Suture Techniques in Rhinoplasty by Use of the Endonasal (Closed) Approach

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The benefits of both the open and closed approaches were combined by use of an extended closed rhinoplasty. It is theorized that circulation would be improved, while providing greater visualization of the tip cartilages for suture techniques in those patients considered at risk for the open approach (e.g., patients who smoke, patients with multiple scars of the tip area, and patients with very thick skin who might be predicted to have a great deal of edema with subsequent fibrosis).

The basic technique involves extension of the usual rim incision in the cartilage delivery technique of a closed rhinoplasty. A transfixion and intercartilaginous incision are required along with an extended rim incision, allowing more thoroughly delivered tip cartilages. Most of the usual suture techniques can then be performed: dome, intercultural, and crura-septal sutures. With the tips completely delivered, tip grafts can be sutured in place under direction vision. The one suture that is not possible at this time is the spanning suture.

Thirty-two cases of extended closed rhinoplasties have been performed in patients who were not candidates for the open approach. There were no healing complications. Five patients had undesirable results, and a revision for aesthetic problems was required. The extended closed rhinoplasty offers many of the advantages of both the open and closed approaches.

The open approach to rhinoplasty has been hailed as offering improved visualization and control of the surgical anatomy as compared with closed techniques. It is particularly valuable for the plastic surgeon who does not perform large volumes of nasal surgery and needs to see what is sculpted—particularly the tip. The open approach, however, has not been without its share of problems. Suggestions that it is associated with more postoperative edema and resultant subcutaneous fibrosis offer concern that this can mask some of the fine nasal tip detail. Most of the time the trade-off is a good one. However, in the thick-skinned nose and in the very large nose undergoing reduction, even a small amount of fibrosis can blur the apparent gains achievable by the detailed sculpturing permitted with the open approach. Patients with thick-skinned or very large noses therefore benefit more from the closed approach. Two additional types
of patients are believed to be poor candidates for the open approach: patients who smoke and those whose nasal tip circulation is at risk as a result of prior trauma or surgical scars.

A few surgeons have devised methods that may achieve the benefits and exposure of the open approach without having to make an external columnar incision. Mir y Mir\(^1\) was one of the first to demonstrate the merits of exposing the medial crura for better tip sculpting. Guerresosantos\(^2\) uses a single marginal incision that begins at the rim of the lateral crus and continues along the middle and medial crura to the level of the footplates. Without the usual double incision that is required for externalizing the tip cartilages, he has been able to expose the tip cartilages through this single incision. Holmstrom and Luzi\(^3\) have used a similar technique, where the marginal incision extends to the floor of the nose. These techniques provide better tip cartilage exposure and improved ability to perform surgical maneuvers.

The conventional closed approach, even with tip delivery methods, does not permit adequate exposure for suture techniques. Suture techniques, made possible by the open approach, have become popular in recent years because they permit precise control in shaping the cartilages. Sutures correct minor asymmetries, provide tip narrowing, and assist in tip projection and minimize, but do not eliminate, the need for tip grafting. Tebbetts,\(^4\) an early proponent of suture techniques in the open approach, has found particular value in the spanning suture. Daniel\(^5\) also favors suture techniques and pioneered the dome suture. Tardy et al.\(^6\) and Neu\(^7\) are among others who have used suture techniques in both the open and closed approaches. I have previously favored four types of sutures for the tip:\(^8\) (1) the crura-septal suture, (2) the spanning suture, (3) the dome suture, and the (4) intercrural suture. The crura-septal suture holds the medial crura to the caudal septum. It assists in achieving tip projection and helps to prevent postoperative tip droop. The intercrural suture holds the medial crura together. It is placed at the cephalic part of the medial crura, near the dome, thereby aiding in projection and tip symmetry. Another intercrural suture is sometimes placed at the caudal part of the medial or middle crura, where it serves to prevent splaying of the tip cartilages.

These suture techniques have helped achieve successful outcomes with open rhinoplasty. Adequate exposure of the tip cartilages is essential when suture techniques are used. Extending these principles to closed rhinoplasty, it was believed that a technique that offered a maximum exposure of the tip could be used to allow as many different suture techniques as possible for tip control.

**Indications**

Indications for the extended closed rhinoplasty include the following:

1. Patients with thick skin
2. Patients who smoke
3. The tip with poor circulation, such as from surgical or posttraumatic scars
4. Patients who are unwilling to accept a small scar on the columella

**Technique**

The incision begins with the conventional one described by Sheen and Sheen,\(^9\) which permits delivery (eversion) of the tip cartilages. However, the rim (marginal) incision is carried further along the medial crura to the level of the
footplate if necessary (Figures 1 and 2, A). These two incisions permit a complete cartilage delivery (Figure 2, B).

To sculpt each dome individually, it is best to deliver each tip through its respective nostril (Figure 2, C). To do so it is necessary to spread and separate the middle crura from one another. Although such exposure would seem to weaken the tip, subsequent suturing (as described below) will eliminate that potential problem.

Once the tips are fully delivered, trimming of the cephalic lateral crura and light dome scoring ordinarily are performed first. It is important for placement of certain sutures in the tip cartilages to be performed next. These include the following:

**Dome Suture**
The dome suture (Figure 2, D) is essentially a 4-0 polydioxanone (PDS, Ethicon, Inc.) horizontal mattress that gently pinches the dome together. It provides narrowing and more projection. To avoid penetrating the vestibular lining of the dome, a bleb of local anesthetic is injected into the vestibular skin just before the needle is passed. In addition, while the needle is passed through the dome cartilage, it is allowed to sit there momentarily while the undersurface of the dome is palpated with the empty needle holder to determine whether the needle has penetrated the vestibular skin.

Occasionally, after the dome suture is inserted, a small amount of twisting of the tips is evident, no matter how careful one is at stitch placement. The tips simply twist. This will not be as apparent with the extended closed technique as it is with the open approach. Therefore it is best to plan on an intercrural suture, described below, to adjust for it.

**Intercrural Suture**
The intercrural suture (Figure 2, E) brings the cephalic ends of the domes together. It adds to further tip projection and symmetry. A single 4-0 PDS suture incorporates the cephalic side of the middle crura about 3 to 4 mm below the dome. This is readily done by delivery of both domes through one nostril. A separate intercrural suture can be placed on the caudal side of the middle crura if they are still too splayed. Care must be taken not to bring the tips too close together because this would lead to a pointed, unnatural nasal tip.

**Crural-septal Suture**
This suture brings the middle crura and the septum together. It assists in projection and prevents the tip carti-

![Figure 2. A, The rim incision is extended toward the footplates. B, A separate transfixion and intercartilaginous incision permits complete tip delivery. C, If some of the fibers between the middle crura are separat-
ed, each tip can be delivered through its own nostril. D, After the domes are lightly scapred to weaken them slightly, a 4-0 PDS dome suture is placed. A mattress suture avoids penetration of the vestibular skin. E, Both tips can be sutured together with a 4-0 PDS intercrural suture. This suture is located on the cephalic side of the middle crura near the domes, but a few millimeters posterior to the domes to allow a small but natural separation of the domes. The intercrural suture pro-
vides tip projection and symmetry. F, Tip grafts are held in place with a needle while 5-0 PDS sutures are placed around the perimeter. G, Overprojecting tips are corrected by transection of the lateral crus (and H, medial crus) in its most posterior aspect, undermining one side and allowing the cartilaginous elements to overlap for several millimeters.](https://academic.oup.com/asj/article-abstract/18/2/99/238644/101)
Figure 3. This patient underwent a primary rhinoplasty with the extended closed approach. Her skin is moderately thick, but she also requested no columellar scar. A, C, and E, The tip is somewhat broad and lacks tip projection. After a small cephalic trim of the upper lateral crus, dome sutures and an intercrural suture were placed to provide maximum narrowing and projection. A tip graft was required in spite of the improved projection from the sutures. The patient also required a small dorsal hump resection. B, D, and F, In postoperative views, the patient exhibits tip narrowing and improved projection.

Tip Graft Sutures

Tip grafting (Figure 2, F) is performed only after the dome and intercrural sutures have been placed. Both tips are delivered through one nostril. By visualizing the entire tip complex, it is relatively easy to decide what the shape of the graft should be and where it should be located. If a Sheen-type graft is desired, its width is dictated by the visualized width of the middle crura only after the other tip sutures have been placed. If a Peck-type graft is desired, its width is dictated by the width between the domes. If the graft needs to augment both the middle crura and domes, it is designed to cover both areas. Once the graft is designed, it is temporarily supported to the existing tip cartilages with a no. 27 needle that penetrates both tip graft and tip cartilages. Suturing of the perimeter of the graft is then easily accomplished with 5-0 PDS sutures.

With experience, the rim (marginal) incision does not have to be carried all the way to the footplate of the medial crus. The incision can go as far as the junction of the middle and medial crura and still allow enough exposure to place sutures. With complete exposure of the tips, other maneuvers can be performed easily, such as transection of the lateral or medial crura to correct the overprojecting tip (Figure 2, G and H).

Results

Thirty-two patients underwent the extended closed rhinoplasty technique: 16 patients had thick skin; nine requested no columellar scar; four had poor circulation resulting from multiple prior surgeries or trauma, and three were smokers who were unable to stop smoking. None of the 32 patients exhibited scar contracture along the medial crura or even a depression of the tip as a result of contracture of the extended scar. Five patients required secondary corrections of the nose: two needed
grafting of a weak external valve involving the lower lateral crus, two required grafting of the tip to achieve greater tip projection, and one elderly patient whose tip complex did not remain at the desired level with respect to the septum underwent correction by rerotation of the tip.

Case 1
The patient in Figure 3 underwent a primary rhinoplasty with the extended closed approach. Her skin is moderately thick, but she also requested no columellar scar. The tip is somewhat broad and ill defined and lacks tip projection (Figure 3, A, C, and E). After a small cephalic trim of the upper lateral crus, dome sutures and an intercrural suture were placed. The rim incision along the medial crus was kept to a minimum to allow just enough exposure to place the sutures and tip graft. The patient also required a small dorsal hump resection. At 14 months after surgery, the patient exhibits tip narrowing and improved projection (Figure 3, B, D, and F).

Case 2
The patient in Figure 4 underwent a primary rhinoplasty with the extended closed approach. Her skin is moderately thick, and she requested no columellar scar. The tip is somewhat broad and ill defined and lacks tip projection (Figure 4, A and C). The patient received dome sutures, intercrural sutures, and a small cephalic trim of the lateral crus. She also received osteotomies and a dorsal hump resection. At 16 months after surgery, the patient exhibits tip narrowing and improved projection (Figure 4, B and D).

Discussion
The technique of exposing as much of the tip cartilages without involving an external columella incision is not new. The techniques that involve only a single rim (marginal) incision provide good exposure although not quite the exposure that the double (intercartilaginous/transfixion and rim) incisions provide. Moreover, with the rim incision alone, the tip cartilages are still attached to the upper lateral cartilages, and they cannot assume an independent position. This becomes particularly important if one is trying to effect changes in tip projection. By making the tip cartilages a free-standing unit that is structurally strong with the aid of suture techniques, the cartilages can be better positioned with respect to the septum.

One suture technique is not possible in the extended closed rhinoplasty. The spanning suture simply cannot be applied in the absence of an open approach. However, that is the only suture that cannot be used. Sutures to secure the distal end of a dorsal graft and the distal end of spreader grafts are possible and very helpful. However, these sutures can be placed in any closed technique that simply uses a transfixion and intercartilaginous incision.

The extended closed rhinoplasty technique shares advantages of both the open approach and the closed approach. It draws from the open approach by providing enough visualization to place certain sutures that are essential for tip stability, projection, and symmetry. The benefit shared by the closed approach is that it avoids the external columellar scar, which is important to some patients. The aesthetic appearance of the columellar scar is seldom a problem in the open approach. Open rhinoplasty has been blamed by some to be associated with subcutaneous fibrosis that obliterates some of the fine structure of the tip cartilages such as the facets. It is particularly important to avoid that fibrosis if the nasal skin is inherently thick because it can add unwanted bulk to an already bulbous nasal tip. In patients with a small nose and thin skin, that small amount of fibrosis is not a problem.

References