Correction of Nasal Valve Stenosis With Lateral Suture Suspension

Derek S. Lee, MD; Alvin I. Glasgold, MD

Objective: To evaluate the effectiveness of using suspension sutures to relieve obstructed nasal breathing caused by nasal valve stenosis.

Subjects, Materials, and Methods: A nonrandomized pilot study of postrhinoplasty patients presenting with symptoms of obstructed nasal breathing was conducted in a private facial plastic surgery practice. All patients demonstrated nasal valve stenosis with a positive Cottle maneuver, clinically evident nasal valve collapse, and lack of response to efforts at reduction in turbinate size. Follow-up ranged from 7 to 12 months. Four men aged 31 to 58 years (mean age, 43 years) and 5 women aged 26 to 52 years (mean age, 39 years) were included in this study in a 1-year period. The nasal valve was suspended with 2 permanent sutures on each side, which were tunneled within the facial soft tissue to an infraorbital incision to lateralize the nasal valve complex and relieve nasal airway obstruction. Subjective self-assessment data for nasal airflow were collected. Preoperative and postoperative observation and photographic analysis provided objective data.

Results: All patients exhibited improvement.

Conclusions: Relief of nasal valve stenosis can be achieved with suspension suture technique as described. It is effective and, in our experience, has been the most predictable means of achieving improvement in nasal obstruction secondary to nasal valve stenosis.


Nasal valve stenosis commonly presents as a postoperative complication of rhinoplasty. Various techniques have been reported to correct nasal valve stenosis through the use of methods that support the nasal valve with rib graft,1 cartilage,2 or onlay cartilage graft.3 Sheen4 popularized the use of a spreader graft, which is inserted between the upper lateral cartilage (ULC) and the septum. The spreader graft lateralizes the superior segment of the ULC and is effective when this portion has been medially displaced.

Frequently, the collapse involves the entire caudal aspect of the junction of the ULC and the lower lateral cartilage, and a spreader graft is not sufficient. Other methods have been proposed that involve cartilage grafts to strengthen the lateral nasal wall4-6 and flaring suture to augment the nasal valve repair with spreader graft.9 However, these techniques have not proved to be uniformly successful. Panlilio10 reported an external approach through the transconjunctival incision to suspend the ULC with permanent sutures. We modified this approach with bilateral infraorbital incisions by using multiple suspension sutures to elevate the ULC superolaterally and to alleviate the nasal valve stenosis. This is a preliminary study of this technique and the results are repeated herein.

The nasal valve was first described by Mink11 in 1903, and its anatomy was defined by Bridger12 as the flow-limiting segment of the nasal airway that was located at the triangular aperture between the ULC and the septum. The angle between the ULC and the septum ranges from 10° to 15°. This angle is maintained by the relationships among the nasal septum, the lower lateral cartilage, and the attachments of the facial muscles.

The nasal valve functions in a manner similar to that of the Starling resistor and is influenced by Bernoulli forces.12 Both the nose and the Starling resistor consist of a semirigid tube with a flexible segment. In the nose, as the inspired air pressure exceeds a critical value, the flexible segment collapses, resulting in nasal obstruction. Thus, some degree of strength and rigidity of the lateral component of the
PATIENTS, MATERIALS, AND METHODS

All patients in this study presented with a history of rhinoplasty, which had occurred at least 2 years ago. All patients had been taking some form of medication to relieve obstructed nasal breathing; these included nasal sprays, both decongestant and corticosteroid; oral antihistamines; and decongestants. The following criteria were used for offering patients a nasal valve suspension procedure:

1. Obstructed breathing, unilateral or bilateral, associated with medial displacement of the nasal valve complex.
2. A nasal valve complex that exhibited significant inward displacement with inspiration.
3. A lack of response to the use of oral and topical medication to reduce turbinate hypertrophy associated with the 2 previous criteria.
4. A positive Cottle maneuver, ie, an instantly improved nasal airway with superolateral retraction of the nasal wall.
5. A 2-week trial of the external nasal dilator to confirm that lateralization of the ULC relieved symptoms.

If a concomitant septal deviation and/or turbinate hypertrophy were demonstrated, plans were made to correct these at the same time as the nasal valve suspension procedure.

The patients were asked to subjectively rate the postoperative nasal airway as worse, unchanged, or improved.

nasal valve is necessary to prevent its collapse during inspiration. Surgical procedures that weaken the lateral nasal wall at the junction of the ULC and the lower lateral cartilage may result in a loss of rigidity of the lateral nasal wall.

The concept of improving intranasal air space by opening the nasal valve has been well documented in sports. The use of an external nasal dilator (Breathe Right; CNS Inc, Chanhassen, Minn) by athletes can be seen at almost every sporting event. The proposed mechanism of such an external nasal dilator in healthy subjects and in subjects with structural or mucosal abnormalities is to increase the minimum cross-sectional area of the nasal cavity and the area of the nasal valve.13,14

If the postoperative nasal airway was improved, patients were asked to judge whether the improvement was satisfactory. Preoperative and postoperative photographs were taken for analysis.

The surgical technique involved outlining a 1- to 1.5-cm incision line at the junction of the subunits of lower lid skin and the cheeks. This subunit junction provided the best site for healing of the incision to prevent any visible scar. The incision was carried down to the area of the periosteum, just below the infraorbital rim (Figure 1). Care was taken to leave not only the periosteum but also a little soft tissue, because the periosteum is thin in this area and a strong holding area for the polypropylene suture was necessary. A 4-0 polypropylene suture on a P3 needle was passed through the periosteum and soft tissue and retained as an anchor point. A 4-0 polypropylene suture using 2 Keith needles was then passed superiorly and laterally to the inwardly rotated nasal valve, exiting through the infraorbital incision. At this point, the 2 ends of the polypropylene suture were tied to the previously placed infraorbital retaining suture. Such suspension of the lateral nasal valve wall was performed at the junction of the superior portion and midpoint of the nasal valve. The second suture was placed at the junction of the midthird and lower third of the nasal valve. We then have 2 points at the junction of the ULC and lower lateral cartilage on the nasal valve retracted in a superolateral direction. To achieve symmetry, this procedure was done on both sides, even if the nasal valve stenosis was unilateral. Initially, the sutures were exposed intranasally. However, on follow-up examinations, they were buried submucosally.

Patient 1 had unilateral nasal valve stenosis and underwent a unilateral nasal valve suspension using a transconjunctival approach for suspension fixation. The remainder of the patients had bilateral nasal valve repair through external skin incisions. Patients 2, 3, and 4 had only 1 suture on each side. Patient 2 had improvement but wished she had more relief of the nasal valve stenosis. Patient 3 had complete relief and was satisfied. Patient 4 had improvement and was satisfied but would have liked a somewhat better airway. Patients 5 through 9 had repairs with 2 suspension sutures on either side and were satisfied with the improvement in their nasal breathing. There was no dissatisfaction regarding the skin incision in any of the patients. Patient 1, who had undergone a unilateral transconjunctival approach, complained of slight asymmetry of her eyes postoperatively. This was difficult to detect. She also stated that there was a difference in the region between the cheek and the eye, visually and with palpation. Of note was the patient’s statement that the side not operated on was now worse. Actually, the side operated on had improved and her airway on the side not operated on was unchanged. There was no incidence of facial cellulitis, abscess, suture erosion through the facial skin, or nasal mucosa in this series. A typical result can be seen in Figures 2, 3, 4, and 5, which are the photographs taken before and after the procedure.

Figure 1. The nasal valve was suspended from the infraorbital periosteum.

RESULTS
This is a preliminary study using 2 suspension sutures as a new technique to correct nasal obstruction secondary to nasal valve stenosis, which, in our patients, occurred secondary to previous rhinoplasty. Preoperative and postoperative rhinomanometry and acoustic rhinometry would support the effectiveness of this technique, and such a study is currently in progress.

This double–permanent suture suspension technique is a modification of the technique reported previously by Paniello. Our learning curve in using Paniello’s technique resulted in the following changes: The double–suspension suture technique should be performed bilaterally, to achieve symmetry in breathing and appearance. The use of 2 suspension sutures on either side provides a better result by lateralizing the entire nasal valve complex. In addition, 2 suspension sutures are less likely to fail than 1. Initially, the sutures were exposed intranasally. However, on follow-up examinations, these sutures were buried submucosally. The anterior cheek skin incision is acceptable to patients, particularly those who are not interested in concomitant transconjunctival blepharoplasty performed. Such incisions heal well without sequelae. The high frequency of patient satisfaction following our modifications shows that this is an effective means of correcting obstructed breathing secondary to nasal valve stenosis. A larger series with preoperative and postoperative rhinomanometry and acoustic rhinometry and with long-term follow-up would be of value to further objectively document the success of this technique. Such a study is now in progress.

CONCLUSIONS

This bilateral–double suspension suture technique is a direct solution to nasal valve stenosis that results from previous rhinoplasty. Such a complication can be corrected safely and effectively with this simple, reliable technique, with predictable results. In the 2 years since this study was concluded, one of us (A.I.G.) has performed this procedure on 12 additional patients, and all results have been uniformly successful. The technique has remained the same except in 2 patients, in whom a small fixation screw was placed into the anterior maxillary wall in place of the periosteal suture. Large series with preoperative and postoperative rhinomanometry and acoustic rhinometry and with long-term follow-up are needed to further study this technique.

Accepted for publication January 11, 2001.

Presented at the Meeting of the Eastern Section of the American Laryngological, Rhinological and Otological Society, Inc, Providence, RI, January 31, 1999.
REFERENCES


Quotable

We do not receive wisdom,
We must discover it for ourselves,
After a journey through the wilderness,
Which no one else can make for us,
Which no one can spare us, for our wisdom is the point
Of view from which we come at last to regard the world.

Marcel Proust