The Laryngoscope

The Impact of Upper Lateral Cartilage Release on Patient-Perceived Nasal Appearance and Obstruction

Rachel E. Weitzman, MD, MPH, MS; Shekhar K. Gadkaree, MD; Natalie S. Justicz, MD; Robin W. Lindsay, MD

Objectives/Hypothesis: Although upper lateral cartilages are commonly released from the dorsum of the septum during spreader graft placement in septorhinoplasty (SRP), there has been a focus on maintaining integrity of connections in the middle vault. Avoiding release of upper lateral cartilages in certain patient groups may represent an early step in this paradigm shift. We aim to assess satisfaction with nasal appearance and correction of nasal obstruction in patients who underwent SRP with spreader graft placement without upper lateral cartilage release and compared it to the traditional upper lateral cartilage release cohort.

Study Design: Prospective cohort study.

Methods: A total of 559 patients who underwent SRP with spreader graft placement with upper lateral cartilage release and 30 patients who underwent SRP with spreader graft placement without release between 2012 and 2020 were administered the Nasal Obstruction Symptom Evaluation (NOSE), FACE-Q Satisfaction with Nose, and FACE-Q Social Functioning scales pre- and postoperatively. Pre- and postoperative NOSE FACE-Q, and negative inspiratory force (NIF) scores and changes were compared between groups.

Results: Results demonstrated clinically and statistically significant improvement at follow-up for both groups. There was no significant difference between groups in mean improvement of NOSE, FACE-Q, and NIF scores at time of last follow-up.

Conclusion: SRP with spreader graft placement with and without upper lateral cartilage release provide clinically and statistically significant improvement, and no significant difference in functional outcome. This suggests that upper lateral cartilages do not need to be released to achieve functional improvement and that surgeons should consider whether release is necessary to achieve goals of surgery.

Key Words: Septorhinoplasty, spreader graft, upper lateral cartilage release, patient-reported outcome measures.

Level of Evidence: 3

***Laryngoscope*, 00:1–7, 2021**

INTRODUCTION

Nasal airway obstruction (NAO) negatively affects quality of life and presents as a leading complaint to otolaryngologists.[1–4] Structural obstruction of the nasal airway is commonly due to septal deviation, turbinate hypertrophy, and/or nasal valve dysfunction. When medical treatment does not provide sufficient symptom relief, septorhinoplasty (SRP) is often performed to straighten the septum and correct nasal valve compromise.[5] Spreader grafts are a common type of graft placed to treat internal valve narrowing and have been shown to improve symptoms of NAO.[6–8] Although spreader grafts have been criticized due to concern for causing undesirable widening of the nasal dorsum, our group has demonstrated in a previous study that spreader grafts can be placed to successfully correct nasal obstruction from internal nasal valve compromise without adversely impacting the aesthetic outcome.[9]

During spreader graft placement in SRP, the upper lateral cartilages are commonly released from the dorsum of the septum. However, there has been a recent focus on maintaining the integrity of the connections in the middle vault. Preservation rhinoplasty has emerged as an increasingly popular option for managing the dorsum to preserve structure and provide a natural and long-lasting outcome.[10–12] The major goal of dorsal preservation is to avoid creating an open-roof deformity that can be seen with classic hump reduction and to maintain favorable dorsal contours.[10,12] Furthermore, when the middle vault is not opened, irregularities, asymmetries, and long-term distortion can potentially be avoided.[11] Avoiding release of the upper lateral cartilages in certain patient groups undergoing SRP for the treatment of nasal obstruction may represent an early step in this paradigm shift beyond patients presenting for cosmetic dorsal hump reduction.

Valid patient-reported outcome measures offer important insight into patient perception following SRP.[9] The Nasal Obstruction Symptom Evaluation (NOSE) survey, a validated quality of life instrument for patients with nasal obstruction, is often used to evaluate outcomes after septoplasty and rhinoplasty.[13] The FACE-Q scale is

From the Department of Otolaryngology–Head & Neck Surgery (R.E.W., S.K.G., N.S.J., R.W.L.), Harvard Medical School, Massachusetts Eye and Ear, Boston, Massachusetts, U.S.A.

Editor's Note: This Manuscript was accepted for publication on Augest 12, 2021.

The authors have no funding, financial relationships, or conflicts of interest to disclose.

Send correspondence to Rachel E. Weitzman, MD, MPH, MS, Department of Otolaryngology–Head & Neck Surgery, Division of Facial Plastic and Reconstructive Surgery, Massachusetts Eye and Ear, 243 Charles Street, Boston, MA 02114. E-mail: rachel_weitzman@hms.harvard.edu

DOI: 10.1002/lary.29872

also a validated, multi-modular patient-reported outcome instrument that assesses a patient's perception of nasal appearance and its impact on social functioning.[14] In this study, we aim to utilize these validated patient-reported outcome measures to demonstrate the impact of two different spreader graft placement techniques on nasal function and nasal aesthetics and to compare NAO and patient satisfaction with nasal appearance between SRP with spreader graft placement with release of the upper lateral cartilages and SRP with spreader graft placement without release of the upper lateral cartilages.

MATERIALS AND METHODS

Patient Selection

This study was performed at a single tertiary care medical center between June 2012 and April 2020 with institutional review board approval from the Human Subjects Research Committee of the Massachusetts Eye and Ear Infirmary. After we obtained written informed consent, patients presenting to the Massachusetts Eye and Ear Infirmary Facial Plastic and Reconstructive Surgery (Boston, Massachusetts) clinic were administered the NOSE survey and the FACE-Q Satisfaction with Nose, Satisfaction With Nostrils, and Social Functioning surveys preoperatively and at 2, 4, 6, and 12 months postoperatively. Surveys were administered in a manner compliant with the Health Insurance Portability and Accountability Act either in electronic format at their scheduled clinic appointment or electronically via email through REDcap (Research Electronic Data Capture), an electronic data-capture platform designed for academic clinical and translational database development.[15] All patients who underwent open SRP with spreader graft placement by the senior author (R.W.L.) for the treatment of NAO and who completed both the NOSE and FACE-Q surveys both preoperatively and at one or more postoperative time points were included in this study. All patient demographics, nasal history, and outcomes were reported and analyzed.

Surgical Technique

A full description of the surgical technique used for the placement of spreader grafts with release of the upper lateral cartilages has been previously published.[16] A 2- to 3-mm-thick strip of either septal or costal cartilage is placed between the septum and the upper lateral cartilages. The spreader graft is placed slightly inferior to the dorsal edge of the cartilaginous septum and extends to the caudal portion of the upper lateral cartilage at the scroll region or to the anterior septal angle. If a dorsal deviation is present, the upper lateral cartilages are released from the dorsum of the septum. The spreader grafts are then sutured to the dorsum of the septum using a 5–0 polydioxanone horizontal mattress suture. The upper lateral cartilages are then secured to the spreader grafts and the septum with an interrupted 5–0 polydioxanone suture to ensure that the caudal edge of the upper lateral cartilage has been fully extended to its normal anatomical length. The upper lateral cartilages are then sutured to the spreaders and the septum with horizontal mattress and interrupted sutures ensuring to secure the upper lateral cartilages slightly superior to the spreaders reconstituting the normal contour of the middle vault. If a dorsal deviation does not exist, often the upper lateral cartilages are not released, and the spreader grafts are placed in pockets between the upper lateral cartilages and the dorsum of the septum (Fig. 1). Care must be taken when elevating the mucoperichondrial flap for the septoplasty to main the continuity between the mucoperichondrium and dorsal portion of the septal L-strut, so that a tight pocket under the dorsal edge of the septum can be elevated for spreader graft placement. Commonly, one horizontal mattress suture is placed between the caudal edges of both spreader grafts and the dorsal septum to further secure the graft. Dorsal preservation dorsal hump reduction was not performed in any of the patients in this study.

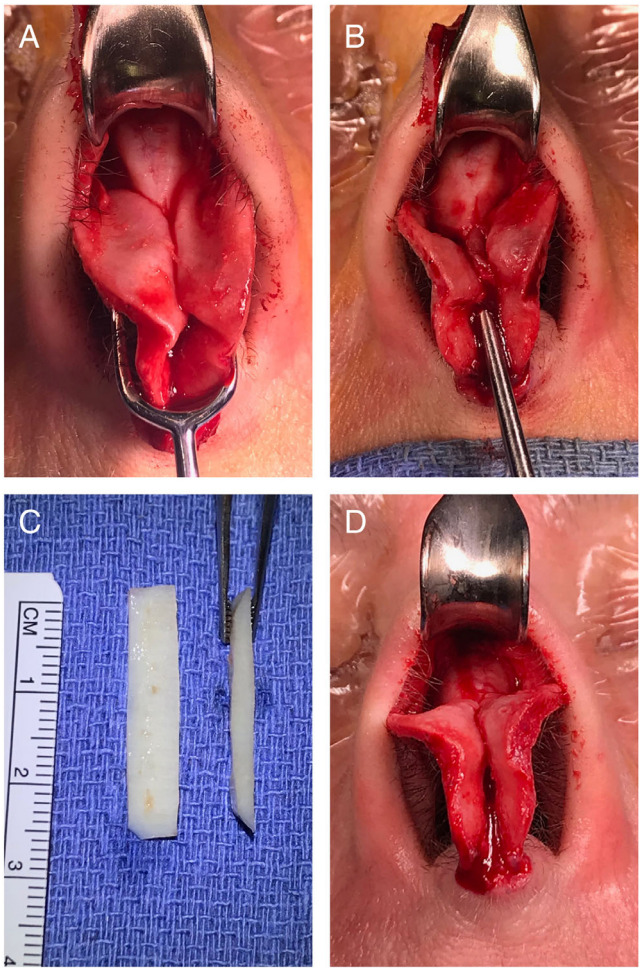

Fig. 1. Spreader graft placement without upper lateral cartilage release. A, Narrow middle vault in a patient with internal nasal valve narrowing and a h/o previous septoplasty and midline dorsal septum. B, Caudal elevator in a pocket created between the dorsal septum and the mucoperichondrium for the placement of the spreader graft without release of the upper lateral cartilages. C, Spreader grafts carved from cadaveric rib because of the patient's previous septoplasty. D, Bilateral spreader grafts in place. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

Outcome Measures

The subjective symptoms of NAO were measured using the NOSE questionnaire, a validated, patient-reported, disease-specific quality-of-life (QOL) assessment instrument that contains five questions related to nasal obstruction rated along a five-point Likert scale.[13,17–19] Question response scores are summed and converted to a total score from 0 (no nasal obstruction) to 100 (severe nasal obstruction).

Perception of nasal appearance was measured using the FACE-Q Satisfaction with Nose and Social Functioning scales, which consist of 10 and 8 validated questions, respectively, that the patient rates on a 4-point Likert scale. Rasch transformation is used to convert the results into a score from 0 to 100, with higher scores indicating greater satisfaction with appearance or quality of life.[14]

Objective measurement of nasal airflow was performed using an In-Check portable inspiratory flow meter (Clement Clarke International Ltd., Harlow, UK) to measure peak nasal inspiratory flow (NIF) pre- and post-operatively. NIF was measured with a tight-fitting anesthetic mask that did not affect the shape of the nose. Patients were instructed to inhale as hard and fast as possible through the mask while keeping their mouth closed and were allowed to practice with the device before formal testing. At formal testing, the patients performed three trials at maximal effort while sitting. The highest flow rate (L/min) of these three measurements was recorded, as has been previously described.

Statistical Analysis

Statistical analyses were conducted using Microsoft Excel, version 16.31, and STATA 16.0. For all tests, $P < .05$ was considered significant. The minimal clinically important difference (MCID) for NOSE scores was set at 30 points, as has been previously described.[17,20] While the MCIDs for FACE-Q scores have yet to be established in the literature, this value was approximated using one-half of the mean baseline standard deviation (SD), as has been previously described.[6,21] The MCID for NIF was set at 20, as has been previously described.[17,20] An unpaired *t* test was used to compare mean preoperative NOSE and FACE-Q scores, mean postoperative NOSE and FACE-Q scores, and mean change in score between the release and nonrelease cohorts at various time points. Scores at the time of each patient's last follow-up were used to calculate means, unless otherwise specified.

RESULTS

Patient Characteristics

A total of 589 patients underwent SRP with spreader graft placement, with release of the upper lateral cartilages performed in 559 (94.9%) patients (287 male [51.6%]), whereas the remaining 30 (5.1%) patients (18 male [60.0%]) did not undergo release of the upper lateral cartilages. Table I presents clinical characteristics of the two patient populations. There was a statistically significant difference in reason for SRP between groups. In the release cohort, 155 (27.7%) patients underwent

Table I.
Patient Characteristics.

	Release	Nonrelease	*P*-Value
Number of patients, n (%)	559 (94.9)	30 (5.1)	
Age, mean (standard deviation [SD]), yr	34.8 (14.8)	35.3 (14.8)	.818
Gender, n (%)			.371
Female	269 (48.4)	12 (40.0)	
Male	287 (51.6)	18 (60.0)	
History of nasal steroid use, n (%)	156 (28.2)	8 (26.7)	.859
History of nasal fracture, n (%)	268 (48.6)	18 (62.1)	.159
History of nasal surgery, n (%)	368 (66.9)	23 (76.7)	.267
Closed nasal reduction	47 (8.4)	1 (3.3)	.500
Rhinoplasty	42 (7.5)	2 (6.7)	1.000
Septoplasty	115 (20.6)	4 (13.3)	.484
Sinus surgery	27 (4.8)	2 (6.7)	.654
Turbinoplasty	36 (6.4)	2 (6.7)	1.000
Reason for rhinoplasty, n (%)			**.010**
Functional	404 (72.3)	28 (93.3)	
Cosmetic	155 (27.7)	2 (6.7)	
Additional graft source, n (%)			
Rib cartilage	57 (10.2)	1 (3.3)	.346
Septal cartilage	478 (85.5)	25 (83.3)	.742
Conchal cartilage	6 (1.1)	0 (0.0)	1.000
PDS plate	111 (19.9)	1 (3.3)	**.028**
Cadaveric rib	16 (2.9)	3 (10.0)	.066
Columellar strut/septal extension graft	196 (35.1)	2 (6.7)	**.001**
Alar rim	89 (15.9)	6 (20.0)	.554
Alar batten	2 (0.4)	0 (0.0)	1.000
Lateral crural strut	124 (22.2)	7 (23.3)	.883
Dorsal onlay	3 (0.5)	0 (0.0)	1.000

Bold value signifies $p < 0.05$.

Table II.
Preoperative and Postoperative NOSE Scores by Spreader Graft Method.

	Mean (SD) Score Preoperative	Postoperative	Mean (SD) Change in Score	Clinically Significant?*
All patients				
Release	63.7 (22.3)	20.4 (19.5)	43.3 (25.4)†	Yes
Nonrelease	65.2 (19.1)	21.4 (16.0)	43.8 (18.7)†	Yes
P-value‡	.681	.895	.282	
Follow-up ≥6 mo				
Release	63.4 (22.3)	20.4 (20.2)	43.1 (25.1)†	Yes
Nonrelease	65.0 (4.6)	20.6 (17.2)	44.4 (19.9)†	Yes
P-value‡	.368	.950	.280	
Follow-up ≥12 mo				
Release	62.0 (22.8)	20.8 (21.4)	41.3 (25.0)†	Yes
Nonrelease	58.8 (9.5)	15.0 (14.7)	43.8 (21.8)†	Yes
P-value‡	.553	.514	.501	
All functional SRP patients				
Release	63.4 (22.5)	20.5 (18.9)	42.9 (25.6)†	Yes
Nonrelease	65.0 (19.7)	21.5 (16.4)	43.5 (19.4)†	Yes
P-value‡	.362	.397	.458	

MCID = mean clinically important difference; NOSE = Nasal Obstruction Symptom Evaluation; SD = standard deviation; SRP = septorhinoplasty.
*Clinical significance was determined by a change greater than the NOSE score MCID of 30.
†Statistically significant change within each cohort ($P < .001$).
‡The *P*-value rows indicate the statistical difference between the spreader with release and spreader without release cohorts.

cosmetic SRP, compared to 2 (6.7%) patients in the nonrelease cohort ($P = .010$).

In addition, use of PDS plate as an additional graft source was significantly higher in the release cohort (111 [19.9%] patients in the release cohort, compared to 3 [10.0%] patients in the nonrelease cohort; $P = .028$). Use of columellar strut/septal extension graft as an additional graft source was also significantly higher in the release cohort (196 [35.1%] patients in the release cohort, compared to 2 [6.7%] patients in the nonrelease cohort; $P = 0.001$). Otherwise, cohorts were well-matched with no statistically significant differences in patient characteristics.

Outcomes

Among the release cohort, there was a clinically and statistically significant improvement in NOSE scores in all patients (at their time of last follow-up), those with follow-up of at least 6 months (n = 315), those with follow-up of at least 12 months (n = 186), and those who underwent functional SRP (n = 404) (mean [SD]: 43.4 [25.4], 43.1 [25.1], 41.3 [25.0], and 42.9 [25.6], respectively; $P < .001$) (Table II). FACE-Q Satisfaction with Nose, FACE-Q Social Functioning, and NIF scores also had statistically significantly improvements at time of last follow-up, with a mean (SD) change of 19.1 (24.1), 8.8 (11.2), and 20.9 (35.8), respectively ($P < .05$). The changes in FACE-Q Satisfaction with Nose and NIF scores were clinically significant, while the change in FACE-Q Social Functioning was not (Table III).

Among the nonrelease cohort, there was a clinically and significant improvement in NOSE scores in all patients, those with follow-up of at least 6 months (n = 10), those with follow-up of at least 12 months (n = 4), and those who underwent rhinoplasty for functional purposes (n = 28) (43.8 [18.7], 44.4 [19.9], 43.8 [21.8], and 43.5 [19.4], respectively; $P < .001$) (Table II). FACE-Q Satisfaction with Nose, FACE-Q Social Functioning, and NIF scores also had statistically significant improvements at time of last follow-up, with a mean (SD) change of 16.5 (24.6), 7.9 (15.5), and 25.9 (34.8), respectively ($P < .05$). The changes in FACE-Q Satisfaction with Nose and NIF scores were clinically significant, while the change in FACE-Q Social Functioning was not (Table III).

Pre- and post-operative mean NOSE scores, as well as mean change in NOSE score, were not significantly different between the release and nonrelease cohorts at time of last follow-up, follow-up of at least 6 months, or follow-up of at least 12 months, or between the release and nonrelease functional rhinoplasty patients. Both cohorts also had significant statistical and clinical improvement from baseline (Table II).

Pre-operative mean FACE-Q Satisfaction with NOSE and FACE-Q Social Functioning scores and post-operative FACE-Q Satisfaction with NOSE, FACE-Q Social Functioning, and NIF scores were not significantly different between the release and nonrelease cohorts at time of last follow-up. However, the mean (SD) pre-operative NIF score was significantly higher in the release cohort, compared to the nonrelease cohort (71.9 [33.8] and 52.7 [25.2], respectively; $P < .001$). There was no statistically significant difference in mean (SD) change in FACE-Q Satisfaction with Nose (19.1 [24.1] points in the release cohort, compared to 16.5 [24.6] points in the nonrelease cohort; $P = .576$), FACE-Q Social Functioning (8.8 [11.2] points in the release cohort, compared to 7.9

Table III.
Preoperative and Postoperative FACE-Q and NIF Scores by Spreader Graft Type.*

	Mean (SD) Score Preoperative	Postoperative	Mean (SD) Change in Score	Clinically Significant?†
FACE-Q satisfaction with nose				
Release	57.5 (21.6)	76.5 (21.5)	19.1 (24.1)‡	Yes
Nonrelease	61.0 (16.2)	77.5 (18.1)	16.5 (24.6)‡	Yes
P value§	.266	.772	.576	
FACE-Q social functioning				
Release	73.5 (20.3)	82.3 (20.4)	8.8 (11.2)‡	No
Nonrelease	76.9 (21.9)	84.8 (21.2)	7.9 (15.5)‡	No
P-value§	.412	.533	.756	
NIF				
Release	71.9 (33.8)	92.8 (43.5)	20.9 (35.8)‡	Yes
Nonrelease	52.7 (25.2)	78.6 (39.2)	25.9 (34.8)‡	Yes
P-value§	**<.001**	.063	.450	

MCID = mean clinically important difference; NIF = negative inspiratory force; SD = standard deviation.
*Reported are the mean (SD) preoperative and postoperative FACE-Q and NIF scores at time of last follow-up, by those with spreader with release (n = 559) and those with spreader without release (n = 30).
†Clinical significance was determined by a change greater than the MCID for each scale: FACE-Q Satisfaction with Nose MCID, 11.0; FACE-Q Satisfaction with Nostrils MCID, 13.6; FACE-Q Social Functioning MCID, 10.2; and NIF MCID, 20.
‡Statistically significant change within each cohort ($P < .05$).
§The *P*-value rows indicate the statistical difference between the spreader with release and spreader without release cohorts.
Bold value signifies $p < 0.05$.

[15.5] points in the nonrelease cohort; $P = .756$), and NIF (20.9 [35.8] points in the release cohort, compared to 25.9 [34.8] points in the nonrelease cohort; $P = .450$) scores between the release and nonrelease cohorts (Table III).

DISCUSSION

Internal nasal valve narrowing is a common cause of symptomatic nasal obstruction. More recently, using computational fluid dynamic modeling, our group has demonstrated the internal nasal valve to be an area of increased resistance, which can be reversed by the placement of spreader grafts (publication pending—accepted to PRS). The traditional approach to SRP with spreader graft placement involves release of the upper lateral cartilages from the dorsum of the septum.[8] Our group has previously reported on the functional and aesthetic outcomes of the placement of spreader grafts with the release, and demonstrated improvement in nasal obstruction without a negative impact on patient-perceived nasal appearance.[9] However, as there is a shift toward preservation rhinoplasty to improve NAO while maintaining natural structure of the dorsum, release of the upper lateral cartilages may be reconsidered. The impact of avoiding release of the upper lateral cartilages in patients undergoing SRP with spreader graft placement has not been demonstrated using patient-reported outcome measures, and results of nonrelease have not been compared to release. It is important not only to evaluate improvement in NAO in patients who have undergone SRP with spreader graft placement with release versus without release of the upper lateral cartilages, but also to analyze aesthetic results, as patient perception of nasal appearance after surgery is a critical part of surgical outcomes. Every maneuver in rhinoplasty should be carefully considered a release of nasal soft tissue and cartilaginous connections has the potential to lead to long-term negative structural issues caused by lack of support. Demonstrating that SRP with spreader graft placement with and without upper lateral cartilage release both provide clinically and statistically significant improvement, and no significant difference in functional outcome, suggests that upper lateral cartilages do not need to be released to achieve functional improvement. Surgeons should consider whether or not the upper lateral cartilages need to be released to achieve the goals of the surgery.

This study demonstrates that SRP with spreader graft placement without release of the upper lateral cartilages results in improvement in NAO and patient perception of nasal appearance. Avoiding release of the upper lateral cartilages produces statistically and clinically significant improvement in NOSE and NIF scores at time of last follow-up, follow-up at 6 months, and follow-up of 12 months. In addition, the nonrelease cohort demonstrated statistically and clinically significant improvement in FACE-Q Satisfaction with Nose and statistically significant improvement in FACE-Q Social Functioning scores at time of last follow-up. In fact, even in purely functional cases, there is statistically and clinically significant improvement in aesthetic outcomes. When comparing the nonrelease and release cohorts, there is no statistically significant difference in mean change in NOSE, FACE-Q Satisfaction with NOSE, FACE-Q Social Functioning, and NIF scores, suggesting comparable improvement.

Despite no statistically significant difference in mean change of NIF scores between cohorts, mean preoperative NIF score was significantly higher in the

release cohort, compared to the nonrelease cohort. We theorize that this is due to the smaller sample size of the nonrelease cohort. We also previously showed that NIF values lack a strong correlation with NOSE scores, which limit's NIF's utility as a diagnostic tool for NAO. Rather, NIF is most useful when pre- and post-operative values are compared to detect clinically significant objective improvements in nasal airflow following SRP (i.e., with change in NIF score).[22] Despite having lower nasal airflow at baseline, as measured by the PNIF, this study demonstrates statistically and clinically significant improvement in NIF scores at time of last follow-up for patient undergoing placement of spreader grafts without release of the upper lateral cartilages. This, combined with the statically significant improvement in NOSE scores in the nonrelease cohort, demonstrates that upper lateral cartilages do not need to be released for successful spreader graft placement.

It is important to consider differences in patient demographics between the release and nonrelease cohorts. There was a statistically significant difference in reason for SRP between groups, with significantly more patients undergoing cosmetic SRP in the release cohort ($P = .010$). This is consistent with the need to release the upper lateral cartilages from the cartilaginous dorsum for completion of a component cosmetic dorsal hump reduction.[23] It is also important to note that placing spreader grafts in a tight tunnel between the dorsal septum and the upper lateral cartilage without release can tension the upper lateral cartilage and open the internal nasal valve improving air flow. Furthermore, use of PDS plate and columellar strut/septal extension graft as an additional graft source was significantly higher in the release cohort ($P = .028$ and $P = .001$, respectively). PDS plate is often utilized in cases with significant caudal and dorsal septal deviation, so it is expected that use of PDS plate often necessitates release of the upper lateral cartilages.[24] The release cohort, therefore, represents a patient population with significant caudal or dorsal septal deviation or one that required dorsal hump reduction. Although these underlying characteristics differ, comparing the groups provides increased power and level of evidence to study patient perception of NAO and aesthetic outcomes in the nonrelease cohort.

While this study demonstrates that both patient-perceived nasal function and aesthetics improve following SRP with spreader graft placement without upper lateral cartilage release, limitations exist. The study was performed at a single tertiary academic center with a single surgeon, so selection bias may have been introduced. Patients were only included in the NOSE, FACE-Q, or NIF score correlation portions of the study if they completed a pre-operative survey and agreed to have their information used for research purposes. Patients completed the baseline NOSE, FACE-Q, or NIF on the day of initial clinic visit, which may have caused patients to focus on their disease and rate their disease as having a more negative impact on their QOL compared to their average baseline, but this should be true for patients in both the release and nonrelease cohorts. In addition, this study does not directly measure the width of the nasal dorsum before or after surgery and does not assess patient satisfaction with nasal dorsum in isolation. We did not employ the Standardized Cosmesis and Health Nasal Outcomes Survey to examine specific questions related to midvault reconstruction.

Because release of the upper lateral cartilages is performed in a different patient population from that without release, this is not a direct comparison. Still, this comparison provides useful clinical insight into patient perception of NAO and aesthetic appearance and shows that release of the upper lateral cartilages during SRP with spreader graft placement is not necessary to improve nasal breathing without negatively affecting patients' overall perception of nasal aesthetics. Patient selection is important when deciding whether or not upper lateral cartilage release is needed. Patients with a dorsal septal deviation and/or undergoing a component dorsal hump reduction will most likely require release. However, the senior author recommends that upper lateral cartilage release should not be performed by default for all patients requiring spreader grafts, and careful consideration should be given prior to release to preserve the native middle vault structure if possible.

CONCLUSION

This study demonstrates that SRP with spreader graft placement with upper lateral cartilage release and without upper lateral cartilage release provides a clinically and statistically significant improvement and no significant difference in functional outcome. Both surgical techniques can be effective, and release of the upper lateral cartilages should not be the default in all patients. The reason for SRP and etiology of NAO and/or deformity should inform clinical decision-making when considering, which technique to perform.

BIBLIOGRAPHY

1. Chandra RK, Kern RC, Cutler JL, Welch KC, Russell PT. REMODEL larger cohort with long-term outcomes and meta-analysis of standalone balloon dilation studies. *Laryngoscope* 2016;126:44–50. https://doi.org/10.1002/lary.25507.
2. Rhee JS, Poetker DM, Smith TL, Bustillo A, Burzynski M, Davis RE. Nasal valve surgery improves disease-specific quality of life. *Laryngoscope* 2005; 115:437–440. https://doi.org/10.1097/01.mlg.0000157831.46250.ad.
3. Gadkaree SK, Fuller JC, Justicz NS, et al. Health utility values as an outcome measure in patients undergoing functional septorhinoplasty. *JAMA Facial Plast Surg* 2019;21. https://doi.org/10.1001/jamafacial.2019.0234.
4. Gadkaree SK, Fuller JC, Justicz NS, et al. A comparative health utility value analysis of outcomes for patients following septorhinoplasty with previous nasal surgery. *JAMA Facial Plast Surg* 2019;143. https://doi.org/10.1001/jamafacial.2019.0176.
5. Rhee JS, Weaver EM, Park SS, et al. Clinical consensus statement: diagnosis and management of nasal valve compromise. *Otolaryngol-Head Neck Surg* 2010;143:48–59. https://doi.org/10.1016/j.otohns.2010.04.019.
6. Fuller JC, Levesque PA, Lindsay RW. Assessment of the EuroQol 5-dimension questionnaire for detection of clinically significant Global Health-related quality-of-life improvement following functional septorhinoplasty. *JAMA Facial Plast Surg* 2017;19:95–100. https://doi.org/10.1001/jamafacial.2016.1410.
7. Toriumi D. *Middle Nasal Vault Anatomy and Clinical Review of Spreader Grafts*. Thieme Medical Publishers; 1995:
8. Sheen JH. Spreader graft: a method of reconstructing the roof of the middle nasal vault following rhinoplasty. *Plast Reconstr Surg* 1984;73:230–239.
9. Fuller JC, Levesque PA, Lindsay RW. Analysis of patient-perceived nasal appearance evaluations following functional septorhinoplasty with spreader graft placement. *JAMA Facial Plast Surg* 2019;21:305–311. https://doi.org/10.1001/jamafacial.2018.2118.

10. Daniel RK. The preservation rhinoplasty: a new rhinoplasty revolution. *Aesthet Surg J* 2018;38:228–229. https://doi.org/10.1093/asj/sjx258.
11. Kosins AM, Daniel RK. Decision making in preservation rhinoplasty: a 100 case series with one-year follow-up. *Aesthet Surg J* 2020;40:34–48. https://doi.org/10.1093/asj/sjz107.
12. Saban Y, Daniel RK, Polselli R, Trapasso M, Palhazi P. Dorsal preservation: the push down technique reassessed. *Aesthet Surg J* 2018;38:117–131. https://doi.org/10.1093/asj/sjx180.
13. Stewart MG, Witsell DL, Smith TL, Weaver EM, Yueh B, Hannley MT. Development and validation of the nasal obstruction symptom evaluation (NOSE) scale. *Otolaryngol-Head Neck Surg* 2004;130:157–163. https://doi.org/10.1016/j.otohns.2003.09.016.
14. Klassen AF, Cano SJ, East CA, et al. Development and psychometric evaluation of the FACE-Q scales for patients undergoing rhinoplasty. *JAMA Facial Plast Surg* 2016;18:27–35. https://doi.org/10.1001/jamafacial.2015.1445.
15. University V. Research electronic data capture webite. Available at: https://projectredcap.org. Accessed October 18, 2019.
16. Lindsay RW. Disease-specific quality of life outcomes in functional rhinoplasty. *Laryngoscope* 2012;122:1480–1488. https://doi.org/10.1002/lary.23345.
17. Rhee JS, Sullivan CD, Frank DO, Kimbell JS, Garcia GJ. A systematic review of patient-reported nasal obstruction scores: defining normative and symptomatic ranges in surgical patients. *JAMA Facial Plast Surg* 2014;16:219–225; quiz 232. https://doi.org/10.1001/jamafacial.2013.2473.
18. Most SP. Analysis of outcomes after functional rhinoplasty using a disease-specific quality-of-life instrument. *Arch Facial Plast Surg* 2006;8:306–309. https://doi.org/10.1001/archfaci.8.5.306.
19. Lipan MJ, Most SP. Development of a severity classification system for subjective nasal obstruction. *JAMA Facial Plast Surg* 2013;15:358–361. https://doi.org/10.1001/jamafacial.2013.344.
20. Timperley D, Srubisky A, Stow N, Marcells GN, Harvey RJ. Minimal clinically important differences in nasal peak inspiratory flow. *Rhinology* 2011;49:37–40. https://doi.org/10.4193/Rhino10.097.
21. Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. *Med Care* 2003;41:582–592. https://doi.org/10.1097/01.Mlr.0000062554.74615.4c.
22. Fuller JC, Bernstein CH, Levesque PA, Lindsay RW. Peak nasal inspiratory flow as an objective measure of nasal obstruction and functional Septorhinoplasty outcomes. *JAMA Facial Plast Surg* 2018;20:175–176. https://doi.org/10.1001/jamafacial.2017.1775.
23. Rohrich RJ, Muzaffar AR, Janis JE. Component dorsal hump reduction: the importance of maintaining dorsal aesthetic lines in rhinoplasty. *Plast Reconstr Surg* 2004;114:1298–1308; discussion 1309-12. https://doi.org/10.1097/01.prs.0000135861.45986.cf.
24. Boenisch M, Nolst Trenité GJ. Reconstruction of the nasal septum using polydioxanone plate. *Arch Facial Plast Surg* 2010;12:4–10. https://doi.org/10.1001/archfacial.2009.103.