CHAPTER 6
TMD AND SLEEP APNEA—THE "WHICH CAME FIRST?" CONUNDRUM

There is an inseparable truth about TMD and SBD.

Sixty-eight-year-old Donna was referred to us by an endodontist (a root canal specialist) because she had a lot of jaw pain when chewing. She had gone to the endodontist because she thought her jaw pain was coming from a tooth, but when he could not find anything wrong, he asked us to evaluate her. In addition to the jaw pain, Donna also had numerous other symptoms: jaw joint noises, sore jaw upon

waking, neck pain, sinus congestion, dizziness, GERD, difficulty falling asleep, tossing and turning all night, fatigue, feeling unrefreshed in the morning, tinnitus (ringing in the ear), ear stuffiness, and ear congestion.

Donna's victory was to eliminate her jaw and tooth pain, which she said had plagued her for as long as she could remember. Donna had actually experienced one jaw issue or another since she was a teenager, including pain, clicking and popping, and grinding of teeth during the night—all on the left side of her face. She had seen four different doctors for evaluation and treatment of her TMD problems, and over the years she'd had ten different types of appliances made for her. Hard, soft, big, small, removable, permanent, part time, full time—she had worn just about every style or type of appliance out there. She felt that using so many treatments to chase her jaw pain had finally made it impossible for her to even bite properly.

VICTORY

Donna's victory was to eliminate her jaw and tooth pain, which she said had plagued her for as long as she could remember.

Her most recent treatment had been four years earlier with a dentist who ultimately dismissed her after growing frustrated with being unable to relieve her pain. Understandably, Donna had grown frustrated as well with the inability of so many providers to resolve her problems.

She finally resorted to taking Benadryl nightly to fall asleep, but she always awoke with a headache. She was

emphatic that her sleep was not an issue and that it was normal for her not to sleep well, a statement we hear daily at our office.

In addition to the treatments for her jaw pain, Donna had been treated for GERD, anxiety, arthritis, hypothyroidism, skin cancer, cold hands and feet, muscle aches and cramps, sinusitis, and chronic temporal headaches on the left side. She had also already undergone a tonsillectomy, nasal surgery, sinus surgery, microdiscectomy on her neck, and an inner ear perfusion.

After careful review of Donna's medical history and her current symptoms, we explained that we needed to do a comprehensive evaluation that included imaging of the TM joints. Given her history and symptoms, it was evident that she was suffering from TMD, since she had all the classic symptoms: bruxism, clicking and popping of the jaw, facial pain, jaw pain, ear pain, tinnitus, dizziness, headaches, and so on—but then again, this was nothing she didn't already know.

I went on to explain to her that I thought there was more going on than just TMD. After all, if it was solely TMD and nothing more, why was she in our office after all those treatments from other providers? Clearly the root cause of her problem had yet to be identified.

THERE IS A CONNECTION

Explaining to a patient who clearly has TMD that something else is at the root of their problems is a crucial point in the

relationship. I have to be extremely careful to ensure the patient knows I have listened to them and heard that their chief complaint is pain and not necessarily sleep problems, but that the two are often intimately related. I have to move cautiously when I present a way of looking at things that has never been proposed—in Donna's case, by multiple providers over a forty-year period. The question I get every single day is: "Why didn't anyone tell me this before now?" *And that's precisely why I wrote this book!*

At that point in the relationship with Donna, I asked if she'd be willing to do me a favor if I accepted her as a patient and completed a comprehensive exam and imaging of her TM joints. Of course, she wanted to know what the favor was. Now, sometimes, I'm a bit blunt or forward with patients, but I also try to be very empathetic and respectful, understanding that they have been through a great deal. In regard to the favor, I told Donna, "As I review your medical history, a lot of things stand out to me about your sleep: bruxism, frequent waking, difficulty falling asleep, feeling unrefreshed in the morning, morning headaches, sore jaw upon waking, fatigue, morning hoarseness in your voice, Benadryl every night needed to sleep, nighttime GERD, and waking with anxiety. With so many symptoms, I think it would be foolish of us not to evaluate your sleep as we evaluate your TMD. So with that, will you agree to complete a one-night sleep test so that we can help you achieve your victory?"

As is the case with many patients, Donna resisted, insisting that sleep had nothing to do with her problems.

"I've always been a bad sleeper," she said, to which I politely replied, "Precisely. You've always had TMD, too."

She got a good chuckle out of my quick reply and responded with "Well, if my sleep was a problem, wouldn't someone else have already evaluated that?"

I reminded her that she asked to be evaluated by me, and that's what I was doing. "Look," I said. "If you have a problem sleeping, what better way to find out than to undergo a sleep test? You sleep every night anyway—or at least you try to. So let's simply evaluate you one night to see what's happening." I went on to explain the inseparable connection between TMD and sleep breathing disorder (SBD). Finally, Donna agreed to the sleep test and we proceeded with our evaluation and imaging.

Our clinical findings illustrated that anatomically, Donna's TM joints were relatively within normal limits. She did have profound muscular pain and discomfort, which was producing a lot of her symptoms, but she had no osteoarthritis and no permanent locking of the TM joint or deterioration of the associated structures. There was no inherent damage to her TM joints—none. Basically, she did not have a primary TMD problem, yet she had been treated like a patient with a primary TMD problem. What I'm saying is that her TM joints were not the problem. I will repeat that again; her TM joints were not the problem. They were a symptom of a greater problem. That is likely why her symptoms hadn't improved through multiple treatments—the wrong thing was being treated.

The most significant clinical findings in the exam were her abnormal nasal and sinus passages, along with a significantly narrow airway. I explained to Donna that we could certainly help reduce her muscular pain and headaches, but I thought that could only be accomplished by eventually treating her suspected obstructive sleep apnea (OSA).

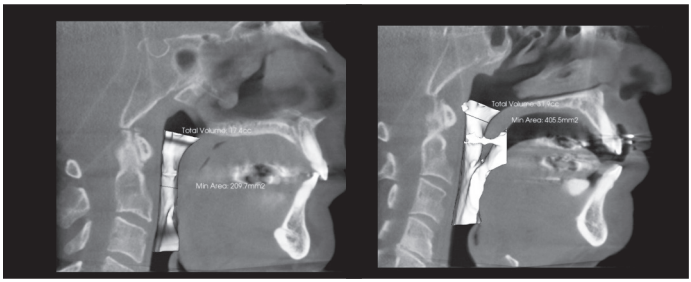
Donna proceeded with a home sleep test, completed by a sleep physician, and the results shocked her. The test showed that she basically stopped breathing 29.7 times per hour. So, nearly thirty times an hour, her brain was sending a signal to her body to resume breathing adequately. Thirty times an hour, her breathing was getting blocked or so slowed that her oxygen levels dropped to the point of potentially damaging her tissues. Thirty times an hour, her body was getting a shock of adrenaline to wake her up and start breathing again. Did I mention that the test showed us she was suffocating thirty times per hour and she had no clue?

We coupled the diagnostic testing results with our clinical evaluation and developed a great game plan for achieving Donna's victory of eliminating her jaw and tooth pain, while also tremendously improving things she didn't even know could be improved. Her tooth pain that brought her to the endodontist was merely referred pain from her bruxism associated with undiagnosed OSA—how's that for a connection?

The sleep physician proposed treating her OSA with an FDA-approved oral appliance given her profound history of bruxism and need to protect her dentition and reduce her

facial pain. The multipurpose appliance was designed to address her collapsing oral structures, leading to her OSA, while also keeping her TM joints in an orthopedically stable position and decreasing her muscular activity. That would treat all her chief complaints, as well as the root origin of her problem. That was really exciting for us.

Before Oral Appliance | With Oral Appliance



Total Volume: 17.4 cc
Min Area: 209.7mm2

Total Volume: 31.9 cc
Min Area: 405.5mm2

TIME TO GET A BIT TECHNICAL

My goal in this book has been not to get too technical, but at this point, I feel you're ready for some details about the intimate relationship between OSA and TMD—as in Donna's case.

That's the ultimate question: Which came first, the chicken or the egg? Or, as it applies to this discussion, which came first, TMD or OSA? The quick answer is that breathing trumps pain. Breathing and adequate sleep are essential for existence, and that cannot be refuted. Taking that one step further: functional, healthy breathing should be primarily through the nose as nature intended.

If breathing trumps all, and the goal is to find the origin of the problem, then let's start by looking at how OSA came into existence and why people develop it.

The human airway begins at the tip of the nose and includes the passages through the nose, through the back of the mouth, and down to the epiglottis, which is the structure that helps facilitate food going into the stomach and air going into the lungs. During swallowing, the epiglottis closes over the trachea (passage tube to lungs) to prevent aspiration of food into the lungs, ensuring that liquids or foods go down the esophagus (passage tube to stomach) to the stomach.

Sleep apnea was first discovered in 1965. Drs. Christian Guilleminault and William Dement developed the first diagnostic criteria for OSA. As a side note, I had the pleasure of lecturing with Dr. Guilleminault at one of our most recent academy meetings. It was an honor and privilege to be alongside the "Father of Sleep."

These two men are the pioneers in sleep. They discovered the different stages of sleep and really brought an understanding to the phenomenon that is studied today. Prior to 1965, sleep apnea was called Pickwickian syndrome, after a character who falls asleep standing up in Charles Dickens's first novel, *The Pickwick Papers*. Doctors thought this dysfunction was limited to obese patients, but later determined that although obesity increases the chance of OSA, it is not the sole cause. Non-obese patients and underweight patients can and do have OSA. We see it every day in our practice; you don't have to be overweight to snore and have OSA.

OSA began to be understood as a complex medical condition caused by the position of the tongue and the tissues of the throat. It was given the name "apnea," which is the Greek word for breathless. In understanding more about apnea, it was discovered that besides English bulldogs and pugs, humans are the only animals to experience sleep apnea. It is purely a result of evolution and the human ability to walk upright and speak combined with the decreasing dimensions of the face, specifically the nose and mouth—a narrow nose means a narrow mouth. After all, as I mentioned earlier, the top of the mouth is the bottom of the nose.

Consider the evolution of man: A Neanderthal's jawbones were much larger and stronger than those of humans today, providing for extra room in the mouth. Neanderthals never had impacted wisdom teeth (third molars). Homo sapiens differed from this by developing a flatter face and a tongue

that descends deeper into the throat. With these changes and evolutions, humans were able to start making simple grunts, which then developed into language. The vocal chords and muscles of the throat allow us to phonate. But like all muscles, these relax and decrease in muscle tone during sleep.

Today's smaller mouth complicates the acts of eating, breathing, and drinking. Moving forward through evolution, the pushed-back faces and narrow dental arches that humans developed predisposed them to have airways that can collapse and tissues that relax when sleep sets in.

So it is now understood that the evolution of the human face, the narrower jaws, and the ability to speak is what predisposed humans to the chance of developing SBD. While obesity is a risk factor, as stated before, it is not the end-all and be-all, and narrower jaws and pushed-back faces are common risk indicators that someone may develop OSA. In fact, patients of Asian descent have greater likelihood of SBD due to their facial structures, specifically midface deficiencies.[21]

A couple of studies illustrate the importance of breathing through the nose and what may happen without adequately breathing through the nose as a person grows and develops. Dr. Egil Harvold conducted an experiment on growing rhesus monkeys that showed that if the nasal passages were blocked, facial development was altered, teeth became more crooked,

21 Aibek E. Mirrakhimov, Talant Sooronbaev, and Erkin M. Mirrakhimov, "Prevalence of obstructive sleep apnea in Asian adults: a systematic review of the literature," *BMC Pulm Med* 13, no. 10 (February 2013), https://doi.org/ 10.1186/1471-2466-13-10

dental arches became narrower, and the mandible did not develop as far forward. Dr. Harvold blocked the noses and observed the changes quickly. As he removed the blockage the growing monkeys started to return towards the normal appearance. This study simply illustrates the importance of breathing through the nose and how that helps develop craniofacial structures to their full dimension.[22]

Furthermore, the medical textbook *Contemporary Orthodontics* illustrates that respiratory patterns dictate facial development:

> "Respiratory needs are the primary determinant of the posture of the jaws and the tongue (and the head itself, to a lesser extent). Therefore, it seems entirely reasonable that an altered respiratory pattern, such as breathing through the mouth rather than the nose, could change the posture of the head, jaw, and tongue. … In order to breathe through the mouth, it is necessary to lower the mandible and tongue and extend (tip back) the head. If these postural changes were maintained, face height would increase, and posterior teeth would super-erupt…"[23]

The result would be teeth that aren't straight.

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22 Harvold, Egil, et al., "Primate experiments on oral respiration," *American Journal of Orthodontics* 70, no. 4 (April 1981): 359-72.

23 Proffit, William, Henry Fields, and David Sarver, *Contemporary Orthodontics* (St. Louis, Missouri: Mosby Elsevier, 2007), 154.

As people grow into adulthood, nasal breathing is paramount to ensuring that OSA doesn't develop. Dr. Guilleminault strongly believes that OSA is preventable in many people if we accurately identify those individuals early in life. In looking at Donna's medical history, it was obvious that she had many symptoms that pointed to her developing OSA.

Dr. Olmos has eloquently explained that there is an established relationship between OSA and TMD and presented evidence that they are bidirectional.

> There is an increased prevalence of TMD in patients diagnosed with OSA. There is an increased prevalence of OSA in patients diagnosed with TMD. Two studies tested the hypothesis that OSA signs and symptoms were associated with TMD. … Both studies supported the significant association between OSA symptoms and TMD, with prospective cohort evidence finding that OSA symptoms precede first-onset of TMD: patients with two or more signs and/or symptoms of OSA had a 73% greater incidence of first-onset TMD.[24]

Dr. Olmos's article cites two studies that looked at more than 4,300 individuals combined and found that breathing symptoms preceded TMD and that breathing problems

24 Olmos, Steven, "Comorbidities of chronic facial pain and obstructive sleep apnea," *Current Opinion in Pulmonary Medicine* 22, no. 6 (November 2016): 570-575.

increase the risk of developing TMD.[25] That further supports the notion that breathing trumps pain. Dr. Olmos and others also found an association between TM joint locking, headaches, and daytime sleepiness,[26] illustrating that patients with TMD symptoms are commonly suffering from sleep problems, and a great deal of these TMD problems are potentially undiagnosed SBD problems too.

Look at the priority of life: The human body can suffer pain. It can walk through pain. But it can't suffer through an inability to breathe. The body will compensate by changing the position of the neck and tongue to ventilate as best it can. Without breath, death is imminent, so the body makes trade-offs to continue breathing at whatever cost, and that results in all the problems I've been talking about in this book—all the problems that Donna was having.

Still, it takes a diagnostic workup to prove to patients—and to ourselves—that their breathing and sleep may be the root of their problems. If so, then addressing their sleep issues can set them on a path to getting healthy and achieving their victory.

Another study, by Dr. Michael Fitzpatrick, illustrated that patients with blocked nasal passages will have a

25 William Maixner et al., "Orofacial Pain Prospective Evaluation and Risk Assessment—the OPPERA Study," *J Pain* 12, no. 11 (November 2012); AE Sanders et al., "Sleep apnea symptoms and risk of temporomandibular disorder: OPPERA cohort," *J Dent Res* 92, no. 7 (May 2013).

26 Olmos, Steven, et al., "Headache and jaw locking comorbidity with daytime sleepiness," *American Journal of Dentistry*, vol. 29, no. 3 (June 2016): 161-165.

worsening of their OSA symptoms.[27] While it cannot absolutely be stated that a blocked nose will cause sleep apnea, we know that patients with blocked nasal passages will have worsening breathing while asleep. This illustrates the importance of doing a comprehensive exam and evaluating the entire respiratory pathway, from the tip of the nose all the way down to the epiglottis.

DONNA'S VICTORY

At Donna's first follow-up visit, two weeks after receiving her oral appliance, she stated that her pain level above the shoulders decreased from a nine to a three. Her tooth pain was gone, and her facial pain seemed to be gone, but she told us she was hesitant to admit that because she didn't think it was possible. After so many years of facial pain, she found it hard to believe that her problems might actually be resolving so quickly.

She also reported that she was no longer taking Benadryl to fall asleep, and that she didn't wake up repeatedly during the night anymore, but instead was waking at 5 a.m., rested and ready to start her day.

In two weeks' time, we were able to reduce facial pain that she'd had for forty years to a point where she was nearly ready to admit that it was nonexistent. Of course, we weren't done yet, but to see so much progress in such a short time was

27 Fitzpatrick, Michael, et al., "Effect of nasal or oral breathing route on upper airway resistance during sleep," *European Respiratory Journal*, no. 22 (2003): 827-832.

an encouraging indication of how treatment would go. And it was an added pleasure to have the patient on board, joining us in the confidence that the treatments would resolve her symptoms.

This chapter illustrates that the primary focus really should always be around identifying the origin of the patient's problem. In Donna's case, it was the airway issues and improving her breathing, which dramatically improved her quality of life. Often, breathing is not taken into consideration when the patient is getting evaluated by doctors, and this is something that is paramount in our treatment process with patients. Since everything in the body is interconnected, modern practitioners need to look not only deeper within their own areas of practice, but at the interrelationships between their specialty and other areas of medicine. Had we only focused on Donna's self-reported TMD, we likely would have had the same results that her previous providers and the forty years of treatment had yielded. It was only upon taking a step back and looking at the bigger picture of her situation that we were able to identify that the root cause of her problems was associated with her nighttime breathing—and the results speak for themselves. It seems almost too simple, but that is what is so rewarding about what I do.

Like Donna, many patients benefit from being treated with a team approach, which is why a sleep physician, ENT physician, nurse practitioner, chiropractor, and osteopathic physician are all part of our treatment team.

In Chapter 8, I will discuss some of the comprehensive therapy and treatment modalities that we use in our office and illustrate what many patients receive as part of the treatment plan with our team. Moving forward, let's look at a condition that causes some patients debilitating pain.