baseline period to 2 weeks of nightly product use. Multilevel regression and paired t-tests were used to test for statistical significance. The snoring solution (Smart Nora) included a pillow insert that gently inflates when early sounds of snoring are detected, enabling breathing to return to normal.

Results: Objectively-measured average snoring reduced from 10% of the night when not using the product to 9% during the first week of use and 7% during the second week of use ($p<.05$). Partners perceived the snoring as less loud and less severe when the product was used. At the end of the study, no partner described the snoring as severe. Objectively-measured sleep of partners revealed a 16% decrease in wake after sleep onset ($p<.05$). Prior to product use, they spent an average of 38 minutes awake after falling asleep (approximately 9% of their sleep period). This decreased to 34 minutes during the first week of product use and to 32 minutes during the second week. Product use also led to improvements in the perceived sleep of snorers and their partners, including ability to sleep through the night without waking up, overall sleep quality, and feeling rested upon waking in the morning (all ps<.05).

Conclusion: By reducing the amount of snoring, the contactless snoring solution improved objectively-measured sleep in snorers' bed partners. Also, the perceived sleep of both snorers and their partners improved.

Support (if any): Smart Nora

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PERIOPERATIVE SLEEP STUDY IN GERIATRIC CARDIAC SURGICAL PATIENTS USING WIRELESS WEARABLE DEVICES

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Introduction: Sleep is a fundamental necessity for health and is commonly disrupted in the perioperative period. Technological improvements leveraging dry electroencephalographic (EEG) sensors have opened the door for large-scale quantitative assessments of sleep in relation to perioperative outcomes.

Methods: Patients utilized the Dreem (Rhythm, New York USA), a wireless EEG headband, to acquire their own preoperative nocturnal sleep records at home. Following cardiac surgery, postoperative recordings were obtained with staff assistance until postoperative night 7. Sleep records were scored as rapid eye movement (REM) and non-rapid eye movement (NREM) stages N1-N3, using modified American Academy of Sleep Medicine guidelines.

Results: Of 100 patients enrolled for perioperative sleep recordings, 74 patients provided 132 preoperative records; 80% were scorable with a median total sleep time (TST) of 209.8 minutes. TST was distributed as 8.3% N1, 70.6% N2, 2.1% N3 and 19% REM, consistent with expected sleep structure in geriatric populations. EEG markers for staging sleep were evaluated in the scorable records: 92% with sleep spindles, 98% with K-complexes, 69% with slow waves, 92% with sawtooth waves, and 80% with rapid eye movements. Among 26 patients with multiple preoperative sleep recordings, no significant within-subject differences in sleep structure were observed (all $p > 0.05$, paired Wilcoxon sign-rank test). 270 postoperative nocturnal sleep recordings were obtained from 83 patients, 70% of which were scorable. TST in scorable postoperative records was distributed as 14.9% N1, 78.6% N2, 0.9% N3 and 5.6% REM. Durations of REM and N3 sleep were significantly reduced in postoperative (POD 1-4) overnight recordings compared to preoperative measurements (Skillings–Mack test, $p < 0.001$ and $p = 0.02$ for REM and N3, respectively).

Conclusion: Wireless EEG devices enhance the feasibility of assaying perioperative sleep. A single night of unattended, ambulatory sleep monitoring is sufficient to establish a preoperative baseline. Multiple preoperative and postoperative sleep studies were tolerated by patients, which showed reductions of N3 and REM sleep in the early postoperative period. This study demonstrates the feasibility of using the Dreem for monitoring sleep macro- and microstructural EEG elements in the perioperative setting.

Support (if any):

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SMART POLYMER IMPLANTS AS AN EMERGING TECHNOLOGY FOR TREATING AIRWAY COLLAPSE IN OSA: A PROOF OF CONCEPT STUDY

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Introduction: Implantable 3D printed 'smart' polymers are an emerging technology with potential applications in treating collapse in adult obstructive sleep apnea through mechanical airway manipulation. There is a paucity of devices that are commercially available or in research and development stage. Limited studies have investigated the use of implantable smart polymers in reversing the collapsibility of the pharyngeal airway by creating counter forces during sleep. This paper describes an application of implantable magnetic polymer technology in an in-vivo porcine model. Study Objectives: To assess the use of a novel magnetic polymer implant in reversing airway collapse and identifying potential anatomical targets for airway implant surgery in an in-vivo porcine model.

Methods: Target sites of airway collapse were genioglossus muscle, hyoid bone and middle constrictor. Magnetic polymer implants were sutured to these sites and external magnetic forces, through magnets with pull forces rated at 102kg and 294kg, were applied at the skin. The resultant airway movement was assessed via nasendoscopy. Pharyngeal plexus branches to the middle constrictor muscle were stimulated at 0.5mA, 1.0mA and 2.0mA and airway movement assessed via nasendoscopy.

Results: At the genioglossus muscles large magnetic forces were required to produce airway movement. At the hyoid bone, anterior movement of the airway was noted when using a 294kg rated magnet. At the middle constrictor muscle, an anterolateral (or rotatory) pattern of airway movement was noted when using the same magnet. Stimulation of pharyngeal plexus branches to the middle constrictor revealed contraction and increasing rigidity of the lateral walls of the airway as stimulation amplitude increased. The resultant effect was prevention of collapse, a previously unidentified pattern of airway movement.

Conclusion: Surgically implanted smart polymers are an emerging technology showing promise in the treatment of airway collapse in obstructive sleep apnea. Future research should investigate their