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RHINOLOGY: NASAL OBSTRUCTION (JV NAYAK, SECTION EDITOR)

The Nasal Vestibular Body and Its Role in Nasal Obstruction

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Abstract

Purpose of Review The nasal vestibular body (NVB) is a recently reported, dynamic swell body present in the anterior nasal airway that may contribute to symptomatic nasal airway obstruction. This review aims to summarize what is currently known regarding the diagnosis and management of this newly identified, and readily treated, structure.

Recent Findings NVB can be a prominent finding in nasal airway pathway; its role as a component of nasal obstruction can be assessed by chemical decongestion of the NVB soft tissue alone. NVB soft tissue reduction can be surgically achieved using radiofrequency ablation. This modality is safe and effective without any evidence of long-term sequala, and moreover provides for significant improvement in nasal air passage following NVB soft tissue reduction.

Summary The NVB is a newly identified nasal structure that can contribute to nasal obstruction. It site of tissue hypertrophy may have been overlooked until recently due to its location in the nasal cavity, or use of vasoconstricting agents prior to formal examination. Topical decongestion of the NVB soft tissue alone can assist in discriminating the role of the NVB in nasal obstruction in individual patients. Reports of surgical management using radiofrequency ablation have thus far been shown to be safe and highly effective.

Keywords Nasal vestibular body · Inferior turbinate · Nasal obstruction · Radiofrequency ablation · Nasal airway surgery

Introduction

Nasal obstruction has a large impact on patient quality of life, and is one of the most common complaints that patients report to otolaryngologists. Qualitatively, airflow passes from the nostril to the pharynx in the narrow channel between the nasal septum and inferior turbinate. Therefore, any mucosal or structural issue that impedes air conduction within this space can, in many individuals, results in a subjective sense of nasal blockage. Nasal obstruction can have multiple co-existing, contributing factors that lead to symptoms (Table 1) [1]. The most common structural causes for nasal obstruction are cartilaginous and/or bony crooked nasal septum, inferior turbinate enlargement, and nasal valve dysfunction [2]. Understanding the precise etiology of nasal obstruction in each individual is crucial for otolaryngologists to recognize, and is determined by detailed and interactive history intake, and objective analysis via anterior rhinoscopy and nasal endoscopy. While sometimes validated subjective questionnaires and tools, such as rhinomanometry, provide additional support to the history and exam, there is no standardization of workflow to diagnose the primary cause of nasal obstruction [3]. Management of nasal obstruction is therefore tailored individually based on the single or multiple etiologies that may manifest in each patient [3].

Recently, the nasal vestibular body (NVB), has been reported as a dynamic soft tissue structure in the anterior nasal airway that has been historically overlooked as a frequent contributors to nasal obstruction in affected patients [4]. This review aims to summarize what is currently known regarding the diagnosis and management of this newly identified, and readily treated, structure.

NVB Anatomy

Nasal vestibular body (NVB) is a dynamic swell body tissue within the internal nasal valve region of the unilateral or bilateral nares. When present, it is located at the inferior

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Table 1 Common etiologies producing nasal obstruction

Anatomical/structural
Inferior turbinate hypertrophy
Nasal septal deviation
Adenoid hypertrophy
Nasal valve insufficiency/collapse
Foreign bodies
Congenital including pyriform aperture stenosis, choanal atresia/stenosis
Nasal vestibular body hypertrophy
Empty nose syndrome – secondary to nasal tissue/turbinate loss
Inflammatory mucosal diseases
Chronic rhinosinusitis with or without nasal polyposis
Rhinitis, allergic and non-allergic
Autoimmune diseases and vasculitis
Infectious diseases
Viral
Bacterial
Fungal
Mycobacterial
Neoplasm
Benign (such as hemangioma, papilloma, chondroma)
Malignant (such as nasopharyngeal carcinoma, squamous cell carcinoma, melanoma)
Medication
Thyroid treatment medication
Oral contraceptives and other estrogens
Anti-hypertensive agents (such as beta blockers, calcium channel blockers)
Non-steroidal anti-inflammatory drugs
Others
Trigeminal neuropathy

lateral aspect of the nasal valve region of the nasal vestibule, adjacent and anterior to the head of the inferior turbinate (Fig. 1) [4]. In approximately 15–30% of patients with nasal obstruction, this soft tissue mound that can be hypertrophied and impede nasal airflow, by narrowing the lower nasal airway region as seen also on imaging (Fig. 2). As already alluded to, any modification in cross-sectional area of the anterior nasal airway can contribute to nasal obstruction symptoms [45]. Little is known about the histology of NVB, but it would be expected to have similar tissue characteristics to the septal body given its dynamic nature and presence in the anterior nasal airway. Studies on tissue histology of the NVB are also underway.

NVB Diagnosis

Diagnosis of the NVB as a component to the nasal breathing should be done in a stepwise matter. Of primary importance is endoscopy of the anterior nasal cavity in its native state, prior to the use of topical decongestants, and prior to anterior rhinoscopy. This is because we have noted that NVB hypertrophy is exceedingly dynamic, and rapidly responds to application of topical vasoconstrictor agents.

If a prominent NVB is detected, to determine its role in nasal obstruction, focal decongestion of the NVB tissue alone can be performed by placement of a cotton disc soaked with standard topical decongestants in a given patient. Like the inferior turbinate (which can be tested in a similar fashion), the hypertrophied and enlarged NVB will contract within 30–60 s to chemical decongestion, often to the great satisfaction of patients suffering from nasal obstruction (Fig. 3). If a patient has subjectively noticed improvement in nasal breathing following this focal decongestion alone, it is logical to deduce that the NVB plays a role in that patient's nasal obstruction [4, 5]. Alternatively, for practitioners who desire documentation of quantitative metrics, prior to NVB testing, scoring of the baseline degree of nasal obstruction can be performed using a visual analog scale (VAS) or a validated questionnaire for nasal obstruction such as the NOSE assessment prior to decongestion [6]. Scores for this same questionnaire are assessed post-decongestion in the

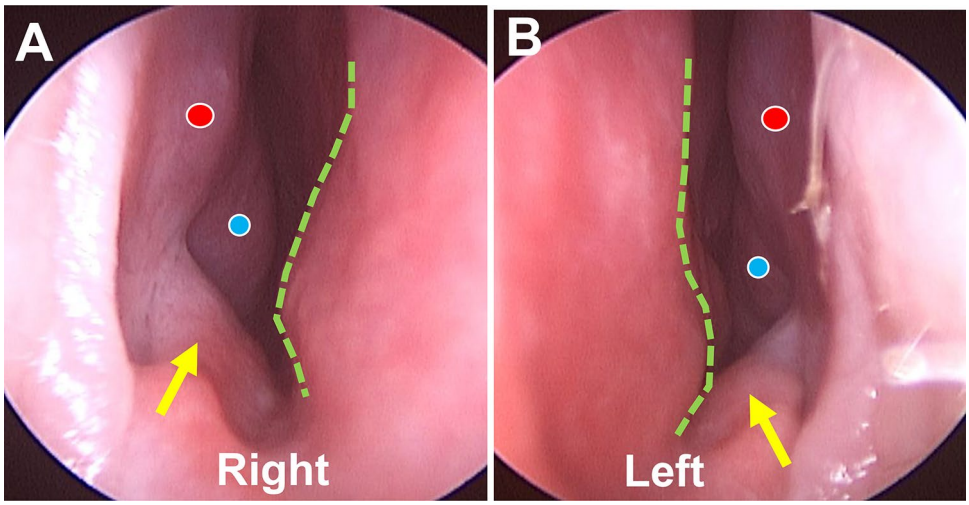

Fig. 1 Hypertrophied NVB soft tissue mounds in the bilateral nasal airways. **A** Right and **B** left anterior nasal airways examined via 0 degree nasal endoscopy, without use of nasal decongestants. In this patient's already narrow nasal passage, marked obstruction of the hypertrophied NVBs in the inferior nasal airway between the septum and inferior turbinates is readily noted. *Yellow arrows* NVBs; *red circles* anterior head of IT; *blue circles* hypertrophied central aspect of IT; *green dashed lines* border of nasal septum on each side, with small anterior spurs present at the maxillary spine

office to provide subjective evidence that NVB hypertrophy contributes an obstructive soft tissue component to the nasal airway in a given patient.

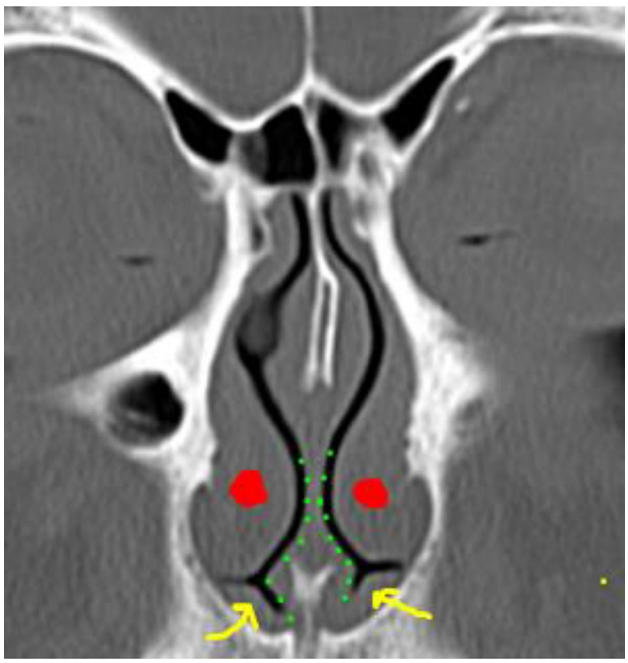

Fig. 2 NVB swell bodies as seen on sinus CT imaging, coronal view. NVB hypertrophy contributes to crowding and obstruction of the lower aspect of nasal airway. *Yellow arrows* bilateral NVBs, *red circle* hypertrophied inferior turbinate; *green-dotted lines* borders of nasal septum, with small anterior spurs present at the maxillary spine. Note: CT shown derives from a different patient than shown in Fig. 1

A common reason leading to failure in identifying the NVB is the use of topical decongestants prior to the examination. Moreover, use of a nasal speculum during the examination may compress the nasal lateral wall, allowing the NVB to be easily overlooked and obscured [4].

NVB Management

Treatment of nasal obstruction may be classified into medical and surgical treatments. In general, medical treatments such as topical nasal sprays and allergy management are offered to all patients with nasal obstruction. If the degree of symptomatic relief is not sufficient, then surgical treatment (in the office and operating room) may be considered. Surgical treatment should ideally address all known anatomic structures that were shown either by testing (such as chemical decongestion of NVB hypertrophy and/or inferior turbinate hypertrophy), or by endoscopy (constructing septal spur or deviation) to be contributory to nasal obstruction symptoms. In our experience, patients who report subjective improvement in nasal obstruction after chemical vasoconstriction of the enlarged NVB typically derive benefit from surgical reduction using mild application of radiofrequency ablation (RFA) to the NVB soft tissue mound [5]. RFA can be performed successfully either in-office with local anesthesia or in the operating room (Fig. 4). NVB treatment using RFA has been reported to be safe and highly effective, providing durable swell body reduction with complete with only transient local morbidity without any long-term complications [5]. To investigate the effect of RFA of NVB on the

Fig. 3 Office-based, dynamic vasoconstriction of NVB. Presence of nasal vestibular body hypertrophy in the right nasal airway at baseline (**A**). After placement of a cotton disc/mini-pledget laden with topical decongestant spray (**B**), this patient showed reasonable chemical reduction of the NVB (**C**). This patient reported marked improvement in baseline nasal congestion complaints following this trial of NVB diminution, indicating the importance of future NVB reduction to fully treat this patient's severe nasal blockade. Note: additional improvement in subjective nasal congestion was additionally also experienced by chemical reduction of the inferior turbinate (not shown, and performed after the sequence **A**–**C** shown above). *Yellow stars* site of the right NVB

patients' quality of life, our group analyzed the SNOT-22 scores pre- and post-surgical reduction. The results showed that patients with nasal obstruction who underwent NVB reduction significantly improved compared to patients treated in similar fashion but without NVB reduction [5]. NVB tissue reduction using RFA can lead to relief of primary or recalcitrant nasal obstruction.

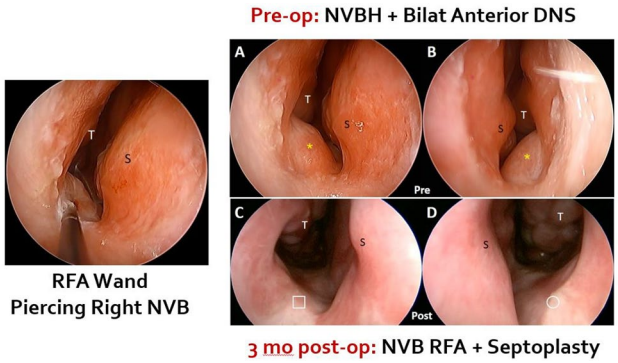

Fig. 4 Successful treatment of NVB hypertrophy using radiofrequency ablation (RFA). Obstruction of nasal airflow due in part from NVB hypertrophy at baseline in the right (**A**) and left (**B**) nasal cavities can be treated via RFA. The thermal energy of RFA can be precisely transmitted to the NVB soft tissues using a wand that pierces the swell body (inset figure to left). Three months following RFA treatment (as well as septoplasty), the patency of the right (**C**) and left (**D**) nasal vestibules region is readily appreciated. *Yellow stars* bilateral NVBs; T inferior turbinate; S nasal septum; white square reduced right NVB; white circle reduced left NVB. (Images from*:* Locketz GD, et al. *Eur Arch Otorhinolaryngol.* 2016 Mar;273(3):777–81. https://doi.org/10.1007/s00405-015-3868-2; with permission from Springer Nature) [4]

Conclusion

The NVB is a newly identified soft tissue swell body present in a minority of patients with chronic nasal obstruction. This structure is present in the antero-lateral aspect of each naris, and may have been overlooked until recently due to its location in the nasal cavity, and/or upfront use of topical decongestant spray by medical staff prior to nasal airway examination. Topical decongestion of the NVB can help to better understand its dynamic quality, and its role in nasal obstruction. Surgical management (thus far solely reported using the platform of radiofrequency ablation) may be utilized treat and control NVB hypertrophy. Ablation of the NVB leading to increased patency of the lower nasal airway has been shown to be highly effective and safe treatment for nasal obstruction, without concerning long-term sequalae noted in the small cohorts included to date. Future research into the true incidence and histology of the NVB, as well as best practices for NVB reduction, will allow improved understanding of the role of this soft tissue structure within the nasal airway.

Compliancewith Ethical Standards

Conflict of Interest The authors declare no competing interests.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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