The External Nasal Valve

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KEYWORDS

• External nasal valve • Nasal valve collapse • Batten graft • Nasal obstruction • Rhinoplasty • Functional rhinoplasty • Nasal surgery • Septoplasty

KEY POINTS

- Nasal obstruction has a negative effect on quality of life. The external nasal valve plays an important role in nasal breathing and, consequently, nasal obstruction.
- Multiple anatomic structures make up the external nasal valve. Surgery to correct external nasal valve pathologic conditions must be tailored to the specific needs of the patient.
- A detailed understanding of the anatomy of the lower third of the nose is critical to proper treatment. Knowing how the anatomy contributes to pathologic conditions is as important as where it is.
- There are effective surgical and nonsurgical treatments for external nasal valve dysfunction.
- The muscles of the nose may play a bigger role in external nasal valve problems than is typically recognized.

Because the internal nasal valve has been identified as the narrowest segment in the nasal cavity, more has been written about the internal nasal valve than the external. A PubMed search at the time of this writing shows 202 articles when searching for "internal nasal valve" and 156 for "external nasal valve." However, the external nasal valve is the gateway to the nose. Pathologic conditions in the external valve are a complex interplay between the cartilage, skin, nasal muscles, vibrissae, and even the force of inspiration. This article aims to consolidate much of the current knowledge of external nasal valve problems and their treatment.

ANATOMY

Mink[1] was the first to identify the nasal valve as a single entity in 1903. To this day, in some articles, there is no differentiation between the internal nasal valve and the external nasal valve. Constantian and Martin[2] rightfully assert that this lack of consensus probably hinders rhinoplasty education. Distinguishing the internal from the external valve is important because they are distinct anatomic areas, though they do share a common border at the scroll. Many investigators describe the external nasal valve as the nostril opening; however, it is more clinically helpful to consider the nostril opening as a component of the external nasal valve.[3–5] In other words, the nostril opening is an area, whereas the external nasal valve is a volume. The borders of this space are the nostril opening caudally, the septum and medial crura medially, the alar cartilage and fibrofatty tissue anterolaterally, and the internal nasal valve opening posteriorly. With this many structures playing an important role in the integrity of the external nasal valve, it should be no surprise that there are multiple ways that external nasal valve insufficiency can manifest. Further complicating matters is that external nasal valve problems may be static, dynamic, or both.

The alar lobule is the convexity that abuts the cheek at the alar-facial junction, bordered superiorly by the alar groove. This curves medially, ending in a concavity posterior to the nasal tip lobule (**Fig. 1**). Ali-Salaam and colleagues[6] sectioned 15 cadavers and found that the alar lobule was devoid of cartilage in all specimens. The alar lobule is composed of skin, fibrofatty

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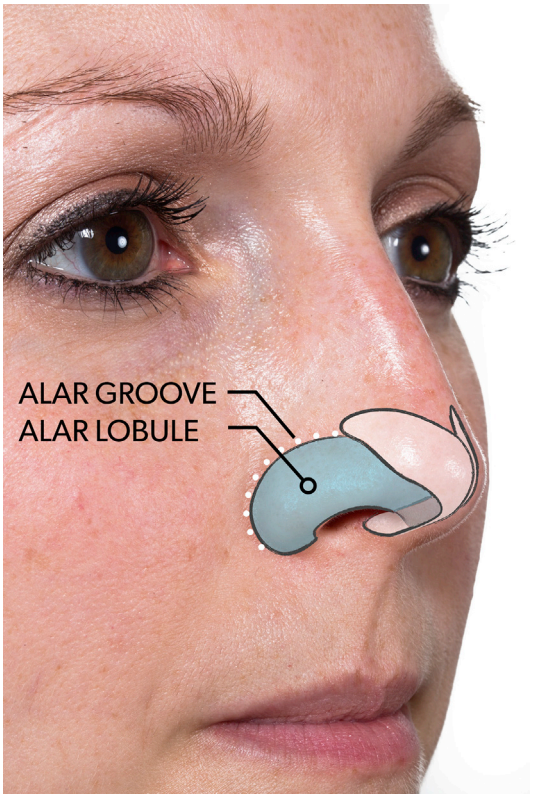

Fig. 1. The lower lateral cartilages are shown in white. The alar lobule is blue. The alar groove is the dotted line. Note that the lateral crura are not located in the alar lobule and that the point of maximal concavity of the alar groove is typically located at the lateral end of the lateral crus.

fascia, and muscle. The lateral crus travels superior to the alar groove and the investigators found that the lateral crura had 4 distinct anatomic variants. In some specimens, the lateral crus ended near the alar groove. In others, it continued along the alar groove and was either smooth or corrugated. Several had smaller, discontiguous sesamoid cartilages laterally.

The paired lower lateral cartilages are the primary structural component of the external nasal valve. Despite this, the alar cartilages are not usually as stiff as the septum. They begin medially at the feet of the medial crura. These are typically splayed somewhat from the midline. The medial crura sweep anterocephalically to the intermediate crura, where they twist laterally, creating a divergence in the area of the infratip lobule. The intermediate crura transition to the domes, a tighter bend that creates the definition of the tip. The domes should have an angle between them that is very obtuse. When the interdomal angle is too acute, the caudal margins of the lateral crura lie closer to the septum. This has important implications for both form and function.[7] When the caudal edge of the lateral crus is close to the septum, the volume of the nasal vestibule is decreased. Aesthetically, this results in an alar rim that is poorly supported and will have a characteristic parenthesis deformity on the frontal view.

When describing the position of the lateral crus, it is helpful to think of it as having both a long and a short axis.[8] The long axis is a line that bisects the dome and roughly bisects the lateral crus along its length. The long axis should be oriented toward the lateral canthus.[9] When the long axis is positioned closer to the medial canthus, the lateral crura are said to be cephalically malpositioned. Cephalically malpositioned lateral crura are a significant contributor to external nasal valve incompetence. In a study by Constantian,[9] all secondary rhinoplasty patients in the sample who had cephalically malpositioned lateral crura had external nasal valve incompetence.

The short axis is perpendicular to the long axis and extends from the cephalic border of the lateral crus to the caudal border. Ideally, the short axis makes nearly a 90° angle with the septum.[7] When the angle between the septum and the short axis becomes more acute, the lateral crura are sagittally malpositioned and the vestibular volume is decreased. **Fig. 2** shows the relationships between the septum, dome angles, and the short and long axes of the lateral crura. Sagittally malpositioned lateral crura are also prone to acting like a hinge, predisposing to collapse of the valve.

Ideally, the shape of the lateral crus should be gently convex or flat. Markedly convex lateral crura will create a bulbous tip and will often be internally recurvate. Internally recurvate lateral crura create a mass effect in the nasal vestibule because the tail of the lateral crus is positioned too far medially toward the septum (**Fig. 3**). Concave lateral crura also decrease the volume of the external nasal valve and can lead to nasal obstruction.

The caudal septum should lie in a midsagittal plane between the medial crura. Therefore, the medial crura typically affect the nostril opening more than the caudal septum. Short or flared medial crura will widen the columella and subsequently narrow the nostril (**Fig. 4**). However, in patients with a severe caudal septal deflection, it may lie laterally to the medial crura and become the medial border of the nostril (**Fig. 5**).

The circumference of the external nasal valve, with the exception of the thin skin under the lateral crus and the mucosa of the septum, is lined with hair-bearing skin. Though the vibrissae have