Obstructive Sleep Apnea and Upper Airway Sensation in World Trade Center Responders - Role of Chronic Rhinosinusitis

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Introduction: Our data from WTC SNORE showed a prevalence of 75% Obstructive Sleep Apnea (OSA) in World Trade Center (WTC) responders. We found a strong association between new or worsening Chronic Rhinosinusitis (CRS) symptoms since 9/11 and OSA controlling for age, gender and BMI. (Sunderram, et.al.CHEST2019;155(2):375-383) This association was not explained by increased nasal resistance, suggesting that other mechanisms including reduced upper airway (UA) sensation that impairs mechanoreflexes to negative pressure could impact UA function in CRS. We hypothesized that an impaired afferent limb of UA reflexes relating to rhinosinusitis reduces the ability to perceive and/or process UA loading contributing to failure of UA stiffening from reflex muscle activation. Methods: In an on ongoing study examining the mechanism of OSA in WTC responders, we used validated questionnaires to obtain CRS symptom scores, Epworth Sleepiness scores (ESS), and the Hospital Anxiety Depression Scores (HADS). Diagnosis of OSA was confirmed either by a recent in-lab polysomnogram or by a Home Sleep Test (HST). Apnea+Hypopneas with 4% O2 desaturations (AHI4) and/or arousal surrogates (Respiratory Disturbance Index) (RDI) were calculated. OSA was considered present if AHI4 was ≥5 or RDI was ≥ 15 and CRS present if the CRS symptom score was ≥3. UA sensitivity was assessed using vibration threshold (VT) testing and 2-point discrimination (2PD) in the posterior pharynx, fingertip and lower lip using previously described methods(Kimoff,et,al. AJRCCM 2001;164:250-255). Linear regression analysis was performed and Pearson's correlation coefficient's calculated. Results: We have so far recruited 104 subjects (92 M, 12F; mean age 59; mean BMI 29.9 Kg/M^2). 74% had OSA and 36% CRS. The median (25-75%tile) AHI was 9 (3-15.8); RDI 19 (13-28); ESS 6 (3-9) and HADS 6.5 (2-12). CRS scores correlated with upper airway VT (R=0.2 (CI 0.004-0.38); p=0.05) on univariate analysis. CRS scores also correlated with 2PD (R=0.23 (CI 0.04-0.41); p<0.05) and remained significant (R=0.2 (CI 0.07-

0.51); p<0.05) after controlling for age, gender and BMI. No association was found between either AHI4 or presence of OSA to either VT or 2PD. Interestingly HADS scores correlated with upper airway VT (R= 0.22 (CI 0.07-0.4); p<0.05) on univariate analysis and fingertip VT even after controlling for age, gender and BMI (R=0.26 (CI 0.01-0.48); p<0.05). Conclusion: Our preliminary data shows that upper airway sensitivity as determined by VT and 2PD are affected in subjects with CRS. Higher levels of anxiety may affect VT testing. OSA does not appear to play a role.

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