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ORIGINAL STUDY

Tomographic dimensions of the nasal vestibular body in relation to nasal obstruction in adults

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ABSTRACT

INTRODUCTION. The nasal vestibular body is a recently reported dynamic elevation in the vicinity of the inferolateral internal nasal valve. The contribution of this anatomical zone in persistent nasal obstruction is not yet defined.

OBJECTIVE. To assess the correlation between the tomographic size of the nasal vestibular body and the presence of nasal obstruction in adults.

MATERIAL AND METHODS. An observational, analytical, prospective, cross-sectional study of a series of cases was conducted between August 1 and December 30, 2020. We included 23 adult patients and we recorded the sex, age, symptoms of obstruction, presence of allergic rhinitis, whether they used treatment for rhinitis, presence of septal deviation and dimensions in length and width of the nasal vestibular body. Patients were distributed in groups, with and without nasal obstruction, and the area of the vestibular body was measured in digital format using millimetre computed tomography.

RESULTS. Of a total of 23 cases, 10 were men (43.48%) and 13 women (56.52%), mean age 28.8±10.2 years. 16 patients (69.57%) had symptoms of nasal obstruction and 7 (30.43%) were without obstruction. 10 patients (43.48%) presented symptoms of rhinitis. Using Spearman's correlation test, we found a positive correlation between width ($R = 0.79$, $p < 0.001$) and nasal vestibular body length ($R = 0.77$, $p < 0.001$) and nasal obstruction.

CONCLUSION. The nasal vestibular body is a structure that could be related to the symptoms of nasal obstruction in the adult population.

KEYWORDS: nasal obstruction, tomography, nasal vestibular body.

INTRODUCTION

Among the critical components of nasal respiratory physiology, the nasal valve area plays an important role in terms of airflow through the nasal cavity during inspiration, but also in the subjective perception of nasal breathing by each individual[1]. Having et al. has already studied the different physical aspects that play an important role in this area, such as the Bernoulli's principle, the Venturi effect or the Poiseuille's law, the harmonic and dynamic function of the nasal valves and their different structures that compose them, which establishes a dynamic at the entrance of the upper airways[2].

The nasal vestibular body (NVB) has been described since 1971 in some mammalian species[3]. However, its implications in persistent nasal obstruction in humans have only recently been reported, given its proximity to the nasal valve[4].

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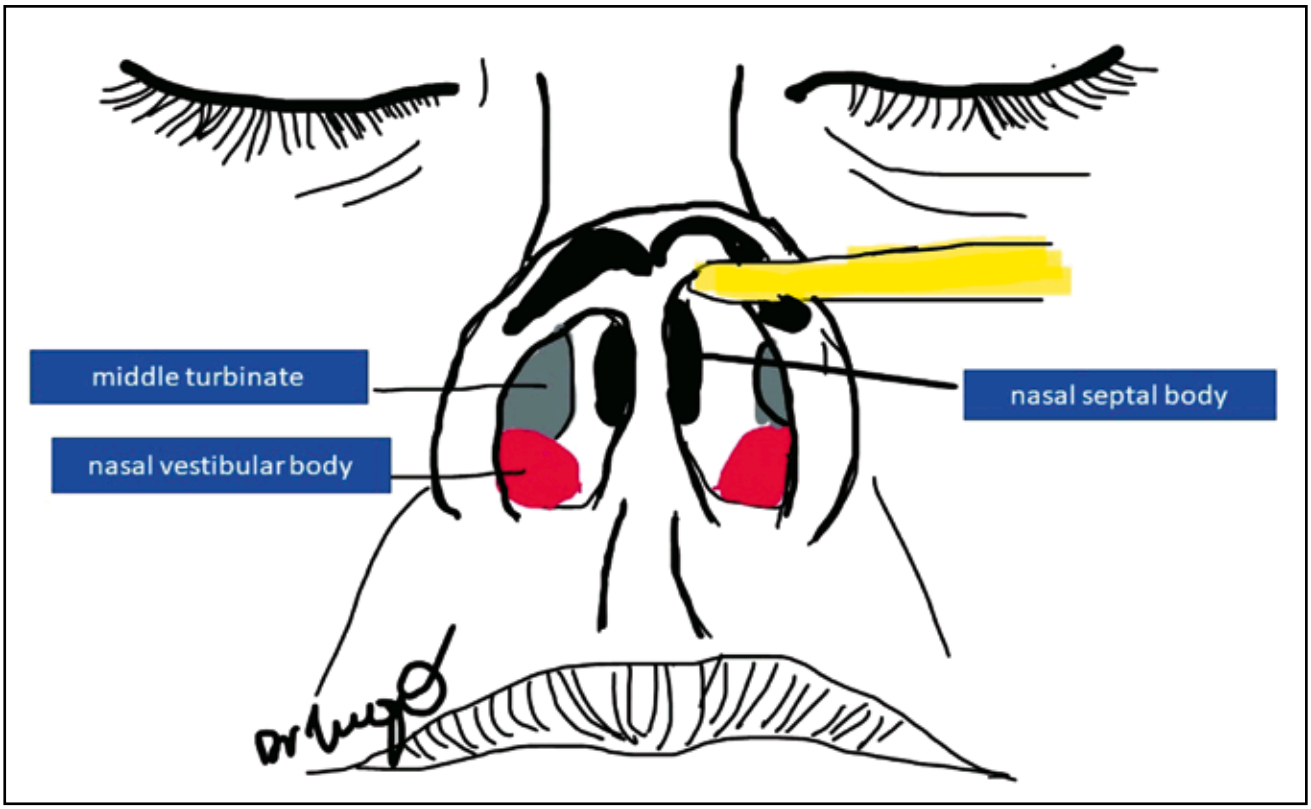


Figure 1. Illustrating the nasal vestibular body (in pink) and the nasal septal body (in black).

Clinically, the evaluation of symptoms of nasal obstruction focuses largely on the direct visualization of the nasal cavity through the anterior rhinoscopy[5,6]. Different tests have been used to objectively quantify nasal obstruction, such as acoustic rhinometry[6], identification of the maximum nasal inflammatory flow[7], or validated subjective questionnaires[8,9]. However, there is no consensus in their use in establishing the correct diagnosis.

Anatomically, NVB arises from the infero-lateral edge of the nose, between the vestibule and the region of the internal nasal valve, and it is adjacent to the anterior part of the inferior turbinate (Figure 1). Therefore, it is reasonable that the nasal vestibular body may be a component in the nasal obstruction experienced by some patients[1]. The low notoriety of this structure makes it very common for it to be easily overlooked[1].

If the implication of this anatomical area in a decrease in nasal airflow is not recognized, it may compromise the results of standard surgical interventions for nasal obstruction. It is very important not to confuse the NVB with the nasal septal body which is a different structure, located in the anterior part of the nasal septum, adjacent to the anterior part of the middle turbinate and to the upper part of the lower turbinate[10,11] (Figure 1).

At present, nasal obstruction is a topic that should be fully understood by the otolaryngologist, since mismanagement or exclusion of an anatomical site to be treated in surgery can be the cause of an unsatisfactory result, especially in the areas of the nasal valve, which can have a high impact on the final breathing. There is little international and national literature that addresses the diagnosis and imaging of this anatomical area of the nose[11].

This study focuses on measuring the nasal vestibular body, which is a recently described dynamic structure that has been the focus of different studies[1,4]. It was observed that NVB could have an additional benefit in nasal ventilation, if this structure is surgically reduced. However, due to its recent description, there is no tool with which it can be measured or observed objectively, a situation that could serve in future surgical planning.

MATERIAL AND METHODS

An analytical, prospective, cross-sectional observational study of a consecutive series of cases, chosen in a non-probabilistic manner, was car-

Figure 2. Cranio-facial CT scan, coronal slices, where the nasal vestibular body and the septal vestibular body are indicated.

ried out at the Facial Surgery and Cosmetology Clinic of Puebla, between August 1, 2020, and December 30, 2020.

The study included patients over 18 years of age, who came for a nasal aesthetic procedure, routinely asked to perform simple tomography of the nose and paranasal sinuses. Exclusion criteria: alterations in nasal anatomy (such as nasal fractures), nasal polyps, previous nasal surgeries, nasal tumors, cleft lip or palate.

Of a total of 32 patients evaluated, 23 were included in whom the variables age, sex, symptoms of nasal obstruction, the presence or absence of rhinitis, the use of topical intranasal medication, the size (in millimetres) of the NVB in length and width were registered. The patients included in the study were distributed into two groups: patients with nasal obstruction, patients without nasal obstruction. In all cases, a cranio-facial CT scan was performed and the images were sent to an external collaborator specialized in radiology who analysed and measured the anatomical area with RadiAnt DICOM Viewer 2020 program (Figure 2).

RESULTS

In the study period from August 1 to December 30, 2020, 23 cases were included, 10 male patients (43.48%) and 13 women (56.52%), with a mean age of 28.8±10.2 years (Table 1).

Symptoms of nasal obstruction were present in 16 patients (69.57%) while 7 (30.43%) had no nasal ob-

Table 1. Main demographic characteristics of the patients included in our study group.

Age (mean ± SD)	**Male**	**Female**	**Average**
	33 +16.05	25.3 + 12.20	28.8 ± 10.2
Gender	**Male**	**Female**	**Total**
	10 (43.48%)	13 (56.52%)	23

Table 2. Average of measurements in millimetres of the nasal vestibular body.

Average in mm	Height right	Length right	Height left	Length left
GENERAL	3.8	5.9	2.95	5.88
Obstruction	3.78	6.63	3.58	6.63
No obstruction	1.55	4.31	1.51	4.15
Rhinitis	4.2	6.96	4	6.8
No rhinitis	2.16	5.21	2.14	5.17
Treatment	3.96	6.76	3.75	6.56
No treatment	4.55	7.25	4.37	7.15

struction. 10 cases (43.48%) had symptoms of rhinitis. 13 patients (56.52%) did not use any medication and only 6 (26%) of them mentioned using some type of medication. Of the 10 patients who reported rhinitis problems, 9 reported nasal obstruction, while of the 12 patients who had some type of septal deviation on the CT scan, 10 reported nasal obstruction.

The average of the dimensions of the nasal vestibular body according to each clinical symptom are presented in Table 2. The table shows the general average of measurements of both the length and the height of both sides of the NVB. After analysing the data, we observed that the dimensions of the NVB are significantly higher in patients with nasal obstruction and rhinitis when compared with those who did not present this pathology.

Using the Spearman's correlation test, a moderate positive correlation was found between nasal obstruction and nasal vestibular body width ($R = 0.79$, $p < 0.001$), and nasal obstruction and nasal vestibular body length ($R = 0.77$, $p < 0.001$). However, there was only a weak and non-significant correlation between the degree of obstruction and patients who presented with rhinitis ($R = 0.39$, $p = 0.06$) (Graph 1).

Graph 1 shows the comparison of the 2 measurements made of both the length and the height of both sides' nasal vestibular bodies, observing a clear preponderance of higher volumes in patients who report nasal obstruction, as well as in patients who report rhinitis symptoms.

DISCUSSIONS

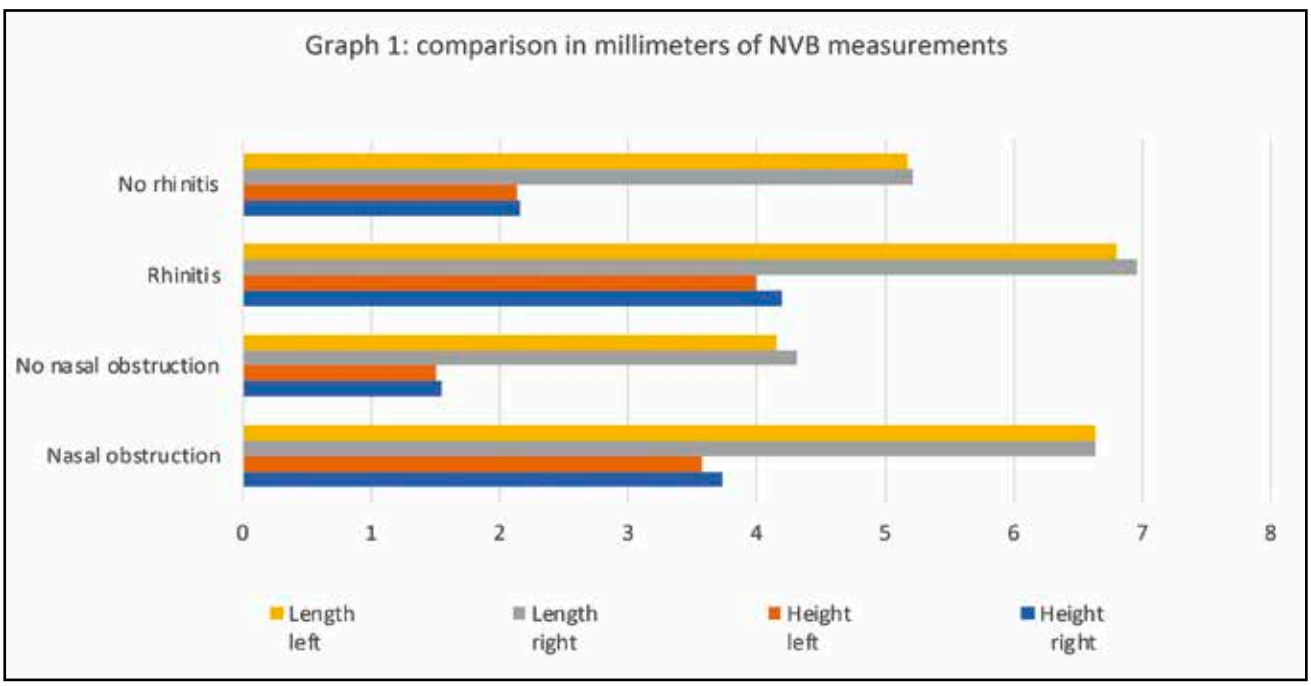
The nasal vestibular body is a structure recently considered as a factor of nasal obstruction. There are very limited publications on the implications related to this anatomical area. Authors such as Garrett D. Locketz et al.[1] refer, in 2016, to this structure as a cause of nasal obstruction. More recently, Nour Ibrahim et al.[4] has published a clinical-surgical study concluding that the surgical treatment of the NVB can be highly effective in treating persistent or recalcitrant nasal obstruction.

Our results could correlate the dimensions of NVB with the symptoms of nasal obstruction. However, there are a number of limitations, the most important being the small number of patients included in the study, that does not allow the generalization of the results to a population sample. At the same time, publications at national and international level are very scarce.

We could point out that this short series represents the first publication that attempts to objectively measure and correlate the effect of the dimensions of this nasal structure and obstruction.

CONCLUSIONS

The dimensions of the nasal vestibular body can be measured by tomography, and this could be correlated with the symptoms of nasal obstruction.



Graph 1. Comparison of the nasal vestibular body measurements (mm), according to different symptoms.

We believe that it is necessary to carry out studies with a larger population, trying to control some variables that could generate biases and limitations in the results.

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