sciendo

DOI: 10.2478/rjr-2025-0022

Romanian Journal of Rhinology, Volume 15, No. 60, October - December 2025

EDITORIAL

What is the relationship between the nose and voice quality?

Andreea Milea

"Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania
ENT&HNS Department, "Sfanta Maria" Hospital, Bucharest, Romania

Voice quality plays a crucial role in personal communication and social interactions. The human voice is more than an acoustic and mechanical phenomenon, it has long been regarded as the mirror of each person's personality, the support for our emotions. It is the way to express ourselves and communicate with those around us[1].

The nasal cavity plays an important role in voice production, not only as part of the airway but also as a filtering and resonating structure. The nasal cavity is the first segment of the respiratory pathway and the third important resonator after the pharynx and the oral cavity. Resonator organs play a key role in the amplification and acoustic shaping of the voice. Formants correspond to the resonance peaks in the vocal tract, and each formant is represented by a number. F1 corresponds to the resonance of the pharynx, F2 to that of the oral cavity, while F3 and F4 reflect the region[2,3]. The sensations perceived at the level of the nose, cheeks and palate are the result of a corresponding vocal timbre, not the cause of it. The anterior facial sinuses do not affect the sound.

There are only some sounds that need nasal resonance, such as the consonants [m], [n], [ŋ], and their production involves lowering the velum. During the production of nasal sounds, a tingling or buzzing sensation can be felt in both cheeks; this region is known as "the mask" in singing literature. In classically trained singers, efficient phonatory-resonatory coordination frequently generates sympathetic vibrations within the facial mask region, producing a buzzing sensation similar to that felt during nasal consonant production[1,4]. In professional voice users, some adjustments of velopharyngeal opening and nasal resonance amplify timbre and projection ("the facial mask")[4].

Classical singers use a special facial expression during singing. Before starting to sing and during singing, this specific expression with nostril widening and raising of the cheeks can be observed[5]. Responsible for this facial expression of the singers are: the alar part of the nasalis muscle, which opens the nares causing nasal flaring; the procerus muscle, which contributes to widening the nostrils; the levator labii superioris alaeque nasi muscle that lifts the upper lip and the wings of the nose; the zygomaticus minor muscle, which helps raise the cheeks[6].

Nasal airflow during breathing ensure filtration, warming and humidification, helping to maintain adequate vocal fold function. However, chronic nasal obstruction forces oral breathing, which dries the laryngeal mucosa, increasing vocal effort and leading to vocal fatigue. Hypernasality commonly occurs in velopharyngeal insufficiency or cleft palate due to incomplete closure of the velopharyngeal port, while hyponasality is most often associated with nasal obstruction.

Disorders such as septal deviation, chronic rhinosinusitis and turbinate hypertrophy can alter the resonant characteristics of the nasal cavity and modify the formant frequencies, consequently affecting voice quality. It has been reported that septal deviation causes a remarkable reduction in the nasalance score, leading to a hyponasal voice. Subramaniam and colleagues[7] studied the effect of septoplasty on acoustic parameters and reported that this procedure leads to improved nasal resonance, as evidenced by increased postoperative nasalance scores, without modifying the fundamental frequency, intensity or formant frequencies. They pointed out that septal deviation disturbs vocal resonance, whereas septoplasty restores normal acoustic balance and leads to less nasalized speech. Therefore, it is important to inform patients, especially professional voice users, of the possible voice changes following septal surgery[7].

The nasal valve region represents the narrowest segment of the nose, providing the greatest resistance to nasal airflow. Consequently, the internal nasal valve has a critical role in

Corresponding author: Andreea Milea, MD, PhD Student, ENT&HNS Department, "Sfanta Maria" Hospital, 37-39 Ion Mihalache Blvd., District 1, Bucharest, Romania
ORCID: https://orcid.org/0000-0001-6134-9239
E-mail: andreeaelena.bejenariu@yahoo.com
Received for publication: September 9, 2025 / **Accepted:** September 16, 2025

controlling nasal airflow and shaping nasal resonance. Some authors have investigated the outcome of septorhinoplasty with spreader grafts on patients' perception of their voice and on acoustic resonance frequencies[8]. They reported that this technique significantly improved patients' self-perceived voice quality, as indicated by a marked reduction in the VHI-10 score and the normalization of preoperative hyponasality[8].

Hernandez-Garcia et al.[9] assessed the impact of functional endoscopic sinus surgery for nasal polyposis and chronic rhinosinusitis on voice acoustics and its influence on speaker identification and verification systems based on speech. They reported that this surgery produces modifications in the vocal tract, improving nasal resonance and decreasing oral breathing, as indicated by a significant postoperative decrease in fundamental frequency and also an improvement in perceptual voice quality. The acoustic changes suggested that functional endoscopic sinus surgery can reduce the reliability of automatic speaker recognition[9].

Regarding turbinate hypertrophy, it has been reported that submucosal inferior turbinoplasty and radiofrequency cauterization for inferior turbinate hypertrophy preserve the fundamental vocal parameters, without significant postoperative differences in the acoustic parameters of the voice (fundamental frequency, jitter, shimmer, harmonics-to-noise ratio). However, radiofrequency cauterization caused a notable postoperative increase in the third formant, indicating that this technique offers a more significant improvement in nasal resonance compared with submucosal turbinoplasty[10].

Voice professionals should be counselled regarding potential voice changes prior to endonasal surgeries because they may be more sensitive to modifications of the vocal tract resonators. Such changes may have an impact on their professional and social life.

Funding: None.
Conflict of interests: None.

REFERENCES

1. Roy N, Bless DM. Personality traits and psychological factors in voice pathology: a foundation for future research. J Speech Lang Hear Res. 2000;43(3):737-48. DOI: 10.1044/jslhr.4303.737.
2. Fleischer M, Pinkert S, Mattheus W, Mainka A, Murbe D. Formant frequencies and bandwidths of the vocal tract transfer function are affected by the mechanical impedance of the vocal tract wall. Biomech Model Mechanobiol. 2015;14(4):719-33. DOI: 10.1007/s10237-014-0632-2.
3. Koc EAO, Koc B, Ercan I, Kocak I, Tadihan E, Turgut S. Effects of septoplasty on speech and voice. J Voice. 2014;28(3):393.e11-5. DOI: 10.1016/j.jvoice.2013.09.008.
4. Jennings JJ, Kuehn DP. The effects of frequency range, vowel, dynamic loudness level, and gender on nasalance in amateur and classically trained singers. J Voice. 2008;22(1):75-89.
5. Aura M, Geneid A, Bjorkoy K, Rantanen M, Laukkanen AM. The nasal musculature as a control panel for singing—Why classical singers use a special facial expression? J Voice. 2019;33(4):510-5. DOI: 10.1016/j.jvoice.2017.12.016.
6. Paulsen F, Waschke J. Sobotta Atlas of Human Anatomy, Vol. 3, 15th ed., English: Head, Neck and Neuroanatomy. Urban & Fischer, Munich, Germany; 2013.
7. Subramaniam V, Yoonus R, Narra M. Effects of septoplasty on the acoustic parameters of voice. Egyptian Journal of Ear, Nose, Throat and Allied Sciences. 2015;16(3)259-63. DOI: 10.1016/j.ejenta.2015.08.006.
8. Celik O, Boyaci Z, Yelken K, Atespare A, Celebi S, Koca O. Septorhinoplasty with spreader grafts enhances perceived voice quality without affecting acoustic characteristics. J Voice. 2012;26(4)493-5. DOI: 10.1016/j.jvoice.2011.03.005.
9. Hernandez-García E, Moro-Velazquez L, Gonzalez-Herranz R, Godino-Llorente JI, Plaza G. Effect of Functional endoscopic sinus surgery on voice and speech recognition. J Voice. 2020;34(4):650.e1-6. DOI: 10.1016/j.jvoice.2019.02.012.
10. Goker AE, Aydogdu İ, Salturk Z, Berkiten G, Atar Y, Kumral TL, et al. Comparison of voice quality between patients who underwent inferior turbinoplasty or radiofrequency cauterization. J Voice. 2017;31(1):121.e17-21. DOI: 10.1016/j.jvoice.2016.02.002.