obstructive dysfunction.

Functional echocardiography data showed significantly lower ejection fraction and stroke volume in patients with OHS and OSA and to a lesser extent in patients with COPD and OSA, but near control values in patients with only OSA. The right ventricle was dilated and the interventricular septum was thicker in all groups with OSA compared to control group but it was more manifest in OHS with OSA and COPD with OSA and to a much lesser degree in patients with pure OSA. The mean pulmonary artery pressure was higher in OHS with OSA (36.9 ± 14.5), in patients with COPD and OSA (33.8 ± 11.6) and there was mild increase in patients with only OSA (18.6 ± 6.2) when compared with control group (13.4 ± 2.1).

Regarding MRI of the upper airways: There was a statistically significant increase in volumetric soft tissue measurements of parapharyngeal fat pad, retro-palatal lateral pharyngeal wall, retro-glossal lateral pharyngeal wall, soft palate and tongue in patient with OSA than in control group. There was a statistically significant decrease in anteroposterior and lateral dimensions in retro-palatal, retro-glossal and epiglottic regions in patient with OSA than in control group. The decreases in anteroposterior and lateral dimensions was more marked during sleep in patients with

OSA at three levels (retro-palatal, retro-glossal and epiglottic) but mainly in retro-palatal region in control group.

As regarding O₂ saturation; group D (overlap syndrome) showed more reduction in basal O₂ during sleep, minimum O₂ saturation during sleep and increase in desaturation index.

Effect of CPAP on Each Group

In the present study we compared the respiratory and non-respiratory polysomnographic parameters before and after CPAP treatment in each group.

In group B (OSA): There was statistical significant difference before and after CPAP as regards REM latency, stage REM % of sleep, stage N1% of sleep, stage N2% of sleep, stage N3% of sleep, slowest heart rate, tachy/brady index, desaturation index, basal O₂ during sleep, minimum O₂ during sleep, obstructive apnea, mixed apnea, central apnea, hypopnea index, AHI during non REM, AHI during REM, AHI, and arousal index, while there was no statistical significant improvement before and after CPAP as regards total time in bed, total sleep time, sleep efficiency, sleep maintenance efficiency, sleep latency, basal heart rate, fastest heart rate.

In group C (OHS+OSA): There was no statistical significant improvement before and after CPAP as regards total time in bed, total sleep time, sleep efficiency, sleep maintenance efficiency, stage REM% of sleep, stage N2% of sleep, basal heart rate, fastest heart rate tachy/brady index, basal O₂ during sleep. While there was statistically significant improvement before and after CPAP as regards sleep latency, REM latency, stage N1% of sleep, stage N3% of sleep, slowest heart rate, desaturation index, minimum O₂ during sleep, obstructive apnea, hypopnea index, AHI during non REM, AHI during REM, AHI, and arousal index.

In group D (overlap syndrome). There was no statistical significant improvement before and after CPAP as regards total time in bed, total sleep time, sleep efficiency, sleep maintenance efficiency, REM latency, basal heart rate, fastest heart rate, basal O₂ during sleep, minimum O₂ during sleep and mixed apnea. While there was statistical significant difference (improvement) before and after CPAP as regards sleep latency, stage REM% of sleep, stage N1% of sleep, stage N2% of sleep, stage N3% of sleep, slowest heart rate, tachy/brady index, total desaturation, desaturation index, obstructive apnea, central apnea, hypopnea index, AHI during non REM and REM sleep, AHI, and arousal index.

CPAP Titration Response

In group B (patients with OSA), 30 patients (93.8%) showed acceptable response (50% optimal response, 25% good response and 18.8% adequate response).

In group C (patients with OHS and OSA), 12 patients (37.5%) showed acceptable response (6.2% optimal response, 25% good response and 6.2% adequate response).

In group D (patients with COPD and OSA), 14 patients (45.16%) showed acceptable response (6.45% optimal response, 32.25% good response and 6.45% adequate response).

On comparison of the degree of improvement among groups after treatment with CPAP, group B showed the most favorable response especially in oxygen saturation and AHI.

Conclusions and Recommendations

From this study the following conclusions could be drained

Patients with OSA had increased BMI compared to normal healthy control subjects.

If we consider the burden in sleep studies, those patients with a high probability of having OSAS (co-morbid diseases and ↑BMI) should be assessed earlier.

The presence of OSA can further increase cardiovascular morbidity and mortality. Large, prospective, long-term studies will help further confirmation of this relationship. Future interventional studies will demonstrate whether treatment of OSA will improve cardiovascular outcomes in those patients.

Elevated serum glucose levels increase the likelihood for the presence of OSA. These results provide further evidence for the association between OSA and metabolic syndrome. Further work is now needed to shed more light on the pathophysiology of this bidirectional association, as well as to ascertain whether glucose and/or other components of metabolic syndromes can be meaningfully used for appropriate referral and early detection of OSA in such patients.

Patients with OSA had variable extra thoracic obstruction in pulmonary functions while patients with OHS with OSA had restrictive pulmonary dysfunctions and patients with overlap syndrome had obstructive dysfunctions, so pulmonary functions can be used for early detection and differentiation of different types of OSAS.

The mean pulmonary artery pressure was much higher in OHS with OSA and in patients with overlap syndrome than control group while there was mild increase in patients with pure OSA. Pulmonary arterial hypertension is frequently observed in patients with sleep related disorders, and appears to be related to obesity and its respiratory mechanical consequences.

Pharyngeal airway in OSA patients demonstrated a significant decrease in both mean values of the cross-sectional area and AP diameter of the soft palate in comparison to control subjects.

During sleep patients with OSA show significant narrowing in retropalatal, retroglossal and epiglottic regions as demonstrated by MRI.

MRI detects the level of obstruction and the degree of obstruction in patients with OSA and can be used for early detection of OSA and may direct methods of management.

Application of nCPAP during the second night corrected apneas and hypopnea, and oxygen desaturations in 45.16% in patients with overlap syndrome, in 37.5% in patients with obesity hypoventilation syndrome with OSA while in OSA response was 93.8%.

Continuous positive airway pressure (CPAP) is the most widely used therapy for obstructive sleep apnea (OSA). Despite its general efficacy, OHS is the lowest. The effect of a bi-level positive airway pressure (BiPAP) trial in OHS needs further future evaluation.

Long-term future studies, conducted on a wider scale of patients should be performed to assess the role and setting of BIPAP in patients with OHS with OSA and patients with overlap syndrome.

Patients with COPD, have frequently disruptions of sleep due to oxygen desaturations, coughing, and dyspnea. The sleep specialist should be aware of these problems and be able to evaluate and manage them.

In COPD, sleep is often disturbed and of poor quality, both subjectively and objectively. In addition, nocturnal oxygen desaturation is common. A number of questions regarding nocturnal oxygen delivery in COPD remain unanswered. These

and other questions of interest will be answered only in future larger and well-controlled clinical trials.

With such a global epidemic of obesity, the prevalence of OHS is likely to increase. It is essential for clinicians to maintain a high index of suspicion, particularly because early recognition and treatment improve outcomes. Further research is needed to better understanding of the pathophysiology and long-term treatment outcomes of patients with OHS.

Desaturation index and arousal index being the most simple and significant screening for patients with OSA and if combined with pulmonary functions can predict OSA and categorize patients into OHS, overlap syndrome and pure OSAS.