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Review Article

Nasal Valve Surgery

PS Saharia[1], Deepti Sinha[2]

Introduction:

The nose is the focal point of the face. Just as our eyes lend expression to the face the nose lends its character and adds to the overall beauty. The shape of the nose has ethnic variations and many people are happy to trace their family and parentage through it. Even though emphasis on cosmetic appearance is increasing, the importance of functionality cannot in any way be undermined. Nasal obstruction is a common complaint in otolaryngologic practice. It can be due to anatomic or physiologic reasons. Assessment of the patient is required to identify the etiology of nasal obstruction. And it is the rhinologist who is the best equipped to assess the form and function of the nose and to provide a solution achieving both the results.

Anatomic causes of nasal obstruction include deviation of nasal septum, nasal valve blockage and hypertrophied inferior turbinate. However there are many patients with significant septal deviations who deny nasal blockage and some with lesser deviations who claim not to be getting enough air. Some of these anomalies in complaints versus examination findings may be explained by the condition of the nasal valve area. The site most commonly referred to as the nasal valve lies at the isthmus or the narrowest part of the nose in coronal plane at the head of the inferior turbinate[1]. This is the area which gives maximal resistance to airflow in the nose[2].

The nasal valve is an anatomically and physiologically well-defined entity and from the clinical view point it is appropriate to mention that the nasal valve area comprises of the following structures (Table1) whose strength and shape help to regulate the passage of air currents through the nose[3].

Table-I

Constituents of nasal valve area

- Caudal margin of the upper alar cartilage
- Septo-alar junction
- Physiological state of the mucosa
- Septum
- Anterior nasal spine
- Lower alar cartilage
- Muscles and soft tissues in the nasal ala.
- Ala and lateral wall of the nose

Examination of the nasal valve:

It is of utmost importance to recognize the nasal valve dysfunction among patients who complain of nasal obstruction. Since the nasal valve area is the site for highest nasal resistance, even a small deformity of the valve area may severely impair the dynamics of the nasal air flow.

The nose is examined for any abnormality of its shape in all its views. The columella, the

1. 43, Vaishali, Pitampura, Delhi 34, India, Email: neenasaharia@hotmail.com
2. Max Hospital Pitampura, Delhi 34, India, Email:drdeeptisinha@gmail.com

Address of Correspondence: Prof P.S.Saharia 43, Vaishali, Pitampura, Delhi 34, India, Email: neenasaharia@hotmail.com

nasal base and the condition of the caudal septum in relationship to the nasal valve is evaluated. The tip of the nose is evaluated and the membranous septum, nasal floor, the valve region are checked for any improvement in the air flow. As an example, in old age, where the musculature is lax and the patients are edentulous, the columella and the tip, both may droop down to cause nasal obstruction but when one lifts the tip, the nose opens up.

The Cottles' manoeuvre is useful in identifying nasal valve obstructions. When the ala is pulled laterally upward, the airway improves: a positive Cottles' maneuver indicates a problem with nasal valve. In case a change in airflow is seen, then strengthening of the lateral wall may be indicated. Instruct the patient to breathe in quickly and check for any nasal collapse. To further test the nasal valve, the lateral wall is lifted with a flat instrument and wall checked for any change in the airflow. During testing exaggerated nasal breathing should be avoided as even the normal nasal valve collapses during exaggerated respirations.

A detailed intranasal examination with and without decongestion should be performed using anterior rhinoscopy and nasal endoscopy. By placing the nasal endoscope at the entrance to the nasal cavity in front of the nasal valve area, the functional status of the valve area can be assessed. Check for the collapse of the alar cartilages during normal and forced inspiration in a physiological position without deforming the nares. Inspect this area for any scar tissue in post-traumatic or operated cases.

Rhinomanometry permits objective assessment of the valvular pathophysiology but it is available in very few centers.

A nasal symptom score is filled by patients so that preoperative and post-operative results can be evaluated.

To illustrate a case in which nasal valve area was operated to achieve a satisfactory airway is being presented. L K, a 24-year-old male presented with history of left nasal obstruction after an accident injury sustained a few years back[Figure: 1]. The sharpness of the pyriform aperture was palpable. Cottles test was positive and airway improved on lifting the left lateral nasal wall. The patient was taken up for surgery under local anesthesia. An incision was made in the left lateral wall till the frontal process of left maxilla. A cartilage graft measuring .75x2 cm was taken from septum and inserted into the pocket. Thus the patient got a firm lateral wall that did not collapse [Figure: 2].

Figure 1: *Preoperative photo*

Figure 2: *Postoperative photo: Nasal valve opened*

Discussion:

The nasal valve was first described by Mink in 1903 as a slit like opening between the lower border of the upper alar cartilage and the nasal septum[4]. The upper alar cartilages are attached with the process dorsalis of the nasal septum at an angle of 10-15 degrees. It is the narrowest part of the nasal airway. This angle is considered to be important for the patency of the nose[5]. Patients with angles less than ten degrees typically have nasal obstructive symptoms. The normal cross sectional area of the nasal valve complex is 55 to 83 mm^2.

The nasal valve complex can be split into the internal nasal valve area and external nasal valve. The internal nasal valve (INV) is a specific structure within the internal nasal valve area. In a study, updated the classic description of the INV by using endoscopic photo documentation[6]. They found six common subtypes: convex caudal border type, angle occupied by septal body, twisted caudal border, sharp angle, blunt angle and concave caudal border types. The sharp angle and convex caudal border types are the most like the classically described INV described by Mink. The study found that the angle occupied by the septal body was the most common subtype and that patients were not likely to have the same subtype in both nasal cavities. The external nasal valve is formed by the nasal vestibule caudal to the INV. The fibrofatty alar and lower lateral cartilage tissues make up the lateral and anterior borders along with the caudal septum and pyriform aperture.

The caudal dislocation of the nasal septum is a common example of distorted nasal valve area. It can be corrected surgically, not only to improve the airway but also to improve the shape of nasal base[7]. Turbinate hypertrophy can contribute to INV stenosis. This can be treated with nasal sprays and oral antihistamines. The most common surgical procedure used to address INV stenosis is spreader graft implantation. This was originally described by Sheen in 1984 and has been used for both functional and cosmetic procedures. Spreader graft placement corrects the lack of dorsal support and helps restore a normal dorsal profile. The grafts can be placed via an open or closed approach. Cartilage is typically harvested from the septum and carved into 1-2 mm thick matchsticks that extend the entire length of the upper lateral cartilage. A submucosal pocket is created between the septum and the upper lateral cartilage. The grafts are sutured in place using horizontal mattress that goes through both upper lateral cartilages, grafts and the septum. Care should be taken to not pass through the underlying nasal mucosa since this could narrow the INV angle. Spreader grafts prevent development of nasal valve stenosis and can create a harmonious eyebrow-nasal tip line[2].

Andre et al described endonasal placement of spreader grafts in 89 patients. They evaluated three different fixation techniques and found that creation of a “tight fitting tunnel” had the greatest post operative improvement[8].

Nasal valve insufficiency is a troublesome entity whose aetiological factors can be congenital, iatrogenic trauma, accidental trauma or aging process[9]. The abnormalities thought to be responsible for the dysfunction of the area could be either a narrow valve because of structural changes in the area or a flaccid lateral wall, which collapses on inspiration or a combination of the above two factors. The airway collapse is explained by Poiseuille’s law and Bernoulli’s principle. Poiseuille’s law states that fluid flow and resistance is related to the fourth power of the radius. Bernoulli’s principle involves the changes in internal and external luminal pressure as it relates to fluid velocity. As air

travels through a narrow space, velocity increases, thereby decreasing the internal pressure which in turn causes collapse. This in turn explains why even small obstructions in this area are symptomatic.

Knowledge about the nasal valve helps the surgeon to provide a rational and systematic approach to a surgical procedure of the nose. A patient who undergoes surgery for the nose for cosmetic reasons shall also be content if his breathing is improved or preserved by recognizing the nasal valve and by avoiding any iatrogenic trauma to the area. The nasal valve surgery thus has to be an exact and precise procedure.

It is apparent that there is no single technique to solve every type of problem in the nasal valve area. The surgeon should deal with the individual components like nasal bones, nasal tip, anterior nasal spine, turbinates, vestibule and in fact the whole nasal valve in a precise manner and also locate the structural deformities which impair the nasal air flow and correct them accordingly. Innate sense of aesthetics and experience play a key role in surgical planning.

A developmentally drooping tip or an acquired droop because of aging produces a flaccid collapse and deforms the nasal valve area[10]. The anatomical components involved in such deformities are the caudal margins of the nasal septum, the lower alar cartilages, the medial crurae and occasionally the anterior nasal spine which if corrected along with the tip rotation will facilitate the air flow and a clear nasal passage.

Though not common, but an injury to the frontal process of maxilla which contributes to the lateral nasal wall and provides attachment to the nasal cartilage, may cause collapse of the lateral wall and unless corrected, this would lead to a nasal valve distortion leading to nasal block during inspiration.

Distinguishing a narrow valve from a weak side wall with dynamic collapse is an important aspect of preoperative evaluation. The dynamic collapse is corrected by cartilage batten grafts to increase the side wall rigidity[11].

The practice of nasal valve surgery along with septoplasty and rhinoplasty in cases where indicated will improve patient satisfaction and postoperative results. At the same time any trauma or narrowing of this area by excessive alar resection should be avoided.

References:

1. Kenyon Guy S, Andrew Peter. Nasal valve surgery, in Rhinology and Facial Plastic Surgery, Springer 2009: 75: 79 – 81.
2. Behrbohm Hans, Tardy Jr M Eugene. In Essentials of Septorhinoplasty, Thieme 2003: 10: 06 – 11.
3. Sulsenti G, Palma P. The nasal valve area: structure, function, clinical aspects and treatment. Sulsenti's technic for correction of valve deformities Acta Otorhinolaryngol Ital 1989; 22: 1 – 25.
4. Mink PJ. Le Nez. Comme vie respiratorie. Presse Otolaryngol (Belg). 1903; 481 – 496.
5. Kern EB. Surgical approaches to abnormalities of the nasal valve. Rhinology 1978; 16: 165 – 189.
6. Murat Cem Mýÿman et al. Internal Nasal Valve: Revisited With Objective Facts. Otolaryngology–Head and Neck Surgery 2006; 134: 41 – 47.
7. Saharia PS. Septal cartilaginous defects and their correction, Indian Journal of Otolaryngol 1988; 40(1): 12 – 15.
8. Andre, RF et al. Endonasal Spreader Graft Placement as Treatment for

Internal Nasal Valve Insufficiency No Need to Divide the Upper Lateral Cartilages From the Septum. Arch Facial Plast Surg 2004; 6: 36 – 40.

9. Zijlker T D, Quaedvlieg PC. Lateral augmentation of the middle third of the nose with autologous cartilage in nasal valve insufficiency, Rhinology 1994; 32(1): 34 – 41.

10. Kasperbauer JL, Kern E B. Nasal valve physiology. Implications in nasal surgery. Otolaryngol Clin of North Am 1987; 20(4): 699 – 719.

11. Schlosser RJ, Park SS. Functional Nasal surgery, Rhinoplasty and Septoplasty Part I. Otolaryngol Clin of North Am 1999; 32(1): 37 – 51.