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Many patients who come in for the sleep test don't know the complications of untreated OSA

-Jenifer T.

Personal opinion of a Sleep Technologist

Why do you decide to become a sleep technologist?

- A passion to work in the healthcare industry
- A challenge to learn new things
- A desire to directly improve patients' sleep and their quality of life
- To increase awareness of sleep apnea as many patients who come in for the sleep test don't even know its complications

What is the most challenging aspect of your profession?

There are many challenges in this profession

1. Patients who have been deprived of good sleep
They are easily irritable and exhibit anxiety problems.
2. Patients who have chronic insomnia
It is difficult to monitor the sleep architecture of these patients as they cannot or would not sleep; we have to find a way to make them sleep through the night.
3. Patients who have morbidly obese
We have to find the optimal pressure for them

What is the biggest change in the profession since you began?

In my experience the biggest change in the profession has been in

- The Polysomnography technology and PAP therapy technology

There are now new portable and wireless polysomnogram machines and innovations in PAP machines, like the Adaptive Servo Ventilation (ASV) which is used in the treatment of Central Apneas and Cheyne-Stokes breathing.

What factors do you think influence patient adherence to CPAP?

In my experience the following factors influence patient adherence to CPAP

- Relief from the symptoms of sleeping disorders experienced while using the machine
- Good quality sleep = benefits of CPAP

What factors tend to influence patient's choice of mask?

In my experience the following factors tend to influence patient's choice of mask

- Affordability
- Comfort
- Durability
- Fit
- Price

Letters to the Editor:

Our readers are invited to write to the editor by volunteering content that they feel strongly about or feel needs coverage in a publication such as this. Your input is welcome and valued, particularly with case studies and hot topics currently debated in the field, as well as reviews of Asia Pacific congresses and conferences that you might like to share with the audience. Your letters will be featured in future issues of Sleepmatters allowing an open forum between the experts, to increase the level of engagement amongst the audience.

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Sleep matters

ASEAN SLEEP NEWSLETTER NEWS / OPINIONS / INSIGHTS

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"The Nocturnal Oxygen Therapy Trial improved survival among patients with COPD with long-term oxygen therapy."¹⁰

-Dr De Los Reyes

Interview with Dr. Virginia s. De Los Reyes on Overlap Syndrome (Chronic Obstructive Pulmonary Disease (COPD) and Obstructive Sleep Apnea (OSA))

What sleep disorders are prevalent in COPD patients?

COPD patients have:

1. Increased nocturnal symptoms,
2. Poor sleep quality,
3. Effects on gas exchange,
4. Obstructive sleep apnea (OSA), termed Overlap Syndrome

Other types of sleep-disordered breathing that are less commonly seen include Central sleep apnea (CSA) and complex sleep apnea (CompSA).

What is the prevalence of OSA in COPD patients?

Approximately 11% of patients with OSA have airflow limitation on spirometry¹.

Results from the Sleep Heart Health study²: No increased prevalence of OSA among patients with mild airflow limitation defined by a forced expiratory volume in one second (FEV1) to forced vital capacity ratio of less than 70%.

Results of 173 Filipino patients diagnosed with COPD: 11.56% had symptoms of OSA using a validated questionnaire³

How does unrecognized and untreated OSA in COPD patient affect management of COPD?

Patients with overlap syndrome (COPD + OSA)

- Displayed more profound oxygen desaturations during sleep^{1,2}
- Higher all-cause mortality (due to cardiovascular condition)^{1,2}
- Higher COPD exacerbation rate^{1,2}
- Worse daytime hypoxemia and hypercapnia^{1,2}
The repeated and prolonged nocturnal hypoxemia may be associated with the development of cardiovascular consequences such as pulmonary hypertension and recurrent cardiac arrhythmias.^{1,2}

What are the signs and symptoms of OSA in COPD patient and how do we diagnose OSA in COPD patients?

The main signs and symptoms in a patient having co-existing OSA and COPD are:

- Relatively worse hypoxemia and hypercapnia⁴
- Poor symptom control of COPD⁴
- Symptoms consistent with OSA including daytime somnolence and morning headaches⁴
- Frequent nocturnal arousals from sleep⁴

We diagnose OSA in COPD patients by doing Polysomnography, also send patients with mild to moderate airflow obstruction with evidence of Pulmonary Hypertension for Polysomnography.

We do spirometry screening in OSA patients who have respiratory complaints typical of COPD and the presence of risk factors for COPD like cigarette smoking.

How do we treat OSA in COPD patient?

In our centre we:

- Maximize treatment of each condition⁴
- Focus on interventions that have shown benefits for both conditions⁴
- Bronchodilators for COPD⁴
- Inhaled corticosteroids for those with severe flow

References: 1. Chaouat A, et al. Am J Respir Crit Care Med. 1995;151(1):82–86. 2. Sanders MH, et al. Am J Respir Crit Care Med. 2003;167(1):7–14. 3. Aslama Alauya-Limping, et al. Philippine Journal of Internal Medicine. May 2007; Vol. 45 (3):125–128. 4. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global Strategy for the Diagnosis, Management and Prevention of Chronic Pulmonary Disease. Global Initiative for Chronic Obstructive Lung Disease; 2011. Available at: http://www.goldcopd.org/uploads/users/files/GOLD_Report_2011_Feb21.pdf. Accessed October 1, 2013. 5. Celli BR, et al. Eur Respir J. 2004;23(6):932–946. 6. Marin JM, et al. Am J Respir Crit Care Med. 2010;182(3):325–331. 7. Stanchina ML, et al. J Clin Sleep Med. 2013;9(8):767–772. 8. Wang TY, et al. Respir Res. 2013;14(1):66. 9. Nowin'ski A, et al. Pneumonol Alergol Pol. 2007;75(1):46–56. Polish. 10. Nocturnal Oxygen Therapy Trial Group. Ann Intern Med. 1980;93(3):391–398. 11. Mieczkowski B, et al. International Journal of COPD 2014;9 349–362

limitation and frequent exacerbations⁴

- Positive airway pressure to treat moderate to severe obstructive sleep apnea.⁴

What are the beneficial effects of CPAP treatment in COPD patient with OSA besides treating OSA?

The mainstay of treatment for patients with OSA and overlap syndrome is positive airway pressure using either CPAP or bilevel positive airway pressure (PAP). Bilevel PAP is needed if there is persistent hypoventilation leading to hypoxemia despite resolution of obstructive events with CPAP.

Early treatment with continuous positive airway pressure (CPAP):

- Improves survival^{6,7}
- Reduces hospitalization^{6,7}
- Reduces pulmonary hypertension^{6,7}
- Reduces hypoxemia^{6,7}
- Decreases COPD exacerbations leading to hospitalisation^{6,7}
- Improves walking capacity and exercise tolerance^{8,9}

What are the beneficial effects of Oxygen treatment on Sleep and breathing in COPD patients?

A major consequence of overlap syndrome is persistent and profound oxygen desaturation during sleep, related to hypoventilation and alterations in the responsiveness to hypoxemia and hypercapnia. Supplemental oxygen has been used to mitigate this issue.¹⁰

The Nocturnal Oxygen Therapy Trial improved survival among patients with COPD with long-term oxygen therapy, although this trial did not specifically investigate patients with nocturnal desaturations alone.¹⁰ In patients with potential overlap syndrome, intermittent nocturnal oxygen desaturations may resolve with treatment of the underlying sleep apnea. The treatment of OSA should therefore be prioritized before instituting supplemental oxygen. If PAP therapy alone does not correct the patient's nocturnal hypoxemia, the additional use of supplemental oxygen may be required.¹⁰



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We encourage positive lifestyle modifications like losing weight and good sleep hygiene.

–Dr. Balwinder Singh

Interview with Dr. Balwinder on OSA and role of surgery in its management

What are the indications for surgery in Obstructive Sleep Apnea (OSA) patients?

There are no hard and fixed indications for surgery in patients suffering from OSA. It is important that the patients must understand

- OSA and its complications
- Various options available for treatment
- Advantages and disadvantages
- Success rate and degree of success
- Long term benefits of a particular treatment plan
- Degree of surgery success is difficult to predict (can be between 70–100%)

Currently, the only treatment that is 100% effective is tracheostomy (except for central OSA) and PAP therapy.

The indications for surgery as laid out by American Academy of Sleep Medicine (AASM) can be broadly divided into the following categories:¹

- 1) Those patients with mild OSA who have surgically correctible obstruction
eg tonsillar hypertrophy, adenoid hypertrophy
- 2) To improve the delivery of PAP in patients already on PAP therapy and having some form of nasal obstruction –In such cases it also becomes an opportunity for the surgeon to try to achieve a cure in an OSA patient who needs surgery for a different reason
- 3) Those patients who refuse PAP
- 4) Those patients who have inadequate treatment outcome with oral appliances

What are different types of surgery to treat OSA and snoring?

There are various types of surgeries to treat OSA

- i. Nasal Surgery

- ii. Minimally Invasive Palatal Procedure
- iii. Nasopharyngeal, Oral and Oropharyngeal Surgery
- iv. Hypopharyngeal Procedure –
 - a) Tongue reduction:
 - b) Tongue advancement/stabilization:
- v. Laryngeal Procedures
- vi. Global airway procedures
- vii. Tracheostomy – rarely done

Snoring is usually a symptom of OSA and only about 6% of OSA patients do not snore.² Thus surgery for OSA indirectly treats snoring. There are some patients who are known as primary snorers. They snore but do not have OSA and when they request for this treatment, we need to identify the most probable cause of the snoring. In my experience it is normally the flaccid palate, poor nasal airway resulting in breathing via mouth and also tonsillar hypertrophy and can be treated accordingly.

Should we do a sleep study before patient undergoes surgery for treatment of OSA?

PSG is mandatory for anyone undergoing surgery for OSA. PSG is well known as the gold standard for diagnosis of SRBD and AASM diagnostic criteria requires to have a PSG showing 5 or more obstructive breathing events per hour during sleep for a diagnosis of OSA to be made.

In my experience, if there are complications during or after the surgery, the surgeon can be taken to court and the need for surgery questioned and the only way to prove that the surgery was indicated is to have a pre-operative PSG showing OSA (AHI of above 15 or AHI of above 5 with symptoms of EDS)

Should we do a sleep study after the operation? What is the ideal time to do a post-op sleep study?

A PSG after surgery for treatment of OSA is ideal for all cases but must be done in patients who have other co-morbidities. For cases with purely OSA and where PSG appointment is difficult to get, subjective assessment can be used eg ESS, STOP-Bang or Berlin questionnaire. There is no ideal time to do a post-op sleep study other than to give adequate time for the wounds to have healed which is normally anything more than 6 weeks post-op.

What is the success rate of surgery in treating snoring and OSA?

Success rate of surgery in treating snoring and OSA is anywhere between 70-100% if the patient for surgery is selected properly and also a thorough examination including a sleep endoscopy is done to identify the site(s) of obstruction.³

What is the rate of re-occurrence of OSA after surgery to treat OSA?

In my opinion, the rate of re-occurrence is variable and tends to occur after 3-5 years after the initial surgery and the degree of re-occurrence is usually very gradual and slow unless it is aggravated by sudden increase in the BMI.

What are the complications of surgical procedures to treat OSA?

The main complications of surgical procedures to treat OSA are:

1. Mainly pain after surgery,⁴
2. hemorrhage and ⁴
3. infection which is a common complication for most other surgeries anywhere in the body. ⁴

The pain tends to be more significant in OSA surgery because the oral cavity, oropharynx and hypopharynx is also the passage for swallowing and thus the operated area is exposed to movement and food material which can aggravate the pain. The other

complications depend on the different type of OSA surgery. In my experience, in the right hands, there should not be the complications of velopharyngeal insufficiency, nasopharyngeal stenosis, deterioration of OSA, which are due mainly to excessive resection, mucosal destruction, and poor selection of type of surgery.⁴

What is your advice to OSA patient's regarding treatment options for OSA?

I go through a step-by-step process.

- Step 1: Go through PSG with patients
Step 2: Explain their AHI, ODI, other oxygen stats, sleep architecture, type of apnea they have, the position in which it occurs the most
Step 3: Explain the disease and its consequences
Step 4: Explain the probable cause(s) of their OSA
Step 5: Discuss available treatment options

Mild OSA – PAP therapy, surgery for those with surgically correctible obstruction, oral appliances, behavioural therapy. Surgery is not offered if the patient has a BMI of more than 30 unless there is an obvious anatomical obstruction like adenotonsillar hypertrophy.

Moderate OSA – PAP therapy, oral appliances and behavioural therapy. If patient is not keen for PAP therapy, oral appliances or surgical options will only be offered after trying PAP therapy.

Severe OSA – PAP therapy. If patient is not keen for PAP therapy, surgical options will only be offered after trying PAP therapy after which patient is still keen for other options after.

In my experience, the patient must not walk out of the consultation room without some form of treatment. That is why we offer surgical options to patients (with moderate or severe OSA) who do not want PAP therapy although surgery is not guaranteed to cure OSA. At the very least, we can still decrease the disease load to a significant degree.

Step 6: Encourage positive lifestyle modifications like losing weight and good sleep hygiene

References: 1. Journal of Clinical Sleep Medicine Vol 5, No 3, 2009 Pg 274 2. Strohl KP, Redline S. Recognition of Obstructive Sleep Apnea. Am J Resp Crit Care Med 1996, 154. 279-89. 3. & 4. Chapter on Palatal Surgery in the book written by Michael Friedman "Sleep Apnea and Snoring : Surgical and Non-Surgical Therapy")



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Obstructive sleep apnea (OSA) can adversely affect neuropsychological function

-Dr. Teofilo

Dr. Teofilo's summary on studies relating to Sleep Disordered Breathing (SDB) and Positive Airway Pressure Therapy (PAP)

1 Obstructive sleep apnea (OSA) can adversely affect neuropsychological function. In this paper, poor sleep quality, apnea hypopnea index (AHI) and oxygen saturation (SaO₂) in severe OSA were associated with memory and attention impairments. Analysis using selected subtests from the Luria-Nebraska neuropsychological battery in 60 subjects (30 with OSA and 30 controls) identified associations between AHI and immediate memory ($r = -0.303$; $P < .05$), logical memory ($r = -0.359$; $P < .01$), and thematic drawings ($r = -0.302$; $P < .05$). Therapy with continuous positive airway pressure (CPAP) in those with OSA improved immediate memory ($P = .03$).

Jurádo-Gómez B, et al. Neurologia. 2015 May 11.

2 Risk of coronary heart disease (CHD) and chronic heart failure (CHF) is higher in persons with untreated OSA.

Test numbers: 1,131 adults without CHD or CHF at baseline and not treated with CPAP for up to 24 years
Result: Persons with untreated severe disease (AHI > 30) had 2.6 times higher likelihood of having incident CHD or CHF compared to individuals without sleep disordered breathing (SDB).

After adjusting for age, sex, body mass index (BMI) and smoking, estimated hazard ratios (HR) for incident CHD or HF compared to AHI = 0 were 1.5 (0.9-2.60) for AHI > 0-5; 1.9 (1.05-3.5) for AHI 5 ≤ 15; 1.8 (0.85-4.0) for AHI 15 ≤ 30; and 2.6 (1.1-6.1) for AHI > 30; P trend = 0.02.

Hla KM, et al. Sleep. 2015 May 1;38(5):677-84.

3 Compared to healthy controls, persons with OSA have higher occurrence of

- Mortality risk
- CHD
- Strokes
- Chronic kidney disease (CKD)

Among 3,079,514 United States (U.S.) veterans, untreated OSA was associated with higher mortality

risk (adjusted HR, 86% vs. 35%) and a faster decline in renal function compared to those with treated OSA.

Molnar MZ, et al. Thorax. 2015 Jun 2.

4 This paper highlights the importance of pre-operative assessment of SDB, including OSA and obesity hypoventilation syndrome (OHS). In this retrospective study, postoperative complications after elective non-cardiac surgery were more common in patients with hypercapnic OHS and overlap syndrome compared to OSA alone. The former group of patients had higher likelihood of developing postoperative respiratory failure ($P < 0.0001$), postoperative heart failure ($P < 0.0001$), prolonged intubation ($P = 0.002$), postoperative intensive care unit (ICU) transfer ($P = 0.002$), longer ICU stay ($P = 0.009$) and total hospital length of stay ($P = 0.0008$) compared to patients with OSA alone.

Kaw R, et al. Chest. 2015 May 21.

5 A prospective cohort study demonstrated that CPAP therapy reduced mortality in older adults with moderate to severe OSA. One hundred and thirty patients with a mean age of 77.8 ± 6.2 years were followed-up for 5 ± 2.54 years. Compared to the untreated group, patients who had received CPAP had significantly lower mortality (21.6% vs. 5.6%) and lower incidence of cardiovascular events (55.7% vs. 13.9%).

Ou Q, et al. PLoS One. 2015 Jun 11;10(6):e0127775.

6 Impaired glucose tolerance can develop in persons with OSA. In a controlled parallel group study, CPAP use of 8 hours nightly for 2 weeks in 39 prediabetic persons with OSA improved glucose metabolism and 24-hour blood pressure (BP) compared with placebo. Treatment differences with CPAP therapy included a lower overall glucose [oral glucose tolerance test [OGTT]] response of $-1,276.9$ mg/dl/min (95% CI, $-2,392.4$ to -161.5 ; $P = 0.03$); and improved insulin sensitivity of 0.77 mU/L/min (95% CI, 0.03 - 1.52 ; $P = 0.04$). Persons who received CPAP therapy also had lower norepinephrine levels and 24-

hour BP compared to the placebo group.

Pamidi S, et al. J Respir Crit Care Med. 2015 Jul 1;192(1):96-105.

7 In a prospective study, adaptive servo ventilation (ASV) significantly lowered AHI, central apnea index (CAI), and obstructive apnea index (OAI) in patients taking high doses of opioids for chronic pain. Thirty-four patients who were prescribed ≥ 100 morphine equivalents for chronic pain for ≥ 4 months were evaluated at baseline and 3 months. Apnea hypopnea indices were 32.5 (38.8 \pm 31.1) during the diagnostic PSG; 11.3 (20.3 \pm 21.8) while on CPAP therapy; and 5.8 (8.6 \pm 7.9) using ASV (CPAP vs. ASV P = 0.021). Corresponding CAIs were 6.4 (16.1 \pm 18.8), 2.6 (10.3 \pm 13.5) and 0.8 (1.5 \pm 2.0); P = 0.006. Obstructive apnea indices and hypopnea indices were also lowest with ASV (0.7 [1.4 \pm 1.7] and 3.8 [5.7 \pm 5.3], respectively) than during baseline PSG (1.9 [9.7 \pm 15.2] and 10.2 [14.8 \pm 12.6]) or during CPAP therapy (3.0 [5.2 \pm 6.7] and 3.5 [5.3 \pm 5.5]); P = 0.002 and = 0.648.

Shapiro CM, et al. Sleep Breath. 2015 Mar 27.

8 Positive airway pressure (PAP) therapy improved right heart function and exercise capacity and reduced all-cause mortality in patients with SDB and CHF with preserved-left ventricular ejection (LVEF). In this study, 109 persons with CHF (LVEF > 50%) and SDB (AHI ≥ 15) were randomly assigned to PAP or control groups. Compared to baseline values, right ventricular fractional area change, tricuspid valve regurgitation pressure gradient, and tricuspid valve E/E' improved in the PAP group after 6 months (all P < 0.05). Positive changes with PAP therapy were also seen in several respiratory parameters, such as forced expiratory volume in 1 second/forced vital capacity,

percent vital capacity and peak oxygen consumption. All-cause mortality was lower in the PAP group (0%) compared to controls (12.8%; log-rank P = 0.014).

Yoshihisa A, et al. Clin Cardiol. 2015 May 12.

9 Continuous positive airway pressure (CPAP) reduced markers of myocardial ischemia (elevated N-terminal brain natriuretic peptide [NT-proBNP] levels and ST-segment depression) during sleep in patients with OSA and coronary artery disease (CAD). In 21 patients with OSA (AHI > 15; SaO₂min \leq 80%) and coexisting CAD, NT-proBNP levels before and after sleep on CPAP were 475 \pm 654 pg/mL and 353 \pm 573 pg/mL, respectively.

Valo M, et al. Clin Cardiol. 2015 Jul 14.

10 Seventy six subjects with newly diagnosed OSA (median AHI of 35.9 (IQR, 27.6-56.3) were started on auto-titrating continuous positive airway pressure (APAP) therapy and were assessed at 1 and 3 months. Patients were randomized to high span (4-15 cmH₂O) or low span (8-12 cmH₂O) APAP settings. Low-span range APAP settings were as effective in correcting AHI as high-span APAP but were associated with higher treatment compliance. Adherence of nights using ≥ 4 h (median [IQR]) was 87% (60.5-97.5) for the high span group and 94% (80.0-98.3) for those assigned to low span APAP (P=0.014).

Mean usage (hours per night [\pm SD]) was 5.7 \pm 1.6 and 6.4 \pm 1.2, respectively (P=0.049).

In addition, the high span group had more frequent nasal congestion, excessive oronasal dryness and nocturnal awakenings. There were no significant differences in residual AHI or daytime sleepiness (Epworth sleepiness scale) at 3 months between groups.

Bastos HN, et al. Sleep Breath. 2015 Jun 12.

Lifesaving cardiovascular interventions include cardiac transplantation; implantation of a long term ventricular assist device; resuscitation after sudden cardiac arrest or appropriate shock for ventricular arrhythmia.¹

2. Who provided the ASV to be used in the trial?

ResMed provided the AutoSet CS device.¹

3. What are the main findings of the study?

- No significant effect on primary end point of study¹
- ASV effectively treated central sleep apnea¹
- No significant difference between ASV and control group (all-cause mortality, lifesaving cardiovascular intervention or unplanned hospitalisation)¹
- No beneficial effect of ASV on functional measures (quality of life, 6-min walk distances)¹
- Significant increase in cardiovascular mortality and all-cause mortality in ASV group¹

4. Do the findings of the study apply to ASV devices from all the manufacturers?

Whilst this study was performed using the ResMed Autoset CS device, adaptive servoventilation devices from other manufacturers operate on similar principles. It would therefore, be prudent to avoid the use of ASV devices in heart failure until new data becomes available.¹

Authors suggested that though the principle of treatment with ASV from different manufacturers is same, we will have to wait for the results of another ongoing clinical trial (ClinicalTrials.govnumber, NCT01128816) to know whether the findings of the study apply to a particular device and algorithm.¹

References: 1. NEJM.org., DOI: 10.1056/NEJMoa1506459, September 1 2015



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ASV effectively treated central sleep apnea¹

-Dr. Lee Yeow Hian

Interview with Dr. Lee on SERVE-HF (Servoventilation in Heart Failure) Trial

1. What were the aims and objectives of SERVE-HF Trial?

This was an international multicentre, randomised, parallel group, event-driven study.

The aims of the study was to investigate the effects of adaptive servoventilation (ASV) in patients with heart failure with an ejection fraction of $\leq 45\%$ and predominantly central sleep apnoea with an Apnoea

Hypopnoea Index (AHI) of ≥ 15 /hr.¹

The primary end point of the study was the time to first event of a composite of death from any cause; a life-saving cardiovascular intervention or an unplanned hospitalization for worsening chronic heart failure.¹

Events in the region and world Jan-July 2016

Philippine College of Chest Physicians 35th Annual Chest Convention	March 2016
Philippine Society of Sleep Medicine SLEEP MATTERS: Discovering the Importance of Sleep, Lung Center of the Philippines	18-19 March 2016
Chest World Congress 2016 Shanghai China http://www.chestnet.org/Education/CHEST-Meetings/CHEST-World-Congress-2016	15-17 April 2016
ATS 2016 San Francisco http://conference.thoracic.org/attendees/future-conferences/	13-18 May 2016
Sleep 2016 Denver http://www.sleepmeeting.org/	11-15 June 2016
Malaysian Thoracic Society Annual Congress, Equatorial Hotel Penang	29-31 July 2016

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