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RESEARCH ARTICLE

Understanding Obstruction Sleep Apnea Syndrome: Cause, Comorbidities, and Treatment Options

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Abstract

Obstructive sleep apnea syndrome (OSAS) is a prevalent condition with varying frequencies across different age groups, including infants, children, and adults. Predisposing factors for the development of this syndrome often differ among these age groups. Apneas and snoring are common symptoms. The incidence of the syndrome is higher in America compared to Europe. The syndrome is associated with significant comorbidities such as hypertension, cardiac arrhythmias, cardiac arrest, coronary artery disease, pulmonary hypertension, and stroke. Treatment options include conservative measures (e.g., weight loss, avoidance of sedatives), the use of automatic positive airway pressure (Auto CPAP) during sleep, and surgical interventions. These surgical techniques are discussed in detail in the text.

Keywords: Obstructive Sleep Apnea Syndrome, Age groups, Comorbidities, Auto-CPAP, Surgical Techniques.

1. Introduction

Obstructive sleep apnea is perhaps the most frequent disorder observed during sleep and affects large groups of thegeneral population. The frequency of the syndrome during childhood reaches up to10% of the general population mainly in the ages of 2 – 8 years.

At these ages mainly it is due to hypertrophy of the tonsils and soft palate and cleft palate.At ages over 65, the frequency of the syndrome is 10% of the general population for men and women. The syndrome is also observed during infancy and mainly concerns premature infants who were born before reaching the age of 37 weeks of pregnancy.

It is mainly because the cortex of the brain which controls the functions of the muscles that keep the pharynx open is not mature but also in the abnormal development of these muscles. Usually, the syndrome passes when the infant attains the normal age corresponding to full-term pregnancy.(1)

1.1 Historical References

Sleep and its twin brother, death, were “evil gods” who dwelt in Tartarus. Children of the night and Erebus. Sleep had three sons, Morpheus, Fobitor, and Fantasos. According to Homer, who he calls Onesimus (sweet) lived on the island of Lemnos.

Sleep was worshiped inEpidaurus, Troizinia, and Olympia. He was considered a quiet and gentle god or demon who wandered the earth and was sometimes depicted as a beautiful young man who sowed the earthsweet dreams or slept in a bed, sometimes as a demon with wings, carrying one dead after death.

These descriptions refer to its variations, quality of sleep experienced over the years but also the effect on sleep quality of other pathological conditions. The sweet sleep is characterized by complete relaxation and rejuvenation which is realized with a feeling of well-being upon rising in the morning. But there are also, sleep disorders. The most common are:

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1.1.1 Narcolepsy

A condition characterized by sudden episodes of sudden sleep during the day accompanied by myosis of the muscle tone "fall"headache and impaired attention and concentration. That is why the children who suffer from reduced school performance.

1.1.2 Insomnia

Disturbances in the onset and duration of sleep.

1.1.3 Pronounced Sleepiness

Mainly in the elderly with dementia.

1.2 Sleep-Wake Disorders

1.2.1 Insomnias

inability to sleep

1.2.2 Sleep Disturbances

nightmares or enuresis(1)

1.2.3 Definition

Obstructive sleep apnea syndrome is characterized by interruptions, pauses, of breathing during sleep, lasting at least 10 seconds. In children, apneas are considered pathological, regardless of the cause their duration.

1.2.4 Sleep Apnea in Children

Characterized by snoring, restless sleep, frequent awakenings at night, apneas, behavioral disorders, (hyperactivity,lethargy, daytime sleepiness, poor school performance) nocturnal enuresis but also difficulty getting up in the morning. Apart from the hypertrophy of almonds and grape-palate and childhood obesity is a strong predisposing factor. A few children show a greater risk of developing the syndrome when the following factors are present:

- Family history of sleep apnea
- Obesity
- Cerebral palsy, Down syndrome, sickle cell anemia,
- Craniofacial anomalies
- Underweight children at birth
- Children with big tongues (1)

Snoring occurs in 12% of the general population of children. But only that1 – 3% of children who snore will develop obstructive sleep apnea.It should be emphasized that children who have prolonged sleep apnea syndrome,may have cognitive and learning difficulties even into adolescence. The coexisting hyperactivity often causes misdiagnosis of attention-deficit/hyperactivity disorder (ADHD). It is estimated that the obstructive sleep apnea syndrome coexists in 25% of children with ADHD diagnosis. In more serious cases the syndrome causes cardiorespiratory complications, as shown below.

1.2.5 Infant sleep apnea

The causes can be a) the small width of the trachea, b) insufficient development of tracheal cartilages, c) staff disorders skull such as e.g., micrognathia, d) cerebral palsy, e) obesity,f)hypertrophy of tonsils, g) thick tongue. If there is infant apnea, you must treat it promptly because the coexisting hypoxemia can cause brain damage.(1)

2. Obstructive Sleep Apnea in Adults

The predisposing factors are the following:

a. Scoliosis of the nasal septum (not a significant factor)

b. Hypertrophy of nasal cavities and tonsils (not an important factor)

c. Palate disorders and large grape (moderate factor)

d. Largetongue base (significant factor)

e. Micrognathia, hypothyroidism, diabetes mellitus, and obesity (significant factors). It must be emphasized that many times the manifestation of sleep apnea in people who have no other obvious predisposing factors, is an earlypoint of manifestation of subclinical or typical diabetes mellitus.It should also be mentioned that many times patients with sleep apnea syndrome have erectile dysfunction. This is a very concerning symptom for obese couples and at first, it is (1, 2) inexplicable.However, the most dangerous comorbidities that develop in a patient who shows sleep apnea, it is hypertension, heart failure, heart problems arrhythmias, and strokes. Also, pulmonary hypertension increases the hematocrit, i.e., the number of red blood cells in the blood.(2,3).

Another important symptom is morning sleepiness initially, which can progress to all-day sleepiness. As a result of this drowsiness, the patient often complains of poor-quality sleep, unrefreshing sleep, decreased work efficiency, constant fatigue, and a tendency to fall asleep while watching TV, after meals, during conversations, while driving, or even as a passenger. (4). Falling asleep while driving is the most important cause of head-on collisions, on streets of Europe and

America. This is mainly due to the existence of many obese individuals in the general population of Europe and America. Such as it was reported that sleep apnea syndrome in Europe concerns 10% of the general population. In America, this percentage is higher because its percentage of obesity is higher (4).

2.1 But How are the Above Findings Created During the Syndrome of Obstructive Sleep Apnea?

During sleep, therefore, the airways of these people are blocked level of the pharynx.(5). This event leads to cessation of breathing (apnea).This results in a drop in the partial tension of oxygen in the arterial blood(PaO2) and the rise of carbon dioxide (PaCO2).

These are stimuli for the respiratory center, located in the medulla oblongata, which increases its activity so that it sends many stimuli to the respiratory musclesso that a stronger inspiratory effort is made towards the cortex as well as the brain, through the ascending limb of the reticular formation(5). His excitement,the cortex of the brain during sleep, from these stimuli causes waves awakening, i.e., the patient wakes up after each apneic episode. For this, there is also the sleepiness mentioned(5).

Centrifugal impulses through the sympathetic nervous system are carried to the periphery and cause an increase in blood pressure (hypertension –cerebral) arrhythmias, constriction of the coronary vessels (angina – heart attack),atrial fibrillation, or even cardiac arrest. The drop in oxygen during apnea causes pulmonary hypertension, destruction of the cavernous bodies of the penis(erectile impotence), and stimulation of the kidneys to produce erythropoietin (increase hematocrit).(5).

From the above, it appears that obesity is directly related to her syndrome sleep apnea, which causes dangerous phenomena for health and life. For these patients should visit the sleep clinics, so that in collaboration with specialist doctors to treat sleep apnea quickly.

2.2 Treatment

1. Weight loss
2. Avoiding meals in the evening
3. No alcoholic beverages
4. Avoiding sedatives, anxiolytics
5. Surgical treatment
6. Application of a positive pressure mask (AUTO – CPAP) during sleep (6).

2.3 Surgical Treatment of Obstructive Sleep Apnea Syndrome

Obstructive sleep apnea syndrome, as mentioned, is a common public health problem. It affects more than 10% of the population over the age of 65.

Surgical treatment of the syndrome is intended to facilitate patency of the airways, interfering with specific points of the obstruction.(7).

Different techniques have been developed because the blockage can be located at indifferent points. Thus, the type of surgical intervention is individualized.The success of surgical treatment is sometimes of a different degree but generallyimproves mortality and morbidity of the syndrome.It should be emphasized that surgical treatment is recommended for patients who do not want it or do not accept Auto-CPAP and in cases where conservative treatment fails treatment.(7).

2. 4 Surgical Techniques

2.4.1 Uvulo Palato Pharyngo Plasty (Uppp)

It is the most frequently applied surgical treatment in patients with sleep apnea syndrome. The excess tissue of the pharynx is removed, as well as the grape and part of the soft palate, because these points are usually responsible for obstructive sleep apnea. Sometimes parsthomas are resected. The treatment requires hospital care and involves patients with moderate or severe obstructive sleep apnea syndrome.(7) (8) (9).

The success of the method is between 33 – 60%, while treating snoring reaches 70 – 90%. A complete cure of the syndrome is achieved in 16.1 – 24%of operated patients. The therapeutic effect depends on age(better for young ages), low BMI, lower sleep apnea index as well as the higher value of hemoglobin saturation (SaO2) during the night. In a percentage of 20-30% of patients, they appear long-termside effects, such as disorders of pharyngoesophageal reflex swallowing, dry throat, etc.

Because most commonly the method cures snoring, but the obstructive sleep apnea syndrome remains, you should after the operating room to perform a polysomnia sleep study to check it result.(10).

Laser treatment is not indicated, because it has not been statistically significant supremacy, on the one hand, and on the other, there is a risk of surgeryswelling of the upper airways. For this case it may be necessary tracheotomy.

- The uvulo palatal flap (UPF) seems to show82% success rate and has fewer side effects

- Hardening of the soft palate (Palatal implants) also known as the Pillar technique.

It is mainly used to treat snoring and mild or moderate snoring obstructive sleep apnea syndrome. Fibrosis is caused which has as resulting in hardening of the soft palate. Treatment can be done with local anesthesia and reduces the sleep apnea index (AHI) by 24 – 44.8%.(11).

2.4.2 Surgery of the Tongue

An important site of upper airway obstruction is at the sublingual area. Patients with this issue often have a large base of the tongue. Additionally, hypertrophy of the tonsils may coexist.

The surgery is characterized by reducing the size of the tongue and preparation of the genioglossus muscle. The operation is performed to improve the sleep apnea index (AHI), morning sleepiness, and quality of life in general. This surgery is done in patients with mild or moderate syndrome who do not tolerate Auto-C-PAP.

2.4.3 Skeletal Surgery

It is applied to moderate or severe syndrome. Often combined with surgery of the hypotubercular area when there is an indication. In advanced techniques increase the tone of the geniolingual, genioid, and its muscles pharynx. This increase in tone results in an increase in its sizeretrolingual space usually by 8 – 14 mm.

Amphignathic advancement of the maxillofacial complex (Maxillo MandibularAdvancement, MMA). It is usually done in severe syndrome. The success of the operation is 87% but should be applied in severe syndrome. In another study, it appears that there is an improvement in quality of life in 93% of patients. The operation results increase in both the retrolingual and retropubic space.

2.4.4 Nose Surgery (Nasal Procedure)

The surgery is done to reduce the obstruction caused by the nasal bones, and the nasal cartilages, but also from the hypertrophy of the nasal soft tissues. The technique treats snoring and not obstructive apnea, given that obstruction occurs further down, at the level of the pharynx.

Indeed, the hypnopnoic index (AHI) does not decrease. There are other surgical techniques that are applied less often, such as: sliding geniplasty, Hyoid myotomy and Suspension,Tracheotomy, Stimulation of hypoglossal nerve.

3. Conclusion

Obstructive sleep apnea is a frequent disorder that affects a significant portion of the general population, with varying frequencies across different age groups. In children, the syndrome is mainly due to hypertrophy of the tonsils and soft palate and affects up to 10% of the population aged 2-8 years. In adults over 65, the frequency is also 10% for both men and women.

The syndrome is also observed during infancy, primarily in premature infants born before 37 weeks of pregnancy. The predisposing factors for obstructive sleep apnea include hypertrophy of the tonsils and soft palate, obesity, cerebral palsy, Down syndrome, and craniofacial anomalies.

The syndrome is characterized by interruptions of breathing during sleep lasting at least 10 seconds and can lead to cognitive and learning difficulties, cardiorespiratory complications, and hypertension. Treatment options include conservative measures such as weight loss and surgical interventions.

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