respiratory disturbance for a given change in MM signal using a mixed linear-regression.
Results: Participants (n=38) had mild to severe OSA (median AH index 28.9/h; median arousal index 23.2/h). MM showed a high level of synchronization with concurrent PES signals. Distribution of gyroscope MM signal amplitude differed significantly between event types: median (95% confidence interval) values of 0.60 (0.17–2.43) for CA, 0.83 (0.23–4.71) for CH, 1.93 (0.54–5.57) for MxA, 3.23 (0.72–18.09) for OH, and 6.42 (0.88–26.81) units for OA. Mixed regression indicated that crossing from NB to central events would decrease gyroscope MM signal amplitude by –1.23 (CH) and –2.04 (CA) units, while obstructive events would increase gyroscope MM signal amplitude by +3.27 (OH) and +6.79 (OA) units (all p<10-6).
Conclusion: In OSA patients, MM signals facilitated the measurement of specific levels of RE associated with obstructive, central or mixed apneas and/or hypopneas. A high degree of similarity was observed with the PES gold-standard signal.
Support (If Any):

0737

FACTORS INFLUENCING AROUSAL THRESHOLDS

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Introduction: Obstructive Sleep Apnoea (OSA) is the most common sleep-related breathing disorder with an estimated prevalence of approximately 15-30 percent in males and 10-15 percent in females. A low respiratory arousal threshold (ArTH) is one of several traits involved in OSA pathogenesis. This has been shown to be reliably predicted using an Arousal Score which is calculated using the patients overall Apnoea-Hypopnoea Index (AHI), nadir SpO2 and Hypopnoea:Apnoea ratio where a score of 2 or more predicts a low arousal threshold, and a score of 1 indicates a high arousal threshold. Our objective was to describe factors associated with high arousal thresholds in patients with OSA as determined by the Arousal Score in a metropolitan population.
Methods: 208 unselected, consecutive, adult, overnight polysomnography with prospectively calculated arousal scores were assessed from 2019 – 2020. Demographic and anthropometric data including Age, Sex, BMI, Epworth Sleepiness Score (ESS), AHI, SpO2 nadir, Hypopnoea:Apnoea ratio and arousal index was recorded. The arousal score was calculated by assigning one point for meeting each of the following requirements: AHI <30; SpO2 nadir > 82.8%; Hypopnoea:Apnoea ratio > 58.3, with a score <2 considered low. Spearmann correlation was performed to determine the factors associated with the Arousal Score.
Results: 208 patients were included in the study. 35.6% of patients had mild sleep apnoea, 23.1% moderate sleep apnoea, 22.6% severe sleep apnoea with 18.8% of patients with no sleep apnoea. Mean arousal score was 2.47 (Std Dev 0.839). Spearman correlation indicated that disease severity, BMI (rs -.374, p-value < 0.01) and STOP-BANG (r2 -0.419, p-value < 0.01) had a statistically significant relationship with Arousal Score. That is, a higher AHI, BMI and STOP-BANG was associated with a low arousal score. Moreover, Gender and Epworth Sleepiness Score exhibited an insignificant association with arousal score. We found increasing severity of disease was associated with lower arousal score and therefore a higher arousal threshold
Conclusion: Our study demonstrates that worsening sleep apnoea severity, higher BMI and higher STOP-BANG are associated with a lower arousal score and therefore higher arousal threshold. Gender and ESS do not appear to be significantly associated.
Support (If Any):

0738

CLINICAL AND PHYSIOLOGICAL RELEVANCE OF COMPUTATIONAL STUDIES OF OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC LITERATURE REVIEW

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Introduction: Structural interventions for obstructive sleep apnea (OSA) have unpredictable success rates. Anatomically accurate computer simulations of airflow and soft tissue dynamics may be used in future virtual intervention planning tools to identify the optimal patient interventions. The objective of this study is to review the existing literature on the correlation between computer-derived biomechanical variables and clinical measures of OSA severity.
Methods: Scientific papers written in English that correlated the apnea-hypopnea index (AHI) with computer-derived biomechanical variables were identified by searching on the PubMed and SCOPUS databases the search phrase “sleep apnea” AND “computational fluid dynamics” OR "finite element" OR “fluid structure interaction”.
Results: A total of 19 articles were identified that reported correlations between computer-derived biomechanical variables and AHI, which was the metric of OSA severity reported in most studies. These studies demonstrated that several anatomic and physiologic variables correlate with OSA severity, including airspace cross-sectional areas, airspace volumes, and airflow resistance. No studies were found that correlated computer-derived dynamic measures of upper airway mechanical stability, such as tissue compliance, to OSA severity.
Conclusion: Computer-derived anatomic and physiologic variables may serve as useful predictors of surgical outcome or mandibular device treatment response in OSA patients. Further research is needed to test the hypothesis that virtual surgery planning based on computer-derived measures of upper airway stability can improve outcomes of OSA interventions.
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0739

CEREBROVASCULAR RESPONSE TO INTERMITTENT HYPOXIA DURING SLEEP IN OSA PATIENTS

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Introduction: Obstructive sleep apnea (OSA) is associated with increased risks of cerebrovascular accidents, but it remains unclear how OSA impacts the cerebral vasculature. Intermittent hypoxia is a hallmark feature of OSA and recurs throughout sleep. In awake humans, the cerebrovascular response to intermittent hypoxia has been well characterized, as an increase of blood perfusion that begins at least a few seconds after the start of hypoxia. Functional magnetic resonance imaging (fMRI) that measures the blood oxygen level dependent (BOLD) signal has revealed significant differences between the cerebrovascular responses in awake humans with and without OSA. However, intermittent hypoxia occurs primarily during sleep in OSA, yet the cerebrovascular response to intermittent hypoxia has not been studied during sleep.

Methods: Eight adult patients with severe OSA were recruited to this study. Each subject first underwent an acclimatization session in which they tried to sleep in the MRI scanner while listening to sound recordings of the fMRI. Each acclimatized subject then underwent an overnight study in which T2*-weighed BOLD fMRI of the whole brain was conducted for 1.5-3 hours in total (TE: 35 ms, TR: 2.0 s, 35 sagittal slices, 3.5 mm isotropic). Oxygen saturation (SaO2), chest movement, end-tidal carbon dioxide and scalp encephalography (EEG) were simultaneously recorded with the fMRI. After rigid-body motion correction and removal of artifacts, the temporal correlation between BOLD signal and the SaO2 signal was analyzed on a voxel-by-voxel basis.
Results: Four subjects (50%) were acclimatized to sleep in the MRI scanner and completed this study. In all subjects, the BOLD fMRI signal showed an initial decrease corresponding to the decrease of SaO2, followed by a delayed increase corresponding to the hyperperfusion, throughout the gray matter of cerebral cortex. The time course of BOLD fMRI signal was significantly advanced in time, by 2-4 seconds, in the visual cortex compared to the rest of cerebral cortex in all subjects. This phenomenon was also observed in some other brain regions, but not consistently across subjects.
Conclusion: This study is, to our knowledge, the first study of the cerebrovascular response to intermittent hypoxia during sleep in humans. In patients with OSA, we observed spatiotemporal heterogeneity of the cerebrovascular response, such that the response in the visual cortex was significantly advanced in time than other brain regions. This phenomenon has not been reported before, and future studies are needed to understand how this heterogeneity is associated with OSA.
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0740

CORRELATION OF PHARYNGEAL CRITICAL PRESSURE WITH UPPER AIRWAY ANATOMY IN OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC REVIEW

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Introduction: Obstructive sleep apnea (OSA) is a disease characterized by multiple episodes of upper airway collapse during sleep that causes oxygen desaturation and waking, leading to multiple comorbidities. The gold standard objective measure of upper airway collapsibility is the pharyngeal critical pressure (Pcrit), the nasal pressure at which inspiratory airflow is abolished. The objective of this systematic literature review is to summarize the current understanding of the anatomical factors that determine upper airway collapsibility.
Methods: A search using the PRISMA methodology was performed on PubMed for English language scientific papers that correlated Pcrit to anatomic measurements (such as airway length, airspace cross-sectional area, airway compliance, lung volumes, BMI, neck circumference, and waist circumference). In addition, papers reporting a correlation between Pcrit and the apnea-hypopnea index (AHI) were reviewed.
Results: 751 papers were retrieved, and a total of 29 papers that matched eligibility criteria were included in the quantitative synthesis. The literature review confirmed that Pcrit has a significant correlation with the AHI. Pcrit also correlated with multiple anatomic measurements, including airway length, tongue dimensions, lung volume, and measures of obesity including BMI, neck circumference, and waist circumference.
Conclusion: The pharyngeal critical pressure is a measure of disease severity in OSA, as demonstrated by its correlation with AHI. The primary variables determining Pcrit were found to be airway length and measures of obesity. Surprisingly few studies to date have investigated the correlation between Pcrit and pharyngeal compliance and between Pcrit and airway cross-sectional area. In the future, a better understanding of the biomechanical factors that determine upper airway collapsibility is expected to help identify the optimal intervention of each phenotype of airway collapse for personalized medicine.
Support (If Any): Medical College of Wisconsin Department of Otolaryngology

0741

NASAL AIRFLOW SHAPE ON HOME SLEEP STUDIES PREDICTS EPIGLOTTIC COLLAPSE

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Introduction: Obstructive sleep apnea (OSA) is characterized by collapse of various portions of the pharynx. Epiglottic collapse can be difficult to diagnose and can affect a patient's tolerance to continuous positive airway pressure (CPAP) or oral appliances (OA). Previous research shows a distinct nasal airflow pattern during periods of epiglottic obstruction. We sought to determine if primary epiglottic collapse noted on drug induced sleep endoscopy (DISE) would correlate with nasal airflow signals seen on home sleep studies.
Methods: We retrospectively analyzed the home sleep studies and DISE of 13 patients being considered for surgical therapies due to intolerance to CPAP. Characterization of nasal airflow signals as epiglottic collapse and non-epiglottic collapse was based on previously published data.[1] Airflow signals were individually scored as either epiglottic type collapse (type 1) and non-epiglottic type collapse (type 2). Total number of breaths and number of flow limited breaths were calculated by the algorithm in the home study device.
Results: Patients included had either complete (n=6) or no epiglottic collapse (n=7). The mean AHI 18 and 19.6, respectively. There was no difference in the fraction of type 1 breaths over total flow limited breaths between the two groups (1.1% for each group). When comparing type 1 breaths to the total number of type 1 and type 2 breaths counted, patients with complete epiglottic collapse on DISE showed a higher percentage of type 1 breaths (33%) compared to those without epiglottic collapse (23%)
Conclusion: Nasal airflow signal shape on home sleep studies can suggest the presence of epiglottic collapse. This type of analysis can provide a noninvasive assessment of physiology and improve treatment decisions.
Support (If Any): Azarbarzin, A., et al., Predicting epiglottic collapse in patients with obstructive sleep apnoea. Eur Respir J, 2017. 50(3).

0742

CHARACTERISTICS OF THE LOW ARTH PHENOTYPE IN PATIENTS WITH OSA

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Introduction: Obstructive sleep apnea (OSA) is a heterogenous disease with both anatomic and nonanatomic factors contributing to the pathophysiology. Recently low arousal threshold (ArTH) has