

## **Innovative Therapy Brings Dental Solutions to Sleep Disordered Breathing**

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Innovative, inventive and entrepreneurial are three adjectives that describe W. Keith Thornton, DDS of Dallas Texas. Why do these words portray a dentist who owns a general dental practice? The answer is simple, throughout his 30 years of practice, Dr. Thornton has been a leader in cutting edge therapies for his patients.

Dr. Thornton, a third generation dentist, studied science and engineering at Rice University and Southern Methodist University before earning his Doctor of Dental Surgery from Baylor College of Dentistry in 1969. Commissioned as a lieutenant in the United States Navy that same year, Dr. Thornton spent a year in a general practice residency at the Oaknoll Naval Hospital in Oakland, California and practiced dentistry for two years at Cubi Point Naval Air Station in the Philippines. When he completed his commitment to the Navy in 1972, he moved back to Dallas and associated with his father in a general dental practice. Both Drs. Thornton focused on the treatment of temporomandibular joint (TMJ) disorders. Not only did they define themselves as specialists, they were two of the first dentists in Dallas to use splints to treat TMJ pain. Together they forged a new concept for the treatment of TMJ disorders, one that was considered revolutionary at the time.

Since his early years of practicing dentistry Dr. Thornton has been an innovator. In 1984 he was the first dentist in Dallas to install computers in all of his operatories to make the office as paperless and as efficient as possible. In addition, he recently installed other state-of-the-art systems in his office: an in-line water steam sterilization system that provides sterilized water to all operatories; a Laminar Airflow system with HEPA filters to filter all pathogens from the air; and a Triad sterilization system with a Miele Instrument Disinfector so that the staff does not need to handle instruments once they are sterilized.

In 1993, an Ear, Nose and Throat physician in Dallas prompted Dr. Thornton to explore treating sleep disordered breathing with oral appliance therapy. The physician expressed his concern about UPPP surgery, a “rotor-rooter” extraction of the throat to clear the airway of any obstruction, including the uvula, inner tongue and soft tissues of the throat. Dr. Thornton began his study of sleep disordered breathing therapies and after a year of inventing, developed the Thornton Adjustable Positioner (TAP<sup>®</sup>).

The TAP is an oral mandibular repositioning appliance. It alleviates snoring and sleep apnea by holding the mandible forward during sleep to prevent the soft tissues of the throat and the tongue from collapsing into the airway and suffocating the sleeper. The basic principle of the TAP is based on cardio-pulmonary resuscitation (CPR). The airway must be open and unobstructed to allow air to pass through the throat. The TAP's unique design allows the patient to adjust the degree to which the mandible is held

forward, simultaneously allowing maximum comfort and effectiveness. One study conducted by Jeffery Pancer, DDS; Salem Al-Faifi, MD; Mohamed Al-Faifi; and Victor Hoffstein, PhD, MD, FCCP concludes that “the [Thornton Adjustable Positioner] appear[s] to be an effective treatment alternative for selected patients with snoring and varying degrees of sleep apnea, including those with severe obstructive sleep apnea” (Chest 1999; 116:1511-1518). The TAP is also the only oral appliance proven effective to successfully treat obstructive sleep apnea.

What exactly happens to the airway physiologically where a TAP would be needed? When the mandible opens and the tongue falls into the back of the throat, the airway narrows. Forcing air through this small opening causes the soft tissues of the throat and the tongue to vibrate and create a noise known as snoring. Snoring is not detrimental, but it can be an indicator of a much more serious problem known as obstructive sleep apnea (OSA). Obstructive sleep apnea (OSA) occurs when the airway completely collapses and blocks airflow into the lungs. The harder one tries to breathe when this occurs, the tighter the airway seal becomes. This airway obstruction lasts until the brain partially awakens the sleeper. Unconsciously, the sleeper will then close the mandible returning the tongue and throat tissues to a normal position. The sleep apnea cycle – falling asleep, relaxing the mandible, airway collapsing, unconsciously awakening with a gasp, falling back asleep – can repeat itself 50 or more times per hour during one night of sleep. With a blocked air passage, one does not receive enough oxygen. Both the awakenings and oxygen deprivation can then trigger other health problems, such as chronic sleepiness, heart attacks, morning headaches, high blood pressure, strokes, heartburn, depression and impotence.

As oral appliance therapy (OAT) becomes a more widely accepted and used method of treatment for sleep disordered breathing (SDB), Dr. Thornton is emphatic in his opinion that “it is important [that] the practitioner develop a new paradigm for [the] diagnosis and treatment of this disorder. This paradigm must recognize the available modalities and prescribe a logical sequence for treatment. Oral appliance therapy should become a part of this paradigm...” (JOMS 1996; 54:1103-1108). According to the American Sleep Disorders Association, the gold standard for diagnosing sleep disordered breathing is the polysomnogram (PSG), which is a costly over-night test. However, a PSG is a fairly arbitrary diagnostic test because sleep-breathing patterns can often vary from night to night resulting in inaccurate one-night readings. Dr. Thornton argues that there are other options for testing SDB that are less costly and can be administered through clinical screening programs, including overnight pulse oximetry, questionnaires for sleepiness such as the Epworth Sleepiness Scale, and questionnaires for the bed partner, including information about pauses, gasps and snoring. Although overnight pulse oximetry cannot prove that a patient has a sleep breathing disorder, it can prove that a patient does not have one. Consequently, both overnight pulse oximetry and patient symptoms can give an adequate indication of sleep-disordered breathing and whether a patient should seek further diagnosis. Dr. Thornton fervently believes that clinical diagnostic testing for SDB and oral appliance therapy should be the gold standard of care and primary therapy offered.

In order to successfully market, research and produce the TAP Dr. Thornton established Airway Management Incorporated (AMI) in 2000, a successor to his first oral appliance company, Oral Appliance Technologies. Recently, AMI divided into two companies, Airway Management Inc. and Airway Management Laboratories (AML). AMI is committed to providing innovative technology for the diagnosis and management of sleep disordered breathing, and to the research and development, marketing, and parts distribution of advanced technology for the treatment of snoring and sleep apnea. Dr. Thornton's daughter, Lauralee Thornton, manages the company under the direction of her father. She is the fourth generation of Thorntons to pursue a career in the dental field and carries on the family tradition. Airway Management Labs focuses on the fabrication of the Thornton Adjustable Positioner. Owned and managed by Jeff Singler, a long time associate of Dr. Thornton, the laboratory manufactures top quality appliances with superior customer service. Mr. Singler, a certified lab technician, has owned and operated a dental ceramics laboratory for twenty-four years. Recently he became interested in oral appliance therapy and manufacturing the Thornton Adjustable Positioner. He explains that "the TAP is a far superior product than the other oral appliances on the market. The concept and design of the appliance allows the patient to take an active part in the treatment of their apnea."

Over the past thirty years, Dr. Thornton has served in many faculty and consultant positions. For 25 years Dr. Thornton has taught appliance therapy for temporomandibular disorders (TMD) at the L.D. Pankey Institute and Baylor College of Dentistry. He has also advised Presbyterian Sleep Medicine Institute in Dallas, Texas; Walter Reed Army Hospital, Department of Sleep Medicine and Department of Dentistry; Bethesda Naval Hospital, Department of Oral and Maxillofacial Surgery; and University of Texas Southwestern Medical School, Department of Otolaryngology. He is currently on staff at Medical City, Dallas, Texas where he treats snoring and obstructive sleep apnea. In addition, he is a member and has held executive responsibilities in nine different dental or sleep societies including the Dallas County Dental Society, Academy of General Dentistry, Sleep Disorders Dental Society, American Sleep Disorders Association and American Academy of Fixed Prosthodontics.