

Reinserting the Hump in Primary Rhinoplasty: The Gain Is Three-fold

Jannis Constantinidis, PhD*
Georgios Fyrmipas, MSc, PhD†

Background: Hump reduction in aesthetic rhinoplasty destabilizes the middle vault. Secondary maneuvers are necessary to avoid the long-term functional and aesthetic sequelae of middle vault collapse. We describe a new technique of reinserting the resected hump that combines (a) placement of the modified hump between the upper laterals and (b) bridging sutures between the upper laterals.

Methods: Retrospective review of patients undergoing primary aesthetic rhinoplasty with hump resection.

Results: Sixty-two patients, 46 with a straight and 16 with a deviated nose, enrolled. Twenty-three patients were operated through an open approach and 39 through a closed approach. Osteotomies were necessary in 56 patients. Mean follow-up was 13 months (range, 9–16 mo). A satisfactory result was achieved in all but 3 patients who had visible irregularities. Two of them required minimal rasping under local anesthesia and the third patient refused any further treatment.

Conclusions: Our modification of Skoog's original technique has certain advantages: the hump acts as a spreader and onlay graft, which preserves the natural dorsal lines. The sutures increase the nasal valve angle while preventing displacement of the reinserted hump. Indications include a straight or mildly deviated nose, a long thin-skinned nose with short nasal bones. The technique is also feasible through the closed or open approach and offers a valuable alternative to spreader grafts or flaps. (*Plast Reconstr Surg Glob Open* 2016;4:e1021; doi: 10.1097/GOX.0000000000001021; Published online 10 October 2016.)

Modification of the nasal profile is one of the most common components in primary aesthetic rhinoplasty. Reduction of an osseocartilaginous hump often leads to an open roof deformity, which is traditionally treated with medialization osteotomies. The ensuing narrowing of the airway at the level of the middle vault may become manifest years postoperatively. A number of solutions have been proposed to tackle both the functional and aesthetic sequelae of the hump resection. The workhorse in middle vault reconstruction is the spreader grafts popularized by Sheen.¹ Dorsal onlay grafts,² the push-down-let-down technique,³ and the spreader flaps⁴ are some alternatives. Hump reinsertion was initially proposed by Cottle⁵ in 1954 and further developed by Skoog⁶

in 1966. The original technique involved hump resection through a transcartilaginous approach, reduction of the hump, and reinsertion of it as an autologous graft. Stabilization of the graft to the anterior septum with an absorbable suture was necessary in some cases. A smooth, stable dorsum, a supported internal nasal valve, sparing of valuable septal cartilage, and short operative time are some of the advantages. The main disadvantage is graft visibility or palpability due to inadequate reduction or displacement. Despite the promising results, only a few surgeons still utilize this technique and its modifications. In this study, we describe a new modification of the Skoog's technique, which combines the modified hump with flaring sutures. The new complex serves 3 functions: that of a dorsal onlay graft, a spreader graft, and a flaring suture.

From the *2nd Department of Otolaryngology Head & Neck Surgery, Papageorgiou Hospital, Aristotle University of Thessaloniki, Thessaloniki, Greece; and †ENT Department, Derriford Hospital, Plymouth, United Kingdom.

Received for publication February 2, 2016; accepted July 8, 2016.
Copyright © 2016 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. All rights reserved. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially.

DOI: 10.1097/GOX.0000000000001021

METHODS

This is a retrospective chart review of patients undergoing aesthetic primary rhinoplasty in a single tertiary referral center between the years 2008 and 2014. Approval of the ethical committee was obtained, and all patients had to give their written consent. Inclusion criteria were adult patients, primary aesthetic rhinoplasty,

Disclosure: The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.

and the patient's request for hump reduction. Patients with severely crooked noses and/or a minimal hump or profile modifications other than a hump resection were excluded.

OPERATIVE TECHNIQUE

The open approach or more often the closed approach was employed depending on the additional maneuvers that were necessary. Local anesthesia with xylocaine 2% and adrenaline 1:200,000 was injected in the columella, intercartilaginous region on both sides, over the dorsum, and in the caudal septum. An intercartilaginous-hemitransfixion incision exposed the anterior septal angle, the cartilaginous septum, and gave adequate access to the ipsilateral lateral crus of the lower lateral cartilage and the nasal dorsum. Any septal modifications and most tip contouring maneuvers would be completed at this stage. This sequence permitted a good appreciation of the size of the hump to be resected to achieve a balanced tip-dorsum relationship. The submuscular aponeurotic system dissection continued up to the root of the nose and laterally over the attachment of the upper lateral cartilages (ULCs) to the dorsal septum. The osseocartilaginous dorsum was freed from the underlying mucoperichondrium and mucoperiosteum. Extramucosal dissection, however, was not feasible in some noses with a large hump. One or 2 Aufricht retractors were used to elevate the dorsal soft tissues. The hump was resected in 1 piece (Fig. 1). A scalpel no. 11 was used to separate the cartilaginous part of the hump starting from the bony-cartilaginous junction and proceeding caudally. The osseous part was divided with a Rubin straight osteotome. A greater bony segment would be resected if deepening of a blunt nasofrontal angle was necessary. The hump was first denuded from any underlying soft tissues including the septal remnant and then reduced to the desired size (Figs. 2–6). For the cartilaginous part, a scalpel no. 15 was used, and for the bony part, a bone rongeur or a diamond drill was used (specifically in thin-skinned noses where irregularities would be more evident) (Fig. 4). With the aid of a morselizer, the osseocartilaginous junction of the

new hump would be crushed before reinsertion (Fig. 5). This maneuver also provided a desirable flattening of the hump. With the dorsal soft tissues retracted, 2 nonabsorbable monofilament synthetic 5.0 sutures were passed through the corresponding medial edges of the upper laterals (1 at the cephalic end and 1 at the caudal end)



Fig. 2. Resection of underlying mucosa and septal remnant from the hump.

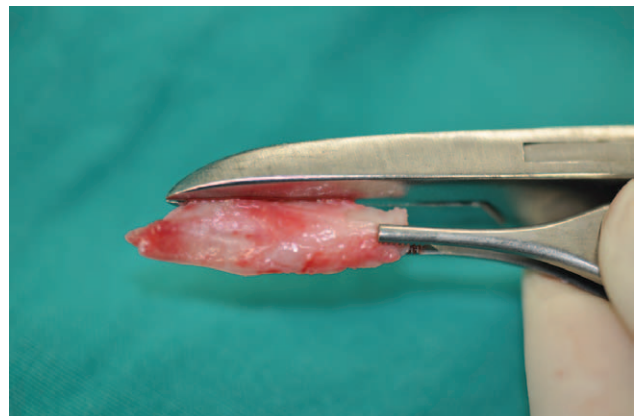


Fig. 3. Trimming of hump edges with a rongeur to the appropriate shape.



Fig. 1. Hump resection.

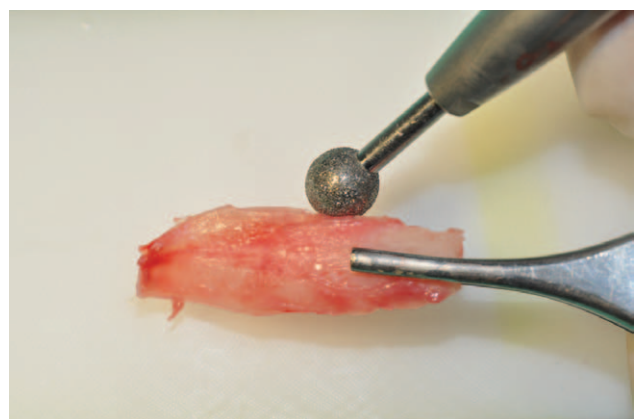


Fig. 4. A diamond burr is used to taper the edges of the hump in thin-skinned patients.

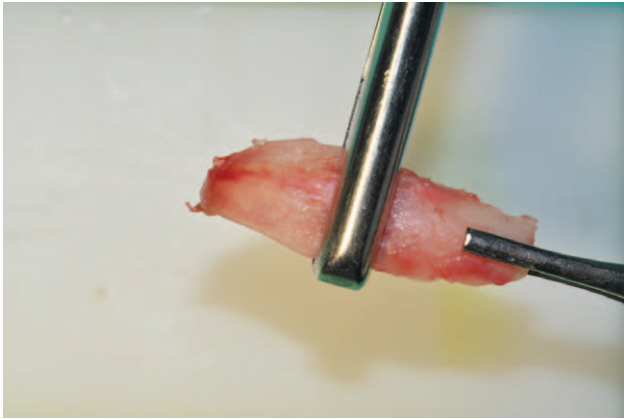


Fig. 5. A morselizer flattens the hump.

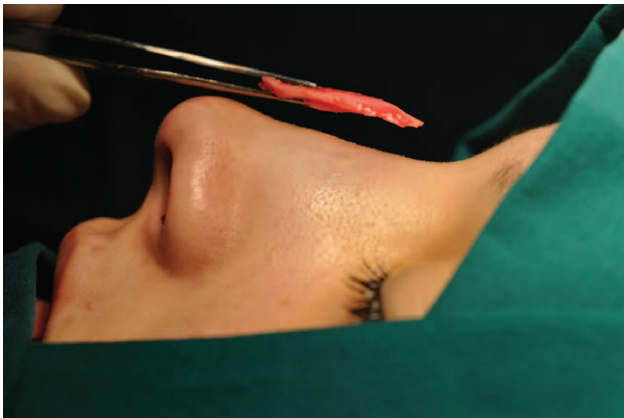


Fig. 6. The appropriately sized hump is reinserted.

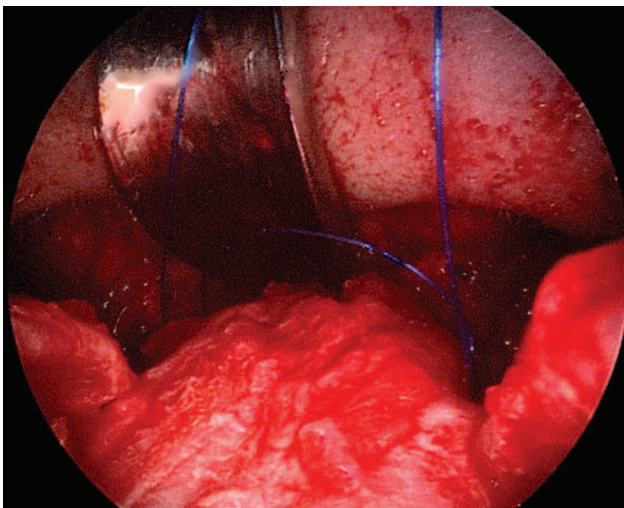


Fig. 7. Endoscopic view of the suture placement through an open-approach rhinoplasty. Nonabsorbable sutures are passed through the medial edges of the upper lateral cartilages.

(Fig. 7). At this point, the paramedian and percutaneous transverse and lateral osteotomies would take place. No osteotomies were performed in cases with a narrow nasal bridge. Silicon nasal splints would then be sutured

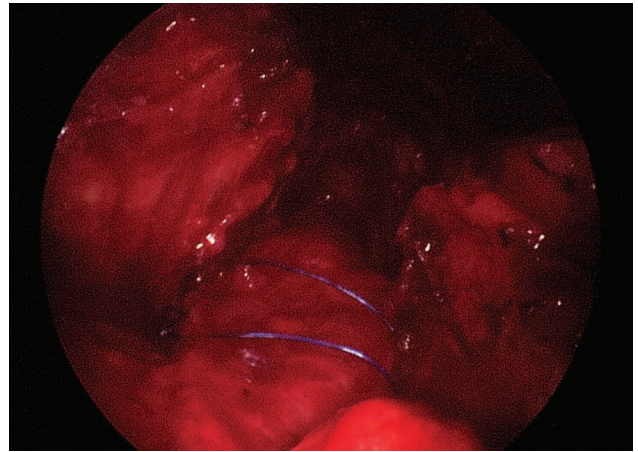


Fig. 8. The modified hump is reinserted between the upper lateral cartilages and the knots tightened. The final position of the hump and sutures is shown.

on either side of the septum, if a septoplasty had been performed, to stabilize the septum and prevent collapse of the hump. The hump was then placed into position under the arch created by the sutures and the latter were tightened (Fig. 8). The ULs would thus stay lateral to the hump, and any inward movement would be prevented. A suture between the hump and the anterior septal angle would also prevent caudal dislocation of the hump. If a septoplasty was necessary, this could theoretically lead to collapse of the autograft because of an unstable dorsal septum. We stabilized the septum with the insertion of 2 nasal splints before the reinsertion of the autograft. This created a more stable basis for the autograft to rest on during the initial healing period. If interdomal sutures were deemed necessary, they would be performed at this stage. Earlier placement would narrow the space for inserting the modified hump. A light absorbable packing was inserted and patients were discharged home the first postoperative day. Follow-up for review was arranged after 1 week to remove the cast and then in the first, sixth, and twelfth months. Two relevant clinical cases are presented (Figs. 9–11).

RESULTS

Sixty-two patients, 41 women and 21 men, with a mean age of 29 years (range, 18–57 y) met the inclusion criteria and entered the study. All patients had a hump nose, 46 patients had a straight nose and 16 patients a deviated nose. The closed approach was used in 39 patients and the open approach in 23. Osteotomies were performed in all but 6 patients who had a narrow or normal nasal width after resection of the hump. Mean follow-up was 13 months (range, 9–16 mo). No patient reported postoperative nasal obstruction, and no hump displacements were noted. Three patients presented with postoperative irregularities visible through a thin skin. Two of them underwent corrective rasping under local anesthesia. The third patient and another patient with a residual hump were both satisfied with the result and not keen to undergo revision surgery.



Fig. 9. A, A 29-year-old female patient with a moderate hump and a low radix. Anterior preoperative view. B, Postoperative anterior view after hump reduction and reinsertion through a closed approach. C, Preoperative lateral view. D, Postoperative lateral view. Trimming of the lower lateral cartilages was achieved through bilateral intracartilaginous incisions, which resulted in increased tip rotation. The reinserted hump provided a stable and smooth profile.

DISCUSSION

The UL–septum complex has a rounded natural shape and defines an uninterrupted, aesthetically pleasing tip eyebrow line. Functionally, a strong and stable complex opposes the forces causing inward displacement of the ULs during inspiration. Oftentimes, the complex is inherently deficient in long, thin, tension-type noses with short nasal bones leading to a subclinical internal valve obstruction. Resection of even a small hump will accentuate this phenomenon. During profile reduction, a T-shape piece of cartilage with 2 components (dorsal septum and the medial part of the ULs) is resected and a dead space is created. Subsequent fibrosis will bring the ULs away from the nasal bone undersurface toward the septal remnant so as to fill the newly created gap. A depression at the junction between the nasal bones and ULs (inverted V deformity) appears and postoperative nasal obstruction ensues.

Currently, spreader grafts are widely used to prevent the functional compromise at the middle vault level after humpectomy. Sheen¹ was the first to recognize the value of reconstituting the integrity of the middle vault complex in 1984. Two rectangular pieces from septal cartilage were placed between the dorsal septal remnant and UL

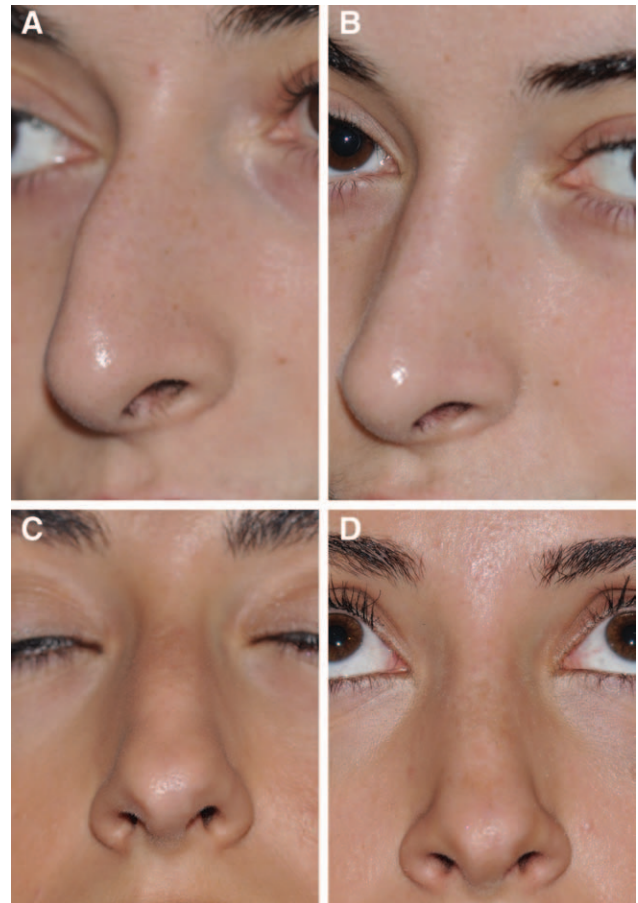


Fig. 10. A, Preoperative left oblique view. B, Postoperative left oblique view. C, A 32-year-old female patient with a straight mild hump and low radix. Preoperative anterior view. D, Postoperative anterior view after hump resection, modification, and reinsertion through a closed approach. Reinsertion of the modified hump resulted in a narrower but still functional nasal dorsum.

remnants, thus reconstituting the loss of T structure after humpectomy. Constantian and Clardy⁷ provided evidence of the functional improvement after using spreader grafts in secondary rhinoplasty. However, spreader grafts may not improve nasal breathing in all primary situations because of insufficient lateralization of the ULs. They may also produce an overly wide middle vault, visible dorsal irregularities because of rotation of the cephalic edges, and they may fail to prevent an inverted V deformity. Less septal cartilage is available for other surgical maneuvers. Humpectomy removes the UL attachments to the septum and therefore results in a loss of the internal spanning forces of the cartilage, which is not addressed by the spreader grafts. This is why many surgeons have moved toward other techniques that attempt to maintain or mimic the elastic properties of the ULs.⁸ Park⁹ was the first to place a nonabsorbable flaring suture between the ULs of an intact UL–septum complex, which caused 2 effects: increased UL tension and a wider internal valve angle. Roostaiean et al⁸ describe the UL cartilage tension spanning suture. A long-lasting absorbable suture is placed between the detached ULs and the anterior septum, so that the

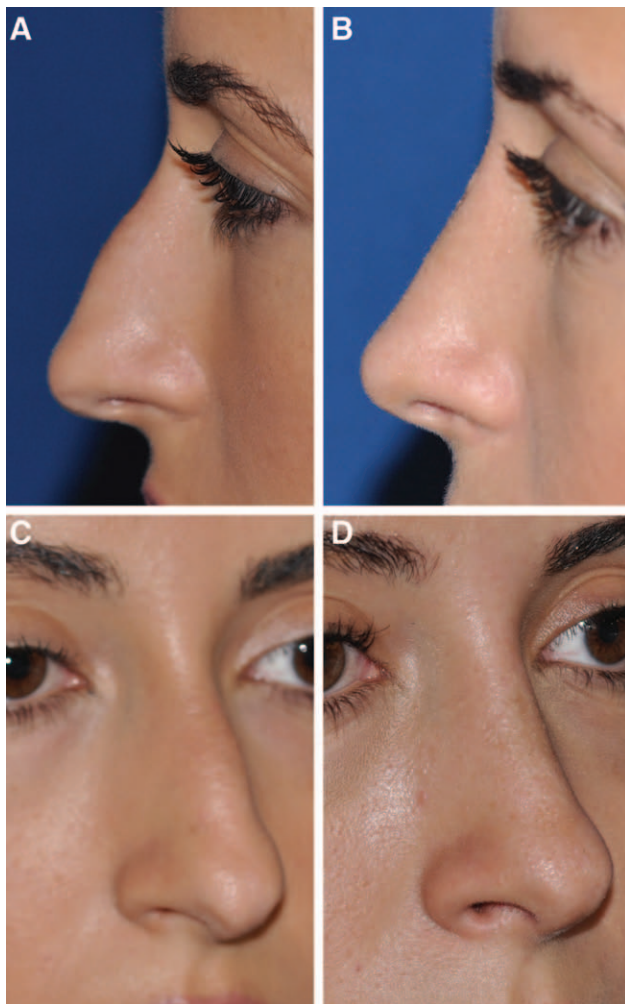


Fig. 11. A, Preoperative left lateral view. B, Postoperative left lateral view. A straight and balanced profile is achieved. C, Preoperative right oblique view. D, Postoperative right oblique view.

longitudinal UL tension is increased. A modification of the technique is the infolding of the detached ULs with the application of sutures, which reconstitutes the spring effect of the intact UL–septum complex (spreader flaps). Further modifications of the spreader flaps have been described to allow for different anatomical situations.¹⁰ However, not all patients are candidates for the latter technique, particularly those with long tension noses or with thin and atrophic ULs. The main disadvantage is the creation of an overly wide middle vault.

The above-described techniques are best performed through an open approach. Operative time, however, is increased. Skin edema masks the instant visual effect of other interventions such as radix or tip graft placement. The final aesthetic result will be evident many months postoperatively.

Skoog's original technique has been utilized in diverse clinical scenarios and modified by various authors. The largest series up to date is that of Regnault and Alfaro¹¹ in 1980 with 305 patients. Fifty percent of them had large and crooked noses. All were operated through the closed

approach. Eighty-nine percent of the patients were satisfied with the result and 2% required a revision mostly because of the visibility of the graft. Lejour et al¹² report good results with 34 patients and point out that the reinserted graft conceals the deviated septum that may manifest after humpectomy. The graft does not resorb neither forms a union with the underlying nasal bones. Hall et al¹³ added sutures between the reinserted hump and the UL to prevent displacement. Sabeti and Tehrani¹⁴ trim the bone edges of the resected hump only and preserve the underlying cartilage. Their main contribution to the evolution of the technique is the insertion of the hump between the ULs to reconstitute the spring effect of the T structure of the septum–UL complex. Mommaerts et al¹⁵ and Cook et al¹⁶ have extended the application of the technique in cases with a shallow nasofrontal angle and a cleft palate, respectively. Niechajev¹⁷ used the technique in 44 patients, including 4 revision and 14 crooked nose cases through a closed approach with 4 patients presenting with palpable graft edges postoperatively.

Our technique is based on the reinsertion of the modified hump as described by the previous authors but with some key differences. We insert the hump in between the UL remnants so as to prevent them from falling inward during the healing period (spreader graft function). Nonabsorbable sutures are placed between the ULs, thus stabilizing the modified hump and preventing its displacement. By regulating the tension of the sutures, we incorporate the function of a flaring suture, that is, increase the UL tension and widening of the internal nasal valve angle. Sabeti and Tehrani¹⁴ also placed the modified hump between the ULs but did not use a flaring suture. Hall et al¹³ sutured the ULs to the edges of the reduced hump to avoid displacement but did not take advantage of the splaying effect of the modified hump. In select cases, the technique can be combined with other tip maneuvers through the closed approach, thus reducing surgical time and avoiding unnecessary postoperative edema. The choice between a closed or open approach relies on the requirement for significant tip modification. Additionally, if the space available after resection of the hump was inadequate for placement of the bridging sutures or even the reinsertion of the autograft, the closed approach would be converted to an open.

There are some technical points that deserve attention: (a) the resected hump should be dealt with great care to avoid inadvertent fragmentation. Substitution with septal cartilage may be difficult. (b) The undersurface of the hump should be devoid of mucosa and dorsal septal remnant so as to avoid inappropriate fitting. (c) Suture placement is easier before the hump reinsertion.

The main indication for our technique is primary hump reduction in a straight or mildly deviated nose. Tip modifications such as cephalic trim and tip grafts and osteotomies for reducing a wide nasal pyramid are feasible. The procedure allows reduction of an obtuse nasofrontal angle provided that a long hump with a significant bony segment is resected. However, small humps that need rasping or conservative resection, severely crooked noses, severe dorsal septal deviations, saddle noses, malformed

or asymmetric lower lateral cartilages, and revision cases need a different approach.

CONCLUSIONS

Hump reduction in primary rhinoplasty destabilizes the middle vault. Further maneuvers are necessary to prevent long-term middle vault collapse and its functional and aesthetic sequelae. The combination of the modified hump reinserted between the ULs and bridging sutures is a middle vault-preserving technique that has not been described before. The autograft prevents the inward collapse of the ULs and provides a smooth and natural nasal neodorsum. The sutures prevent displacement of the autograft and increase the nasal valve angle should it be necessary. The technique does not require an open approach in the majority of cases, thus permitting less soft-tissue dissection and scarring and reduced operative time. Noses with a large hump and long noses with thin skin and short nasal bones that would otherwise need an open approach and spreader grafts may alternatively be managed with this technique.

Jannis Constantinidis

2nd Department of Otolaryngology Head & Neck Surgery
Papageorgiou Hospital
Aristotle University of Thessaloniki
Thessaloniki Ring Road, Nea Efkarpia
Thessaloniki 56429, Greece
E-mail: janconst@otenet.gr

PATIENT CONSENT

Patients provided written consent for the use of their image.

REFERENCES

1. Sheen JH. Spreader graft: a method of reconstructing the roof of the middle nasal vault following rhinoplasty. *Plast Reconstr Surg.* 1984;73:230–239.
2. McKinney P. An aesthetic dorsum. The CATS graft. Cartilaginous autogenous thin septal. *Clin Plast Surg.* 1996;23:233–244.
3. Pinto RM. On the “let-down” procedure in septorhinoplasty. *Rhinology* 1997;35:178–180.
4. Gruber RP, Melkun ET, Woodward JF, et al. Dorsal reduction and spreader flaps. *Aesthet Surg J.* 2011;31:456–464.
5. Cottle MH. Nasal roof repair and hump removal. *AMA Arch Otolaryngol.* 1954;60:408–414.
6. Skoog T. A method of hump reduction in rhinoplasty. A technique for preservation of the nasal roof. *Arch Otolaryngol.* 1966;83:283–287.
7. Constantian MB, Clardy RB. The relative importance of septal and nasal valvular surgery in correcting airway obstruction in primary and secondary rhinoplasty. *Plast Reconstr Surg.* 1996;98:38–54; discussion 55.
8. Roostaean J, Unger JG, Lee MR, et al. Reconstitution of the nasal dorsum following component dorsal reduction in primary rhinoplasty. *Plast Reconstr Surg.* 2014;133:509–518.
9. Park SS. The flaring suture to augment the repair of the dysfunctional nasal valve. *Plast Reconstr Surg.* 1998;101:1120–1122.
10. Kovacevic M, Wurm J. Spreader flaps for middle vault contour and stabilization. *Facial Plast Surg Clin North Am.* 2015;23:1–9.
11. Regnault P, Alfaro A. The Skoog rhinoplasty: a modified technique. *Plast Reconstr Surg.* 1980;66:578–590.
12. Lejour M, Duchateau J, Potaznik A. Routine reinsertion of the hump in rhinoplasty. *Scand J Plast Reconstr Surg.* 1986;20:55–59.
13. Hall JA, Peters MD, Hilger PA. Modification of the Skoog dorsal reduction for preservation of the middle nasal vault. *Arch Facial Plast Surg.* 2004;6:105–110.
14. Sabeti F, Tehrani AN. A new technique for reconstruction of the nasal dorsum: underlay autografting. *Arch Facial Plast Surg.* 2002;4:141–148.
15. Mommaerts MY, Van Butsele BL, Abeloos JS, et al. Rhinoplasty with nasal bone disarticulation to deepen the nasofrontal groove. Experimental and clinical results. *J Craniomaxillofac Surg.* 1995;23:109–114.
16. Cook TA, Davis RE, Israel JM. The extended Skoog technique for repair of the unilateral cleft lip and nose deformity. *Facial Plast Surg.* 1993;9:195–205.
17. Niechajev I. Skoog rhinoplasty revisited. *Aesthetic Plast Surg.* 2011;35:808–813.