Abstract Submitted
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Using Computational Fluid Dynamics to examine airflow characteristics in Empty Nose Syndrome[1] TIM FLINT, University of Canterbury, MAHDI ESMAILY-MOGHADAM, ANDREW THAMBOO, NATHALIA VELASQUEZ, JAYAKAR V. NAYAK, Stanford University, MATHIEU SELLIER, University of Canterbury, PARVIZ MOIN, Stanford University — The enigmatic disorder, empty nose syndrome (ENS), presents with a complex subjective symptom profile despite objectively patent nasal airways, and recent reports suggest that surgical augmentation of the nasal airway can improve quality of life and ENS-related complaints. In this study, computational fluid dynamics (CFD) was performed both prior to, and following, inferior turbinate augmentation to model the resultant changes in airflow patterns and better understand the pathophysiology of ENS. An ENS patient with marked reduction in ENS symptoms following turbinate augmentation was identified, and pre- and post-operative CT imaging was collected. A Finite element framework with the variational multiscale method (Esmaily-Moghadam, Comput. Methods Appl. Mech. Engrg. 2015) was used to compute the airflow, temperature, and moisture transport through the nasal cavity. Comparison of the CFD results following corrective surgery showed higher levels of airflow turbulence. Augmentation produced 50%, 25%, and 25% increases in root mean square pressure, wall shear stress, and heat flux respectively. These results provide insight into the changes in nasal airflow characteristics attainable through surgical augmentation, and by extension, how nasal airflow patterns may be distorted in the 'overly patent' airway of ENS patients.

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