Dorsal Reduction and Spreader Flaps

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Abstract
Dorsal reduction (humpectomy) is a simple maneuver in principle, yet it commonly results in irregularities and general inaccuracies, along with occasional internal valve compromise. Traditionally, spreader grafts have been applied to reconstruct an internal valve disrupted during dorsal reduction. Imbricating the dissected ends of the upper lateral cartilages at their interface with the septum (spreader flaps) allows the surgeon to use this tissue, which would otherwise be discarded, to reconstruct the internal valve and design an aesthetically pleasing nasal line. The application of a spreader flap is not only an easily reproducible technique to restore middle vault structure but allows for precise incremental control when performed at the time of humpectomy. To that end, the authors provide a detailed description of their internal valve reconstruction technique, which has been honed over the past 15 years.

Keywords
dorsal hump, nasal valves, spreader graft

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At one time, removing the dorsal hump was probably considered the most mundane part of rhinoplasty. It was certainly easier than tip-plasty; it provided better overall results and was more predictable. However, with the advent of improved tip-plasty techniques, especially suture methods, we have found ourselves returning to the dorsum. We have come to realize that dorsal irregularities are not uncommon, and there have been many cases where the dorsum was under- or overresected. Fortunately, some of our fellow surgeons devised inventive methods for creating an aesthetically pleasing dorsum and minimizing irregularities.1,5 As more care and attention were paid to the dorsum, the issues with middle vault collapse and inverted-V deformities went by the wayside. This was thanks in part to the spreader graft, which was pioneered by Sheen,6 Constantian and Clardy,7 and others.8-15 Over the years, attention then turned to utilizing resected hump material. Original attempts to reconstruct the dorsum and middle vault included returning a portion of the hump following dorsal reduction, as Daniel5 demonstrated. Another option involves preserving the upper lateral cartilage (ULC) in some fashion, preventing it from being resected at all (which is demonstrated by the technique in this article) and thereby mitigating the need for spreader grafts altogether. Although techniques such as the one in this article present alternative options, it must be emphasized that spreader grafts remain the gold standard for middle vault reconstruction.

HISTORY OF THE SPREADER FLAP
Berkowitz16 and Oneal and Berkowitz17 were among the first to utilize the ULC as spreader grafts, as described in 1995. (They coined the term spreader flap.) At about the same time, Seyhan18 and Lerma19 described essentially the same operation. Rohrich et al described a minor variation of this operation in 1999.1,20 He and others referred to it as...
the “autospreader” or “turnover flap.” In similar fashion, Fayman and Potgieter21 (and also Sciuto and Bernardeschi22) recommended releasing the ULC from the dorsum, reducing the dorsal septum as needed, and then folding the ULC over the dorsum in a pants-over-vest fashion. Recently, Byrd et al23 shared their favorable experience with the spreader flap concept. Finally, Arslan and Aksoy24 described a slightly different way to fold over the ULC, preserving it and reattaching it to the dorsal septum. We have also reviewed the spreader flap procedure on prior occasions.25,26

**INDICATIONS**

Most dorsal humps can be addressed with spreader flaps after reduction. If a hump is even 2 mm above the ideal dorsal line, it will usually be possible to fold the ULC over to make a spreader flap immediately prior to performing the incremental humpectomy. In some cases where the hump is minimal and folding over the ULC is not possible, it may be an option to simply return the ULC to the dorsum “as is” and suture it to the dorsal septum. However, in many cases, the ULC will not lie against the dorsal septum exactly as it did before ULC release, because it did not retain its original shape. It may collapse against the septum, losing width in the middle third. Spreader grafts offer a solution in those cases. Another alternative is to employ the more precise suture technique described by Neu27 to restore the contour of the ULC.

**TECHNIQUE**

For this procedure, the open approach is preferred except by extensively experienced surgeons, as the closed approach is much more difficult. To begin, the mucoperichondrium of the septum is hyperinfiltrated. A small, 1-cm intercartilaginous incision is made immediately adjacent to the dorsal septum. This allows for a mosquito clamp to be placed on the caudal aspect of the ULC (Figure 1), after which the mucoperichondrium is elevated (Figure 2). Starting at the anterior septal angle, a Freer or Cottle tool is applied to elevate at least 1 cm of the mucous membrane from the dorsal septum. As mucoperichondrium is elevated, more mobility is granted with the spreader flap. The ULC is released from the dorsal septum up to the level of bone (Figure 3). A scalpel works well for this purpose. The ULC is then disarticulated from the bone (Figure 4)
by sliding a Cottle elevator under the bone. The ULC extends cephalically deep to the bone; every attempt should be made to keep it intact as it is released. The ULC is then folded over and sutured (Figure 5). This is carried out with a mosquito clamp on the caudal end of the ULC. The dorsal perichondrium can be separated from the ULC to facilitate foldover and suturing. Two or three 5-0 PDS mattress sutures (Ethicon, Inc., Somerville, New Jersey) are usually sufficient (Figure 6). The knot should be maintained on the outside of the flap, and every effort should be made to avoid traversing the vestibule with the suture, which results in suture exposure. The spreader flap is created prior to the humpectomy to prevent inadvertent injury during incremental dorsal reduction.

After dissection and suture of the spreader flaps, the hump of the dorsal septum is incised with a scalpel (Figure 7). The scalpel should be inserted at the bone and pulled toward the caudal end. An osteotome is inserted into the dorsal septum in the slot made by the knife to remove the bone (Figure 8). The osteotomy should be moved from side to side as it is tapped, for better control. The dorsum is rasped as needed; utilizing a "push-type" rasp minimizes the risk of detaching the spreader flaps from the bone. (The flaps are delicate and subject to damage when a rasp is blindly applied.) An incremental humpectomy is ideal. Rasping and further dorsal septal cartilage shaving can be performed at this time. At this point, the spreader flaps are loosely attached to the bone, so they are mobile and flexible enough to be secured to varying heights of the dorsal septum.

To finish, the ULC is secured to the dorsal septum with 5-0 PDS. One clamp is placed on the caudal end of each

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**Figure 3.** The upper lateral cartilage is released from the dorsal septum up to the level of bone. A scalpel works well for this purpose.

**Figure 4.** (A) The upper lateral cartilage (ULC) is disarticulated from the bone. A Cottle elevator or knife is placed under the bone. The ULC extends cephalically deep to the bone; it should be kept intact as it is released from the bone. (B) The intraoperative view clearly demonstrates the disarticulation process.
The spreader flap (Figure 9), which orients the septum and maintains its straight position. The caudal end of each spreader flap is secured to the septum with 5-0 PDS (Figure 9). Scoring is performed as needed to taper the caudal end of the flaps. The illustration in Figure 10 shows the final intraoperative positioning.

Figure 5. (A) The upper lateral cartilage (ULC) is folded over and sutured, with a mosquito clamp on the caudal end of the ULC. The dorsal perichondrium can be dissected free from the ULC to facilitate foldover and suturing. (B) The intraoperative view shows the ULC being folded over with a forceps.

Figure 6. Two or three 5-0 PDS mattress sutures are needed to maintain the flap. The knot should be maintained on the outside of the flap, and the vestibule should not be traversed, as doing so will cause suture exposure.

Figure 7. The hump of the dorsal septum is incised with a scalpel, which is inserted at the bone end and pulled toward the caudal end.
Clinical results are shown in Figures 11 to 13. A video of this technique is available at www.aestheticsurgeryjournal.com

**DISCUSSION**

The spreader flap has undergone an interesting evolution over the past 15 years. Over time, this procedure has become more reliable and reproducible. We employ it routinely on all primary rhinoplasty patients who present with a dorsal hump, and it has become the standard method by which we achieve dorsal reduction while reconstructing the middle third of the nose. In patients whose nasal hump is very small, it may not be possible to roll the cartilage around to make the flap; for these cases, we make an attempt to reapply the ULC to the dorsal septum or apply spreader grafts. As stated earlier, in the final analysis, spreader grafts remain the gold standard for internal valve reconstruction.

Although it is possible to utilize spreader flaps with a closed approach, we believe that developing a spreader flap with that technique is often akin to building a ship in a bottle. It can certainly be done, but only with a great deal of painstaking effort. If this technique is performed with a closed approach, some of the usual surgical steps (including applying mattress sutures to the cephalic end of the flap) must be omitted. In that situation, it is easier to score the proximal part of the flap. However, scoring often narrows the flap too much, and one must revert to a spreader graft. Given the complexity, we only advise performing this technique with a closed approach for surgeons who have extensive experience with the open approach.
Figure 11. (A, C) This 38-year-old woman presented with a classic dorsal hump. (B, D) Fourteen months after placement of spreader flaps and dorsal reduction, along with other procedures such as tip-plasty and osteotomies. Postoperatively, the patient had no airflow obstruction symptoms, and the middle third of the nose was of normal width.
Figure 12. (A, C) This 19-year-old woman presented with a dorsal hump. (B, D) Thirteen months after placement of spreader flaps and dorsal resection, along with other procedures such as tip-plasty, caudal shortening, and osteotomies. Postoperatively, the patient had no airflow obstruction symptoms and the middle third of the nose was of normal width.
Figure 13. (A, C) This 30-year-old woman presented with a dorsal hump. (B, D) Eleven months after placement of spreader flaps and dorsal resection, along with other procedures such as tip-plasty and osteotomies. Postoperatively, the patient’s profile view was much improved, and the middle third of the nose was of normal width.
CONCLUSIONS

We believe that spreader flaps provide an easily reproducible option for restoring middle vault structure and allow precise, incremental control during humpectomy. The technique has been utilized in our practices for 15 years with positive results, and we employ it for primary rhinoplasties where a dorsal hump is present.

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