Impact of long-term nasal airflow deprivation on sinonasal structures and chronic rhinosinusitis

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Abstract

Abstract Objectives: Total laryngectomy (TL) patients are good models in which to evaluate the effects of nasal airflow cessation on the sinonasal tract. Here, we evaluated changes in sinonasal structures and association with chronic rhinosinusitis (CRS), in the computed tomography (CT) images three-year post-TL. Design: Retrospective medical chart review. Setting: Tertiary referral medical center, teaching hospital setting. Participants: Data from patients that underwent TL from 2005–2017 were reviewed retrospectively. Patients with a final follow-up CT taken less than 3 years after TL, tracheo-esophageal puncture, inadequate CT image, or history of sinonasal surgery were excluded. The control group included partial laryngectomy or hypopharyngectomy patients. Altogether, 45 TL patients and 38 controls were selected. Main outcome measurements: The volume of all four paranasal sinuses, inferior turbinate mucosal volume (ITMV), maxillary sinus natural ostium (MSNO) mucosal width, and Lund-Mackay scores (LMS) were measured on preoperative and postoperative CT scans. Results: The mean duration between surgery and the final CT scan was 6.3±2.4 and 5.5±2.3 years for the TL and control groups, respectively. Neither group showed significant changes in four paranasal sinuses volume or MSNO mucosa width. The ITMV decreased significantly, from 4.6±1.3ml to 2.8±1.1ml ($p<0.001$), in the TL group, whereas the control group showed no significant changes. Postoperative LMS changes in both groups were insignificant. The number of patients with LMS aggravation or alleviation was the same in both groups, regardless of preoperative CRS. Conclusions: Paranasal sinus structures and CRS are not affected significantly by nasal airflow cessation; however, the inferior turbinate mucosa is affected by long-term discontinuation of nasal airflow.

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