SLEEP DISORDERS

Abstract:

Three of the most common sleep disorders are narcolepsy, obstructive sleep apnea, and restless legs syndrome. Narcolepsy is characterized by excessive daytime sleepiness, cataplexy, hallucinations, and sleep paralysis. Obstructive sleep apnea is characterized by airway collapse that cause greatly decreased or absent breathing. Restless legs syndrome is characterized by an uncontrollable urge to move the legs during sleep. These conditions lead to insomnia, the chronic inability to fall asleep and to stay asleep, and patients who suffer from insomnia may feel a lack of rejuvenation and daytime tiredness. Sleep disorders can cause significant medical and psychological health conditions. The basic treatment for all three is good sleep hygiene. Medications may provide relief from the signs and symptoms. The use of a CPAP machine and other oral devices may also alleviate insomnia due to sleep apnea. A case study is discussed that illustrates the benefit of good sleep hygiene and CPAP for a male diagnosed with sleep apnea.

Learning Objectives:

1. Describe the correct definition of insomnia.
2. Identify the three most common sleep disorders.
3. Identify one commonly used treatment for each of the three sleep disorders.
4. Identify a population that is likely to suffer sleep disorders.
5. Describe the three basic principles of sleep hygiene.

Introduction

Sleep disorders are one of the most common medical problems. Millions of Americans suffer from a sleep disorder, and the inability to sleep well has significant physical and psychological consequences. When most people think of sleep disorders the word insomnia comes to mind. But insomnia is both a general term that refers to difficulty in the sleep process and it is the term used for a specific type of sleeping disorder. According to The International Classification of Sleep Disorders there are 11 different types of insomnia and there are multiple causes for each type of insomnia. Common examples of insomnia caused by a medical condition is obstructive sleep apnea or restless legs syndrome. Insomnia can be acute or chronic.

Pathophysiology of Insomnia

The term insomnia refers to a specific condition that is caused by sleep disorders. Insomnia also refers to a specific type of sleep disorder. Insomnia is generally used to refer to a person having difficulty sleeping but insomnia is complicated than difficulty sleeping. The condition includes difficulty falling asleep, difficulty staying asleep, and sleep that is not refreshing or restful. Difficulty sleeping can be caused by a secondary medical condition, a psychological disorder such as anxiety or depression, or by a primary sleep disorder. Someone who is complaining of quality of sleep will need a sleep assessment done with all of these possibilities investigated.

Primary sleep disorders are those that do not have a secondary medical cause or a psychological cause. Given the number and complexity of sleep disorders it would not be possible to discuss them all here, so only three of the most common sleep disorders will be

discussed. These include obstructive sleep apnea, restless legs syndrome, and narcolepsy. Sleep disorders in the elderly and sleep hygiene will be a specific focus in later sections.

Not everyone who has difficulty falling asleep and difficulty staying asleep would be diagnosed as having insomnia. There are specific criteria that are used to make the diagnosis of insomnia, which are discussed next.

Repeated Difficulty Falling Asleep (Sleep Latency)

Difficulty falling asleep is defined as taking more than 30 minutes to fall asleep. The problem is considered to be acute if it happens for 30 days or less, and it is considered chronic if it persists for longer than 30 days.

Repeated Difficulty Staying Asleep

Someone is said to have repeated difficulty staying asleep if the person sleeps for less than six hours, and/or wakes up three or more times a night. The problem is considered to be acute if it happens for 30 days or less, and it is considered chronic if it persists for longer than 30 days.

Poor Sleep Quality

Poor sleep quality is a hallmark of insomnia and is described as sleep that does not leave someone feeling rested and refreshed. These people will sleep but when they wake up, they do not feel rejuvenated, but feel tired. The problem is considered to be acute if it happens for 30

days or less, and it is considered chronic if it persists for longer than 30 days.

Types of Sleep Disorders

The number of people who are affected by a sleep disorder varies and depends on the specific disorder but taken as a whole, sleep disorders are very common. About one-third of all adults in the United States have a sleep disorder at some time in their lives, and approximately 20% say that they have chronic insomnia. Insomnia is more common in women, adults, people who do shift work, and people who have certain medical or psychiatric problems.

Sleep disorders are also especially common in the elderly, and more than 50% of the elderly report some type of chronic sleep problem. Most elderly people who have problems with sleeping do not have a particular problem falling asleep but they do have difficulty staying asleep, and this has been well documented by sleep studies. The elderly on average have much more frequent, and longer periods of interruption of their sleep than do younger people. Part of the problem can be explained by the increased incidence of medical conditions that can disturb sleep. Elderly people are also more likely to take medications that can disrupt sleeping patterns. The implications of insomnia and sleep disorders in the elderly are serious. People who are elderly and do not have good quality of sleep are more likely to suffer falls, have an increased incidence of morbidity and mortality and suffer from daytime sleepiness.

Human Sleep

Sleep is one of the most essential human activities. Although all living beings sleep, and sleep has been studied for many years, it is still

not entirely clear what sleep is, why people need it, or what happens when people sleep.

Sleep is often thought of as a simple, basic and passive process. A person closes their eyes, nods off, and then wakes up seven or eight hours later. The need for sleep is obvious. Everyone associates sleep with rest. If a person does not get enough sleep, tiredness occurs. However, when sleep is closely considered, it is clear that sleep is not simple, it is not passive and although people sleep when tired, sleep in many ways is not a completely inactive and restful activity.

The Process of Sleep

Sleep happens regularly and naturally every night. During sleep people are essentially unconscious and cannot respond to external stimuli unless it is very intense. The senses of sight, hearing, touch, *etc*., are either not operating or greatly diminished during sleep, and there is almost no voluntary muscle activity. When observing someone who is sleeping, or from an individual's own personal sleep experience, sleep may be considered a time where the body and brain are basically inactive, and sleep is regarded as a very simple, basic activity. However, sleep is actually a complex activity and the body and the brain are definitely working during sleep.

Sleep is not simple. It is actually a very complicated process that is comprised of five distinct stages. People move through these sleep stages, and some of the stages of sleep are experienced more than once, and each one is characterized by brain wave activity and physical activity that are particular to that stage. The heart rate, breathing, and body temperature all fluctuate in specific ways during the stages of

sleep, and the activity of the immune system, the activity and secretion of hormones, and the activity of all of the other organ systems do, as well.

One of the most important stages of sleep is called REM sleep. REM sleep is a good example of how complicated sleep is and how sleep is not actually passive or restful in the way many people regard it. REM sleep is an acronym for ***R****apid* ***E****ye* ***M****ovement* sleep. During REM sleep, the eyes move rapidly and randomly. Most people have between four and five periods of REM sleep during the night. REM sleep is sometimes referred to as paradoxical sleep because although people are resting during REM sleep, the body and the brain are very active in ways that at times are quite different.

During REM sleep, the heart beats slowly and steadily but breathing is rapid and irregular. REM sleep is very deep sleep but someone in the REM stage of sleep can be easily awakened. The nervous system and the brain remain active during REM sleep but the muscles are barely moving. Brain wave activity during REM sleep is similar to brain wave activity during periods of full consciousness. REM sleep is the time in which people dream. Although sleep tends to be thought of as passive, dreaming is an experience that clearly shows sleep is anything but passive.

During REM sleep a person's consciousness is greatly decreased, the ability to react to external stimuli is diminished, and voluntary muscular activity is essentially absent but there is a lot of activity going on. REM sleep is a time of intense activity of certain parts of the body and the brain, but sleep in general is very far from being a time where

the body is completely at rest. It has been estimated that the basal metabolic rate only decreases 5-10% during sleep.

All of the body's organ systems are working during the night; the immune system, the nervous system, the muscular system, and the skeletal system, for example, all use the period of sleep to rebuild and recuperate and these are active processes. During REM sleep, the brain uses more oxygen than during awake periods. When people are observed sleeping, there is actually quite a bit of moving - tossing and turning - during the period of sleep. Sleep is therefore a very active and complex process.

Although sleep has been extensively studied, it is still in many ways a mystery. Quite a bit is known about what happens during sleep, and it is clear from sleep deprivation studies that sleep is vital for survival and optimal functioning. However, the exact purpose of sleep remains unknown. It may be that sleep is necessary for the conservation of energy, and sleep may be a time during which the body rebuilds and restores itself. If someone is deprived of sleep, wound healing and the function of the immune system are adversely affected. There is quite a bit of evidence that suggests that sleep is important because it gives the brain a "quiet time" during which it can organize knowledge and memories without the distraction of consciousness.

Purpose of Sleep

Despite the misconceptions about sleep and the fact that the exact nature and purpose of sleep are still not known, there is one indisputable fact about sleep - people need to have it. If animals are not allowed to

sleep they will die in several weeks, even if they have food, shelter, and water. Humans also suffer greatly if they do not get enough sleep or enough quality sleep. In particular, if the REM stage of sleep is disrupted the consequences can be very bad.

Someone who is deprived of sleep or quality of sleep may develop mood changes, such as irritability and an inability to concentrate and focus. The motivation to work and perform self-care activities may disappear. If a person's sleep deprivation or sleep quality is too intense or too prolonged, the person may begin to hallucinate and he or she may develop an almost psychotic-like state of mind.

Amount of Sleep Needed

The amount of sleep that is normal and the amount that someone needs will depend on the person. Newborn babies sleep an impressive amount of time. It is not unusual for an infant to sleep 16 to 20 hours a day. As people get older the need for sleep diminishes, and older adults and the elderly may only require six hours of sleep a night. The amount of sleep someone needs is also partly influenced by genetics.

Sleep that is considered "normal" and the amount of sleep that someone needs can be easily assessed on the basis of whether the person feels rested and refreshed after a night of sleep. If a person feels rested after sleeping, that person is getting enough sleep. If the answer is no, then the person needs more sleep.

Narcolepsy

Narcolepsy is a sleep disorder that is characterized by the four signs of excessive daytime sleepiness, cataplexy, hypnagogic and hypnopompic hallucinations, and sleep paralysis.

Excessive Daytime Sleepiness

In order for someone to be diagnosed with narcolepsy, the daytime sleepiness must happen suddenly, without warning, and during normal daytime activities such as driving, talking, and working.

Cataplexy

Cataplexy is defined as a sudden onset of muscle weakness and decreased muscle tone. Cataplexy associated with narcolepsy may be generalized and severe, or mild and localized. An attack of cataplexy may only involve a few small muscles and last a few seconds, but in rare cases someone with narcolepsy who is having an attack of cataplexy will be unable to move for 20-30 minutes.

Hypnagogic and Hypnopompic Hallucinations

Hypnagogic hallucinations are hallucinations that happen immediately before someone who has narcolepsy falls asleep. Hypnopompic hallucinations are that happen when someone with narcolepsy wakes up.

Sleep Paralysis

Sleep paralysis is a temporary paralysis that occurs at the beginning of sleep or when waking up. In most cases of narcolepsy accompanied by sleep paralysis, the person is unable to move when first awakening; sleep paralysis that occurs when falling asleep is less common. Someone who has narcolepsy and sleep paralysis literally

cannot move when these episodes occur, but is fully conscious. Physical contact will often be enough to end the episode of sleep paralysis.

Excessive daytime sleepiness is seen in everyone who has narcolepsy. The other three signs occur very frequently, but not everyone who has narcolepsy will have all four. Although narcolepsy is one of the most common sleep disorders, it is a relatively rare problem. Narcolepsy affects less than one percent of the population; the incidence of this disorder is estimated to be 0.02-0.18% of the U.S. population. Men are more likely to develop narcolepsy than women by a ratio of 1.64:1. Narcolepsy can begin during childhood, adolescence and early adulthood, and children as young as two years old have been diagnosed with narcolepsy.

Causes of Narcolepsy

Narcolepsy is a complex disorder, and there is no single cause of the disease. However, researchers believe that there are three pathologic mechanisms that combine and interact to produce the signs and symptoms of narcolepsy.

There is evidence that suggest that genetics determine who develops narcolepsy. However, the influence of inheritance is not well understood and it is not always a strong predictor of who will get narcolepsy. For example, first-degree relatives (*i.e.*, a parent, sibling, or offspring) of someone who has narcolepsy are 10-40 times more likely to have narcolepsy than someone without the disease.

In situations in which narcolepsy may be expected to occur - in identical twins for example - it is actually less common than among first-

degree relatives. It may be that narcolepsy is like many diseases; some people have a genetic abnormality that makes them likely to develop narcolepsy, but they will only develop the disease if they are exposed to certain environmental conditions or if they have other risk factors.

It may also be that narcolepsy is caused by an inadequate amount of a certain brain neurotransmitter and a lack of the brain cells that produce this neurotransmitter. Many people who have narcolepsy have been found to be totally lacking a brain neurotransmitter called *hypocretin*, and they have few to none of the brain cells that produce hypocretin. Hypocretin is a neurotransmitter that controls wakefulness and sleep. If there is little or no hypocretin in the brain, then the very complex cycle of wakefulness and sleep is disrupted, and sleep will happen unpredictably, uncontrollably, and at abnormal times.

Lastly, researchers also believe narcolepsy is caused, in part, by an autoimmune process. The immune system of the body is a complicated system of organs and specialized tissues and cells identify, attack, and neutralize bacteria, toxins, and viruses that are foreign and potentially harmful. An autoimmune disease can be considered to be "a case of mistaken identity." Instead of isolating and killing harmful foreign bacteria and viruses, the immune system attacks normal healthy tissues. There is evidence - not conclusive evidence, but very suggestive evidence - that the immune systems of people who have narcolepsy are destroying the cells that produce hypocretin.

Signs of Narcolepsy

The four signs of narcolepsy, excessive daytime sleepiness, cataplexy, hypnagogic and hypnopompic hallucinations, and sleep

paralysis, were described earlier. These describe how narcolepsy is diagnosed. Anyone reading the description of those four signs may imagine that narcolepsy can be an extremely difficult illness to live with. However, these physical signs of narcolepsy do not tell the whole story of the profound effects narcolepsy can have on someone's emotions, social life, and professional life. Narcolepsy is also associated with many serious physical and psychological illnesses. People who have narcolepsy face multifactorial problems.

Frequent and Unpredictable Sleep

Individuals with narcolepsy tend to fall asleep during the middle of the day; they can fall asleep while working, when driving, or in the middle of a conversation. Other sleep disorders may accompany narcolepsy.

Frequently Fatigued

Individuals with narcolepsy often complain of feeling fatigued or low on energy. This may lead to low motivation, poor work performance, and a diminished ability to engage with family and friends. Social isolation is a real possibility for sufferers of narcolepsy. Advancement at work can also be difficult. One study showed that 24% of people with narcolepsy had to quit their job and 18% were fired as a result of the disease. Sexual dysfunction is a possibility.

If narcolepsy is not diagnosed, friends, family, and co-workers may attribute the signs and symptoms of the disease to poor character, lack of motivation, or even substance use. Not all patients who have narcolepsy have significant attacks of cataplexy, hypnagogic and hypnopompic hallucinations, and sleep paralysis. But even intermittent

and mild episodes of these signs of narcolepsy can be frightening. Imagine waking up and being paralyzed, or having a sudden attack of cataplexy - essentially being paralyzed while awake.

Physical and Psychological Disorders

Narcolepsy has also been associated with many serious physical and psychological disorders. People who have narcolepsy are much more likely than someone who does not have the disease to have bipolar disorder, major depressive disorder, obsessive-compulsive disorder, panic disorder, and social anxiety disorder. The incidences of digestive tract problems, elevated serum cholesterol, heart disease, high blood pressure, and upper respiratory tract diseases are higher in people who have narcolepsy than in people who do not. The basic problem of narcolepsy is a disturbed sleep cycle, but the physical, psychological, and social implications of the disease are very serious and quite extensive.

Treatments for Narcolepsy

The first step in treating narcolepsy is maintaining good sleep hygiene. The topic of sleep hygiene will be covered in detail in a later section, but sleep hygiene is basically instituting and maintaining a lifestyle and habits that promote good sleep. Several examples of sleep hygiene are avoiding alcohol for four to six hours prior to going to bed, retiring at the same time every night, and making sure there are no interruptions during sleep. Patients who have narcolepsy should get regular exercise, and they should use caution when performing any task such as driving or operating heavy or dangerous machinery if there is a possibility of becoming sleepy or suffering an attack of cataplexy.

Aside from sleep hygiene, the primary therapy used for treating narcolepsy is medications. Methylphenidate (Ritalin®) and modafinil (Provigil®) and various antidepressants are the drugs most commonly prescribed. Methylphenidate and modafinil are essentially stimulants and they help decrease excessive daytime sleepiness. Methylphenidate is usually taken twice a day; each dose is taken 12 hours apart. Modafinil is taken once in the morning. The antidepressants are used to treat cataplexy, and the common choices include fluoxetine (Prozac®) and clomipramine (Anafranil®).

Obstructive Sleep Apnea

Obstructive sleep apnea is a sleep disorder that is characterized by periods of nocturnal airway obstruction. Specifically, this means that someone who has obstructive sleep apnea has recurrent episodes during the night when the airway collapses and breathing is interrupted.

Obstructive sleep apnea is a very common sleep disorder, and there is evidence that the percentage of the population affected is increasing each year. It affects children and adults, and it is estimated that up to 18 million people in the United States have the disease. Obstructive sleep apnea is twice as common in men as it is in women, and it is much more common in adults who are age 65 or older than in younger adults.

Signs and Symptoms

The basic process of obstructive sleep apnea is airway collapse. During sleep the pharynx of someone who has obstructive sleep apnea relaxes to a point at which air can longer flow through to the lungs; the pharynx essentially collapses. When this happens oxygen delivery to the

body is greatly decreased, ventilation can be decreased by 50% or more, the heart rate can vary widely, and the person experiences a sudden onset of apnea or a period of hypopnea. For those unfamiliar with obstructive sleep apnea as a condition, a brief review of the upper airway structures and functions, and symptoms associated with obstructive sleep apnea (OSA) may be helpful.

Pharynx: The pharynx is the airway connection between the mouth and the larynx.
Apnea: Apnea is a term that means absence or cessation of breathing.

Hypopnea: Hypopnea is a term that means greatly decreased breathing.

Ventilation: Ventilation refers to the process of exchanging air between the lungs and the environment.

In order to be considered diagnostic of obstructive sleep apnea, periods of apnea or hypopnea must last ≥ 10 seconds and there must be ≥ 5 of these episodes in every hour of sleep. The episodes of hypopnea must be characterized by a decrease in ventilation of at least 50%. Some people will have literally hundreds of these episodes of apnea or hypopnea during the night. The other part of the diagnostic criteria of obstructive sleep apnea is unexplained excessive daytime sleepiness.

The airway collapse is caused by several different factors. The muscles that keep the pharynx open may be weak and during inspiration the pharynx will be sucked closed. The pharynx may be subjected to excess pressure that forces the pharynx to close. It may also be that the pharyngeal collapse may be caused by a combination of those two

factors. There is also some evidence that reflexes that work to keep the pharynx open may be compromised or damaged. Many people who have obstructive sleep apnea are obese and have abnormally large accumulations of fat in and around the neck which could cause pressure on the pharynx, and some people who have this sleep disorder have abnormal anatomy such as enlarged tongues or soft palates that can interfere with air flow during the night when someone is relaxed and sleeping.

In most people who have obstructive sleep apnea the disease is caused by several different factors that each contributes to the disease. The signs and symptoms of obstructive sleep apnea include:

- Snoring
- Apneas that are witnessed by a sleep partner
- Insomnia
- Excessive tossing and turning
- Nocturia - a frequent need to wake up during the night to urinate
- A sudden onset of gasping or choking that wakes someone up.
- Excessive daytime sleepiness
- Daytime fatigue
- Mood changes
- Poor memory, inability to concentrate
- Sexual dysfunction

A simple way to remember the primary signs and symptoms of obstructive sleep apnea is to think of the *three Ss.* Someone who has obstructive sleep apnea will **S**nore, be very **S**leepy during the day, and that person's **S**ignificant other will notice periods of sleep apnea. A person who has sleep apnea will typically be observed tossing and

turning, and will be snoring very loudly and then stop breathing. After 10 seconds or more of apnea, breathing would start again. The resumption of breathing would not be smooth or quiet; the person will gasp and choke and may partially awaken for a few seconds.

Treatment for Obstructive Sleep Apnea

Obstructive sleep apnea can be successfully treated, and it is important to do so. Aside from the obvious consequences caused by the disruption of sleep, OSA has been associated with an increased risk of developing cardiovascular disease, hypertension, and stroke. These associations are still unproven, but there is strong evidence for a cause and effect. However, it has been shown that the treatment of obstructive sleep apnea will improve the quality of sleep and lessen or eliminate many of the signs and symptoms of OSA such as insomnia, mood changes, and problems with memory and concentration. The treatment of OSA consists of lifestyle changes, good sleep hygiene, and the use of continuous positive airway pressure (CPAP), and/or oral appliances.

Surgery has a very limited role in treating obstructive sleep apnea, and it is only used for very specific cases. Sleep medications such as sedatives and hypnotics are not recommended as treatment for obstructive sleep apnea.

Lifestyle changes that are recommended include weight loss and avoidance of alcohol. Losing weight and avoiding alcohol for at least four to six hours before going to bed can definitely decrease the severity of obstructive sleep apnea.

Continuous positive airway pressure is a very effective way of treating obstructive sleep apnea, and it has become the primary treatment for obstructive sleep apnea. A CPAP machine consists of: 1) The air compressor, 2) tubing that connects the air compressor to a mask, and 3) a mask similar to an oxygen mask that fits over the mouth or the mouth and nose both. Continuous positive airway pressure works by delivering a constant flow of air into the pharynx. Because the person who is using CPAP is wearing a nose clip and a tight fitting mask, the air from the compressor flows directly into the pharynx and the air pressure prevents the pharynx from collapsing. The use of CPAP has been shown to be very effective in treating obstructive sleep apnea, and it is usually the first therapy that is tried.

Oral appliances are another treatment option. These appliances are essentially splints that are inserted each night into the mouth and removed in the morning. The splints hold the lower jaw and the tongue forward and this helps widen the pharynx. The devices can be helpful but many people find them bulky and uncomfortable and thus difficult to tolerate. Oral appliances are not the first choice for treating OSA, and they are only used if the patient has mild-to-moderate disease or if CPAP has not been effective. Oral appliances will not be effective if the patient has severe obstructive sleep apnea.

Obstructive versus Central Sleep Apnea

Brief mention should be made of the difference between obstructive sleep apnea and central sleep apnea. While obstructive sleep apnea is due to obstruction of the upper airway as described above, central sleep apnea occurs because a person's brain is unable to send the proper signals to the body structures that control

breathing. Unlike OSA, the person diagnosed with central sleep apnea may have other co-occurring conditions, such as heart failure and stroke, and central sleep apnea is less common than obstructive sleep apnea.

Experts suggest that sleeping in geographic areas at a high altitude may lead to central sleep apnea. Treatments for central sleep apnea may involve treating the co-occurring conditions, and the use of a device to assist breathing or use of supplemental oxygen.

Snoring is typically indicative of a certain level of airflow obstruction, however snoring can also be due to central sleep apnea. Individuals with central sleep apnea will generally not snore as severely as those diagnosed with an obstructive sleep apnea.

Risk factors of central sleep apnea include male sex, older age adults (65 years or older), the presence of other co-occurring medical conditions, specifically heart disease, stroke, brain tumor or brainstem lesion, high altitude, and opioid use, use of a CPAP device may lead to complications in a person with a diagnosis of complex sleep apnea, which is a combination of OSA and central sleep apnea. On the other hand, some people with a combined OSA and central sleep apnea respond well to CPAP. Treatment needs to be individualized in such cases .

Restless Legs Syndrome

Restless legs syndrome is a neurological disorder that often causes problems with sleeping. The restless legs syndrome (RLS) is characterized by an irresistible and uncontrollable urge to move the legs. The sensation is not painful, but it can significantly interfere with

the activities of daily living and as mentioned previously, it often disrupts sleep.

The restless legs syndrome affects between 5-15% of the population. Women are affected more than men by a 2:1 ratio. Restless legs syndrome can occur in children, but it usually is an age-related problem; the older person is at greater the risk of developing the syndrome. Restless legs syndrome is very common in women who are pregnant.

Signs and Symptoms of Restless Legs Syndrome

The classic sign of restless legs syndrome is an irresistible urge to move the legs. This is often accompanied by uncomfortable sensations in the legs. These sensations are not painful and many patients find them difficult to describe, but itching or a vague feeling that something is crawling on the legs is often reported.

The urge to move the legs begins when someone is resting, and about 85% of all people who have restless legs syndrome also have what is called *periodic limb movements of sleep*. These movements are sudden and involuntary dorsiflexion: the foot is moved upwards so that the toes are pointed back towards the shin. The periodic limb movements of sleep usually last from 0.5 to 5 seconds and they happen every 20-40 seconds while someone is sleeping.

In order to make the diagnosis of restless legs syndrome, someone must have the following symptoms.

- The characteristic, uncontrollable urge to move the legs.
- The urge to move the legs begins at rest and/or during sleep.
- The urge to move the legs is partially relieved by movement.

- The symptoms happen at least three times a week and have been occurring for three months or longer.
- The signs are not caused by a another medical disorder or by a medication.

The signs and symptoms of restless legs syndrome can be relatively mild or they may be quite severe, and in about two-thirds of all cases the disease gets worse progressively worse over time. Many patients report that stress or fatigue exacerbates the urge to move the legs and the periodic limb movements of sleep. The symptoms cause sleep disturbance and significant interruption in someone's personal, professional, and social life. People with restless legs syndrome also often complain of daytime fatigue.

Causes of Restless Legs Syndrome

In most cases of restless legs syndrome there is no identified cause, and this type of the disease is called primary restless legs syndrome. It does seem clear that RLS is in part an inherited disease, and the syndrome is more likely to develop in people who have close relatives that are affected by the disorder. It is also thought that a contributing cause of RLS is an abnormality in certain receptors in the brain that bind to the neurotransmitter dopamine. Secondary restless legs syndrome may be caused by an iron deficiency or by peripheral neuropathy.

Treatment for Restless Legs Syndrome

There is no cure for primary restless legs syndrome, but the available treatments can be effective. If someone has only mild symptoms and the disease is not affecting sleep or personal life,

treatment may not be needed. For those who need treatment, physicians will recommend a combination of nonpharmacologic and pharmacologic therapies. The nonpharmacologic treatments are good sleep hygiene, avoidance of alcohol, and use of hot baths, or massage. There is a wide variety of medications that are used to treat restless legs syndrome: Gabapentin (Neurontin®), Gabapentin enacarbil (Horizant®), pramipexole (Mirapex®), levodopa/carbidopa (Sinemet®), rotigotine (Neupro®), benzodiazepines (for example, clonazepam, diazepam), opioid analgesics such as codeine, clonidine, and iron supplements.

Sleep Hygiene

The term sleep hygiene has been used several times in previous sections. Sleep hygiene refers to lifestyle changes and specific activities that can help people who have insomnia or a sleep disorder fall asleep and sleep without interruptions.

There are basic principles of sleep hygiene that need to be reinforced when treating patients with a sleep disorder. They must be encouraged to maintain a sleep schedule, such as a regular bedtime and waking time. Naps during the day should be limited. The sleep setting should include an environment that is conducive to sleep. The room should be cool, dark, and quiet.

Individuals with a sleep disorder should be encouraged to avoid alcohol, caffeine, nicotine, and large meals for four to six hours prior to retiring to their sleep area. They will need to be educated against drinking a large amount of fluid immediately before bedtime. Exercise should be limited to several hours prior to bedtime. Exercising just

before sleep will awaken the senses and lead to difficulty getting to sleep. Sleep and bedtime should involve a ritual of keeping to a sleep schedule, and avoiding activities that may disrupt good quality sleep.

One issue that is frequently mentioned when sleep hygiene is raised relates to the use of sleep medications. Medications such as hypnotics or sedatives are used because they will induce sleep. Hypnotics and sedatives that are commonly used include alprazolam (Xanax®), diphenhydramine (Benadryl®), diazepam (Valium®), oxazepam (Serax®), and trazodone. However, these medications are not a cure for a sleep disorder, they can be habit forming and people can develop a substance use disorder from taking them. Many sleep medications have significant side effects, are contraindicated for certain people, or both. The hypnotics and sedatives can also be used when there is a medical or psychological problem that is the cause of the sleep disorder.

If a hypnotic or sedative is prescribed for someone who has a sleep disorder or insomnia, the lowest effective dose should be used. Such a drug should be used only when necessary and their routine, nightly use should be discouraged. Patients should be made aware that these medications can cause drowsiness and daytime sleepiness, and they should never be used with alcohol.

Case Study: Insomnia

The following case study was obtained from a PubMed search and discusses a case of central sleep apnea in a 51-year old male.

The authors reported that the patient was treated in their sleep facility and reported a history of snoring, sleep-breathing pauses and a weight gain of approximately 10 pounds over the past months. He denied excessive daytime sleepiness, sleep disturbances related to nightmares or excessive dreaming, or frequent nighttime awakening.

The patient's lifestyle habits included occasional alcohol consumption however he denied tobacco use or other drugs. He reported occasional consumption of caffeinated beverages. His past medical history included co-occurring conditions of chronic kidney disease and high blood pressure. Current medications included vitamins, antihypertensive medications and occasional medications to relieve the body of fluid retention.

During the patient's physical examination he was found to be overweight, he had a large tongue, but his nasal passages were non-congested. His heart and nervous system examinations were normal. Blood pressure was obtained and read 140/90 mmHg and his pulse was 98 beats per minute.

The authors reported that in order to rule out a case of obstructive sleep apnea in their patient that a sleep study test was done, which was revealed a case of moderate OSA and severe central sleep apnea. His symptoms improved by avoiding laying flat (on his back) while sleeping, and the events of obstructive and central apnea events reduced significantly from 103 to 16.5 events per hour.

The patient underwent a split-night sleep study where CPAP was performed with the patient in both a flat position (on his back) and while

sleeping on his side. This showed there was a resolution of obstructive respiratory events but minimal changes the central apnea events, also with the use of CPAP.

The patient underwent other diagnostic testing for the heart (echocardiography) and to rule out heart failure. He was found to have mild issues with his heart function. A brain radiology image was done to rule out a possible issue with the brainstem function. There was a discrete compression on a left artery where blood flowed to the brain, suggesting there was impairment of the respiratory center on the brainstem, which was causing the central sleep apnea.

When a second sleep study was performed two months later to document how his sleep posture worked as a therapeutic option there was substantial improvement in the central sleep apnea events. However, the patient's obstructive sleep apnea events persisted in those postures in the form of hypopneas. Therefore, CPAP was adjusted and he underwent a later home sleep study with strict sleeping on his side. The patient's sleep study results were improved with side positioning for sleep and the proper settings on his CPAP device.

Discussion

Brainstem damage by compression of an artery as a cause of central sleep apnea has been described in this case. In the patient presented here, there was an anatomic disturbance to the brain that led to central sleep apnea. Brainstem artery compression may contribute to an impact in the central nervous system regulation of the pharyngeal (upper airway structure) tone during sleep.

Continuous Positive Airway Pressure is an initial therapy option for patients diagnosed with congestive heart failure central sleep apnea and for those with other co-occurring health issues, such as kidney problems and hypertension. Its not entirely clear why CPAP is beneficial in central sleep apnea, but its believed this is due to the prevention of breathing changes during airway narrowing when a patient is asleep. In this case, CPAP at a prescribed setting was effective to reduce obstructive events with helpful sleep position changes to the side.

Sleep studies showed there was a remarkable improvement in the patient's central sleep apnea events by sleeping on the side, and it was possible that this also had to do with the patient's heart size, and heart filling cycle, and other measures of heart function. The patient in this case however did not meet the criteria for heart failure. The authors stated that the adoption of a sleeping posture to the side has been described in a few other medical studies, as well. They raised the fact that more studies are needed to confirm that this approach to altering sleep posture makes a significant difference to how well blood reaches the brain during sleep.

None of the medications in the patient's treatment were known to cause an adverse outcome regarding sleep apneas, or any impairment in the respiratory drive. This is important to note as some medications, notably narcotics, can worsen a case of sleep apnea.

The authors concluded that a combination therapy of CPAP and strict body (lateral) positioning resulted in an improved response in this patient diagnosed with central sleep apnea and OSA, potentially avoiding the need for surgical correction.

Summary

Sleep disorders and insomnia are very common and they are more common in the elderly. Insomnia is defined as a chronic inability to fall asleep and to stay asleep, and the sleep does not provide feelings of rest and rejuvenation. Insomnia is both a general term that refers to difficulty in the sleep process and it is the term used for a specific type of sleeping disorder.

Three of the most common sleep disorders are narcolepsy, obstructive sleep apnea, and restless legs syndrome. Narcolepsy is characterized by excessive daytime sleepiness, cataplexy, hallucinations, and sleep paralysis. Obstructive sleep apnea is characterized by airway collapse that cause greatly decreased or absent breathing. Central sleep apnea is different from obstructive sleep apnea and tends to involve other health issues in older individuals, such as heart and neurological conditions. Restless legs syndrome is characterized by an uncontrollable urge to move the legs and periodic limb movements of sleep.

These disorders can cause significant medical and psychological problems. The basic treatment for all three is good sleep hygiene. Medications may provide relief from the signs and symptoms. Treatment is individualized and frequently involves the use of CPAP or other oral devices to help patients airways to not obstruct while asleep.