



Obstructive Sleep Apnoea and its Management

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ABSTRACT

Apnoea means absence of breathing effort. Apnoea can be identified by – 1) Absence of breathing for more than 10 sec. 2) Associated with 3% decrease of SpO_2 . 3) Cortical Arousal. According to several studies, 425 million (30-69 years old) adults worldwide have moderate to severe obstructive sleep apnoea, and 936 million (95 percent CI 903-970) persons (men and women) have mild to severe OSA. The number of affected individuals was highest in China, followed by the USA, Brazil, and India.¹ Healthy people have normal pharyngeal dilator muscles, which support proper oxygen supply to the lungs by maintaining an open airway. Due to decreased muscle tone, patients with obstructive sleep apnoea will not experience their regular sinusoidal inspiration and expiration. Risk factors are centripetal obesity, micrognathia, Down syndrome, Acromegaly, Hypothyroidism, high nasal resistance. Clinical features are snorting/gasping, frequent awakening, dozing off involuntarily during task, dry mouth, halitosis, mood swings. On examination patient with mostly present with high blood pressure, increased abdominal girth, increased neck circumference, increased tongue size with a decreased mandible size, low lying palate, enlarged tonsils. Work up- whenever there is an apnoeic episode:- EEG (in REM cycle) look for positive cortical arousal, ECG look for prolonged R-R interval (bradycardia), Decrease in nasopharyngeal airflow sensor activity, drop in SpO_2 at the time of episode – Cheyne stokes breathing. There will be a sinusoidal movement between chest and abdomen. Treatment options for OSA include losing weight, avoiding sleeping on one's back, checking for nasal allergies regularly, avoiding alcohol, having a uvulo-palato-pharyngoplasty, implanting upper airway devices that simulate the hypoglossal nerve, and repositioning the mandible orally. However, these treatments have a very low success rate. Keywords: OSA- obstructive sleep apnoea, EEG- electroencephalogram, ECG- electrocardiogram, REM- rapid eye movement, HSAT-Home Sleep apnoea Test.

Received 05.10.2022

Revised 23.10.2022

Accepted 11.12.2022

INTRODUCTION

Obstructive sleep apnoea (OSA) means a period of intermittent absence of respiration during night times generally due to some disease [1]. The patient which are morbidly obese i.e. individuals with BMI > 30kg/m² are more commonly prone to OSA, When a person is supine, the pharyngeal dilator muscles typically prevent the tongue from falling backward, promoting proper oxygen flow to the lungs. In REM phase of sleep tone of these muscles is least plus person having OSA results in the decrease in tone of muscle to a level which causes narrowing of airway which contributes to development of hypoxia, hence causing cortical arousal which results in sleep disturbances at night [2].

Patients with OSA have a sharp inspiratory uptake and a subsequent plateau thus exhibiting a scooped out pattern of breathing magnitude of obstruction is increased further secondary to obesity or patient with small jaw resulting in falling of soft tissue backwards to the posterior pharynx. Soft tissues, especially the uvula, vibrate when air tries to enter through this little airway, producing the loud snoring that is so distinctive to that person. Snoring intensity rises as the airway gradually narrows.

Problems caused by OSA:

- 1) Extreme fatigue at night
- 2) Never wakes up fresh
- 3) Body pain
- 4) Secondary Hypertension
- 5) LVH/LV strain
- 6) Increased cardiovascular mortality
- 7) Congenital OSA resulting in behavioural issue

DEFINITION

Obstructive sleep apnoea (OSA) occurs when episodes of upper airway collapse and obstruction recur during sleep with arousal with or without reduced oxygen saturation [2]. The oropharynx in the back of the throat collapses during OSA events, causing arousal and / or low oxygen saturation, causing sleep fragmentation. Due to recurring, disease-related cortical arousals during night, OSA causes increased daytime sleepiness.

RISK FACTORS

1) Centripetal Obesity

It causes midline fat deposition resulting in narrowing of pharyngeal inlet [3].

It also causes decreased chest wall compliance which decreases the caudal traction hence compromising the patency of upper airway.

2) Micrognathia/Retrognathia

In some individuals the tongue is disproportionate as compare to the size of mandible of the person due to mandibular hypoplasia while in other cases the mandible has an abnormal alignment with respect to maxilla.³

These factors result in falling of tongue backwards during the REM phase of sleep thus contributing to development of OSA.

3) Developmental Causes

Developmental causes such as TREACHER COLLINS cause defective developmental of face, cheek bones, jaws, ears and eyelids thus contributing to reduced patency of upper airway.

Individuals with Down syndrome are also associated with a higher risk of developing OSA.

4) Endocrine causes

In females with age over 45 years and gradual onset of menopause there is a decrease in oestrogen levels in the body. This contributes to development of OSA in post-menopausal females [4].

Acromegaly and Hypothyroidism have also been associated with onset of OSA.

5) High Nasal Resistance

In some individuals suffering with deviated nasal septum or exhibiting nasal polyps, it becomes difficult for them to have proper nasal breathing.

This leads to the development of mouth breathing as you sleep, which makes your tongue slip back and obstructs your airway.

Clinical Features

Patients with OSA are found to have snorting or gasping. There is absence of nocturnal dyspnoea, if it's there its due to PND (Paroxysmal Nocturnal Dyspnoea , nocturnal asthma or GERD(Gastro-oesophageal Reflux Disorder).

There is frequent awakening during night whereas during day the individual exhibits dosing off involuntarily during tasks in daytime. Dry mouth, Halitosis, Mood swings are also observed. Erectile dysfunction is also noted in some cases of OSA [5].

An increase in blood pressure is observed which can also be pre-existing to the current symptoms [6]. An increase in abdominal girth and neck circumference is seen. There is increase in tongue size with a relatively small mandible. The individual has enlarged tonsils and a low lying palate with bulky uvula.

Diagnosis

The diagnosis of OSA is made by sleep studies as well as screening tools. A combine approach is followed to reach the final conclusion in determination of OSA [7].

Sleep Studies

Polysomnography is the gold standard investigation done for OSA [8]. It records nasal airflow, chest expansion and various other factors. It includes the following:

EEG: in REM sleep, the conversion of beta wave to alpha wave is noticed hence cortical arousal is present.⁹

ECG: A prolonged R-R interval will indicate bradycardia.

Nasopharyngeal airflow sensor activity is decreasing [10].

Snore-flow: the following image noting is present.

Hypopnea > Apnoea > Hyperpnea [7]

SAO₂ : a dip in SAO₂ is noticed at the time of episode thus exhibiting Cheyne stokes breathing (Hypopnea-apnoea-hyperventilation)

There is a sinusoidal pattern of movements between the chest and abdomen.

HSAT(Home Sleep Apnoea Test):- The more recently available home sleep apnoea test is also a widely used and convenient method for diagnosing OSA [11]. It is done using a device which itself is a portable breathing monitor one wears overnight. As the individual sleeps the device monitors breathing and oxygen

levels to detect and measure pauses in breathing, which are known as apnoea [3]. The test calculates an OSA severity score by calculating the average no. of lapses in breathing per hour in bed.

Screening Tools

The screening tools used for OSA are Epworth Sleepiness Questionnaire and STOP-BANG Questionnaire

Epworth Sleepiness Questionnaire:-

This questionnaire includes various situations and how likely the individual is supposed to doze off in those situations [12]. A four point grading is done for each question and hence a total score is calculated. For a Medicare subsidised sleep study-if a patient scores 8 or more, medical advice is recommended and a polysomnography should be done.

STOP BANG Questionnaire:-

This questionnaire consists of 8 yes/no questions and an individual with 3 or more yes responses leads to the conclusion that the individual is at an increased risk of developing moderate to severe OSA [13]. This consists of S- Snore, T-Tired, O-Observed apnoea, high blood P-Pressure, B-BMI>35Kg/m², A-Age>50years, N-Neck girth>15.75inches, G-Gender male.

Management

The medical management includes some behavioural changes from the patient's side while another approach includes active intervention.

- 1) Weight loss: A weight loss of 10% leads to a 30% decrease in OSA incidence [14].
- 2) The patient is advised to avoid sleeping in supine position and is directed to sleep in lateral position [15].
- 3) The patient is also advised to avoid nasal allergy and should also avoid alcohol 3 hours before sleep.

The active medical interventions include:

- 1) CPAP(continuous positive airway pressure) It is the treatment of choice in cases of OSA . Splint airway is kept open. CPAP is advised if the individual experiences >15 Hypopneic episodes/ hour or >5aponeic episodes/hour [16].
- 2) Uvulo-palato pharyngoplasty is also found to be useful in management of OSA.¹⁷
- 3) Surgical implantation of an upper airway device can also be done. It stimulates the hypoglossal nerve thereby preventing OSA [18].
- 4) Some oral devices are also useful in OSA. They help in repositioning of the mandible thereby decreasing the chances of OSA [19]. Although the efficacy of these devices is quite less.

NURSING MANAGEMENT

Sleep apnoea is primarily treated with primary care, and patients rely on their doctor for advice and treatment. However, patient should be taught the warning signs for example: if a patient encounters a problem that indicates abnormal drowsiness, he should visit a doctor [20].

Sleep behaviour questions can also be asked in follow-up appointments and lifestyle stories. Excessive daytime sleepiness and the associated loss of relationships and motivation will almost certainly affect people's behaviour and how they deal with other factors in their lives [20]. Caregivers need to be aware of this. Nurses in hospitals can find clues during the day, but especially at night, there is a unique opportunity to observe the patient when he or she is asleep.²¹ Abnormal patterns of awakening and snoring should be evaluated with the patient to determine if there is an underlying problem. Sleep patterns were to be assessed during hospitalization and during subsequent lifestyle interviews.

Nurse should educate a patient regarding his lifestyle modification such as exercise, nutritious diet, Healthy sleep habits etc. Nurse should also educate the OSA diagnosed patient for the proper use of CPAP(Continuous positive airway breathing) device, various oxygen therapies such as oxygen administration through face mask, nasal cannula etc [22].

Nurse can focus on: Early and prompt diagnosis by asking questions, asking patient to maintain sleep diary or monitor sleep with the help of roommate/bed partner, lifestyle modification, also assisting with symptomatic management [22].

CONCLUSION

Obstructive sleep apnoea (OSA) occurs when episodes of upper airway collapse and obstruction recur during sleep with arousal with or without reduced oxygen saturation.² Patients with OSA are found to have snorting or gasping. There is absence of nocturnal dyspnoea which worsen the outcome of daily activities hence affecting the quality of life. Prevention and precautionary steps may benefit the patient to sustain healthy life style. Various screening tool can help in early detection and identification of symptoms to rule out OSA.

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CITATION OF THIS ARTICLE

Ruchika Singh, Keerti Phalswal. Obstructive Sleep Apnoea and its Management. *Bull. Env.Pharmacol. Life Sci.*, Vol Spl Issue [4] 2022: 01-04