Featured Operative Technique

Septoturbinotomy

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SAGE

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Abstract

The inferior turbinates are a principal cause of nasal airway obstruction. To some extent, the bony septum (the perpendicular plate of the ethmoid) also, on occasion, contributes to that airflow obstruction. There are many excellent methods to resect or ablate the turbinates, including submucous resection and cauterization. However, some have been associated with bleeding, crusting, and the development of synechiae. In this Featured Operative Technique article, we propose 2 mechanical means to expand the nasal vault: (1) the insertion of a large and long speculum that outfractures the turbinates and also centralizes the bony septum when the handles are compressed and (2) the insertion of a large clamp, which is expanded (in reverse "nutcracker" fashion) to achieve a similar result. Mechanical dilation (expansion) of the nasal vault with the speculum or large clamp substantially improves vault diameter such that further work on the turbinates in the form of turbinectomy is seldom necessary. The nasal vault is not necessarily expanded to the maximal diameter that could be achieved with resection procedures but need not be to achieve satisfactory air flow. Septoturbinotomy is a quick and simple way to deal with inferior turbinate hypertrophy. It is a minimally invasive procedure that improves the airway in virtually all cases, such that turbinectomy is seldom employed. It can be used prophylactically on all rhinoplasty cases requiring lateral osteotomy, which potentially shrinks the nasal vault slightly.

Keywords

septoplasty, septal deformity, turbinectomy, turbinoplasty, nasal airway, rhinoplasty

The inferior turbinates are a cause of airway obstruction both because of the mass of soft tissue that encompasses the trabeculae of bone and because the bone itself is often malpositioned and located near the middle of the vault.[1-3] A multitude of destructive and nondestructive surgical techniques have been used to reduce enlarged turbinates.[4-13] When conventional medical means to shrink the soft tissue component fail and there is an unequivocal obstruction from the bony turbinate itself, turbinectomy has traditionally been a successful means of improving that component of airflow obstruction.[14-16] Among the many methods, resection techniques such as partial resection, submucous resection, and cauterization have been and continue to be successful.[4]

However, some of the complications associated with invasive procedures include epistaxis, crusting, and, less frequently, synechiae.[17] Our personal experience in the past was that of moderate epistaxis, which tended to occur at the time of nasal packing removal. In addition, there tended to be crusting, exudate production, and odors, all of which added a small but not insignificant amount of morbidity to the overall rhinoplasty.

Consequently, we began outfracturing the turbinates,[18,19] as others have done.[6,7,9] We recognized that a substantial increase in the diameter of the vault would result if the lower (inferior) vault was expanded with almost any blunt instrument.[20] Similar results were achieved whether a large and long nasal speculum or simply a large clamp was used. A loud fracture was heard (often to the displeasure

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Figure 1. Local anesthetic (lidocaine and bupivacaine with epinephrine) is injected into the membranes of the turbinates and bony septum 7 minutes prior to septoturbinotomy.

of the nurses in the operating room) as the turbinate outfractured. Coincidentally, it was also noted that the bony septum (perpendicular plate of the ethmoid) had centralized to a significant degree. Here, too, the bony septal movement was less than perfect. However, the outfracturing of the turbinates, combined with centralization of the bony septum (assuming it was not midline and was therefore a contributing factor), resulted in a substantial increase in subjective airflow and decrease in complications. In many cases, the vault expansion was only partial and yet the subjective improvement to the patient was almost always significant, if not dramatic.

We have been performing this procedure for more than 10 years. In cadaveric studies, this minimally invasive procedure has demonstrated an enlargement of the maximal internal diameter of the nasal vault.[20] This Featured Operative Technique report provides further clinical evidence of patency through results from acoustic rhinometry before and after septoturbinotomy.

OPERATIVE TECHNIQUE

Preoperatively, we identify patients with nasal airflow obstruction and note the presence of inferior turbinate hypertrophy and/or septal deviation.

Surgical Technique

Nasal speculum method

Septoturbinotomy is typically performed before any other part of the rhinoplasty. Local anesthetic must be administered and consists of the following: lidocaine 0.5% with epinephrine (1:200 000) and bupivicaine 0.25% with epinephrine (also at 1:200 000) are injected with a 3-mL syringe and a 1.5-inch-long, 27-gauge needle (Figure 1). Seven minutes or more are allowed to elapse before performing the procedure, so that the epinephrine may take effect. The basic procedure, as demonstrated in the schematic of Figure 2, involves inserting a speculum and forcibly opening it to outfracture the turbinate and centralize the bony septum.

A nasal speculum that is 3 inches in length usually works well and is readily available in most surgery centers and hospital operating rooms (Figure 3A). The wider the blades, the better (Figure 3B). The speculum is inserted through the nares until the entire instrument is within the vault. Attempting to compress the handles when some part of the speculum is external to the nares will very likely result in a fracture of the nasal rim skin. If the turbinates are markedly hypertrophied or badly malpositioned, the fit may be tight.

The handles are compressed and the sound of a fracture can almost always be heard. If a fracture noise is not heard, a small, thin speculum is inserted into the nostril to permit the surgeon to observe the position of the large speculum. When properly positioned, 1 blade of the speculum lays along the turbinate and the other along the vomerine ridge. This serves 3 purposes: (1) the vomerine ridge acts as a solid fixed point against which to work; (2) some centralization (not always achieved) of the vomerine ridge spurs may occur, which can help improve airflow; and (3) the surgeon is less likely to damage the septal cartilage (located just anterior to the vomerine ridge) should the blade inadvertently be located on the cartilaginous septum.

Two or 3 such compressions of the handles are advised. The septoturbinotomy is done bilaterally. Expanding only 1 side could cause a shift of the septum away from the midline, resulting in a blockage on the relatively normal side. To verify the adequacy of the procedure, the large, long speculum is removed, its blades are closed, and it is reinserted into the vestibule. A successful result is indicated if the speculum drops smoothly and easily into the nasal vault in the direction of the pharynx.

If a fracture noise is not heard after 2 to 3 compressions, or if the closed speculum does not easily drop into the nasal vault, another alternative maneuver exists and should be utilized. A wide (8-mm) Joseph periosteal elevator is placed aside the turbinate and cantilevered against the anterior nasal spine (Figure 4). The anterior nasal spine acts as a fulcrum from which the Joseph elevator can then directly infracture the turbinate. For anterior deviations of the anterior nasal spine region, additional maneuvers such as the use of a small osteotome may be required. After completion of the septoturbinotomy, Doyle splints are inserted and left in place for approximately 6 days (the length of time that the external nasal splint is left in place).

Large clamp method ("reverse nutcracker")

Occasionally (as suggested by one of the senior authors, M.A.L.), the wide bladed nasal speculum—which has an opening of 3 cm—may not have enough force to crush the inferior turbinate and centralize the bony septum. Therefore, an alternative is to use a large clamp such as a 6-inch Pean

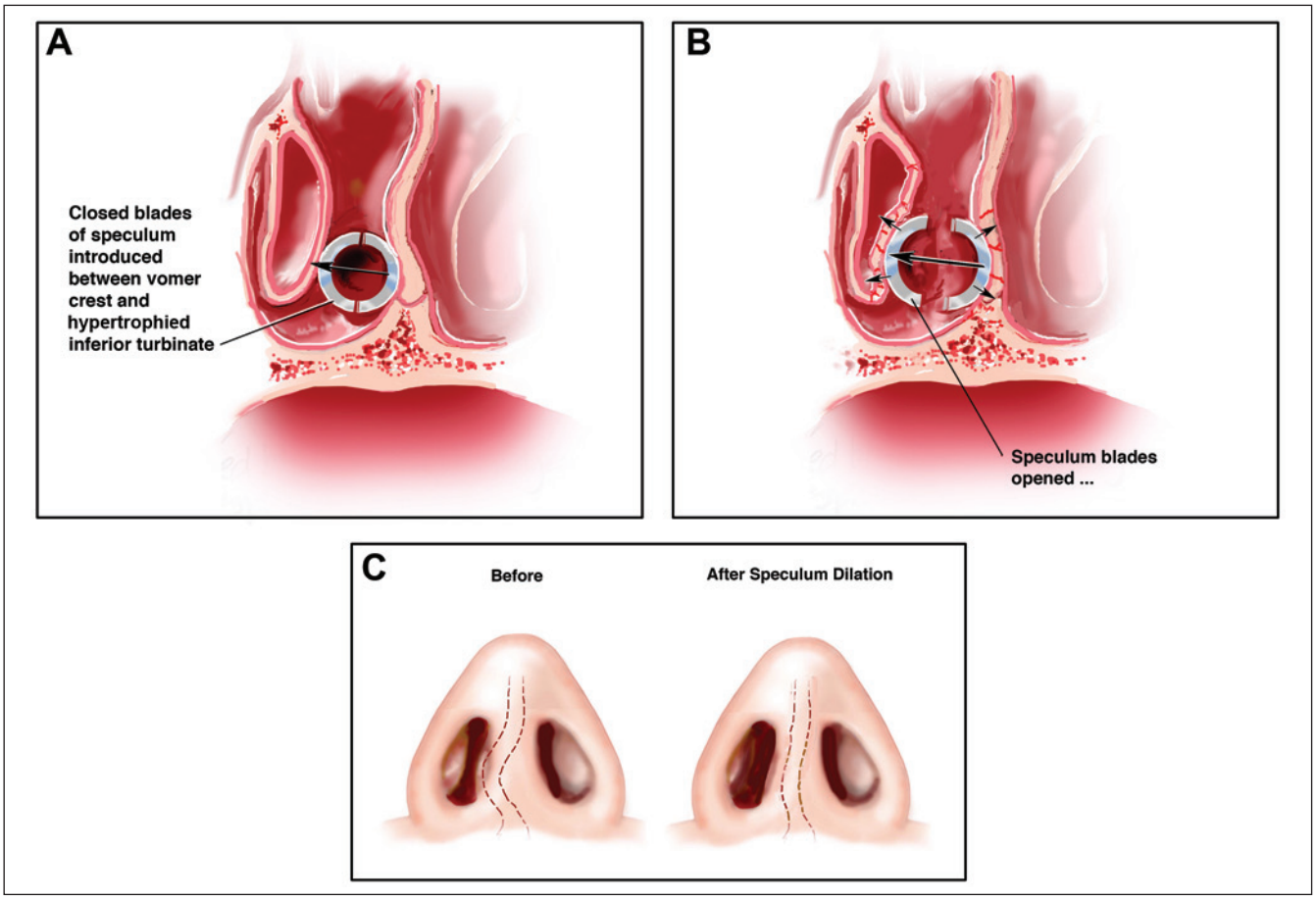

Figure 2. Schematic of basic procedure. (A) The speculum is inserted into the vestibule. (B) Upon opening the speculum, the turbinate is compressed and the bony septum is centralized. (C) The result is an expanded airway.

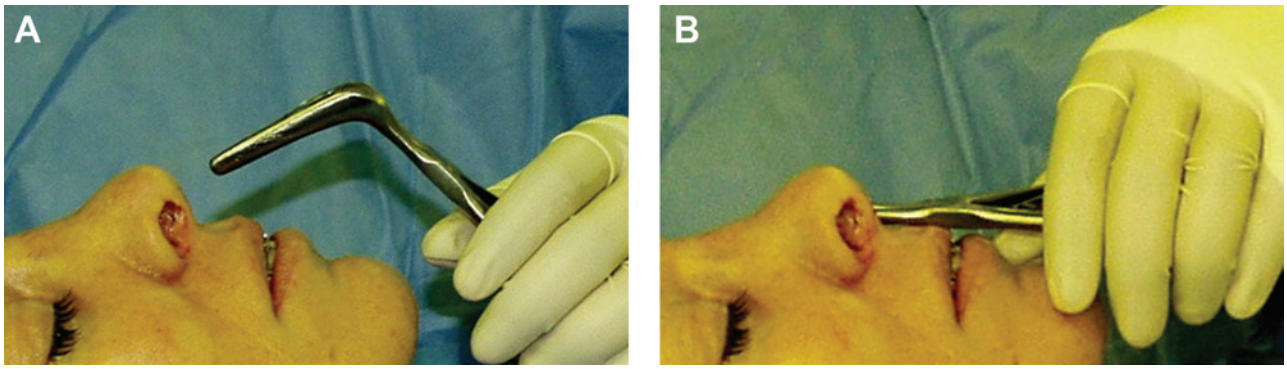

Figure 3. (A) A long (3-inch-wide) speculum is used for most septoturbinotomies. (B) The large speculum is placed deep in the nasal vault beyond the nasal rim skin so as to avoid fracturing the nostril rim when the handles are compressed.

(CooperSurgical, Trumbull, Connecticut; Figure 5). In these cases, a No. 28 French Rusch tube cut at 5-cm lengths (Figure 6A) is inserted and left in place for approximately 6 to 10 days (Figure 6B).

A video of the authors' techniques is available at www.aestheticsurgeryjournal.com. You may also scan the code on the first page of this article to be taken directly to the video on www.YouTube.com.

CLINICAL ANALYSIS

For this particular report, we prospectively selected 10 septoturbinotomy candidates for inclusion and objective analysis of data. All patients were women, and all had acoustic rhinometry studies before and after septoturbinotomy. The mean cross-sectional area and volume of the nasal cavity were prospectively compared preoperatively

Figure 4. If a fracture is not heard, an alternative method employs an 8-mm Joseph periosteal elevator as a lever. It is placed against the anterior nasal spine, which acts as a fulcrum.

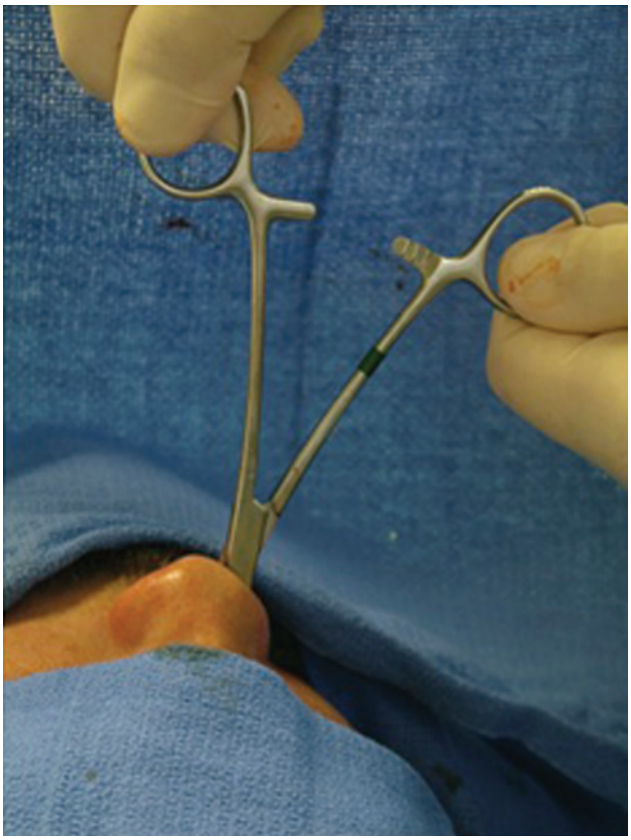

Figure 5. Septoturbinotomy also may be performed with a large clamp, which is inserted deep into the nose before spreading it open. The technique has been referred to as the "reverse nutcracker" method.

and postoperatively ($P < .01$). Demographic information and concomitant procedures, such as rhinoplasty, were documented. Adverse events and complications were also noted. Follow-up was at least 1 year.

RESULTS

The average patient age was 37 years. Six (60%) of the 10 patients had septoturbinotomy concomitant with cosmetic rhinoplasty. The mean cross-sectional area and nasal cavity volume were compared via acoustic rhinometry before and after septoturbintomy. There was a significant increase in the mean cross-sectional area and volume of the nasal cavity between preoperative and postoperative evaluation ($P < .01$). Postoperatively, none of the patients were noted to have mucosal crusting, desiccation, bleeding, infection, malodorous nasal drainage, atrophic rhinitis, or persistent nasal obstruction. Revisionary surgery was not needed in any of the 10 patients.

DISCUSSION

There is little doubt that the noninvasive technique we describe here contributes so much considering so little effort. The learning curve is essentially quite small, the technique is very easy to teach, and time of surgery is approximately 1 minute. As long as the surgeon is not overly exuberant and does not expect to achieve a "perfect" result, a significant or dramatic change in the inferior vault size can be expected in most cases. If the surgeon is dissatisfied with the expansion effort, closed septoturbinotomy does not preclude any of the other maneuvers commonly performed by many plastic surgeons. These include, but are not limited to, resection, opening of the leading edge to crush the bone, and cauterization. It should be noted that septoturbinotomy is not indicated when septal cartilage harvest is required.

Initially, we only had subjective symptoms to indicate the worthiness of septoturbinotomy. However, later, quantitative studies were done to actually measure the extent of vault size increase.[19] Measurements were made and photographs taken before (Figure 7A) and after septoturbinotomy (Figure 7B). Later, liquid silicone polymer was used to fill the nasal cavity of fresh cadavers to obtain an approximation of the size and shape of the nasal vault (Figure 8).[20] In addition, graduated, transparent, semifirm rubber tubing was inserted along the nasal floor until resistance was encountered. The largest such tube that was accommodated by the nasal vault without significant palpable resistance was defined as the maximal nasal vault diameter. The maneuver of septoturbinotomy was performed, after which repeat vault measurements were taken with the silicone polymer and with the graduated tubing. Using 9 cadavers, the mean increase in vault diameter was 64%. Theoretically, this translates (by Poiseuille's law) to a potential 7-fold increase in airflow. The ratios of enlargement showed a range from 1.25 to 2.33. In addition, the septoturbinotomy was performed on both the obstructed and the nonobstructed side, and therefore a mean increase of 14% was enjoyed on the nonobstructed side, although the result on the nonobstructed side did not achieve statistical significance ($P = .095$). Visually, the expansion was obvious. The molds obtained in the study conformed well to the architecture of the nasal vault and were thought to be representa-

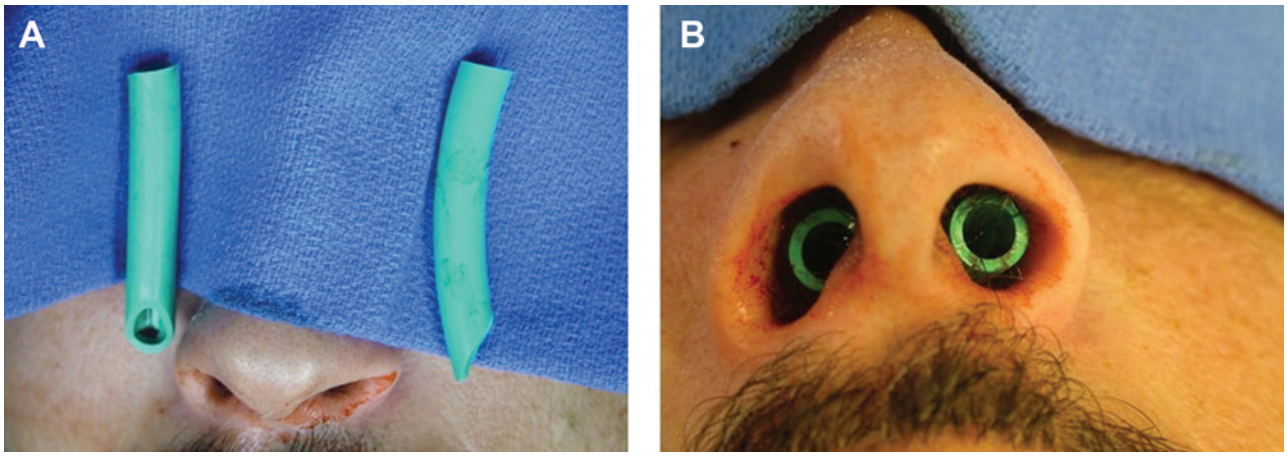

Figure 6. (A) Either Doyle splints or rubber tubing cut to the appropriate size can be used to maintain patency of the airway. (B) The tubing is kept in place for up to 6 days to prevent movement of the bones and recurrence of the obstruction.

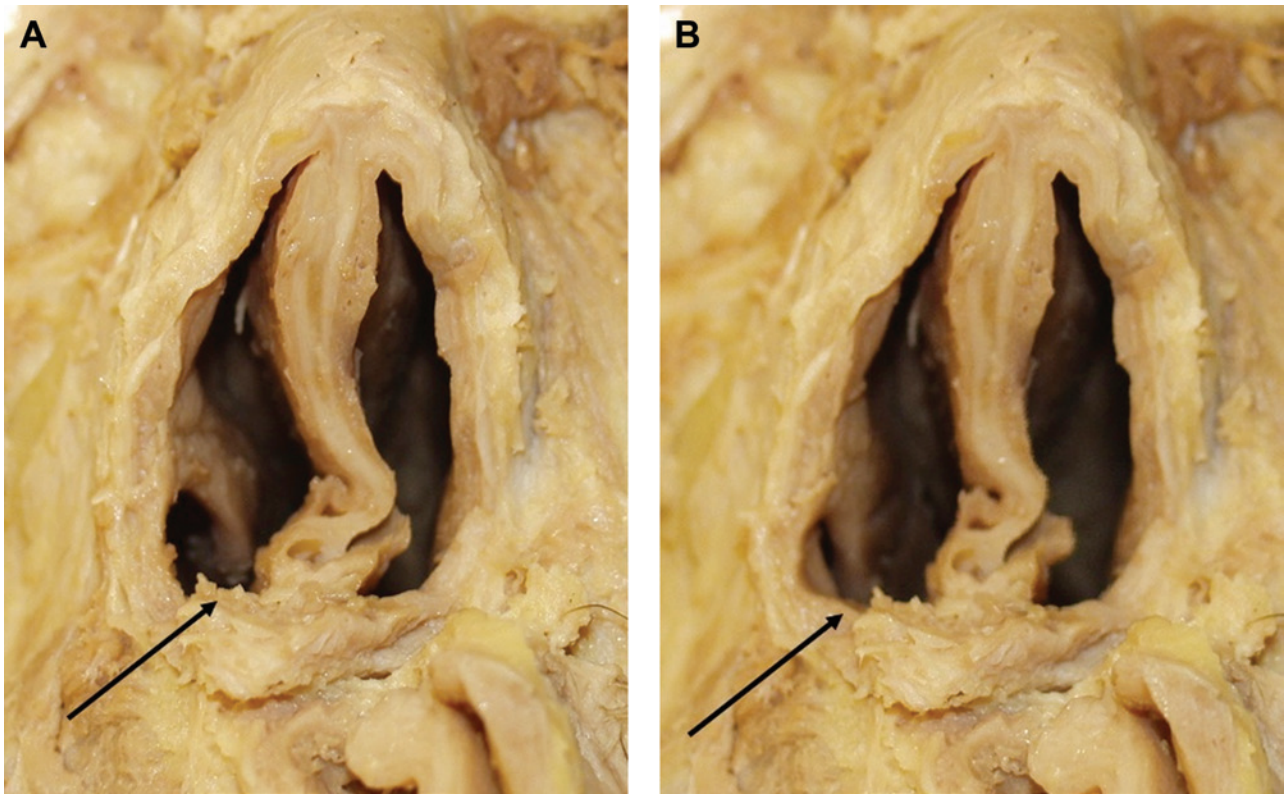

Figure 7. (A) Cadaver septum with turbinate hypertrophy and bony septum malposition before closed septoturbinotomy. (B) Cadaver septum showing improvement after closed septoturbinotomy.

tive of the anatomy. Most recently, we have begun to obtain rhinometry measurements for patients undergoing turbinotomy. Measurements are taken before and after surgery. When comparing preoperative and postoperative rhinometry data, turbinotomy was found to significantly improve the nasal airway ($P < .05$).

Nasal surgery treats anatomical causes of airway obstruction. We acknowledge that the mucosa has a dynamic relationship with the environment. Therefore, functional treatment with saline or pharmacotherapy should be considered in refractory cases.

One other interesting aspect to the history of turbinoplasty is worth mentioning. Years ago, the turbinates were considered the prime culprit of airway obstruction, along with septal deviation. In recent years, however, it has become apparent, thanks to the work of surgeons like

Figure 8. Liquid silicone polymer studies in cadavers were able to quantitate the extent of vault size increase following septoturbinotomy.

Sheen[21] and Constantian and Clardy,[22] that the valves (both the internal and, to some extent, the external) are the cause of many, if not most, of the nasal airway obstruction cases seen by surgeons. Once the valvular contributions are corrected, the septum and certainly the turbinates become lesser factors. Previously, many cases of nasal airway obstruction likely were corrected by aggressive repeat septal and turbinate surgery when, in fact, correction of the valvular obstruction may have obviated the need to expand the vault by turbinectomy.[23,24] At that time, the reason surgeons concentrated on the turbinates was most likely the fact that unlike valvular surgery, turbinate surgery is relatively easy to perform. Correction of the turbinates may compensate partially for airflow obstruction due to valvular pathology. Today, we recognize that valve correction sometimes obviates the need for turbinotomy or turbinectomy.[25]

CONCLUSIONS

Septoturbinotomy is a quick and simple way to address nasal airflow obstruction during rhinoplasty. It is a minimally invasive procedure that has previously yielded an anatomical increase in nasal vault diameter and now provides objective evidence of functional improvement on acoustic rhinometry.

Disclosures

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