

Health File

A novel approach to reverse sleep apnoea

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If you are suffering from excessive snoring and have additional symptoms, such as witnessed apnoea (cessation of breathing during sleep), gasping for breath during sleep, morning headaches, urinary frequency at night, mood changes, memory loss, concentration/learning problems, impotence, recent weight gain and waking up with a dry mouth in the morning, you are probably one of the one billion adults worldwide experiencing a diminished quality of life due to **Obstructive Sleep Apnoea (OSA)**.

It is estimated that 936 million adults aged 30-69 years have mild to severe OSA, whereas 425 million adults have moderate to severe OSA globally. The number of affected individuals is highest in China, followed by the USA, Brazil and India, with the prevalence exceeding 50 per cent in most Western countries.

In South Africa, the prevalence of OSA in adults is 20,9 million (36 per cent of the total population) with moderate to severe OSA in 4,8 million adults. Despite the high prevalence, the majority of those affected by OSA (70-80 per cent) remain undiagnosed.

A sleep study or polysomnogram (PSG) will confirm OSA. The cardinal symptom of this condition is excessive daytime sleepi-



Professor Rushdi Hendricks.
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ness, characterised by daytime catnaps, dozing off at work or while driving your car.

OSA is a serious, debilitating condition characterised by blockage of the upper airway during sleep as a result of collapse of the soft tissues in the throat, which can result in poor quality sleep.

OSA is closely associated with well recognised causes of morbidity and mortality, such as obesity, metabolic syndrome, systemic inflammation, insulin resistance, type 2 diabetes mellitus and atherosclerosis.

OSA increases one's chances of developing cardiovascular and cerebrovascular disease, including hypertension, coronary artery disease, heart attack, stroke, palpitations and pulmonary hypertension.

There exists a strong relationship between obesity and OSA. The prevalence of obesity has es-

calated to very high proportions in South Africa, and weight-loss improves OSA.

How sleep apnoea happens

During sleep, most muscles of the body relax while the muscles which control breathing remain active. Air is thus sucked in through the nasal and oral cavities into the lungs via the throat. The negative pressure of inhalation is usually counteracted by the compliance (stiffness) of the pharyngeal wall.

In patients with OSA, the protective stiffness of the pharynx is lost, leading to the collapse of the soft palate and tongue against the back of the throat, effectively blocking the airway. As the airway becomes narrower (Venturi Effect), increased turbulence in the pharynx causes the soft palate to vibrate, thereby generating the sound of snoring.

While there are multiple sites of upper airway obstruction during sleep, the tongue base is recognised as a key player in the pathogenesis of OSA. The current gold standard in the non-surgical management of airway collapse is continuous positive airway pressure (CPAP). The inflow of air splints the tongue base in a forward position. However, most people find it hard to sleep with a mask, leading to lack of compliance and a high abandon rate (27-46 per cent).

Upper airway surgery to open the airway has shown limited ef-

fectiveness in the long term. Current devices to advance the base of the tongue fall due to fracture, slippage or migration because they depend upon the mechanical adherence to the soft tongue muscle.

I developed an interest in OSA when an ENT colleague brought a patient with failed upper airway surgery and looked for an alternative way to reverse his OSA. I then developed a technique of advancing the tongue by 10 mm and securing it to the inside of the chin. The operation turned out to be a huge success, and up until today (10 years later) that very patient no longer needs his CPAP machine.

In 2012, Dr Hilda Landman, a medical colleague encouraged me to speak on 'Radio Sonder Grense' about my invention and found instant volunteers from all over the country, mainly farmers, who wanted an easy way out of CPAP enslavement.

With the assistance of pulmonologist, Dr Hoosain Khalfey, I selected 10 patients for a pilot study, five of which had very large tongues (macroglossia). I reduced the tongue size by 30 per cent while simultaneously moving the tongue forward. The results were highly successful and the proof of concept was confirmed.

In 2015, I approached Professor Keerran Dheda at UCT and was invited to join the Division of Pulmonology (Department of Medicine) and work on a protocol with pulmonologist Dr Ali Esmail.

I developed an animal model in the cardiac laboratory with Profes-



sor Deon Bezuidenhout to test a novel tongue tethering device. I implanted this device into 22 sheep. By utilising the body's own stem cells to make a biological tendon, the device completely disappears after 8 months and leaves behind a natural anatomic tendon.

This tendon is well tolerated and has sufficient strength to stop the tongue from falling back against the throat, thereby reversing OSA. The publication of this work has just been accepted by an acclaimed international tissue engineering journal.

I patented this concept with UCT and Insha Allah, next year, will be conducting a multicentre study funded by the EU between RSA, Denmark and Netherlands to test the efficacy and safety of the new device.

If you think you may have this condition, you may contact me or please see your GP, pulmonologist, cardiologist, neurologist or psychiatrist for advice.

Professor Rushdi Hendricks (PhD Surgery UCT, MChD (MFO), BChD, West Cape) is a specialist maxillofacial and oral surgeon with a practice in Claremont.