Chapter 7
Functional Sleep Disorders

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Abstract Sleep-related disorders are common, and when left untreated, they can negatively impact health, cognitive development and learning, behavior, and emotional regulation. This chapter will focus on sleep disorders with no known primary organic trigger, which thus can be defined as falling within the spectrum of functional disorders. Fortunately, these disorders are amenable to adjustment of patients' behavior and/or cognition. Patients with sleep disorders are often treated by specialists who deal with pulmonary disease, and many of the therapies employed in the treatment of such sleep disorders are the same as those for functional respiratory disorders. Sleep-related disorders that are treated primarily by medical or surgical therapies such as sleep-disordered breathing (SDB), narcolepsy, idiopathic hypersomnolence, and restless legs syndrome will not be discussed. However, application of positive airway pressure (PAP) therapy for SDB is demanding, and many patients have difficulties with its application. Thus, management of the functional issues associated with application of this therapy is discussed.

Keywords Apnea • Enuresis • Insomnia • Parasomnia • Positive airway pressure • Sleep

Sleep-related disorders are common, and when left untreated, they can negatively impact health, cognitive development and learning, behavior, and emotional regulation [1, 2]. This chapter will focus on sleep disorders with no known primary organic

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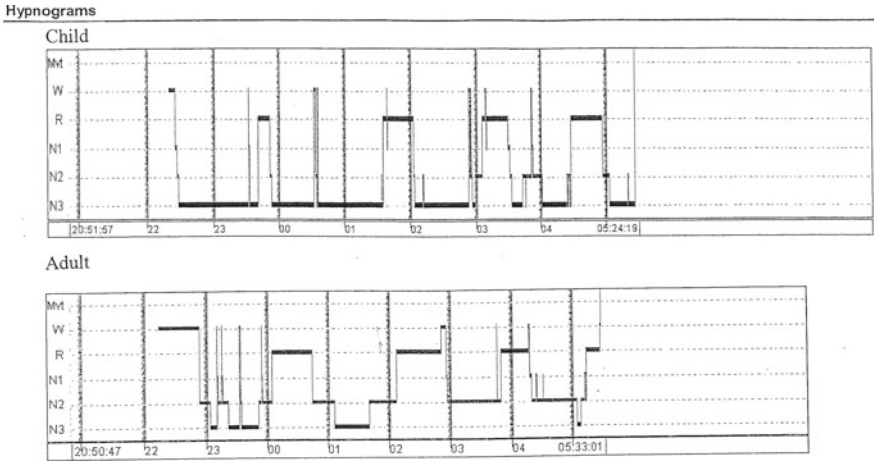

Fig. 7.1 Note the ultradian cycles of REM and NREM sleep stages and the predominance of SWS (stage N3) in childhood, which decreases through the lifespan

trigger, which thus can be defined as falling within the spectrum of functional disorders. Fortunately, these disorders are amenable to adjustment of patients' behavior and/or cognition. Patients with sleep disorders are often treated by specialists who deal with pulmonary disease, and many of the therapies employed in the treatment of such sleep disorders are the same as those for functional respiratory disorders. Sleep-related disorders that are treated primarily by medical or surgical therapies such as sleep-disordered breathing (SDB), narcolepsy, idiopathic hypersomnolence, and restless legs syndrome will not be discussed. However, application of positive airway pressure (PAP) therapy for SDB is demanding, and many patients have difficulties with its application. Thus, management of the functional issues associated with application of this therapy is discussed.

Sleep is divided into two stages according to the polysomnographic features of electroencephalographic (EEG) patterns, eye movements, and muscle tone. These are non-rapid eye movement (NREM) sleep and REM sleep (or dream sleep). NREM sleep is further divided into stage 1 (N1), stage 2 (N2), and stage 3 (N3), which also is known as "deep" sleep or slow wave sleep (SWS) [3].

NREM and REM sleep rotate throughout the night in what is called "ultradian cycles." Each of these "sub-cycles" lasts about 90–110 min (Fig. 7.1). The parts of NREM and REM per cycle change throughout the night. NREM sleep predominates in the first third of the night and REM sleep in the last third [3].

Sleep architecture changes with age. The average duration of sleep during a 24-h period declines from infancy through adolescence (Table 7.1). The proportion of REM sleep decreases from birth through early childhood and adulthood (from 50% to 25–30%). Further, an initial predominance of SWS drops off after puberty and continues to decrease over the life span (Fig. 7.1) [3].

Table 7.1 Average duration of sleep during a 24-h period

	Recommended sleep time (hours)	
	Nighttime	Naps
Infants	9–10	3–4
Toddlers (2–3 years)	9–10	2–3
Preschool (3–5 years)	9–10	0–1
Elementary school (6–12 years)	9–10	0
Adolescents (12–20 years)	9	0
Adults	7–8	0

Adequate sleep is essential for normal cognitive function and development. SWS restores cognitive function, while REM sleep is involved in enhancement of cognition, such as consolidation of memory, and in the growth and development of the central nervous system of children. Insufficient sleep results daytime sleepiness, neurocognitive dysfunction, and mood disturbances [1, 2].

The following sleep-related disorders, without a known physical trigger will be discussed:

- Parasomnias
  - Disorders of arousal from NREM sleep: sleepwalking, sleep terrors, and confusional arousals
  - Parasomnia associated with REM sleep: nightmares
  - Other parasomnias: sleep enuresis
- Sleep-related movement disorders
  - Sleep-related bruxism
- Insomnia
  - Behavioral insomnia of childhood: sleep-onset association and limit-setting types
  - Psychophysiological insomnia

Parasomnias are events of unwanted behaviors and experiences that accompany sleep.

Disorders of arousal from NREM sleep are initiated almost exclusively from SWS and are more common in children than adults. They occur in the first few hours of sleep when NREM sleep is predominant. They involve skeletal muscle disturbances, autonomic behaviors, agitation, and disorientation. There is usually amnesia for the events [4].

Anything that causes an increase in the SWS would trigger these episodes in susceptible individuals. For example, sleep deprivation causes rebound of SWS and subsequent increase in the occurrence of these parasomnias. In addition, arousals by a noise, a light, or a sleep apnea event trigger the episodes [4].

Sleepwalking can begin as soon as the child is able to walk and occur at any age. Most of the time, it resolves on its own by adolescence. The prevalence is as high as 17% in childhood, with a peak incidence between ages 8 and 12 years.

The incidence is 4% in adults including *de novo* cases. In adults, it is more common in males, but there is no gender difference in childhood [4].

During a typical sleepwalking episode, the patient sits up in bed and appears confused before walking. Sometimes, patients walk or bolt out of bed and run immediately. During an episode, the sleepwalker appears awake and confused. The eyes are open with a confused look. The event may terminate spontaneously at inappropriate places. If forced to respond, agitation and shouting may occur. There are safety concerns when sleepwalking is associated with wandering outside, jumping out of windows, or engaging in behavior that could be potentially injurious to a patient's bed partner [4].

Sleep terrors consist of sudden arousals from SWS with intense fear as manifested by a cry or blood-curdling scream and autonomic nervous system manifestations related to the intense fear of hyperventilation, tachycardia, and diaphoresis. The person sits up in bed, is unresponsive to stimuli, and when awakened is confused and disoriented. Bolting out of bed and running is not uncommon in adults and can be associated with harm to self and others. Amnesia of the event occurs, but sometimes there are reports of dream fragments involving imminent danger, particularly in adults. The incidence is up to 6.5% in children and 2.2% in adults. A substantial number of adults with sleep terrors have a history of bipolar disorder, depressive disorders, or anxiety disorders [4].

Confusional arousals are manifest by confusion and grogginess upon awakening from SWS early in the night or in the morning. Sometimes, there may be thrashing and movement in bed. The usual episode lasts 15–30 min. Stress and anxiety exacerbate these episodes [4].

These parasomnias can have significant impact on children and their parents. Children may limit their social interactions, such as sleepovers, because of fear of the embarrassment from occurrence of the episodes. Parents' sleep may be disturbed as a result of their children's parasomnias, and they frequently worry about the possibility that their children may have underlying health problems and about the risk of physical harm to their children [5].

Treatments include assuring the children and parents regarding the self-limited and benign nature of the events. In addition, ensuring adherence to adequate sleep hygiene and avoidance of sleep deprivation should lead to a decrease in the frequency of these episodes. Good sleep habits include:

- Ensuring adequate total sleep time for age.
- Consistent sleep schedule on weekdays and weekends.
- Avoiding napping or restricting them to early afternoon.
- Avoiding caffeine entirely or at least after 12 noon.
- Beginning wind-down activities an hour before bedtime.
- Avoiding television, radio, cell phones, and computer game playing at bedtime.
- Avoiding strenuous exercise in the evening.
- Avoiding a big meal an hour before bedtime.
- The bedroom should be used for sleep only and not for play.
- The television and computers should be removed from the bedroom.
- The room should be cool and quiet.

With sleepwalking, care should be taken to ensure the children's safety. Additional treatments are indicated when the episodes recur frequently or cause physical harm or significant anxiety to parents and the children. In partial arousal parasomnias, benzodiazepines or tricyclic antidepressants have been used for their effect on shortening SWS [5]. Scheduled awakenings prior the time of the events are sometimes helpful in preventing the episodes from occurring. Teaching children self-hypnosis in one or two visits has been used successfully to eliminate sleepwalking in children and adults and alleviating the associated daytime anxiety (see Chap. 12) [6–10].

Nightmares occur in the second half of the night, when the REM stage is prominent. The patients experience coherent dreams. They are frightening as they unfold and may sometimes cause awakening. Nightmares disorder occurs when nightmares recur frequently. As compared to partial arousal insomnia, the patient is usually frightened but coherent and remembers the events. Sometimes, children are too frightened to go back to sleep and often request parental reassurance. Nightmares usually start between the ages 3 and 6 years, and it is estimated that 10–50% of children aged three to 5 years have nightmares severe enough to disturb their parents. Approximately 2–8% of general population has a current problem with nightmares. Nightmares occur consistently in patients with posttraumatic stress disorder (PTSD). Stress and traumatic events, anxiety, sleep deprivation, and insomnia are associated with an increased incidence of nightmares. Frequent nightmares are associated with certain personality traits. Antidepressants, antihypertensive drugs, and dopamine-receptor agonists are associated with nightmares. Associated features of nightmares include nighttime fears, bedtime resistance, and sometimes daytime anxiety [4, 5].

Treatment is offered for severe and persistent nightmares that are associated with sleep avoidance and subsequent sleep deprivation or daytime sleepiness and anxiety. For younger children, active reassurance by the parents usually is sufficient [5]. For older children, teaching and positive reinforcement for independent coping skills is helpful. Avoiding frightening movies, books, and computer games; reducing stressors; and ensuring adequate sleep are useful measures to prevent nightmares. Safety objects, such as blankets or stuffed animals, and providing of dim nighttime lighting can be helpful [4]. Hypnotherapy has been used successfully in eliminating frequent nightmares. The same strategies of hypnotherapy have been used successfully for eliminating night terrors. Given the amenability of young children to hypnotic suggestions, the parents can stay with the child as he or she shows evidence of beginning to sleep (hypnagogic state) and start making positive suggestions such as that they will keep the child safe and secure. The children can construct a dream catcher above their bed. According to Native American tradition, the net will catch the bad dreams and allow good dreams to go through. In addition, using self-hypnosis-induced relaxation at bedtime allows the children to be more comfortable in going to bed [6–9].

Nighttime fears manifest by resisting falling asleep because of fears that occur independently from any intra-sleep disorder such as nightmares. Most children develop fear of potential harm as part of normal cognitive development. Such fears typically start in preschool. Risk factors include anxiety, stress, traumatic events,

parental anxiety, and family conflicts. Nighttime fears usually are benign and self-limited although can extend to adolescence. In one study, 79% of children reported nighttime fear, including 49% of adolescents, and a severe form associated with significant insomnia is seen in 20–30% of children. Sometimes, nighttime fears are masked by bedtime resistance and curtain calls that manifest by the patient leaving his or her bedroom and returning to the family room for different excuses such as saying goodnight or for one more goodnight kiss. The fears can be so intense such that the patient cries and leaves the bedroom seeking parental assurance at bedtime or in the middle of the night. Typically, children alleviate their fears by sharing the bedroom with parents or household members. They are sometimes associated by daytime fears and somatic complaints at bedtime such as headaches and stomachaches [4, 5, 11].

Most children develop coping mechanisms on their own or with help of parents with no need for referral for therapy. Using security objects such as blankets and stuffed animals and having a nightlight can be comforting and decrease the fear of the child and they are encouraged. Treatment is needed in severe cases that disrupt the sleep of the child and the family. The therapist assures the parents about the benign nature of nighttime fears and instructs them to avoid reinforcing the fears, to teach children coping skills, and helps develop solutions (see Chap. 9 for discussion of cognitive behavior therapy in this context). Creating a reward system for appropriate bedtime behavior can be useful. At the same time, limits should be set to disallow the child's behavior that could reinforce the child's fears, such as reading and watching scary movies and books that reinforce the belief of the presence of predators. The child should be told that screaming in the middle of the night for the purpose of reporting the fears is unhelpful, and in this case, the parents may say, "Remember: Stay calm and quiet." Hypnotherapy can alleviate nighttime fears by teaching children relaxation techniques (e.g., involving imagery of a favorite place or focusing on slow deep breathing) and by suggesting that they can practice self-hypnosis to help them relax at bedtime that allows them to fall sleep easily [6–9].

Sleep-Related Movement Disorders

Bruxism is abnormal clinching or grinding of teeth during sleep. The incidence increases in early childhood, and it becomes relatively uncommon in older individuals following eruption of the secondary teeth. The risk of bruxism tends to increase in association with anxiety, depression, attention deficit hyperactivity disorder, medications such as selective serotonin reuptake inhibitors (SSRI) and amphetamines, obstructive sleep apnea, occlusal misalignment, mental retardation, autism, and cerebral palsy [4, 5, 12].

Bruxism is self-limited, and treatment usually is unnecessary. In managing these patients, the source of stress should be explored. Therapy should be directed at eliminating the anxiety associated with stress. Self-hypnosis as a relaxation tech-

nique has been reported to be useful. Mouth guards are used in severe cases to protect teeth from erosion [4, 5, 12].

Insomnia is a subjective experience of difficulty in initiating and/or maintaining sleep with subsequent effects on daytime function and mood [4]. In early childhood, *parents* usually complain that their children experience difficulties with falling asleep and/or frequent awakenings. The issue is often due to parents' difficulty in limit setting (behavioral insomnia limit-setting type) or to children's association of sleep onset with parents' presence (behavioral insomnia sleep-onset association type).

Treatment is directed toward the parents by teaching skills in setting limits and encouraging adequate sleep hygiene and weaning their children gradually from requiring and depending on their presence while falling asleep [13].

Psychophysiologic or primary insomnia occurs in adolescents. The incidence is estimated to be 9–13%. This diagnosis is rare in prepubertal children. Psychophysiologic insomnia develops in adolescents with certain personality traits that probably are genetically determined [4, 5]. These traits include heightened physiologic arousals (hyperarousal state) and cognitive hypervigilance. The usual course is that a *precipitating* event such as an acute stress triggers the insomnia in the *predisposed* patient. When developed, the insomnia is maintained by the *perpetuating* factors including poor sleep habits, such as irregular sleep–wake schedule and excessive consumption of caffeine. Anxiety can develop about the lack of sleep and potential consequences of missing school and social functions. Associations can develop that are incompatible with sleep, such as learning to associate the bedroom with being awake rather than asleep with increased somatic and muscle tension at bedtime. As the cycle develops in which the more one strives to sleep, the more agitated one becomes and less able to fall asleep, the more the bedroom becomes associated with lack of sleep. Further, conditioned environmental cues can cause insomnia to develop. For example, playing violent videogames, watching television, or socializing (including through social media) at bedtime conditions the patient to associate being in their bedroom with behaviors that are not conducive to sleep. Thus, the bedroom can become a conditioned stimulus that prevents sleep, and some patients report that they sleep better when away from their bedroom.

The recommended first line of treatment for psychophysiologic insomnia is cognitive-behavioral treatment (Chap. 9) and hypnotherapy (Chap. 12). Hypnotherapy may also be used in combination with cognitive-behavioral therapy. The principles of these therapies are observation of adequate sleep hygiene. Cognitive-behavioral treatment targets learned sleep-preventing associations and combines sleep restriction with stimulus control. Stimulus control involves asking the patient to get out of bed when awake more than 20 min; to engage in quiet, nonstimulating activity; and to return to bed only when sleepy. Sleep restriction is part of stimulus control, and the principle is to shorten time in bed to the amount usually spent sleeping and to gradually increase the length of time in bed after sleep efficiency improves. Self-hypnosis often is successful in facilitating falling asleep and diminishing preoccupation with anxious thoughts [14]. Mindfulness meditation also may be helpful in the treatment of insomnia (Chap. 16) [15].

Nocturnal enuresis is characterized by recurrent involuntary voiding during sleep. It is defined as occurring at least twice a week after 5 years of age. *Primary enuresis* is diagnosed when a patient has never had a dry period for 6 consecutive months. *Secondary enuresis* occurs in children who have recently suffered a psychosocial stress, such as parental divorce, physical or sexual abuse, or neglect. Chronic constipation and encopresis are frequent comorbidities in children with secondary sleep enuresis [5, 16].

Enuresis has significant impact on children and their families. Children feel embarrassed, limit their social functioning, and may develop low self-esteem, shame, or emotional, behavioral, and conduct problems. The parents are worried and may punish the children for their behavior.

The spontaneous cure rate is 15% per year. Treatments include behavioral adjustments by improving bladder health via regular voiding, avoiding drinking at night, and avoiding caffeine. An enuresis alarm can be helpful. Since the enuresis occurs usually early in the night, awakening the child at the anticipated time of enuresis sometimes is useful. Pharmacological treatment has been used successfully, including imipramine, and DDAVP is useful in the short term, but recurrence is common when medication is discontinued [5, 15]. Hypnotherapy has been reported as useful in the treatment of children with primary nocturnal enuresis. Hypnosis was shown to be more effective than imipramine for children with enuresis older than 5–7 years of age, and the results usually are evident after few sessions [6, 7].

Positive Airway Pressure Therapy for Obstructive Sleep Apnea

It is estimated that OSA occurs in 2–10% of children and adolescents and 28% of adults. Tonsillectomy and adenoidectomy (T&A) is the treatment of choice for children. PAP therapy is the treatment of choice for adults and in children not responsive to T&A [17, 18]. PAP therapy involves forcing air with high pressure through a tightly fit mask with a headgear. Although it was found to be effective, it has been reported that only 53% of adults and 33% of children adhere to this therapy [17, 18]. Please see case 4 below for a discussion regarding possible reasons for lack of adherence to PAP and how this might be addressed.

Case Studies

Case 1

Sarah is a 6-year-old girl who was brought by her parents for abnormal behavior during sleep. She has a 2-year history of sleepwalking. She arises after 1.5 h of falling asleep and walks to her parents' room. During the episode, her eyes appear to be open, but she seems to be looking through the parents and not at them and does not

respond to them typically. Sarah becomes agitated and screams when her parents try to awaken her from an episode. She does not remember the event in the morning.

Sarah otherwise is healthy. Her sleep history indicates that she goes to bed at 9 pm and falls sleeps within 15–20 min. The parents report that she snores loudly enough that they can hear her in their room across the hall. The snoring sometimes is interrupted by pauses that are followed by gasping. Her breathing is labored when snoring.

Despite sleeping for 10 h overnight, she naps for 1½ h after returning from school.

Her physical examination is remarkable for the presence of grade 3 tonsils and adenoid facies.

Questions:

1. What is the likely diagnosis?
   (a) Seizures
   (b) Sleepwalking
   (c) Sleepwalking and possible sleep-disordered breathing
   (d) Night terrors
   (e) None of the above
2. How do you confirm the diagnosis?
   (a) Sleep study (overnight polysomnography)
   (b) Sleep EEG
   (c) Lateral neck film to evaluate the size of the adenoids
   (d) Chest X-ray
   (e) All the above
3. How do you manage the patient?
   (a) Assure her parents that sleepwalking is benign and review the safety measures that should be undertaken.
   (b) Tonsillectomy and adenoidectomy.
   (c) Clonazepam half an hour before sleep.
   (d) Teach the child self-hypnosis.
   (e) a and b.

Answers:

1. (c): Sarah's history is consistent with sleepwalking. The history of continuous loud snoring and the findings on her physical examination suggest sleep-disordered breathing. In this case, the sleep deprivation and frequent arousals that are typically associated with obstructive sleep apnea likely trigger the sleepwalking [10]. The history of daytime napping indicates the possibility of poor sleep quality associated with obstructive sleep apnea because the patient's history indicates

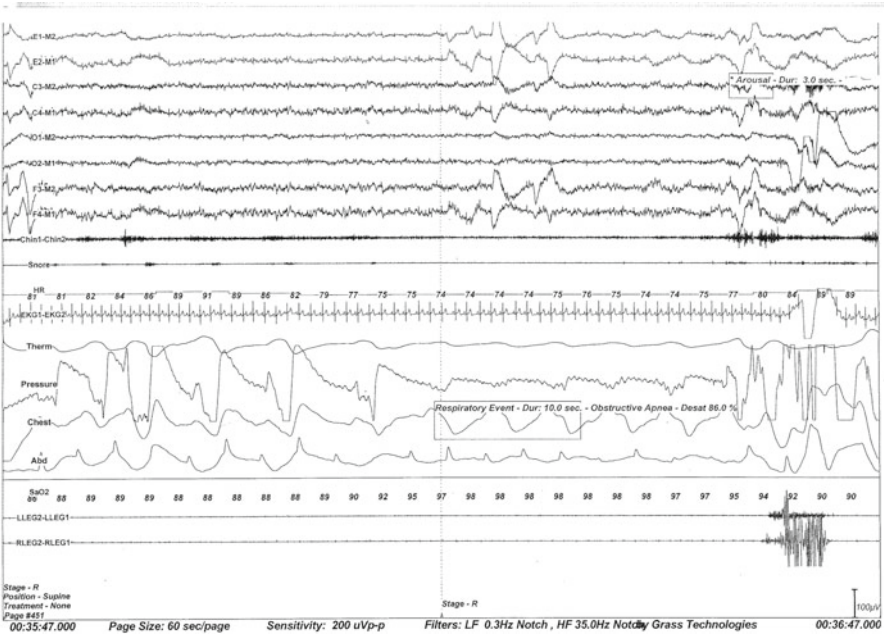

Fig. 7.2 These 2 epochs (60 s) are from R stage of Sarah's sleep. The obstructive episode is evident by the flattening of the nasal flow waveform as transmitted by the thermistor and the pressure cannulas and is associated by continuing abdominal and chest wall movements and followed by arousal and oxygen desaturation

adequate 10-h nighttime sleep. Children at 6 years of age do not usually nap, unless they are sleep deprived. It is unlikely that she has seizures since she does not demonstrate stereotypical movements and sleep-related enuresis that are typical of sleep-related seizures.

2. (a): Although the history and physical examination are suggestive, polysomnography is indicated in order to confirm the presence of sleep-disordered breathing and determine its severity. A sleep study is not indicated to confirm sleepwalking per se because the diagnosis of sleepwalking can be made on the basis of the history. Sleep study with extensive EEG montage is indicated sometimes when the history is not clear and there is suspicion of seizures causing the nighttime activities. Sarah's sleep study revealed 11 obstructive episodes per hour of sleep and some that were associated with arousals (Fig. 7.2). This is consistent with moderately severe obstructive sleep apnea. The arousals and sleep deprivation associated with sleep-disordered breathing are potent triggers of sleepwalking. We did not observe sleepwalking during the study, but that does not rule out sleepwalking.
3. (e): In this case, it is to be expected that treating the sleep-disordered breathing will eliminate arousals, improve sleep quality, and thus eliminate the triggers for sleepwalking. Therefore, referral for tonsillectomy and adenoidectomy (T&A) was made. The parents were educated about taking safety measures to

ensure the child safety. Clonazepam is a benzodiazepine that has been used for its effect on shortening SWS with a resultant decrease in the frequency of sleepwalking. It is recommended in difficult to treat cases that have led to injuries. Hypnotherapy also has been utilized successfully in treating sleepwalking, but we decided in this case to treat the sleep apnea first in order to eliminate the trigger and then follow for the need for further therapies. Sarah underwent T&A, and following the treatment, the parents reported resolution of the snoring and disturbed sleep, and the frequency of sleepwalking diminished substantially.

Case 2

Joe is a 7-year-old boy brought by his parents for difficulty falling asleep. Despite following adequate sleep hygiene and bedtime routine, Joe resists sleep and comes out of his bedroom for different excuses such as asking for water, more kisses, or to use the bathroom. He will not fall sleep unless the light is kept on in his bedroom and one of his parents stays with him. Eventually, he falls asleep at around 11 PM. In 1 or 2 h, he wakes up and goes to the parents' bedroom to complain of fears of intruders. He ends up falling back to sleep in his parents' bedroom and remains there for the rest of the night. The parents allow him to sleep in their bed so they can sleep.

During the daytime, Joe takes 2 h naps on most weekdays. He is doing well in school and does not experience problematic daytime anxiety or fears. When asleep, he does not exhibit symptoms suggestive of disordered breathing. Otherwise, the medical history is insignificant.

Questions:

1. What is the diagnosis?
   (a) Nighttime fears
   (b) Night terrors
   (c) Nightmares
   (d) Sleepwalking
   (e) None of the above
2. How should this be managed?
   (a) No need to treat.
   (b) Encourage the parents to invite the child to sleep with them to make him feel safe and protected.
   (c) Educate the parents regarding helping the child to develop coping skills.
   (d) Allow the child to fall asleep in the living room while the parents are available, and then the child can be transferred to his room.
   (e) None of the above.

Answers:

1. (a): Joe appears to resist sleep in his room because of his fears. The fact that he sleeps well as long as he is with his parents supports this impression. Nightmares and night terrors occur during sleep and not while the patient is trying to fall asleep. Severe forms of nightmares (associated with awakening from fearful dreams) and terrors (associated with screaming) can lead to bedtime resistance similar to Joe's manifestations, but he does not have symptoms while asleep, as long as he sleeps with the parents. Joe's arousals and going to his parents' room are inconsistent with sleepwalking since he appears to be fully awake when he goes to his parents and complains about fear of intruders.
2. (c): Treatment is indicated because the fears are severe and affecting the child's and the family's sleep. The sleep disruption is evident by the history of daily napping, which is indicative that Joe is sleep deprived, because 7-year-olds do not usually sleep in the daytime. The following strategies can be used: The parents are taught to assure the child of their presence nearby to ensure his safety. It is important that the parents maintain a balance between reassuring the child and avoiding reinforcement of the fears. For example, effective parental assurance of safety includes saying, "Mommy and daddy are next-door and we'll always make sure that you are safe." Joe can be taught appropriate coping skills and ways to respond to nighttime fears, such as "being brave" and making positive self-statements such as, "I can take care of myself." The parents can assure the child by checking on the child in a mutual agreed schedule (e.g., every 15 min) of personal assurance. Reading stories that provide examples of coping role models who conquer their fears can be helpful. The family can encourage the child to develop creative solutions such as monster spray.

Case 3

Samantha is a 16-year-old with a 2-year history of "poor sleep." She believes that she sleeps for 2–3 h in the night. It takes her 2–3 h to fall asleep, and on many nights, she awakens in early morning and has difficulty falling back to sleep or may not be able to fall back to sleep. While in bed, she is anxious about her inability to fall asleep and the consequences of sleep deprivation. Despite of being tired in the daytime, it is difficult for her to take naps even when she has the opportunity. She consumes up to 5 cups of coffee a day and still is unable to concentrate in classes, and her grades subsequently have declined. This year, she decided to drop out of school. She has not been able to participate in her favorite sport, lacrosse, because of her daytime fatigue. Samantha's parents say she always has been a poor sleeper, and she becomes anxious easily. Her insomnia started after she broke her arm while playing lacrosse 2 years ago and was unable to participate in the sport for 3 months. She could not sleep well at first because of the pain, but even after the pain resolved, her sleep did not improve. Her parents stated that Samantha's sleep issues were not associated with such severe daytime consequences in the past. She is depressed

about her inability to meet friends, participate in social activities, the decline in her grades, and her decreased chances of receiving a college lacrosse scholarship as a result of insufficient playing time. Otherwise, the history indicates that she had been healthy. Her physical examination is remarkable for an anxious and tired-appearing adolescent but otherwise is unremarkable.

Questions:

1. In the development of Samantha's insomnia, which of the following are either predisposing, precipitating, or perpetuating factors?
   (a) History of being "poor sleeper and becoming anxious easily"
   (b) Breaking the arm 2 years ago
   (c) Poor sleep hygiene and anxiety about lack of sleep
   (d) All the above
2. The recommended therapy for Samantha is:
   (a) Hypnotic medication
   (b) Replacement of her bedroom furniture so that she can develop new sleep-time associations
   (c) Cognitive-behavioral therapy and hypnotherapy
   (d) Combination of the above
   (e) None of the above

Answers:

1. (d): The history that Samantha has always been poor sleeper and becomes anxious easily demonstrates a *predisposition* to develop insomnia. The sport injury *precipitated* the insomnia 2 years ago perhaps because of her associated decreased physical activity, withdrawal from playing on the team, and withdrawal from social activities. The insomnia has been *perpetuated* because of maladaptive behavior such as spending prolonged time in bed ruminating about the consequences of lack of sleep, the changes in her life, her lost friends, and the fact that her chance of receiving a scholarship for college was decreased as she was unable to play lacrosse with the varsity team.
2. (c): CBT is the standard of care. For Samantha, the bedtime was delayed to 2:00 a.m. (consistent with her reported sleep-onset time) to minimize sleep-onset latency. The rise time was set at 6:30 a.m., which was consistent with her school schedule. Once asleep within 20 min on a consistent basis, her bedtime was gradually moved earlier by 30 min to the goal of an 11:00 pm bedtime. She was instructed not to nap during the day. Samantha was offered hypnotherapy and used it successfully to relax at bedtime and to alleviate her anxieties. Within 3 weeks of therapy, Samantha's sleep-onset latency was shortened. She continued

to have some nocturnal awakenings, but decreased in frequency and duration. In the daytime, her mood improved, and she decided to return to school.

Case 4

Kevin is a 16-year-old male who came for ongoing continuous positive airway pressure (CPAP) management. He had been diagnosed previously with severe obstructive sleep apnea. His apnea–hypopnea index (AHI) was 46/hour, indicating severe obstructive sleep apnea. He underwent T&A. The surgery did not resolve the snoring, and he continued to experience daytime tiredness and sleepiness, and his post-surgery AHI was 22/h. Therefore, CPAP therapy was recommended. His medical history was significant for morbid obesity, hypertension (his blood pressure was 158/95), and dyslipidemia. His physical examination was notable for obesity (body mass index 38, with a normal range of 20–25).

Kevin was given a CPAP with nasal mask with auto-titration, which automatically increases the pressure of forced air to treat and prevent apnea. The auto-titration equipment was given in order for Kevin to acclimate with the equipment, in anticipation of the need for overnight therapy titration study at the sleep lab. The visit was scheduled 1 week after he was given the PAP equipment. Kevin reported using the PAP sporadically for less than a minute at a time. He explained that he found it impossible to breathe with the air forced on his nose with high pressure. He said he felt as if he was going to "suffocate." He developed anxiety that he would feel palpitations from seeing or hearing the CPAP.

Questions:

1. How would you change Kevin's attitude toward the CPAP?
   (a) Just give him more time and ask him to keep trying since he has the equipment for 1 week only.
   (b) Refer him for cognitive-behavioral and desensitization therapy.
   (c) Teach him self-hypnosis to cope with the anxieties.
   (d) Offer him a bribe, such as a car, in exchange for using the CPAP.
   (e) b and c.

Answers:

1. (e): CBT has been found to substantially increase the rate of adherence to CPAP in adults and in children, in particular when used early. In fact, this follow-up visit in 1 week is very important because studies have shown that skipping CPAP for one or more nights in the first weeks is a marker of a group of patients who likely will go on to use CPAP poorly [17, 18]. Giving patients more time or

offering a bribe would not be sufficient to help overcome significant anxiety. For Kevin, we educated him about obstructive sleep apnea and the benefits of the treatments. We reviewed his symptoms such as excessive daytime sleepiness and discussed the positive consequences of his potential improvement. We reviewed the results of the sleep study to highlight how the therapy addresses the problems. We discussed the advantages and disadvantages of treatment and developed goals for his therapy. Given his anxieties, we recommended gradual desensitization. He was instructed to practice breathing with the mask only in the daytime. Gradually, the headgear was placed and, when comfortable, a low positive airway pressure was introduced. The pressure was increased gradually according to his tolerance. Self-hypnosis was offered and accepted by the patient in order to relax and relieve his anxieties associated with using the CPAP. After he became comfortable and able to breathe in the daytime with the prescribed pressure, the therapy was applied while he was sleep.

Conclusions

Functional sleep-related disorders are common. They have negative effects on the sleep efficiency and architecture and thus substantially impact the cognitive function of patients. Simple measures to adjust the behaviors of the patients and their parents can resolve these disorders and improve the quality of life and function of the patients.

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