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Introduction: the complexity, challenges, and rewards of effective sleep medicine

Ronald D. Chervin

Patients with sleep disorders often present with difficulty sleeping at night, or with daytime sleepiness and related complaints during the day. Frequently, the two issues are intertwined. In a diagnostic evaluation, to understand a patient's sleepiness the clinician should ask the patient directly to what extent he or she feels sleepy, perceives a problem with sleepiness, has had motor vehicle crashes or near-misses, or has experienced sleepiness in other sedentary circumstances. Obtaining a sleep history from a family member is also important and sometimes yields different perspectives. However, the history can be supplemented by standardized subjective or objective tests. Such tests can help the clinician to arrive at a correct diagnosis, judge the impact of a sleep disorder, or assess responses to intervention over time. Standardized tests help to compare results between patients, or in the same patients across time. Results should not be interpreted in isolation from the history, and they do not by themselves often dictate clinical decision-making. The following case describes a patient with complex sleep-related issues, and illustrates in part how subjective and objective assessments may be useful, but also discrepant or – if interpreted in isolation – misleading. More broadly, this patient's history and outcome show that effective amelioration of a patient's sleep complaints, to the point that he or she experiences fully restored healthy sleep, can require a systematically broad approach, trial and error, continued care over some time, and persistence in addressing what often turns out to be multiple underlying causes of inadequate sleep and daytime consequences.

Case

A 46-year-old woman who worked as a dental assistant presented with the chief complaints of non-restorative sleep and nocturnal awakenings for the previous 10 years. She sometimes had difficulty with sleep maintenance, but even after nights when she had slept soundly, she did not feel that her sleep had been refreshing. Her difficulties with sleep seem to have coincided with having had children, spaced 2 years apart, and associated weight gain of about 20 pounds (9 kg) that she was not able to lose thereafter. She endorsed feeling "tired" more than "sleepy" or "fatigued." She reported occasional snoring and frequent mouth breathing, but no witnessed apneas. Her Epworth Sleepiness Scale showed a total score of 6 points on a scale that ranges from 0 to 24. She would typically turn out the lights at 10:00 PM, fall asleep in 30 minutes or less, and wake up at 7:00 AM. She would wake up often, up to every hour. She felt as if she "does not get into deep sleep." The time to fall back asleep after each awakening would be variable. She did not feel refreshed in the morning. During the night, when she could not sleep, she would sometimes have ruminating thoughts and concerns. When she woke up, she would often look at her alarm clock to see what time it was. She watched television and read

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in bed. On occasion she would have the sensation after getting into bed in the evening that she would have to move her legs. This sensation would be relieved by getting up and walking around. She endorsed a history of depression, anxiety, and irritable bowel syndrome. Her examination showed a weight of 137 pounds (62 kg), and a height of 5 feet (152 cm) with a neck circumference of 13.5 inches (34 cm). Her oral examination showed a crowded oropharynx with Mallampati Class IV, minimal overjet, and a normal hard palate. She had mild septal deviation to the left and normal turbinates, with no collapse of the external nasal valves on inhalation. A recent thyroid-stimulating hormone level and free thyroxine (T4) were normal.

What diagnostic considerations and tests could be considered for this patient?

Several diagnostic considerations are raised by this history. She appears to qualify for restless leg syndrome, a clinical diagnosis defined by four main features: a sensation of the need to move the legs; circadian worsening at night; worsening at rest; and improvement with movement. She may also have psychophysiologic insomnia, an extremely common condition in which chronic insomnia arises from excessive concern about sleep itself. Psychophysiologic insomnia is suggested, for example, by her tendency to watch the clock during the night. However, she also snores, has mouth breathing, and complains of tiredness if not sleepiness per se. Moreover, her exam also suggests a crowded oropharynx that is predisposed to repeated collapse during sleep, as occurs in obstructive sleep apnea. In practice, evaluation for obstructive sleep apnea often takes precedence over investigation for other causes of insomnia, mainly because sleep apnea raises the likelihood of long-range risk for serious medical consequences, including cardiovascular morbidity and mortality.

This patient was scheduled for polysomnography in a sleep laboratory. The test showed normal results however, with an apnea/hypopnea index (AHI, events per hour of sleep) of only 1.3, where concern for an adult would begin at values closer to 5. The minimum oxygen saturation was also normal at 91%.

What should be evaluated or treated next?

False negative results can occur, though not frequently, with gold standard nocturnal polysomnography performed to assess for obstructive sleep apnea. One option, especially for patients with high pretest suspicion, would be to repeat the testing. In this case, the pretest suspicion was not considered to have been sufficiently high, and this patient also had other possibilities to consider as causes for her complaints. The patient's serum ferritin level was 29 μg and lower than the thresholds (50–75 μg) usually used to indicate that supplemental iron for restless leg syndrome may be helpful. She was treated with supplemental iron and with ropinirole as needed for symptoms of restless legs. However, her symptoms were only occasional and were not thought to be primarily responsible for her complaints. She was therefore referred to a psychologist who specializes in sleep medicine and is certified to provide cognitive behavioral therapy for insomnia (CBT-I).

Data from well-designed clinical trials suggest that cognitive behavioral therapy for chronic, psychophysiologic insomnia is highly effective, and in comparison to hypnotics more likely to retain long-term effectiveness.[1,2] The CBT-I was administered over six sessions, one approximately every 2 weeks. She made considerable progress, and 10 months later on follow-up, she continued to report that her nighttime sleep was still quite good. She had minimal difficulties initiating and maintaining sleep, with only occasional exceptions when she was particularly anxious. Although she was clearly grateful for this improvement – she estimated that her insomnia was about 75% better – she still complained that she continued to experience tiredness, a lack of energy, and also excessive sleepiness during the daytime. She still endorsed occasional snoring, and mouth breathing. She noted that she had gained about 10 pounds (5 kg) since her last sleep study. Her Epworth Sleepiness Scale showed a total score of 9, where abnormal subjective sleepiness is often considered to be reflected by scores of 10 or higher. She provided a 1-week sleep diary that showed an average bedtime at 10:30 PM and rise time at 6:30 AM, with average wake after sleep onset of only

25 minutes, and a 12-minute sleep latency. Sleep efficiency (time asleep divided by time in bed) was at 87%, which was 12% higher than before CBT-I, and she was indicating a 30-minute gain in total sleep time each night.

Just give up?

The sleep psychologist, realizing that CBT-I had achieved its aims, yet the patient still complained of daytime tiredness, wisely decided to refer this patient back to a sleep medicine physician. Restless legs symptoms were still present, but relatively infrequent. Continued snoring and weight gain led to recommendations for another laboratory-based polysomnogram. As the patient was not quite obese, with a body mass index even after the weight gain of 29 kg/m^2, and moreover had received one negative polysomnogram already, esophageal pressure monitoring was added to the polysomnogram. Esophageal pressure monitoring provides a gold standard measure of the work of breathing and assessment of upper airway resistance. This assessment can be especially useful in thinner or younger individuals, and women in particular, who present with symptoms that suggest obstructive sleep apnea, but show few frank apneas or hypopneas on polysomnography. Some of these individuals have a narrowed upper airway during sleep, and exert considerable effort to breathe despite having few discrete periods of diminished breathing that can be detected by standard sleep laboratory methods. Research has shown that some patients who exert continual, steady effort to breathe during sleep can be sleepy during the day as a result, and respond to treatment with continuous positive airway pressure.[3] In fact, some research over the past 10 years suggests that snoring patients with labored breathing may activate the cerebral cortex on a breath-to-breath basis throughout the night, possibly causing excessive daytime sleepiness in this subtle but recurrent manner above and beyond the impact of frankly observable, longer arousals or awakenings.[4]

The repeat polysomnogram showed 16 apneas or hypopneas per hour of sleep and a minimum oxygen saturation of 92%. Esophageal pressures reached an excessive maximum negative value of –19 cm of water during inhalation, whereas in normal circumstances this nadir should be closer to –10 cm of water. A Multiple Sleep Latency Test (MSLT) was also performed the day after the polysomnography. This is a gold standard objective measure of daytime sleepiness, and can also be used to assist in the diagnosis of narcolepsy. The main outcomes are the mean sleep latency, across five nap attempts, scheduled every two hours during the daytime, as well as the number of nap attempts on which rapid eye movement (REM) sleep was recorded. Abnormal daytime sleepiness is supported by the finding of a mean sleep latency of < 8 minutes, and narcolepsy as suggested if this finding is accompanied by REM sleep on two or more of the nap attempts. This patient in fact showed a mean sleep latency of 3.5 minutes, consistent with severe daytime sleepiness. No sleep-onset REM periods were recorded during the naps.

Given the evidence for obstructive sleep apnea on the polysomnogram, the patient subsequently returned to the sleep laboratory for a continuous positive airway pressure (CPAP) titration study. Settings from 4 to 10 cm of water were applied, and subsequent review of the study suggested that 9 cm of water effectively treated this patient's obstructive sleep apnea. She obtained a CPAP machine for home use 2 weeks ago, at the time of this writing. She reported success at using the machine each night, for the entire night, with the exception of 2 nights. When using the machine, she no longer snored. Her bed partner reported that her sleep appears to be "much more peaceful, as if she has simply passed out for the entire night." She no longer kicked her legs during the night. She felt as if most of her insomnia had been treated by the CBT-I, and that now her sleep was completely sound when using CPAP. She no longer experienced the restless legs symptoms that used to warrant occasional use of ropinirole.

However, despite this progress, this patient continued to complain that she felt no more refreshed on awakening than she had before having CBT-I or using CPAP. She still complained of a "general fatigue" that could limit her daytime activities, and also a

degree of sleepiness that could limit her ability to read or work at a computer for extended durations. She did endorse feeling as if her mind was "a little more clear" but was still somewhat disappointed that despite all the improvement in her sleep, which she very much appreciated, she still did not feel more refreshed on awakening or less fatigued during the day.

Discussion

The large majority, but not all patients with sleep disorders, after appropriate assessment and treatment, can experience complete or nearly complete resolution of their original complaints. Although this patient was much improved, her original complaints of non-restorative sleep and daytime fatigue did not respond, even after treatment for three sleep disorders: psychophysiologic insomnia; restless legs syndrome; and obstructive sleep apnea. We do not know whether her MSLT, which originally showed prominent sleepiness, would now show improved results. One possible explanation for the lack of subjective improvement at her last visit is that she had not yet used the CPAP for an adequate period of time to judge its effects on her fatigue. Up to 2 or 3 months of consistent CPAP use may be necessary in some cases to fully assess the impact on daytime symptoms. The patient believed that in recent years her depression and anxiety were well controlled, with bupropion and citalopram. However, if she was mistaken, then depression could certainly contribute to daytime fatigue that might not respond to treatment of sleep disorders. That said, sleepiness caused by depression is generally less likely than primary sleep disorders to cause abnormal MSLT results.

Finally, this case history illustrates another interesting point that surfaces frequently in sleep medicine, as well as other sections of this book. Whereas her Epworth Sleepiness Scale, the most commonly used standardized assessment of subjective daytime sleepiness, reached only 9 points – below the threshold (10) often taken for initial concern about daytime sleepiness – her MSLT showed objective evidence of severe daytime sleepiness. The 1-page Epworth costs only pennies, and it takes only minutes for a patient to rate his or her own tendency to doze, under eight variably soporific circumstances. The questionnaire was initially validated by evidence that Epworth scores showed some correlation with MSLT results.[5] However, that correlation was not strong, and subsequent studies have often showed little or no correlation between the Epworth and the MSLT.[6] Discrepancies such as this, between subjective and objective measures, are common in sleep medicine, and may indicate that such measures assess somewhat different constructs. Our measures – either subjective or objective – are not always as definitive in clinical practice as many clinicians would like to believe. For this patient, in retrospect, her clinicians would have been misled had they interpreted her normal Epworth score, in isolation, as an indication that her complaints should be ignored, and that further investigation after CBT-I, for possible obstructive sleep apnea, was unnecessary. In this case, persistent effort to understand this patient's complaint led to a clear diagnosis of obstructive sleep apnea, despite the older normal study, and demonstration on an MSLT of objective evidence for excessive daytime sleepiness that was quite significant.

In practice, an MSLT is usually obtained (and sometimes covered by medical insurance) only when narcolepsy is a diagnostic consideration, or when an objective assessment of sleepiness can be argued to be vital. This may be the case when fatigue and sleepiness seem difficult to separate on history, risk exists for driving and especially public transport accidents, or sleepiness and related symptoms appear to have complicated etiologies or inadequate response to treatment, as in this case. In contrast, a simple subjective measure such as the Epworth Sleepiness Scale may be best suited for routine use during clinical evaluations, in a manner that can make such evaluations comparable between clinicians or across time and treatments. Both subjective and objective assessments of sleepiness may have separate appropriate uses, but they must always be interpreted within the context of a thorough clinical history. They cannot be assumed to provide concordant results or redundant information.

Lastly, they should rarely if ever be expected, in isolation, to guide clinical decision-making.

Main points

Complaints such as non-restorative sleep and daytime sleepiness or fatigue raise the possibility of underlying sleep disorders, which can be multifactorial. Assessment of sleepiness can be performed by standardized subjective methods, laboratory-based objective testing, or both, but such results must be evaluated in the context of the clinical history to best serve each individual patient. Sleep medicine is a complex field, with multidisciplinary roots, that offers substantial opportunity to improve the health and quality of life for many patients. Nonetheless, not all patients experience complete resolution of their symptoms, and considerable more research will be necessary before this field achieves its full potential to eliminate many intersecting problems with nocturnal sleep and daytime function.

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SECTION ONE

Sleepiness versus fatigue, tiredness, and lack of energy

In the field of sleep medicine, few issues are more critical than daytime sleepiness. Hypersomnolence represents the borderland between sleep and full alertness, and is important to recognize as one of the most common indications that nocturnal sleep has not been fully restorative. Sleep, which is critical to life, in essence tries to impose itself into wakefulness. Unfortunately, recognition of sleepiness is not always as simple as it sounds. As it usually develops insidiously, patients often are unaware that they are affected, or that everyone else does not feel the same. Moreover, patients choose many different words other than sleepiness – words often less clearly associated with sleep disorders, in the minds of their physicians – to describe their main complaints. This means that early in the process of obtaining a history, physicians can be misled into pursuing investigations and possible etiologies that deviate considerably from the true source of the problem.

This first section of the book, therefore, presents several cases that highlight a too-often non-descript basket of terms, including sleepiness, fatigue, tiredness, and lack of energy, that often remain insufficiently understood or clarified by the clinicians who try to help the innumerable patients presenting with one or more of these issues as their chief complaint. The authors of these cases, each a neurologist whose clinical practice or research focuses on sleep, help to clarify how clinicians can distinguish between different sleepiness-related symptoms, as well as what can or cannot be assumed to underlie these symptoms. Some sleep disorders may be more likely than others to produce a complaint of sleepiness, as opposed to related constructs. Finally, some neurologic and other conditions may produce sleepiness and the other symptoms simultaneously. Fortunately, in some cases, standardized or objective testing, as discussed in the second section of this book, can provide some clarification. A thorough history and appropriate interpretation of any testing obtained are important because, in most cases, sleepiness, fatigue, tiredness, and lack of energy can all be improved by appropriate diagnosis and treatment for an underlying sleep disorder.

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How to distinguish between sleepiness, fatigue, tiredness, and lack of energy

Anita Valanju Shelgikar

Case

A 40-year-old woman presented to the sleep clinic for evaluation of "daytime fatigue." This symptom began insidiously 4 years ago, but has been worsening over the past 18 months. Her main concern was that her "sluggish fatigue and unrefreshing sleep make me unmotivated to get my work done."

She reported that until 18 months prior to presentation, she felt her sleep quality was "reasonable" but since that time has "not been as deep" with approximately three awakenings for nocturia each night. She reported a bedtime of midnight, sleep latency of < 15 minutes, ability to resume sleep quickly after each nocturnal awakening, and wake time between 7:30 and 9:30 AM. She denied feeling refreshed upon awakening, and experienced persistent tiredness throughout the day.

Her Epworth Sleepiness Scale score was 3 out of 24; she reported a chance of dozing only while watching television or lying down in the afternoon. She previously tried multiple over-the-counter sleep aids, including melatonin and valerian root. She endorsed caffeine intake of one beverage daily, and started dextroamphetamine/amphetamine 20–30 mg daily for a diagnosis of possible attention-deficit/hyperactivity disorder. She continued to take bupropion, started 12 years ago, and attended counseling for management of a mood disorder.

Since onset of her fatigue 4 years ago, she had gained 30 pounds (14 kg), which she attributed to "eating to help stay awake." She reported rare snoring, witnessed apneas, and a sore throat upon awakening. She endorsed nasal congestion 2–4 nights per week and reported that her legs felt restless 3 times per month. This leg discomfort worsened in the evening, was associated with a strong urge to move, and transiently improved with walking. She reported occasional auditory hypnogogic hallucinations, described as a "loud bang that was not a real sound," along with occasional sleep paralysis, but denied hypnopompic hallucinations or cataplexy.

Past medical history included migraine headaches, depression, possible attention-deficit/hyperactivity disorder, and positive antinuclear antibody (ANA) without clinical manifestations of rheumatic disease. She continued to be followed by a rheumatologist. Medications included magnesium oxide, onabotulinumtoxinA injections for migraine headache, dextroamphetamine/amphetamine, bupropion, vitamin D3, folic acid, glucosamine, oral contraceptive, multivitamin, and valacyclovir.

Physical examination was notable for a body mass index (BMI) of 30.4 kg/m^2, a crowded oral airway, and a high-arched palate.

What evaluation was done and what was the diagnosis?

Limited serologic evaluation to assess for endocrinologic etiologies included a thyroid-stimulating hormone

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Table 2.1 Key historical features of case

- Daytime fatigue for 4 years, worsening over 18 months
- Non-restorative sleep
- Use of stimulant medication
- Eating to stay awake, with subsequent 30-pound (14-kg) weight gain
- Decreased motivation
- Rare snoring and witnessed apneas
- Comorbid migraine headache and depression

(TSH) level of 1.96 mIU/l and a vitamin D level of 75 ng/ml, both of which were within normal limits. The patient was also advised to maintain follow-up with her psychiatrist for continued management of her mood disorder.

Table 2.1 highlights the key historical points raised by this patient. The clinical history suggested some features of sleep-disordered breathing, such as snoring, frequent nocturnal awakenings, and non-restorative sleep. Her oropharyngeal anatomy may have also increased the likelihood of sleep-disordered breathing in this patient. A baseline polysomnogram was obtained, with esophageal pressure (Pes) monitoring to quantitatively assess upper airway resistance. This study showed a total sleep time of 151 minutes, sleep latency of 29.5 minutes, and sleep efficiency of 42.9%. The apnea/hypopnea index (AHI, events per hour of sleep) measured 0.3 per hour of sleep, the respiratory effort-related arousal (RERA) index measured 0 per hour, and minimum oxygen saturation was 91%. The Pes signal was only reliable during one period of sustained non-REM sleep, during which esophageal pressures ranged from –8 to –17 cm of water as shown in Figure 2.1. Her periodic limb movement index was 15.9 per hour. The final study interpretation noted these findings to be suggestive of increased upper airway resistance, although the findings did not meet criteria for obstructive sleep apnea.

Discussion

Fatigue is reported in myriad medical and psychiatric conditions. Patients with depression, multiple sclerosis, congestive heart failure, fibromyalgia, cirrhosis (just to name a few) may endorse fatigue. This symptom is often attributed to a number of potential etiologies, such as a medication side effect, reduced exercise tolerance, or changes in dietary intake. Fatigue can profoundly impact a patient's quality of life through its effects on mood, job performance, and independence with activities of daily living. Patients with fatigue often undergo basic metabolic and endocrinology evaluations; if these are unrevealing, it is not uncommon for these patients to be referred for sleep medicine consultation.

Excessive daytime sleepiness, also a feature of many disparate conditions, can likewise have a negative impact on a patient's mood, job performance, and interpersonal relationships. As a result of motor vehicle crashes and other disasters that occur with loss of consciousness, daytime sleepiness also poses a significant public health risk. Given similarities in functional consequences of fatigue and sleepiness, discrimination between the two can be challenging. Traditional teaching distinguishes fatigue as a physical tiredness or lack of energy and sleepiness as propensity to doze or fall asleep.[1] Sleepiness is generally caused by an alteration or imbalance in sleep–wake mechanisms; fatigue may arise from the same factors, but can be caused by others as well.[2] Providers often ask a number of questions to categorize the patient's symptoms as either fatigue or sleepiness. However, consideration of these entities as mutually exclusive may hinder formulation of an accurate differential diagnosis and management plan.

Simple questions about when symptoms are worst – for example, after 2 hours of shopping, or 1 hour of sedentary reading – may help to distinguish fatigue from sleepiness. Some patients, though, are not detailed historians. Lack of collaborative history can further confound determination of the patient's primary symptom. Significant research has focused on fatigue, sleepiness, and even the interplay between the two. However, substantial variability remains in definitions of these two entities. Some studies define fatigue and daytime sleepiness as distinct entities, while others use the terms interchangeably. Formal study of these symptoms has been facilitated only to

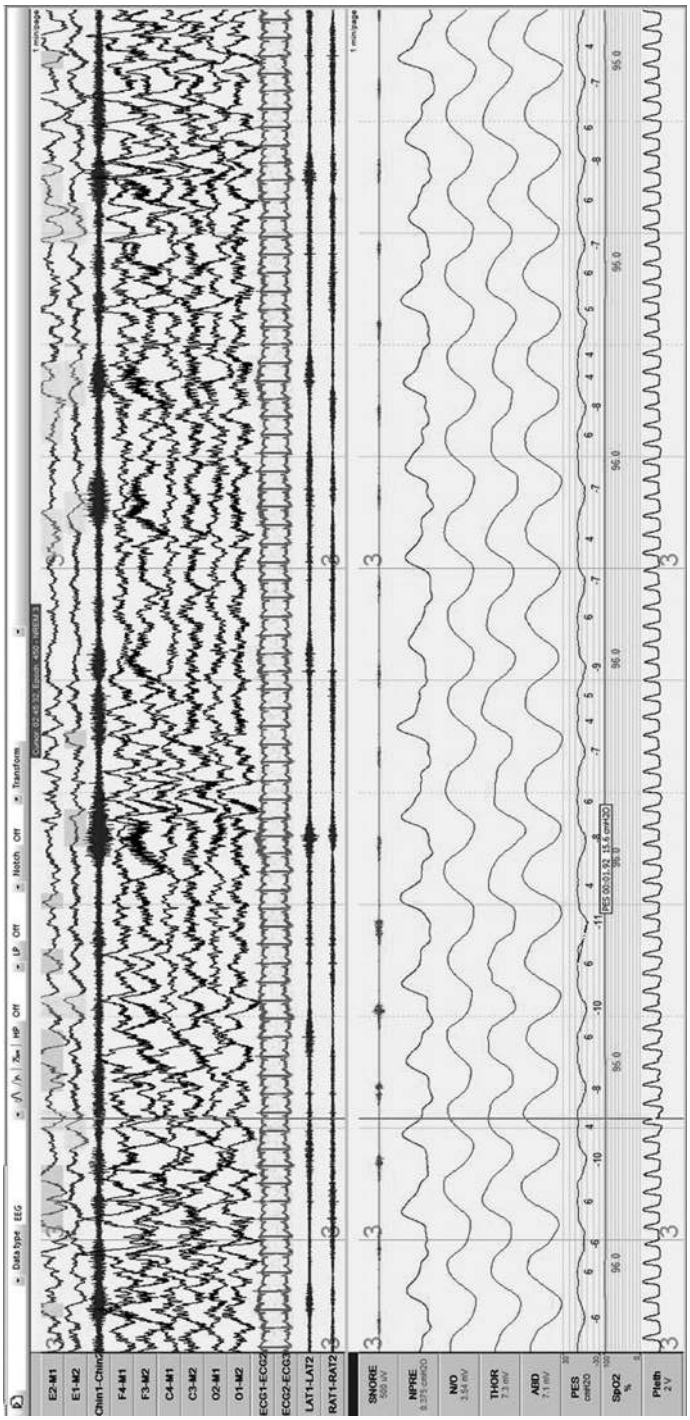

Figure 2.1 Baseline polysomnogram with esophageal pressure (Pes) monitoring. The Pes values suggest increased resistance of the upper airway, with pressure swings up to 15 cm of water shown. Pressure swings greater than about 10 cm of water often raise concern. The recording montage includes the following leads: central (C3-M2, C4-M1), frontal (F3-M2, F4-M1), and occipital (O1-M2, O2-M1) electroencephalograms; left and right eye electrooculograms (E1-M2, E2-M1); mental/submental electromyogram (Chin1-Chin2); electrocardiogram (ECG1-ECG2, ECG2-ECG3); left and right eye electromyograms (LAT1-LAT2, RAT1-RAT2); snore volume (SNORE); nasal pressure transducer (NPRE); nasal/oral airflow (N/O); thoracic (THOR) and abdominal (ABD) effort; esophageal pressure (PES); arterial oxyhemoglobin saturation (SpO2); and plethysmography (Pleth). See plate section for color version.

a limited extent by objective measures. The Multiple Sleep Latency Test (MSLT) is a validated objective measure of the ability or tendency to fall asleep, and is often used in the assessment of daytime sleepiness. While the MSLT is considered the gold standard for objective measurement of sleepiness, there remains no systematically collected data on normative values for mean sleep latency.[3] A validated, measurable biomarker of fatigue has yet to be determined, which leaves much room for variability in the definition and identification of fatigue.

Subjective questionnaires are often used in the clinical assessment of daytime sleepiness, and are used less often in the evaluation of fatigue. Of the multiple validated questionnaires available for subjective assessment of daytime sleepiness, the Epworth Sleepiness Scale[4] is the most widely used. This tool provides the respondent with a four-point Likert scale to assess the likelihood of dozing in eight distinct sedentary situations in recent times. The total score varies between 0 and 24, with scores of 10 or more raising concern (progressively) for subjective daytime sleepiness. Although concordance between Epworth scores and objective measurements of sleepiness is not strong, the Epworth can be a useful, cost-efficient tool for longitudinal use in a given individual.

The Fatigue Severity Scale[5] was initially used for multiple sclerosis and systemic lupus erythematosus patients. This questionnaire employs a seven-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree" for the ratings of statements about the effect of fatigue on mood and physical function. The Fatigue Severity Scale is a validated tool that differentiates between healthy controls and individuals with fatigue. Like the Epworth Sleepiness Scale, the Fatigue Severity Scale can be used in the clinical setting to track changes in a patient's score over time. Although the Epworth Sleepiness Scale is more commonly used in sleep medicine clinics, there may be a role for use of the Fatigue Severity Scale, particularly in certain patient populations. Table 2.2 summarizes some of the subjective and objective assessment tools that can be considered in the evaluation of sleepiness and fatigue.

Table 2.2 Subjective and objective assessment instruments that are often used in the evaluation of patients who complain of daytime sleepiness or fatigue

- Epworth Sleepiness Scale
- Fatigue Severity Scale
- Nocturnal polysomnography
- Multiple Sleep Latency Test

This patient reports "fatigue" as her chief complaint, and describes multiple medical and social factors that contribute to this symptom. While she does endorse physical tiredness, she also reports poor sleep quality and non-restorative sleep. She does not explicitly complain of daytime sleepiness, and her Epworth Sleepiness Scale score is low. However, she makes reference to inability to stay awake without medication or non-pharmacologic intervention (e.g. eating). In fact, her use of a pharmacologic stimulant (i.e. dextroamphetamine/amphetamine) and caffeine may mask some of her daytime symptoms, including sleepiness. Categorization of the patient's daytime symptoms is further confounded by her comorbid mood disorder, which is commonly associated with sleep disturbance. Her frequent nocturnal awakenings and non-restorative sleep, in the setting of her physical findings of obesity and a crowded oral airway, suggest that there may be undiagnosed sleep-disordered breathing as well. In this patient, symptoms of fatigue and sleepiness may, in fact, coexist. It is difficult to ascertain clearly distinct etiologies for each symptom, and some of her comorbidities may contribute to both symptoms. These considerations should be taken into account in medical decision-making and in formulation of a multifaceted treatment plan.

Main points

Fatigue and sleepiness are sometimes clues to different underlying conditions. However, these symptoms can also coexist and have additive effects on a patient's daytime functioning. Historical information, and particularly discussion of the contexts in which symptoms occur, may help elucidate the underlying etiology. The clinician