

The Role of Autospreader Flap in Primary Rhinoplasty

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ABSTRACT:

BACKGROUND:

A spreader flap, or autospreader flap, is a flap used for dorsal reconstruction in primary rhinoplasty after cartilage dorsum excision. In a primary rhinoplasty that requires a humpectomy, the dorsal aspect of the upper lateral cartilages is commonly discarded. Many of these patients need spreader grafts to reconstruct the middle third of the nose. However, it is possible to reconstruct the upper lateral cartilages into "spreader flaps" that act much like spreader grafts.

OBJECTIVE:

To evaluate the efficacy of autospreader flap for midvault reconstruction after humpectomy in primary rhinoplasty.

PATIENTS AND METHOD:

This prospective study was done on 124 patients in Erbil, from February 2010 to Jan. 2014. All patients who underwent primary rhinoplasty and requiring humpectomy are included in this study. A tunnel is created on the underside of the upper lateral cartilage, which is released from the cartilaginous septum and also from its attachment to the nasal bone. It is then rolled on itself to make a spreader flap, which is secured with sutures. Scoring along the dorsal edge of the upper lateral cartilage may be necessary in thick cartilage. The flap is then secured to the dorsal edge of the reduced dorsal septum. Data were entered and analyzed using the statistical package for social sciences SPSS version (18).

RESULTS:

In 124 patients who underwent an open approach rhinoplasty (44 patients were male and 80 patients were female), the autospreader flap almost always reconstructed the middle third of the nose. It was easy to execute in the open approach. At surgery, seven patients needed spreader grafts because the flaps were too narrow. Postoperatively, twelve patients exhibited inadequate nasal width.

CONCLUSION:

Autospreader flap is a suitable technique for restoration of midvault after humpectomy in primary rhinoplasty. The application of autospreader flap allows the surgeon to reconstruct the internal valve and design an aesthetically pleasing dorsal nasal line.

KEYWORDS: primary rhinoplasty, autoproader flap, cartilage dorsum excision, dorsal nasal reconstruction.

INTRODUCTION:

Rhinoplasty is one of the most challenging procedures in all of facial plastic surgery. This is evident in the fact that entire textbooks are devoted solely to the topic. While basic principles remain largely unchanged, new concepts and techniques are continuously evolving, since improving aesthetic appearance and maintaining nasal function are inseparable goals in rhinoplasty surgery, and failure with either can be devastating for the patient^(1, 2).

Reducing the dorsum of the nose in primary rhinoplasty is a common surgical goal. This often involves rasping or removing the excess

prominence of the nasal bones and upper lateral cartilages and the nasal septum. Even judicious reduction of the angle formed by the septum and the upper lateral cartilages will increase the resistance of airflow, to correct this gradient, the placement of a spreader graft between the mucoperichondrium of the upper lateral cartilages and the dorsal septum has proven to be useful in maintaining the internal nasal valve geometry.⁽³⁾

The importance of preserving the internal nasal valve area and reconstructing the middle third of the nose by spreader grafts is well established as a result of the pioneering work of Sheen,

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Constantian and Clardy, and others. That concept was extended years ago by trying to preserve the upper lateral cartilage in a primary rhinoplasty and using it to act as a spreader graft, thereby minimizing the need to harvest additional cartilage. One of the first techniques to use the upper lateral cartilage for spreader grafts was described in 1992 by Wood and subsequently by Oneal and Berkowitz, who gave it the name "spreader flap."^(4,5,6,7)

The upper lateral cartilages have both vertical and transverse components. The thickness and strength of these are variable and may differ according to age, sex, or ethnicity. The transverse portion is a critical structure in defining the dorsal aesthetic lines and in establishing the nasal valve angle (normal, 10 to 15 degrees). Manipulating these cartilages should be performed with precision to preserve the nasal airway and to control the postoperative appearance of the dorsal nasal lines.^(8,9)

The autospreader flap (spreader flap) is a surgical technique that adjusts the height of the upper lateral cartilages precisely and safely while preserving the function of the internal valve. In this technique the transverse portion of the upper lateral cartilage is rotated medially to function as a local spreader flap while reducing the profile of the dorsum and preserving the aesthetic lines. This method will preserve the "normally resected" portion of the upper lateral cartilages in patients with high dorsum and use this portion of the upper lateral cartilages to control midvault width and internal valve function.⁽⁹⁾

The autospreader flaps are actually the transverse portion of the upper lateral cartilage turned into and against the edge of the septum. The thickness of the spreader flaps is equivalent to the thickness of the midseptum, while the actual cartilaginous thickness is much thinner; the inclusion of the perichondrium in the flaps adds additional thickness. Accordingly you can expect a spreader effect equivalent to what would be obtained with normal spreader graft. When greater thickness is needed than that provided by the spreader flap, there is no problem in combining a standard or extended spreader graft with the spreader flap.⁽⁹⁾

The advantage of autospreader flaps technique will preserve the septum and reducing patient morbidity and the surgical time needed to maintain or restore dorsal aesthetic lines and internal valve function when performed with humpectomy^(3,6,10).

The autospreader flap is indicated in high-risk patients who are at risk for middle vault collapse and airway obstruction following rhinoplasty, typically, patients who have a high, narrow dorsum, a weak middle vault, short nasal bones, or a positive Cottle test preoperatively.⁽³⁾

The aim of this study is to evaluate the efficacy of autospreader flap in primary rhinoplasty when requiring humpectomy.

PATIENTS AND METHOD:

This is a prospective study done on 124 patients in Erbil, from February 2010 to January 2014. All patients who underwent primary rhinoplasty and requiring humpectomy are included in this study. Exclusion criteria are secondary rhinoplasty and those patients who do not require humpectomy. The follow-up period was 10–34 months (mean, 15 months). Standard medical photographs have been taken for medical documentation pre and post-operatively. Data were entered and analyzed using the statistical package for social sciences SPSS version (18).

Surgical Technique

The open rhinoplasty technique was applied to all the patients. The first step with this technique is through a columellar incision with infracartilaginous exposure is typically used followed by degloving of the midvault and nasal dorsum. Beginning at the anterior septal angle, a mucoperichondrial tunnel is created with a Cottle elevator deep to the upper lateral cartilage at its junction with the dorsal septum. This tunnel continues all the way up to and just under the nasal bone. However, this dissection should be limited to the area of the nasal bone to be removed so the remainder of the attachment between the upper lateral cartilage and the nasal bones can be left intact. The transverse component of the cartilage is then separated from the septum at the midline in a submucoperichondrial manner. Next, the horizontal part of the bony dorsum is removed with a 10-mm osteotome. Once the desired reduction on the cartilaginous septum is completed, further nasal bone reduction can follow if necessary. It is at this point that the dorsum of the nose can be properly evaluated for contour irregularities, with close attention paid to the upper lateral cartilages.

The over projecting portion of the upper lateral cartilages and the transverse component is rotated internally approximately 90 degrees to lie between the septum and the medial edge of the upper lateral cartilages supported as a flap by its attachment to the mucoperichondrium.

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Using a longitudinal incision along the cartilage without damaging the mucoperichondrium helps maintain the autospreader flaps in a stable position (mostly in thick cartilages). The new dorsal edges of the upper lateral cartilages are then sutured at the midline to the rotated autospreader cartilages and secured along the septum using 5-0 polydioxanone suture. According to the anatomy of the extended parts of the upper lateral cartilages, the entry and exit points of the sutures can be modified. One or two mattress sutures can be used according to the length of the extended parts of the upper lateral cartilages (Figure 1).

When the upper lateral cartilage does not extend down to the anterior septal angle, or even if it extends there but does not provide enough cartilage substance for placement of the sutures, small cartilage grafts was placed on both sides of one-third of the caudal part of the septum. These cartilage grafts are of 7 to 10x3x2 mm in size. The lower part of the upper lateral cartilage will juxtapose with the cartilage grafts, but this can be adjusted to avoid ending up with an excessively wide dorsum.

RESULTS:

One hundred twenty four patients who underwent an open approach rhinoplasty, 44 patients were male (35%) and 80 patients were female (65%). Patients' age ranged from 18 to 54 years (mean 31year).

Dorsal hump reduction was performed in all patients. A dorsal hump reduction greater than or equal to 5 mm was performed in 53 patients (43%), figure 2.

Most of these patients (105 patients) had adjunctive procedures performed such as septoplasty and inferior turbinate reduction.

Evaluation of improvement in nasal breathing was based on patients' subjective assessments. Rhinomanometric evaluation was not conducted.

All the patients (84) with breathing problems described a great relief of their symptoms.

During the follow-up period, 12 patients (9.7%) experienced nasal breathing problems. two of these patients had lower lateral cartilage weakness (pinch nose), and 10 patients had nasal breathing difficulty due to allergic rhinitis, and they responded to medical treatment.

The dorsal aesthetic lines were symmetric in 39 patients (31.4%) preoperatively versus 112 patients (90.3%) with symmetric dorsal aesthetic lines postoperatively ($P < 0.001$), figure 3.

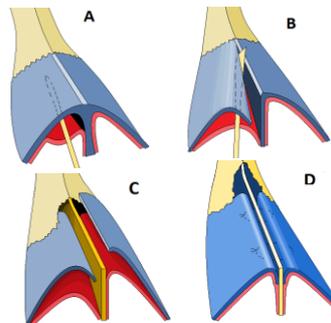


Figure 1: Steps of autospreader flap setting A- Dissection of mucosa from the cartilage. B- Separation of upper lateral cartilage from the septum C- Folding of the excess cartilage against the septum D- Suturing the folded cartilage with the septum.



Figure 2: A,B pre-operative anteroposterior and lateral view of 29 years old patient who had a dorsal hump with a dependent nasal tip. C, D post-operative view of the same patient 13 months later, showing dorsal hump reduction.



Figure 3: A,B pre-operative anteroposterior and lateral view of 18 years old patient who had a dorsal hump with asymmetrical dorsal aesthetic lines. C, D post-operative view of the same patient 23 months later, showing dorsal hump reduction and symmetrical dorsal aesthetic lines.

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Two of the patients had narrowing of the nasal dorsum (inverted V deformity) . They were treated successfully by spreader graft placement. At surgery, seven patients needed spreader grafts because the flaps were too narrow.

Postoperatively, in 12 patients, the spreader flaps inadequately reconstructed the middle third of the nose. In each case, the cause appeared to be a collapse of the folded-over upper lateral cartilage, because the dorsal edge of the upper lateral cartilage was overzealously scored.

Regarding patient satisfaction, 109 patients (87.9%) were satisfied or completely satisfied,

figure 4. Among 15 unsatisfied patients, three had concha hypertrophy, which was treated with nasal topical steroids. Two patients had inverted V deformity, they were treated surgically. Four patients had visible dorsal irregularity. The manual examination of these three patients led us to realize that these irregularities were due to insufficient medialization of the nasal bones. Six patients were not satisfied with their nasal air intake, although there were neither mechanical obstructions nor concha problems.



Figure 4: A,B pre-operative anteroposterior and lateral view of 20 years old patient who had a dorsal hump with a long nose. C, D post-operative view of the same patient 3 years later, showing dorsal hump reduction.

DISCUSSION:

Spreader grafts are the standard for reconstructing the middle third of the nose. However, there are situations when the dorsal edge of the existing upper lateral cartilage (in the form of a spreader flap) may act as a substitute for the spreader graft. When it can be used, the autospreader flap minimizes the need for harvesting additional material. Like the spreader graft, the autospreader flap can prevent functional problems by increasing the size of the internal nasal valve angle and by maintaining the width of the middle third of the nose^(4, 7).

In reconstructing a nasal dorsum in rhinoplasty, we believe that the use of flaps (namely, upper lateral cartilage flaps) is more anatomic and stable. The upper lateral cartilages (ULCs) and their cephalic extensions have anatomic flap characteristics because the mucosa beneath the cartilage is spared during the reduction, and the blood supply to the cartilage is not disrupted. Consequently, no changes in volume or shape are anticipated.⁽¹¹⁾

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Technically speaking, meticulous dissection of the ULCs is of utmost importance. To obtain an intact and uninjured cartilage, the dissection

between the ULCs and the nasal bones should be carried out diligently. The nasal mucosa in the immediate vicinity of the cartilages should be handled with care to avoid any perforations because this mucosa may be included in the sutures⁽¹¹⁾.

Resorbable suture materials such as polyglactin, polydioxanone suture, and polyglycaprone are good for holding the cartilages in approximated position long enough for the scar tissue to take over. However, we believe Polydioxanone is a better choice because it has long lasting tensile strength with a good knot-holding ability⁽¹¹⁾.

Operative treatment of a dorsal hump can lead to significant aesthetic and functional deformities if the midvault is not properly restored following reduction. The physiologic consequence of inadequate restoration is internal nasal valve collapse. Aesthetically, patients may suffer from poorly defined or asymmetric dorsal aesthetic lines (DALs). Paramount to avoiding these complications is preservation of native tissue, and proper restoration of anatomic relationships^(5,8).

The Dorsal aesthetic lines (DALs) play an important role in providing pleasing and consistent results in rhinoplasty. Ideally, the lines should be symmetric with a smooth and continuous contour that matches either the interphiltral distance or tip defining points in width. The ULCs define the middle third of the DALs thereby playing an integral role in the overall contour and aesthetic result⁽⁸⁾.

In evaluating our series of 124 consecutive primary rhinoplasties, we found that we are able to achieve symmetry and smooth contour of the DALs in approximately 90.3% of our patients postoperatively, this is comparable with the result of Rohrich et al who can achieve 94% symmetrical dorsal aesthetic lines postoperatively⁽⁸⁾.

One of the unintended benefits of autospreader flap construction is the resultant precision in humpectomy. Traditionally, humpectomy has been considered a mundane part of rhinoplasty, in contrast to tipplasty; however, the reality is that humpectomy is frequently associated with postoperative dorsal irregularities at the keystone area. Before accurate release of the upper lateral cartilage from the nasal bone, there was a tendency in the original procedure to damage and tear the cephalic end of the upper lateral cartilage during the process of bony hump removal. The

result was irregularities of cartilage at the keystone area. By releasing the medial aspect of the upper lateral cartilage from the nasal bone,

the caudal edge of the bone is exposed, allowing accurate placement of an osteotome. If, however, it is decided that bony hump reduction should be performed with a rasp, it is best to use the rasp first before creating spreader flaps. Rasping can be disruptive to spreader flaps. In general, our method of hump reduction is similar to the incremental component dorsal reduction approach described by Rohrich et al.^(7,8)

Limitations to using this technique include those patients with deviated dorsal septum or asymmetric dorsal aesthetic lines. These would more likely benefit from traditional spreader grafts harvested from the septum and perhaps combined with autospreader flap. Autospreader flaps may not prove adequate as stability if associated with bony collapse, in such instance spreader grafts should be used⁽⁹⁾.

We agree with the opinion of other authors (Byrd, Gruper) that autospreader flaps may not provide adequate stability when there is associated collapse of the bony sidewalls. In these instances, traditional spreader grafts that extend beyond the keystone are indicated.

Patients with weak lower lateral cartilages, inadequate tip projection, or a deviated nasal tip will require additional support not provided by an autospreader flap. An extended spreader graft would be the method of choice to support the nasal midvault, allowing more control of nasal tip support and lower lateral cartilage positioning.^(9,10)

Postoperative evaluation showed that four of our patients had visible bony irregularities in the dorsum, particularly shown in oblique and lateral pictures. We found that these irregularities were not due merely to insufficient reduction but rather to insufficient medialization of the nasal bones. Probably, performing an improper wedge resection between the nasal bones and the ethmoid plate was the reason for not bringing two nasal bones together. In other words, optimal medialization of the nasal bones is as important as reduction of the bony dorsum.

CONCLUSIONS AND RECOMMENDATION:

The autospreader flap is a simple, reproducible, and effective technique in shaping the dorsal midvault of the nose after dorsal reduction in primary rhinoplasty to create more natural aesthetic dorsal nasal lines while preserving the function of the internal valve.

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We believe that spreader flaps should be considered as a first choice for dorsal reconstruction with or without cartilage grafts in

aesthetic nasal surgery and we do not advise the use of this procedure in secondary rhinoplasty cases.

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