OBSTRUCTIVE SLEEP APNEA-
CLINICAL SPECTRUM AND MANAGEMENT

ABSTRACT
In the last 50 years there has been considerable research in the field of sleep medicine. There are nearly 88 disorders of sleep of which insomnia and obstructive sleep apnea (OSA) are common. Insomnia is a symptom ranks second to pain. OSA is also common but its awareness both among medical profession and the lay public is poor.

OSA carries significant morbidity and mortality.
Sleep disordered breathing (SDB) consists of snoring, upper airway resistance syndrome and obstructive sleep apnea. OSA is characterized by repeated pharyngeal collapse pharynx (partial or complete) in sleep resulting in cyclical hypoxemia. A combination of anatomical factors and muscular hypotonia of pharyngeal muscles is often responsible for this closure during inspiration. Sympathetic stimulation coupled with release of stress hormones and endothelin impose a significant burden on the cardiovascular and metabolic systems. OSA has serious cardiometabolic consequences. OSA is a risk factor for the development of hypertension, metabolic syndrome, type 2 diabetes mellitus, ischemic heart disease, strokes, deep vein thrombosis, dementia, gastroesophageal reflux and fatty liver.

Symptoms of OSA: Habitual snoring (often loud) and daytime sleepiness are the two prominent symptoms of the disorder. Sometimes snoring may be minimal at certain times of the night which may considered as normal due to tiredness. The other nocturnal symptoms are witnessed apneas, choking, dyspnea (can be mistaken for dyspnea of cardiac origin-paroxysmal nocturnal dyspnea) restlessness manifested by frequent change of posture, nocturia (due to release of atrial natriuretic peptide), sleep talking, bruxism, gastroesophageal reflux, diaphoresis and drooling. The apneic hypopneic episodes of OSA have the capability of disrupting myocardial perfusion even in individuals without cardiac disease. The resultant effects are manifested by nocturnal myocardial ischemia, arrhythmias and hypertension. A greater prevalence of cardiovascular complications is seen throughout the spectrum of sleep disordered breathing (SDB). Some subjects may just complain of insomnia (patient unable to continue sleep due to repeated arousals) and may compel a physician to prescribe an hypnotic. Sedatives, hypnotics and antianxiety medicines are often prescribed in practice. Such drugs increase the hypotonia of pharyngeal muscles and therefore should be avoided. Alcohol is often used as a sleeping aid by some patients and it also carries similar risk. It is not uncommon to observe patients to have choked themselves in sleep after consuming such medications/alcohol before retiring to bed. It is also important to note that OSA patients are often REM sleep deprived. Chronic REM sleep deprivation results in anxiety, excessive eating and hypersexuality. Excessive eating promotes obesity which in turn aggravates sleep apnea. It is therefore necessary to treat sleep apnea in obese individuals to achieve optimal body weight.

Prevalence of OSA: Young et al reported that 4% of men and 2% of women in a middle-aged North American population had symptoms of OSA and an apnea hypopnea index of greater than 5 events per hour of sleep. This signifies that approximately 5-10 million Americans are affected. In India Udwadia et al reported that the estimated prevalence of sleep disordered breathing was 19.5% and that of obstructive sleep apnea hypopnea syndrome (SDB and daytime hypersomnolence) was 7.5%. Further, snoring can be observed when a group of subjects are sleep together as for eg. in railway sleeper coaches. It is not uncommon to observe at least 6-7 loud snorers in each coach. The usual number of berths in each railway sleeper coach is 72. There are also several mild snorers. The prevalence of OSA is higher in the elderly population and in postmenopausal women. The prevalence of SDB in elderly increases with age ranging from 5% - 15% in middle aged adults to 24% in community dwelling older adults. Also the prevalence of SDB is greater in persons with hypertension, obesity and patients with cardiac arrhythmias.

Predisposing Factors for OSA: Although obesity is risk factor for development of OSA it is not uncommon to observe OSA in low and normal body weight subjects due to anatomical factors (narrow upper airway). The predisposing factors for OSA include narrow upper airway- crowded pharynx, macroglossia, retruded chin and/or maxilla, obesity, hypothyroidism, acromegaly, middle age, male gender and also smoking.
Obstructive Sleep Apnea- Clinical Spectrum and Management

SLEEP APNEA AND HYPERTENSION

OSA is an established risk factor for hypertension. In fact it is one of the common and important causes for reversible hypertension. More than half of patients with obstructive sleep have systemic hypertension compared with an expected prevalence of 20% in middle aged obese men. Approximately 25% of patients with hypertension have obstructive sleep apnea.

The chronic usage of continuous positive airway pressure (CPAP) in patients with hypertension and obstructive sleep apnea results in reduction of hypertension both while awake and during sleep. Partinen et al. observed that patients of sleep apnea who were successfully treated had a substantial reduction in cardiovascular events compared with an equally affected patient who refused treatment.

CORONARY ARTERY DISEASE (CAD) AND SLEEP APNEA.

Several studies have suggested that there is a greater risk of CAD in sleep related breathing disorders. There is a 20 fold risk of developing myocardial infarction in untreated OSA. The prevalence of sleep related breathing disorders was 37% among men and 30% among women with angiographically verified coronary artery disease. The Stockholm female coronary angiographic study concluded that snoring contributes to the atherosclerotic process and history of habitual snoring should be taken into consideration when treating patients with cardiac disease. Andreas et al. observed clinically important sleep apnea in 50% of patients with coronary artery disease. It is also interesting to note that nearly 30% of patients with coronary artery disease and concomitant sleep apnea experienced myocardial ischemia during apnea primarily during REM sleep.

OSA and Diabetes: Diabetes is a cardiovascular disease. There is a close association between OSA and insulin resistance. The nocturnal events in OSA ultimately culminate in cyclical hypoxia, cyclical hypertension release of catecholamines & stress hormones, insulin resistance and diabetes. Recently the authors has reported favourable results in glycemic control in 4 patients of type 2 diabetes who had obstructive sleep apnea with regular usage of CPAP. The beneficial metabolic effects of CPAP has been discussed recently.

OSA and Stroke: Sleep related breathing disorders affect cerebral haemodynamics adversely. There is greater than 50% reduction in central blood flow during apneic and hypopneic events. There appears to be a bi-directional relationship between CVA and sleep disordered breathing. OSA is a risk factor for strokes. The factors which contribute to the development of stroke or TIA in a patient of OSA are nocturnal desaturations, autonomic instability and increase in intracranial pressure which reduces the cerebral perfusion pressure. Elevated catecholamine levels in OSA also promote thrombosis.

Untreated OSA patients have more strokes, stroke morbidity and mortality than those who are treated. It is to be noted that strokes themselves may generate sleep disordered breathing. There is high prevalence of OSA syndrome in patients with acute stroke. Studies have shown that usage of CPAP in stroke patients who have OSA is highly rewarding.

Daytime symptoms of OSA includes sleepiness, fatigue, morning headaches, poor concentration, decreased attention, depression, decreased dexterity and personality changes. Daytime sleepiness interferes with work performance at office. There is increased risk for vehicular and industrial accidents. Early morning headaches is often ignored or linked to hypertension which is usually present in OSA patients as a consequence of cyclical hypoxemia.

OSA and Mood: Personality changes like angry behavior may force the patient to seek psychiatric consultation. Social life is also adversely affected. OSA and depression are closely associated. OSA patients are often depressed. Depression also contributes to daytime sleepiness. Associated metabolic derangements like obesity and diabetes also cause daytime sleepiness.

OSA and Fatty Liver: Multiple defects in fuel and fat metabolism are implicated in the genesis of fatty liver. The exact cause of Non-Alcoholic Fatty Liver Disease is still unknown. Insulin resistance and obesity occupy the center stage but the factors responsible for the progress and transformation from one stage to another is a matter of research and debate. Recent reports suggest that cyclical hypoxemia and sympathetic stimulation in OSA patients pave the path of liver insults and injury. These inciting factors persist night after night only to transform hepatic steatosis to hepatic inflammation and subsequently cirrhosis.

SDB and pregnancy: Increased waist-hip ratio is a symptom of chronic hypothalamic arousal. Hypothalamic pituitary axis may be aroused even in utero. It is interesting to note that sleep disordered breathing in pregnant women may have adverse effects on both mother and fetus (pregnancy-induced hypertension and small gestational age birth).

Approximately 28% of children born in India are of low birth weight, and low birth weight is associated with elevated glucocorticoid levels in later life. A story from the womb to the tomb!

Diagnosis of OSA: Polysomnography is the gold standard to diagnose OSA. The study must be planned properly to get the best results. It is not advisable for the patient to keep early morning appointments the next day (eg. catching an early morning flight) lest anxiety affect the sleep duration. Patients suffering from common cold, fever and other acute medical conditions are best avoided. However sleep studies have been done in acute stroke since treatment of sleep apnea in acute stroke is known to be highly rewarding.

Management in Adults: The management of OSA in adults rest on the following (A) General Measures (B) CPAP (C) Non CPAP Measures. Before embarking on these measures one must look for correctable disorders like hypothyroidism, acromegaly.
A. General Measures: Mild OSA cases need advice to avoid alcohol and sedatives. It is also advisable to sleep on one side. A tennis ball may be stitched to the back of the pyjama so that the subject cannot sleep on his back.

Obesity: Obese patients need to achieve optimal body weight. Patients of OSA are often obese and have difficulty in maintaining optimal body weight due to day time drowsiness, tiredness and lack of exercise. Substantial weight loss is not always beneficial of OSA.

B. CPAP: CPAP remains the treatment of choice. It acts as a pneumatic splint and is effective in eliminating apnea and its sequelae. Snoring is also abolished. Several trials have documented its efficiency. There is substantial improvement in both sleepiness and neurocognitive performance. Decrements in blood pressure are also observed. Advantages of CPAP: (i) It is safe and effective. (ii) The unit is portable (iii) Patients readily accept its usage. (iv) There is immediate reversal of symptoms and the patient experiences sense of well being. (v) In the event of power failure the unit runs on an inverter / battery.

Although there is controversy regarding the use of CPAP in mild cases, it can be used in subjects who show improvement with its usage.

Nasal stuffiness and dryness of throat are complained by some patients. This can be treated by heated humidification, nasal decongestants, steroids or both. Intensive support with regular follow up improve CPAP adherence.

It is advisable to explain the consequences of untreated OSA to the patient and to his / her relatives. This helps in compliance. A sense of well being, alertness, feeling fit induced by continuous usage of CPAP is a positive sign and the unit in fact becomes a part of the life of the individual.

Caution: It is important to carry a certificate from the treating physician, that the unit has to be used regularly and is life saving. This saves a lot of time when travelling since security checks are now very strict all over the globe.

C. Non-CPAP Treatment: These include surgery and oral appliances. (Patients who do not accept CPAP or are CPAP failures are the candidates for oral appliances and surgery.)

Surgery: The surgical procedures advocated are (a) Uvulopalatopharyngoplasty (UPPP) in which uvula and redundant soft tissue of the soft palate are resected. The results of the surgery are not satisfactory in all subjects.

Oral appliances: Mandibular and tongue retaining devices are useful alternatives in CPAP failures and in cases of mild OSA. Oral appliances reduce retroglossal collapse and surgery probably reduces retropalatal collapse.

Tracheostomy: This remains the sole treatment for OSA with predictable success. However this procedure is reserved for severe cases since it has psychological & social effects in addition to short term and long term complications. The management of OSA therefore mainly rests of CPAP failing which other measures can be instituted. Drugs have no role to play in its management.

In conclusion, it is important to recognise OSA in clinical practice. Screening all patients of hypertension, coronary artery disease, diabetes, stroke, dementia, fatty liver; GERD for sleep apnea is worthwhile since its treatment is rewarding in multiple ways viz good quality of sleep, daytime alertness, normal physical activity which helps in reducing body weight, good cardiovascular function and better glycemic control.

RECOMMENDED FOR FURTHER READING