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CME CREDIT HOURS

Experiences of a sleep disorders center: 1700 patients later

KEY POINTS:

The traditional clinical teaching is that obstructive sleep apnea tends to result in a complaint of sleepiness, while central sleep apnea results in insomnia. However, the clinical symptoms of obstructive and central sleep apnea may be more similar than originally supposed. Clinicians should recognize that patients with sleep apnea may present with a wide range of symptoms.

Consider depression in any patient with insomnia. In patients with depression and insomnia, it is probably unwise to use hypnotics alone. Rather, it is better to use specific treatments for depression, including medications such as tricyclic antidepressants or serotonin reuptake inhibitors.

Patients with periodic leg movement disorder are equally likely to present with chief complaints of either insomnia or excessive sleepiness.

ABSTRACT: Sleep studies reveal many patients to have specific sleep abnormalities different from what might be suspected from the clinical history. For example, in our experience, patients who were later found to have central sleep apnea presented with chief complaints of excessive sleepiness or insomnia. In patients requesting evaluation for sleep apnea, screening studies that detect only sleep-disturbed breathing (ie, oximetry) may miss other diagnoses in one fourth of cases.

Although there are more than 200 accredited sleep disorders centers in the United States, sleep medicine is still so new that relatively few case series on this topic have been published. In 1990, we reported our experience with approximately 600 patients seen in the first 27 months in a sleep center.[1] This paper summarizes the work carried out over 6 years, the reasons patients sought help for sleep disorders, the diagnoses made, and the treatments offered. The original 600 patients are included in this newer, larger series.

PROTOCOL

Between September 1987 and September 1993, 1692 patients came to the Sleep Disorders Center at the State University of New York at Stony Brook. Of these, 1352 underwent polysomnography (sleep studies). This paper describes only the 1515 patients who were 18 years old or older, of whom 1171 (77%) underwent sleep studies. The 177 younger patients, of whom 174 underwent sleep studies, are described in a separate report.[2] Of the adult patients, 1013 were men and 502 were women. The mean age was 45.8 ± 0.4 (SEM) years (range 18 to 87).

During an initial daytime visit, patients filled out a questionnaire about their sleep habits, and a physician performed a detailed medical and psychiatric evaluation and physical examination.

Patients who subsequently underwent sleep studies returned afterward for a visit with the physician, who explained the results of the recording and recommended a course of treatment.

We entered data from the medical history, physical examination, questionnaires, and polysomnographic recordings into a dBASE III PLUS file (Borland International, Inc, Scotts Valley, Calif) with 123 variables; this database forms the basis of this report.

Criteria for diagnoses of sleep disorders

Polygraphic recording techniques and diagnostic criteria are described in detail in previous publications.[3,4] In brief, the criteria were:

Sleep apnea—sleepiness, sleep disturbance, or other symptoms,[1] plus the polysomnographic finding of at least five episodes of apnea or hypopnea per hour of sleep, each lasting at least 10 seconds, during which arterial oxygen saturation decreased at least 4%.

Obstructive sleep apnea—sleep apnea in which an airway obstruction (manifested as paradoxical respiratory movements) was present during more than 50% of the total time spent in disordered breathing (episodes of apnea or hypopnea).

Central sleep apnea—sleep apnea in which an obstruction was present during less than 50% of the time spent in disordered breathing. Only a few patients had conditions at the borderline of obstructive and central sleep apnea using this definition: 2.6% of patients with sleep apnea had an obstructive time between 45% and 55%.

Primary snoring—snoring, with fewer than five episodes of apnea or hypopnea per hour of sleep.

Periodic leg movement disorder (formerly called nocturnal myoclonus)—sleep disturbance or excessive sleepiness, accompanied by five or more periodic myoclonic leg movements (accompanied by electroencephalographic arousal) per hour of sleep.[3]

Narcolepsy—a mean sleep latency of 5 minutes or less, accompanied by at least two episodes of rapid eye movement-onset sleep, during a multiple sleep latency test. Such patients usually have a history of irresistible sleep episodes ("sleep attacks"), usually appearing in adolescence or young adulthood, accompanied by secondary symptoms including cataplexy.

OBSERVATIONS

Overview

Why the patients came. The most common reason (cited by one third of the patients) for coming to us was to be evaluated for sleep apnea (**FIGURE**). Another fifth came because of daytime sleepiness, and yet another fifth came because of insomnia. Less-frequent reasons included snoring and disorders of arousal (sleepwalking or night terrors). "Restless legs," nightmares, chronic fatigue, seizures during sleep, and sexual dysfunction each accounted for fewer than 1%.

What we found. Among patients who underwent sleep testing, the most common diagnosis was obstructive sleep apnea, followed by primary snoring, nocturnal myoclonus, and sleep disturbance associated with psychiatric illness (**FIGURE**). Less common diagnoses included insomnia due to medical conditions (4%), poor sleep habits (3%), and conditioned insomnia (3%).

What we recommended. The treatment we recommended most frequently was continuous positive airway pressure (CPAP) for sleep apnea. The next most frequent treatments were instruction in sleep hygiene, referral for psychiatric treatment, conservative measures such as weight loss for sleep apnea or snoring, and referral to internists or surgeons for treatment of medical conditions (**FIGURE**). Other treatments included alterations in the dosages of currently prescribed medications (3%), pharmacotherapy of sleep apnea (2%), benzodiazepines as hypnotics or to treat nocturnal myoclonus (2%), and antidepressant medications (2%). In approximately 3% of cases, we recommended no specific treatment. Approximately 87% of the patients for whom we recommended a specific treatment actually underwent such treatment (carried out either by us or by the primary care physician); the rest declined.

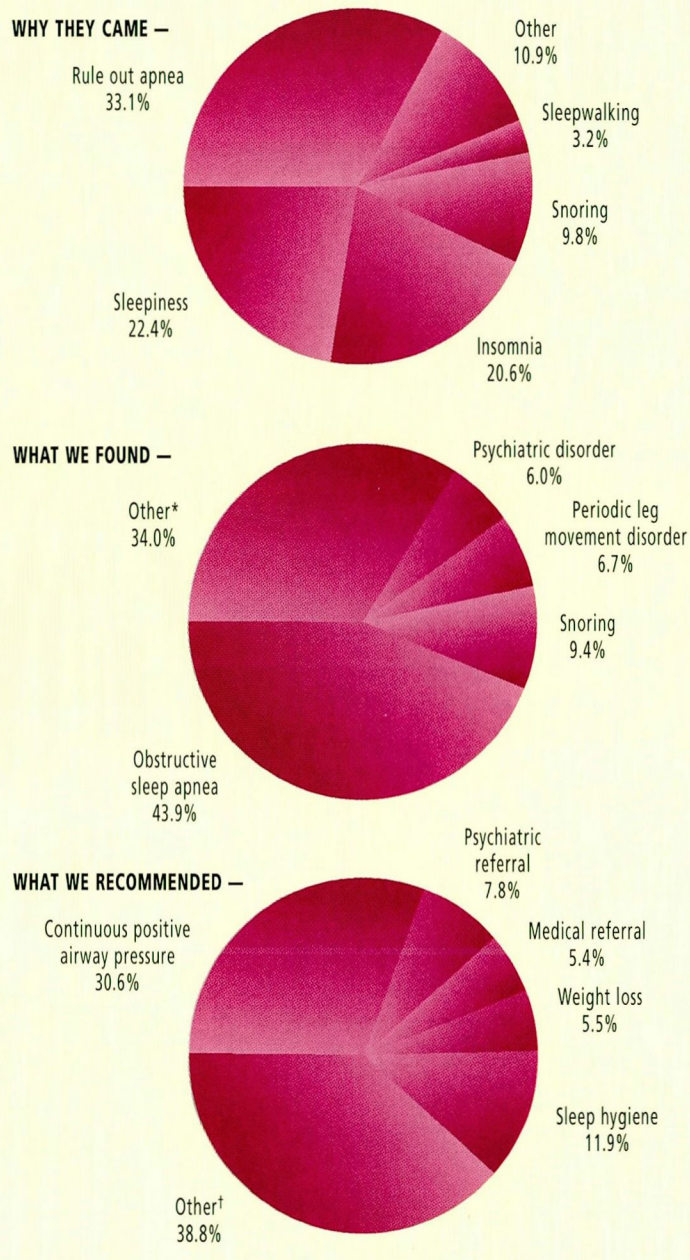
The clinical symptoms of obstructive and central sleep apnea may be more similar than originally supposed

Diagnosis by chief complaint

Excessive daytime sleepiness. Among patients who presented with a chief complaint of daytime sleepiness, the most common diagnosis was obstructive sleep apnea (46%), followed by primary snoring (7%) and periodic leg movement disorder (6%), psychiatric illness (6%), central sleep apnea (4%), poor sleep habits or inadequate time in bed (4%), and narcolepsy (4%). The other 27% had less common conditions.

Insomnia. Patients who presented with a

FIGURE



* Central sleep apnea and sleep disorders associated with medical illness, drug or alcohol abuse, seizure disorders, narcolepsy, circadian rhythm disorders, and disorders of arousal.

†Altering dosage of current medications, pharmacotherapy for sleep apnea, antidepressant medications, benzodiazepines for treatment of periodic leg movement disorder, and other treatments.

chief complaint of insomnia were a more diverse group. The most common diagnosis was conditioned (persistent psychophysiological) insomnia (16%), characterized by conditioned anxiety about being able to sleep, which then results in inability to go to sleep.[3] Periodic leg movement disorder accounted for 13%. Subjective insomnia, in which the patient feels that he or she sleeps very little, but in which the polysomnogram shows relatively normal sleep,[3] was found in 10%. Less common diagnoses included obstructive sleep apnea (9%), sleep disturbance associated with medical conditions (6%), and sleep disturbance with psychiatric illness (20%).

Medical and psychiatric illness

Medical illnesses, including end-stage renal disease, nocturnal dyspnea when lying down, arthritis, diabetes, and congestive heart failure requiring diuretic therapy (resulting in frequent urination), caused sleep disturbances in 6% of the patients complaining of insomnia and 2% of those with excessive daytime sleepiness. We reached this conclusion when a sleep disturbance was temporally related to a medical illness that might reasonably be expected to disturb sleep, and the polysomnogram showed no other pathophysiologic causes of sleep disturbance. Although the best way to confirm such a relationship is to see if the sleep disturbance clears up when the medical condition is successfully treated, such an approach was not always possible, because many of the illnesses were chronic.

Many more patients had major medical illnesses but also were found to have specific sleep disorders and hence are not categorized in this section. For example, we previously described 11 patients who had end-stage renal disease and were receiving hemodialysis, of whom six had sleep apnea,[5] and 11 patients undergoing peritoneal dialysis, of whom six had sleep apnea.[6] We also described 10 patients referred from a clinic devoted to chronic fatigue syndrome, of whom seven had positive polysomnographic

findings, including periodic leg movement disorder, sleep apnea, and a narcolepsy-like disorder.[7] Nocturnal seizure disorders were found in three patients (0.2% of the total group).

Psychiatric illnesses were much more frequent among patients who presented with insomnia than with excessive sleepiness (20% vs 6%; $P < .001$). Approximately equal numbers of patients had major depression, anxiety disorder, and other psychiatric illnesses.

Psychiatric illnesses were diagnosed clinically on the basis of an interview with a psychiatrist (W.M.), although in most cases polysomnography was also performed to rule out other pathophysiologic causes of poor sleep. Sometimes, polysomnography also added information about psychiatric illnesses, such as short REM latencies in major depression.[1]

In 12 patients (of whom 11 came for evaluation of insomnia), major depression was so apparent that we recommended treatment without a polysomnogram. Including these 11 patients, 25% of patients with insomnia had psychiatric disorders, including 13% with major depression, 6% with anxiety disorders, and 6% with other psychiatric diagnoses. Among those who underwent sleep studies and who were found to have major depression, the single most common reason for coming to our center was insomnia (58%).

Primary disorders of sleep

Sleep apnea. As mentioned above, obstructive sleep apnea was the most common diagnosis among patients who presented with a chief complaint of daytime sleepiness (found in 46%), but it was also found in 9% of patients presenting for evaluation of insomnia, 68% of patients presenting for an evaluation of snoring, and 58% of patients who came specifically for an evaluation for apnea. Conversely, in patients found to have obstructive sleep apnea, the most common reasons for coming to us were a specific request to be examined for apnea (49%), excessive daytime sleepiness (25%), snoring (16%), and insomnia (3%).

In patients with central sleep apnea, the most common reasons for presentation were a specific request to be evaluated for apnea (52%), daytime sleepiness (28%), snoring (8%), and insomnia (4%). Of patients with primary snoring, the reasons for presentation included a specific request to be evaluated for apnea (49%), snoring (20%), excessive sleepiness (19%), and insomnia (5%).

Periodic leg movement disorder (nocturnal myoclonus). Patients with periodic leg movement disorder accounted for 7% of all the patients in the study, 13% of those who presented with insomnia, and 6% of those with daytime sleepiness. Of patients found to have periodic leg movement disorder, 38% had originally come with a specific request to be evaluated for apnea, 27% came because of sleepiness, and 27% came because of insomnia. Many fewer patients (0.3% of the total group) were found to have restless legs syndrome.

Narcolepsy was diagnosed in 2% of our patients who underwent sleep studies and in 4% of patients who presented with sleepiness. An additional 1% of patients were found to have idiopathic central nervous system hypersomnolence, characterized by significant sleepiness (a mean sleep latency of less than 5 minutes on the multiple sleep latency test but no evidence of cataplexy or REM-onset sleep episodes).

Disorders of arousal. As might be expected, sleepwalking and night terrors were relatively uncommon in adults, occurring in 0.8% and 0.2%, respectively, of all patients.

CLINICAL IMPLICATIONS

One should consider depression in any patient with insomnia

Compared with the approximately 600 patients we saw up to 1989,[1] roughly the same percentage of patients in the present study came for evaluation of sleepiness, snoring, or apnea (65% vs 72%, respectively), but there was some shifting of proportions in this group. Specifically, fewer patients came because of sleepiness (22% in this study vs 33% in 1989; $X^2 = 25.8$, $df = 1$, $P < .0001$), while more patients came specifically to be evaluated for apnea (33% in this study vs 19% in 1989; $X^2 = 38.7$, $df = 1$, $P < .0001$). One possible explanation is that public awareness of sleep apnea has increased.

Also of interest is that only three fourths of patients who came specifically to be evaluated for apnea proved to have obstructive or central sleep apnea or primary snoring. Another 7% of these patients had periodic leg movement disorder, 6% had sleep disturbances associated with other medical conditions, 3% had sleep disturbances associated with psychiatric illnesses, 1% had condi-

GLOSSARY

Sleep latency—the time from when the lights are turned out until sleep onset.

Multiple sleep latency test—a measure of daytime physiologic sleepiness. This is performed by giving a patient four 20-minute opportunities to nap during the day, during which an electroencephalogram is recorded. The mean sleep latency from these four naps is calculated; the lower this value, the sleepier is the patient. Values of less than 5 minutes are generally considered to represent significant daytime sleepiness.

Rapid eye movement (REM) latency—the interval between sleep onset and the onset of REM sleep. Typical normal values for healthy young adults are from 90 to 110 minutes; short REM latencies are less than 60 minutes.

REM-onset sleep—an episode of REM sleep occurring during the first 20 minutes of sleep. These are typically seen in narcolepsy and other conditions, including drug and alcohol withdrawal and some circadian rhythm disturbances.

tioned insomnia, and the rest had a variety of less frequent illnesses. Insofar as this experience can be generalized to other centers, this finding implies that in patients presenting (or referred) specifically to be evaluated for sleep apnea, screening tests looking only for apnea (eg, oximetry) will miss one fourth of cases of sleep disorders.

Sleep apnea

The traditional clinical teaching is that obstructive sleep apnea tends to result in a complaint of sleepiness, while central sleep apnea results in insomnia. However, this common assumption was not borne out in this case series. Although patients with obstructive sleep apnea reported excessive sleepiness much more commonly, one in 10 patients who came to us because of insomnia was found to have obstructive apnea syndrome. Of note, in patients with central sleep apnea, sleepiness was a more common presenting complaint than was insomnia (28% vs 4%). As in an earlier analysis of 207 patients with sleep apnea,[4] the percentage of patients complaining of sleepiness did not differ significantly in obstructive vs central sleep apnea (25% vs 28%, respectively).

Evidence is growing that obstructive sleep apnea has a number of aspects of central sleep apnea, such as reductions in the amplitude of gastric pressure before the onset of obstructive apneas[8] and the appearance of apparently obstructive apneas at the nadir of diaphragmatic activity.[9] Similarly, our data suggest the clinical symptoms of obstructive and central sleep apnea may be more similar than originally supposed. The broader point, however, is to recognize the wide range of symptoms with which patients with sleep apnea may present.

Periodic leg movement disorder

Patients with periodic leg movement disorder were equally likely to present with chief complaints of either insomnia or excessive sleepiness. These groups did not differ significantly in the number of periodic leg movements per hour (28.0 ± 5.0 vs 21.9 ± 3.8 respectively). There was no evidence, then, that patients with a chief complaint of sleepiness had a higher rate of leg movements, although they might differ in some subtle way (eg, degree of arousal associated with each leg movement) that polysomnography does not measure. Also of note, more than one third of all cases of periodic leg movement disorder were in patients who originally presented with a specific request to be evaluated for sleep apnea.

Psychiatric disorders

This series also demonstrates the wide range of presentations of depressive disorders. Although insomnia was the most common chief complaint (58%) in patients who had polysomnograms and were found to have depression, 10% had a chief complaint of daytime sleepiness, and 10% came for an evaluation of snoring. Of the 12 patients in whom a clinical diagnosis of major depression seemed so clear that a polysomnogram was not ordered, all but one presented for evaluation of insomnia.

Thus, one should consider depression in any patient with insomnia. In patients with depression and insomnia, it is probably unwise to use hypnotics (which are not beneficial for depression and indeed may provide a means of committing suicide). Rather, it would be better to use specific treatments for depression, including medications such as tricyclic antidepressants or specific serotonin

reuptake inhibitors.

Indeed, in our center hypnotics prescriptions were infrequently written. In more than 1500 patients (of whom 159 were evaluated because of insomnia), we wrote only 31 prescriptions for benzodiazepines or other hypnotics, all but nine for a benzodiazepine to treat periodic leg movement disorder. In almost all cases, then, specific diagnoses could be made, and specific treatments could be instituted. ■

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