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Review Article

Post-tonsillectomy taste dysfunction: Myth or reality?

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Abstract Lingual branches of the glossopharyngeal nerve (CN IX) are at risk of injury during tonsillectomy due to their proximity to the muscle layer of the palatine tonsillar bed. However, it is unclear how often this common surgery leads to taste disturbances. We conducted a literature search using PubMed, Embase, Cochrane Library, Google Scholar, PsychInfo, and Ovid Medline to evaluate the available literature on post-tonsillectomy taste disorders. Studies denoting self-reported dysfunction, as well as those employing quantitative testing, i.e., chemogustometry and electrogustometry, were identified. Case reports were excluded. Of the 8 original articles that met our inclusion criteria, only 5 employed quantitative taste tests. The highest prevalence of self-reported taste disturbances occurred two weeks after surgery (32%). Two studies reported post-operative chemical gustometry scores consistent with hypogeusia. However, in the two studies that compared pre- and post-tonsillectomy test scores, one found no difference and the other found a significant difference only for the left rear of the tongue 14 days post-op. In the two studies that employed electrogustometry, elevated post-operative thresholds were noted, although only one compared pre- and post-operative thresholds. This study found no significant differences. No study employed a normal control group to assess the influences of repeated testing on the sensory measures. Overall, this review indicates that studies on post-tonsillectomy taste disorders are limited and ambiguous. Future research employing appropriate control groups and taste testing procedures are needed to define the prevalence, duration, and nature of post-tonsillectomy taste disorders.

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Introduction

In addition to providing pleasure from eating, drinking, and satisfying hunger, the taste system serves a range of other important physiologic functions. For example, it helps to distinguish nutrients from toxins,[1] provides signals to facilitate nutrient digestion,[2,3] and regulates salt and energy intake.[4] Taste disorders can lead to malnourishment, significant gains or losses in weight, and changes in dietary decisions.[5,6]

To help preserve such functions, this important sensory system exhibits considerable anatomical redundancy. Taste buds are differentially innervated throughout the oral cavity by branches from three different cranial nerves. The chorda tympani branch of the facial nerve (CN VII) innervates the taste buds on the anterior two-thirds of the tongue, whereas the greater superficial petrosal branch of this nerve innervates taste buds on the soft palate. The lingual branches of the glossopharyngeal nerve (CN IX) innervate taste buds on the posterior third of the tongue and the upper epiglottis, and the superior laryngeal branch of the vagus nerve (CN X) innervates taste buds on the lower epiglottis and esophagus.[7,8]

Transient or permanent taste disturbances can occur from a wide variety of causes.[9] These include medications, infections, radiation to the head and neck, exposure to oral irritants (including tobacco), and vitamin deficiencies.[6,10] Among surgeries that can lead to taste dysfunction are middle ear surgery,[11–13] tonsillectomy,[14,15] third molar extraction,[16] microdirect laryngoscopy,[17] and potentially uvulopalatopharyngoplasty.[18] Additionally, diseases like xerostomia, depression, diabetes mellitus, or renal failure have been reported to cause some degree of taste dysfunction.[5,6]

Taste disorders can be clinically classified into qualitative (dysgeusia or phantogeusia) and quantitative (hypogeusia or ageusia) disorders, the latter of which can be measured using standardized testing.[19] Qualitative disorders are more likely to affect quality of life, since they typically manifest as bitter, metallic, salty, or other unpleasant taste sensations. They are a common reason for a referral to specialized chemosensory disorder clinics. Quantitative taste disorders are more rare and more likely to go unnoticed,[20] and must be distinguished from the olfactory disorders that often present as diminished "taste" function. The olfactory receptors are stimulated by the retronasal food vapors, i.e., vapors that enter the olfactory region via the nasal pharynx during deglutition, and are responsible for the majority of "taste" sensations other than those of sweet, sour, bitter, salty, and umami. These include such flavor sensations as chocolate, coffee, licorice, steak sauce, strawberry, lemon, spaghetti sauce, and mint to name a few.[21]

The anatomic relationship of CN IX to the muscle layer of the palatine tonsillar bed is variable and can lead to the injury of the lingual branch of the glossopharyngeal nerve during tonsillectomy.[14,15] CN IX enters the pharynx anterior to the stylopharyngeus muscle by passing between superior and middle pharyngeal constrictors (Fig. 1). The lingual branches of CN IX pass between the superior and middle pharyngeal constrictor muscles, but in some cases can be partially exposed or adherent to the tonsillar capsule due to incomplete coverage of these nerve branches by the pharyngeal constrictor muscles.[15]

According to the National Center for Health Statistics, tonsillectomy is one of the most frequently performed surgeries in otolaryngology.[22] The implications of such damage for taste function have not been thoroughly investigated. Numerous lawsuits against surgeons have come forward in multiple countries in relation to tonsillectomy-related taste problems, raising a question about the prevalence and nature of taste changes after this operation.[23–26] This article reviews the extant literature on post-tonsillectomy taste function. Its goal is to provide the reader with an understanding as to what is known about the effect of this common operation on such function and to provide direction for future research in this area.

Materials and methods

A systematic review of literature was conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIMSA) statement. Two independent reviewers conducted a search using PubMed Plus, Embase, Cochrane Library, Google Scholar, PsychInfo, and Ovid Medline. All original reports on post-tonsillectomy taste function published in English prior to May 2017 were included, with the exception of single case reports. The search terms included *tonsillectomy* AND *taste* OR *ageusia* OR *hypogeusia* OR *dysgeusia* OR *taste disturbances* OR *tongue sensation* OR *complication*. Our systematic search

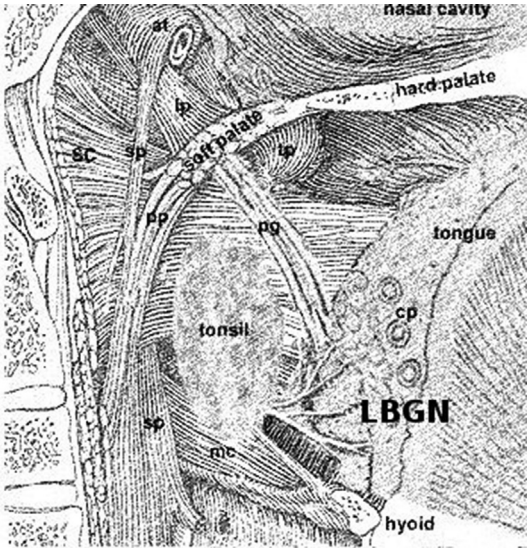

Fig. 1 CN IX anatomic relationship to pharyngeal constrictor muscles[a]. sc — superior pharyngeal constrictor muscle; mc — middle pharyngeal constrictor muscle; sp — stylopharyngeus muscle; pg — palatoglossus muscle or anterior tonsillar pillar; pp — palatopharyngeus muscle or posterior tonsillar pillar; lp — levator veli palatini muscle; tp — tensor veli palatini muscle; cp —circumvallate papillae; at — attachment at the torus tubarius. [a]elements of the drawing were obtained from http://www.wesnorman.com.