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The Nightly Fight to Breathe

By QUINN EASTMAN

Sleeping through the night is difficult when your airway won't stay open. Let's face it, when you're snoring and snorting and being yanked out of deep sleep into light sleep more than 30 times in an hour, you don't wake up well rested.

Terry Markert is a big guy, but he used to be even bigger: at six-foot-one and 362 pounds, his weight was affecting his health.

The IT administrator had been diagnosed with type 2 diabetes, was having joint pain, and was sleeping poorly—snoring loudly and frequently waking up startled in the night from not being able to breathe. “As the day wore on, I would have issues with getting sleepy, tired, fatigued,” he says.

Several of his doctors had recommended bariatric surgery. But Markert decided to take two proactive steps first: he went on a diet with his wife, and he visited a sleep lab. He has now lost 46 pounds and uses a CPAP to assist his breathing while he sleeps.

Nancy Collop, director of the Emory Sleep Center, arranged for him to have a home test while he slept. A monitoring strap was placed around his chest and midsection, and a nasal cannula measured airflow out of his nose. The results: severe sleep apnea.

“I was off the charts,” Markert says. Collop recommended a CPAP (a device that provides continuous positive airway pressure) and then referred him to a respiratory therapist at the Emory Sleep Center to be fitted.

He began using the CPAP regularly last summer. “It was a rough two or three nights when I was first getting used to it,” he says. “I felt like throwing it across the room a few times.” Soon enough, though, he got used to the device and began sleeping through the night.



After experiencing health issues and difficulty sleeping, Terry Markert visited Emory's sleep center and was diagnosed with sleep apnea. He now uses a CPAP device to assist his breathing at night. “I have a lot more energy,” he says.

The more a sleep apnea patient is able to use CPAP, the better, both in terms of respiratory disturbance and alertness the next day. By any measure, adjusting to CPAP is a big practical change for a patient, and it requires daily cleaning. But when it works, patients notice.

“After four or five days, I started feeling better during the day and had a lot more energy,” Markert says. “The CPAP is also equipped with a humidifier, so it made breathing through my nose more comfortable.”

A CPAP is the standard remedy for the most common sleep disorder, sleep apnea. The mild air pressure prevents

the soft tissue at the back of the throat from collapsing, cutting down on the frequency of all those gasps and snorts.

“If a patient wears the device consistently, it will be effective,” Collop says. “With other options, such as an oral appliance, we tend to see a lower success rate.” Evidence has been emerging that CPAP can bring down blood pressure in patients who most need it—those with drug-resistant hypertension who have an elevated risk of heart attack and stroke, for example. For milder sleep apnea, the statistical

benefits don't pop out as much, but being more alert in the afternoons is still a quite valuable benefit.

The pros: CPAP is not invasive and irreversible like surgery and does not require as much individual customization as an oral appliance. Thus, CPAP is what most sleep apnea patients will be urged to try first.

The cons: It does take some getting used to. “It is a very strange sensation,” says respiratory therapist Brandy Escobar, who coaches patients on CPAP and helps them find the best equipment. “You're sleeping with something on your face.”

Up to 30 percent of patients pre-

scribed a CPAP refuse it from the start. Of those who agree, about a quarter stop in the first year, and about half stick to it long-term. Accordingly, the Emory Sleep Center has adopted a two-pronged approach. They provide extra support to help people adapt to CPAP as well as other options for people who can't tolerate it.

Respiratory therapists are on site, able to deal with mask trouble or to give people an extra nudge to try CPAP again. "The therapist told me, 'Before you throw it off the top of your house, please give me a call,'" Markert says.

A major aim of the program is education—making sure patients understand the results of their sleep studies and what comes next. It's not always a quick fix, says Escobar. Patience and consistency are required, and the patient's attitude plays a big part.

"If someone is just there because a spouse has been complaining about their snoring, that's not the best starting point," says respiratory therapist Brandy Escobar. "We have to explain why this is going to be a benefit for their long-term health."

Emory Sleep Center, part of Emory's new Brain Health Center at Executive Park, has eight sleep lab beds in private rooms and conducts about 2,100 sleep studies per year. An average of 40 to 50 CPAP devices are provided per month.

Sometimes, after the initial sleep study, a patient will be asked to come back to the sleep lab for a "titration," a trial run of CPAP that helps establish the best air pressure settings for that patient. Titration might reveal that two levels of pressure—higher for inhalation and lower for exhalation—are needed for optimal function, an option that is available on advanced devices. "The machines are very smart. They can tell if there is leaking and how effective the pressure is," Escobar says.

Luke, I am your...CPAP device

In other situations, a patient may be given the CPAP machine to take home to try for the first time. For a few, doctors prescribe a sleep aid when a patient is starting CPAP.



Dr. Raj Dedhia offers patients with sleep apnea several surgical options. **Dr. Jennifer Zreloff** helps arrange for at-home sleep testing if patients can't spend a night in the sleep lab.

"There may be some anxiety," Escobar says. "I always recommend trying it out when you're awake, watching TV or folding laundry, so that there is some distraction and there aren't big worries about whether you can go to sleep immediately."

Even after titration, a patient may need to come back more than once to find a mask that fits and a sleep position that works well. Markert had to try several masks to find one that allowed him to sleep on his side.

Several ways to get more zzz's

Previously, if people dealing with sleep apnea sought an alternative to CPAP, there were two main options—an oral appliance, appropriate for patients with mild to moderate apnea, or nasal/throat surgery for severe apnea. Now there is a third: hypoglossal nerve stimulation.

"Hypoglossal nerve stimulation is designed to be an option only for people who can't tolerate CPAP, but not a replacement for it," says Raj Dedhia, an ear, nose, and throat (ENT) surgeon who joined the Emory Sleep Center in September.

Dedhia is one of a handful of ENT surgeons in the country with additional training in sleep medicine.

Simplest solutions

An oral appliance remains a potential option for patients with mild to moderate sleep apnea, but is generally not as effective for those with more severe sleep apnea or with structural problems in the nasal passages such as a deviated septum. The appliance extends the jaw a small amount and provides space for the tongue at the front of the mouth, thus clearing the back of the mouth.

"It does put some stress on the jaw joint," Dedhia says. "Patients say it takes a little time in the morning to feel relaxed."

For relatively mild cases of sleep apnea, doctors sometimes try "positional therapy," also known as the "tennis ball sewn into the pajamas" technique, designed to make sure someone avoids sleeping on his or her back. In more severe cases of sleep apnea, restriction of airflow happens regardless of position.

Surgical tactics

Even with surgery for severe cases, however, doctors are using a variety of tactics rather than a one-size-fits-all approach.

"Several years ago, if patients were unsuccessful with CPAP, they were given a stark choice: 'Do you want UPPP or not?'" Dedhia says, referring to



Nancy Collop

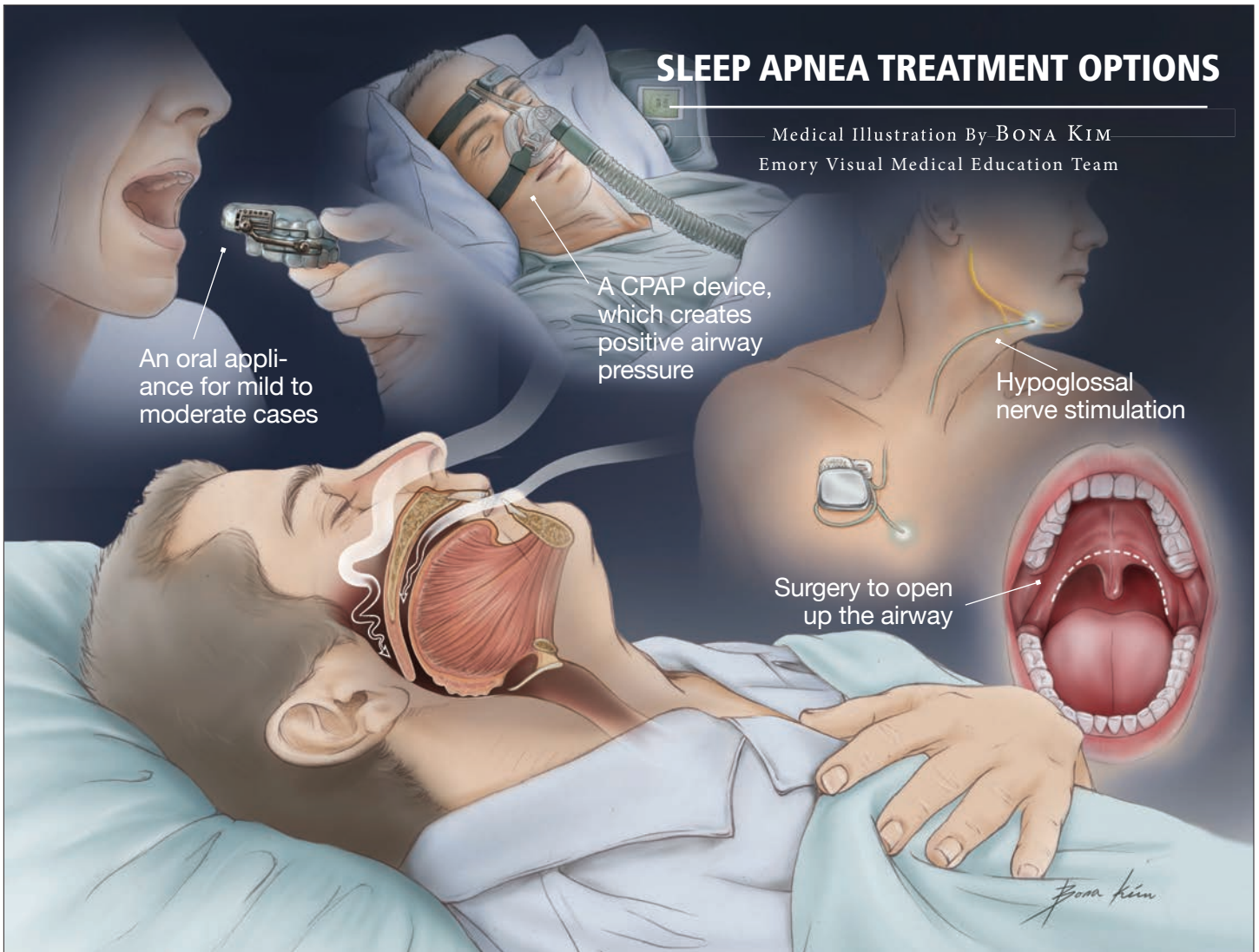
Director of the Emory Sleep Center

EMORY HEALTHCARE
THE EMORY CLINIC, INC.

*Nancy Collop, MD
Emory Sleeper*

SLEEP APNEA TREATMENT OPTIONS

Medical Illustration By BONA KIM
Emory Visual Medical Education Team



An oral appliance for mild to moderate cases

A CPAP device, which creates positive airway pressure

Hypoglossal nerve stimulation

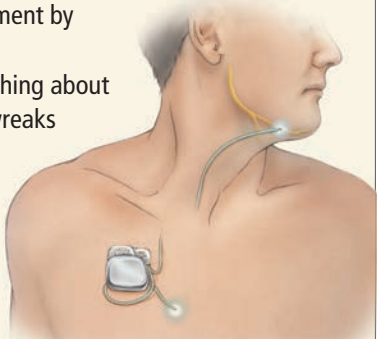
Surgery to open up the airway

Sleep apnea and cardiac health

Short closures of the airway can disturb someone's sleep cycle even if they don't completely wake up. Longer closures result in a temporary reduction of oxygen levels in the blood, leading to strain on the blood vessels and the heart.

As a result, sleep apnea is not only a risk factor for developing atrial fibrillation, the most common heart arrhythmia, it can also be an obstacle to successful treatment by catheter ablation.

"There's something about sleep apnea that wreaks havoc upon the heart's electrical system," says cardiologist Michael Lloyd.

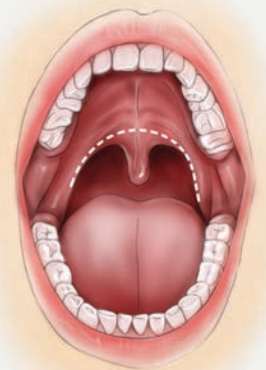


The obesity link

In sleep apnea, the soft tissues at the back of the throat block the free passage of air. Insufficient muscle tone, age-related flabbiness, and extra bulk stemming from obesity all contribute to it. Snoring, gasping, or waking up with a dry throat or elevated blood pressure in the morning can all be tip offs, as can afternoon sleepiness.

Obesity is commonly associated with sleep apnea and correlates with its severity. Sometimes weight loss by itself can improve breathing during sleep. In children, enlarged adenoids or tonsils can be a cause of sleep apnea, but this is less common in adults.

The increase in obesity during the past few decades means sleep apnea has been increasing too, but specialists say the condition remains underdiagnosed because detecting it can be cumbersome.



uvulopalatopharyngoplasty, in which excess tissue in the throat is removed to make the airway wider (this might include tonsils and adenoids as well).

With this procedure there is a risk of scarring, which can undermine the respiratory benefits. Newer approaches involve less resection and more remodeling, depending on the shape of the individual's airway. Usually an endoscopy is performed first to assess the throat's anatomy and how it is being obstructed.

Hypoglossal what?

The newest option, falling somewhere between devices and surgery, is hypoglossal nerve stimulation.

In this procedure, doctors implant a device that electrically stimulates the hypoglossal nerve, which controls the muscles in the tongue. The stimulation prevents the tongue from falling back and obstructing the airway.

The electrical stimulation is modulated by a chest sensor that detects breathing, and is timed so that the stimulation occurs at the bottom of the breathing cycle. Patients activate the device before going to sleep with a handheld remote and turn it off when they wake up.

The FDA approved a hypoglossal nerve stimulator developed by the company Inspire in 2014, based on findings that the device could cut the number of apnea events, or disruptions of breathing that interrupt sleep, by almost 70 percent after one year. Some patients reported discomfort or soreness of the tongue, due to stimulation causing their tongues to slide along their bottom teeth.

Despite the level of effectiveness, which is roughly comparable to CPAP, the device's benefit in Inspire's study was demonstrated in people who were atypical—they were relatively lean for people with sleep apnea.

In the Inspire study, people with a BMI of more than 32 were excluded,

and the average BMI of participating patients was 28.4 [almost exactly the BMI for the average middle-aged American].

Prospective patients also had to undergo drug-induced endoscopy, assessing the shape of the airway, to show that the device was likely to help.

"We are still gathering data on how well hypoglossal nerve stimulation works in different patients," Dedhia says. "It is critical to optimize outcomes, and I suspect a study with expanded BMI criteria could occur after more long-term data is available."

The nerve stimulation device, however, can cost many times more than a CPAP device. CPAP machines range from about \$1,000 to \$3,000 and many insurance companies consider CPAP medically necessary for sleep apnea and can arrange for rentals, which reduces the initial financial sting. In comparison, the nerve stimulation device, with surgical implantation, costs about \$30,000, and some insurance companies still consider it investigational and won't cover it.

Dedhia says hypoglossal nerve stimulation provides a valuable alternative to surgery, however, especially for people with atrial fibrillation. Implanting the stimulator could be less painful and invasive than surgery and involve less risk of bleeding. That's important for a group of patients who routinely take blood thinners.

"All three of these less invasive approaches—CPAP, oral appliance, and stimulation—are adjustable, which is valuable," Dedhia says. "Even if someone stays the same weight, sleep apnea is a disease that tends to progress over time."

Sleep lab at home?

Emory Sleep Center's doctors usually prefer to perform sleep studies in the laboratory, where technicians can obtain precise data. But in an effort to take patients' comfort and convenience

into account as well as keep costs in check, the Sleep Center has been working with primary care physicians and nurses across Emory Healthcare to allow sleep studies to be performed at home. Jennifer Zreloff, a physician at Emory's patient-centered primary care clinic at 1525 Clifton Road, says this is often a more convenient option for people.

"Sometimes I get pushback from patients who say they don't have time to come in for a sleep test, or they have kids who require care at night," says Jennifer Zreloff. "Home testing eliminates the hassle."

The home sleep apnea test equipment includes a pulse oximeter finger clip to measure oxygen levels in the blood, a nasal cannula, and color-coded chest and abdomen sensors for monitoring breathing. The home sleep test omits the EEG leads that record brain waves. A preprogrammed hand-sized module records the information, which sleep specialists can review afterward.

A standard measure of severity is a patient's AHI or apnea-hypopnea index. It gauges how many times in one hour breathing is disrupted. An AHI of 5 to 15 is classified as mild, 15 to 30 as moderate, and more than 30 as severe. The usual definition of sleep apnea is an AHI over 5, plus noticeable symptoms such as daytime sleepiness. "I see lots of patients who don't explicitly say they're sleepy but have other complaints like fatigue, inattention, or lack of energy," says Collop.

Also, just having an elevated AHI, with or without symptoms, has been associated with developing hypertension, she notes.

Estimates of how many people in the U.S. have sleep apnea vary considerably, from 4 to 15 percent of men and 2 to 6 percent of women. Either way, it still adds up to a lot of folks who need help getting a good, restful night's sleep.

"We order a home sleep test about once a week," Zreloff says. "We've been stunned to see how much demand there is." ■

For more, emoryhealthcare.org/sleep or 404-778-7777.