Dorsal Augmentation with Preservation Concepts

Dean M. Toriumi, MD[a,b,*]

KEYWORDS

• Preservation rhinoplasty • Dorsal augmentation • Subdorsal cantilever graft • Ethnic rhinoplasty

KEY POINTS

- Augmentation of the nose can be performed using preservation techniques incorporating a subdorsal cantilever graft.
- The subdorsal cantilever graft is positioned below the nasal dorsum to *push up* the nasal bones and middle vault.
- Subdorsal cantilever graft type A augments the middle vault and caudal nasal bones but does not elevate the radix.
- Subdorsal cantilever graft type B raises the radix as well as the nasal dorsum to augment the entire dorsum of the nose.
- The subdorsal cantilever graft is a complex graft that requires experience with dorsal preservation and costal cartilage grafting.

Video content accompanies this article at http://www.facialplastic.theclinics.com.

INTRODUCTION

Preservation rhinoplasty is a philosophy that focuses on preserving as much of the normal nasal anatomy as possible while modifying the shape of the nose.[1] Preservation techniques highlight the preservation of the middle nasal vault, Pitanguy and scroll ligaments, and conservative tip maneuvers.[2] Dorsal preservation focuses on preserving the structure of the middle nasal vault while reducing the dorsal hump. Using similar concepts, the nasal dorsum can be elevated or *pushed up.*

There are 2 main areas of augmentation that can employ the "push-up" techniques. In correction of the saddle nose deformity, the nasal bones are typically in proper position or may even exhibit a dorsal hump. In these cases, the middle vault is pushed up, and the nasal bones are managed as needed. In such cases, spreader grafts or other structural grafts can be placed below the middle vault to push up the depressed cartilages.[3] These grafts must be very strong to support the middle vault and typically require autologous costal cartilage.

When performing major dorsal augmentation, as in the ethnic patient, a determination must be made on whether the radix needs to be raised in conjunction with the nasal dorsum or whether the radix position should remain the same, but the caudal nasal bones and middle vault elevated to align with increased tip projection.

This article covers preservation concepts used to correct the saddle nose deformity and augment the nasal dorsum.

SUBDORSAL CANTILEVER GRAFT

The subdorsal cantilever graft (SDCG) is a costal cartilage graft that can correct the saddle nose

[a] Private Practice, 60 East Delaware Place, Suite 1525, Chicago, IL 60611, USA; [b] Department of Otolaryngology – Head and Neck Surgery, Rush University Medical School, Chicago, IL 60611, USA
* Private Practice, 60 East Delaware Place, Suite 1525, Chicago, IL 60611, USA
E-mail address: deantoriumi@toriumimd.com

Facial Plast Surg Clin N Am 33 (2025) 269–284
https://doi.org/10.1016/j.fsc.2025.02.003

Abbreviations

PDS	Polydioxanone
SDCG	Subdorsal cantilever graft
SDCG-A	Subdorsal cantilever graft type A
SDCG-B	Subdorsal cantilever graft type B

deformity and perform major dorsal augmentation.[4,5] There are 2 forms of the SDCG. Subdorsal cantilever graft type A (SDCG-A) is a single graft that extends from a space created under the bony nasal vault, passes under the middle vault, and then attaches firmly to a caudal septal extension graft or caudal septal replacement graft (**Fig. 1**). The subdorsal space is created by incision in the septum immediately under the upper lateral cartilages, removing some bone under the nasal bones, and then allowing the middle vault and nasal bones to be pushed up from below (**Fig. 2**). If the nasal bones need to be elevated, circumferential bone cuts can also be made to allow the bony vault to be pushed up (**Fig. 3**). In order for the middle vault to push up, a complete lateral keystone release with division of the piriform ligament is needed (**Fig. 4**). With the SDCG-A, the radix is not elevated, so a radix bone cut may not be necessary in many cases. In cases with shorter nasal bones, no bone cuts may be needed. With longer nasal bones, at least lateral osteotomies and transverse bone cuts will likely be necessary, creating a hinge point at the radix.

The SDCG-A is specially designed with a narrower leading edge to ensure the dorsum is not too wide. Frequently, a trough is created along the leading edge of the graft to accommodate the remnant septal keel on the undersurface of the middle vault (**Fig. 5**). The SDCG is advanced into a space created below the nasal bones, extends under the middle vault, and is fixed to the caudal septal extension graft. With the SDCG-A, the radix is not raised, and the maximal elevation is in the middle vault.

The subdorsal cantilever graft type B (SDCG-B), is primarily used for major dorsal augmentation with radix augmentation.[4] This would entail increases in dorsal height of 3 mm to 5 mm. After completing the subdorsal release of the septum and circumferential osteotomies, the nasal dorsum

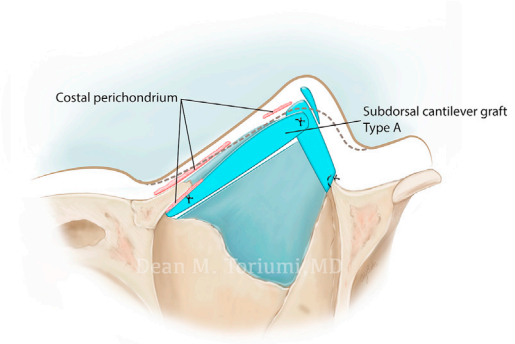


Fig. 1. SDCG-A is a graft used to raise the dorsum when the radix position is to be preserved. This graft is lodged into a space created under the nasal bones, but does not extend beyond the medial canthus. (*Courtesy of* Dean M. Toriumi)

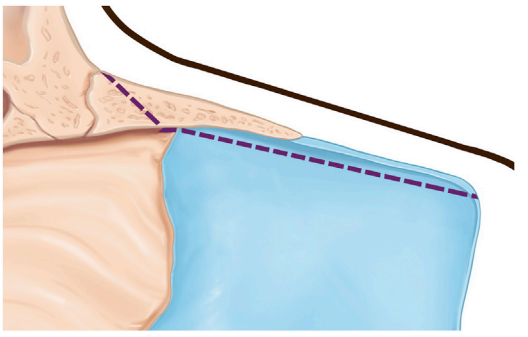


Fig. 2. A high septal incision is made just under the middle vault and extends up the medial canthus. This releases the nasal bones and middle vault from the septum. In many cases, the radix bone cut is not necessary.

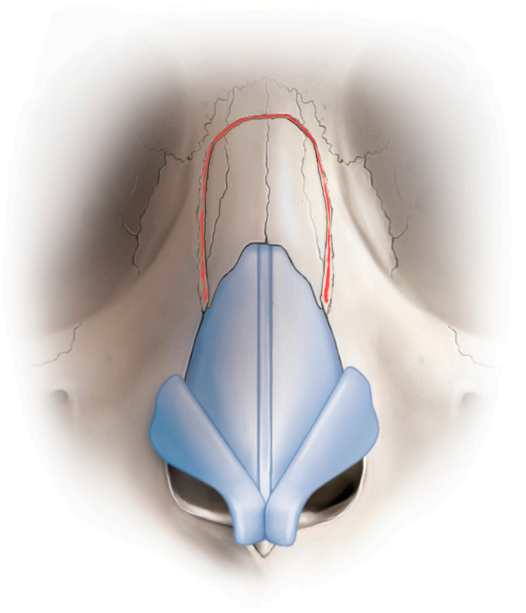


Fig. 3. Circumferential bone cuts are made to release the bony vault (radix and lateral bone cuts). In most cases, the transverse bone cuts can be executed internally as well. (Quality Medical Publishing, Inc. 2021; Toriumi DM, Davis R Marina Medical Rhinoplasty Cadaver Dissection Course Videos, Street. Louis.)

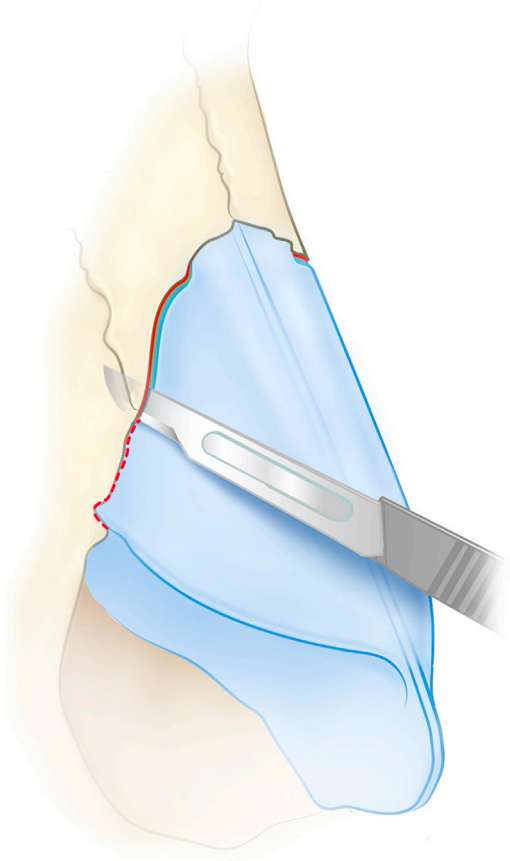


Fig. 4. Lateral keystone release to allow the middle vault to move anteriorly.

Fig. 5. SDCG-A shows a trough carved along the anterior surface of the graft to allow the subdorsal keel to fit and align with the graft.

can be elevated. The bone cuts include a radix bone cut made at the level of the medial canthus, bilateral lateral osteotomies along the ascending process of the maxilla, and bilateral internal transverse bone cuts (Video 1). A wide subperiosteal dissection is performed along the ascending process of the maxilla to allow the nasal bones to elevate.

At this point, the SDCG can be used to raise the radix and hold the dorsum in an elevated position. To accomplish this, the cranial end of the SDCG-B graft extends through the radix bone cut to sit on top of the frontal bone and raise the radix (**Fig. 6**). The SDCG-B is "cantilevered" off the stable frontal bone, and the bony dorsum can be reliably held in an augmented position without impacting the underlying septum. The septum can be trimmed without affecting the position of the nasal dorsum. This is why the SDCG-B can be used in reconstructive cases where there is no septal support due to injury, infection, or prior surgery.[5]

The key design feature of the SDCG-B is a distal tongue/shelf that extends through the radix bone cut with an inset to accommodate the nasal bones (**Fig. 7**). The SDCG-B passes under the bony and middle vaults to connect to the caudal septal extension graft. The leading edge of this graft must be narrow to avoid making the dorsum too wide. Native costal perichondrium can be left on parts of the graft to aid in fixation and stabilization.

Depending on the depth of the supratip, the patient may need supratip augmentation. In such cases, the SDCG-B should have a prominence where it sits under the middle vault. This prominence under the middle vault preferentially pushes up the middle vault to accommodate the tip projection. A complete lateral keystone release and division of the piriform ligament is key to avoid tension that can result in the recurrence of the deformity. Small grafts or soft tissue grafts can be used to "fine-tune" the profile and create the final dorsal alignment.

Both the SDCG-A and SDCG-B must be very strong to raise the dorsum and middle vault and hold their positions. This is why autologous costal cartilage must be used. If the patient has softer rib cartilage, it will not support the nasal dorsum, potentially resulting in loss of dorsal augmentation. In these cases, one can harvest a costochondral graft with part bone and some cartilage. The

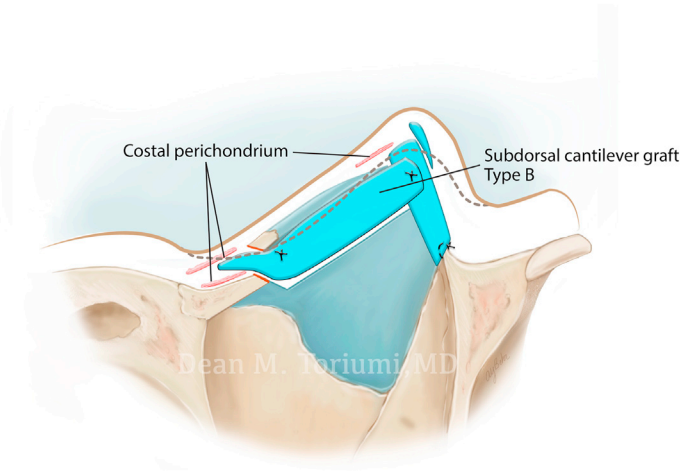


Fig. 6. SDCG-B with the graft extending through the radix bone and is cantilevered off the stable frontal bone. Note the tongue cranially, to allow the graft to fit through the radix bone cut. Also, note the carve out cranially, to allow the nasal bone to sit on the graft without a marked step off. (*Courtesy of* Dean M. Toriumi)

bony portion would sit under the dorsum and the cartilage part is attached or sutured to the caudal septal extension graft. The best type of cartilage for the SDCG is partially calcified rib cartilage, as it is strong and will hold up the dorsum yet can be sutured and carved. If bone is used, a piezotome or bur can be used to sculpt the graft.

The existing septum may be in the way of the graft and may require some trimming to allow the SDCG to fit under the nasal dorsum. Additionally, the posterior edge of the graft may need to be trimmed to prevent blocking the nasal valve. The graft may create some fullness of the upper septum, but as long as it is not blocking the nasal valve it should not be a problem. Patients with a tall, narrow nose with a narrower airway are at risk for blockage of the nasal valve and may not be candidates for the SDCG. Ethnic patients requiring dorsal augmentation typically have a wider airway, more room at the nasal valve, and are less likely to experience blockage of the nasal valve.

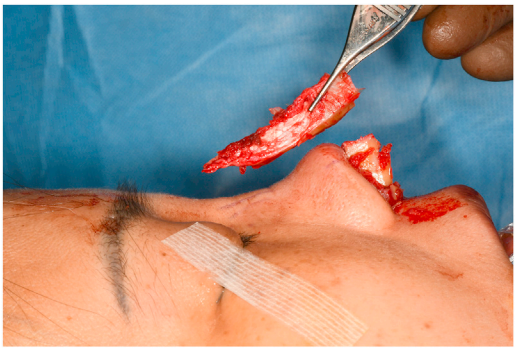


Fig. 7. SDCG-B is carved with a tongue to allow it to fit through the bone cut and cantilever off of the frontal bone. Native perichondrium is left on the graft to enhance vascularization and aid in graft fixation.

Fixation of the graft requires drilling a transosseous hole that goes across the bony vault, allowing passage of the 4-0 polydioxanone (PDS) suture. The suture then passes through the SDCG to fix it to the nasal bones, holding the graft in place (Video 2). The suture will prevent the SDCG from migrating caudally and potentially losing augmentation.

At the end of the operation, the tongue of cartilage that sits on the frontal bone may need to be trimmed so there is no visible or palpable graft. Additionally, a piece of costal perichondrium or soft tissue or crushed cartilage can be placed over the radix to camouflage the cranial end of the graft. In some cases, smaller soft pieces of cartilage may be needed to fill small dorsal irregularities.

Contraindications for the Subdorsal Cantilever Graft

1. Soft or weak costal cartilage. For the SDCG to be effective, the costal cartilage must be very strong and dense or even partially calcified. In some cases, a costochondral (bone and cartilage) rib graft can be used. The rib cartilage density can be assessed by using a 27-gauge needle to palpate the 7th rib. If soft or weak cartilage is used, late settling of the dorsum can result.
2. Cadaver rib is not recommended for the SDCG as there is inadequate follow-up on the use of this type of cartilage for long-term structural support.
3. If the surgeon is not skilled in dorsal preservation and using costal cartilage, the SDCG should not be attempted as it is a more complex technique.
4. The SDCG should not be used in patients with a narrow nasal vestibule as the nasal valve could

be partially blocked. Ethnic patients tend to have a wide nasal airway with room for the SDCG.

SADDLE NOSE DEFORMITY

In the saddle nose deformity, typically there is a lack of structural support in the middle nasal vault that contributes to the saddle deformity. In some cases, there is a bony convexity with the saddling of the middle vault below. In these cases, the dorsal hump can be managed using dorsal preservation techniques, and the middle vault saddling can be pushed up from below after completely releasing the lateral keystone and the piriform ligament. The bony hump/bony cap can be rasped or reduced using an Ishida cartilaginous push down with or without bony cap preservation, or a spare roof type B.[6,7] The lateral keystone release and release of the piriform ligament are critical to the success of the SDCG, as recurrence of the deformity is possible if there is too much tension on the cartilages.

Case 1

This 32-year-old female patient presented after developing a saddle nose deformity due to trauma to her nose (**Fig. 8**) (Video 3). She had nasal airway obstruction and loss of the support to her middle nasal vault. The injury occurred 5 years prior to presenting for management.

Examination revealed severe saddling of her middle vault as well as a large bony dorsal hump. Her septum was deviated as well.

This patient is a classic saddle nose deformity with a dorsal hump in the upper two-thirds of the nose and a concave "saddled" middle third of the nose. Her septum was deviated as well.

To manage her problem, I used the piezotome to perform rhinosculpture to take down her bony hump and narrow her bones. **In these cases, I will avoid performing osteotomies to narrow the bones as the bony vault is the only stable structure available to act as a foundation for the reconstruction.** I harvested costal cartilage due to loss of septal support and no available septal cartilage for grafting. I performed a lateral keystone release and divided the piriform ligament to allow the middle vault to push up. I also released the septum from the middle vault by performing a high subdorsal cut and also took out some bone under the bony vault using a narrow Rongeur.

To reestablish caudal septal support, I carved a caudal septal replacement graft and fixed it into a notch I made in the nasal spine (see **Fig. 8**A, B).

I carved an SDCG-A with a notch caudally so it can be firmly fixed to the caudal septal replacement graft (see **Fig. 8**C, D). I positioned the SDCG-A under the middle nasal vault and fixed it to a caudal septal replacement graft (Video 3).

I also released the lateral crura and placed costal cartilage lateral crural strut grafts to manage the nasal tip and to support the lateral wall of her nose (see **Fig. 8**E, F).

The patient has done very well with correction of her saddle nose deformity (see **Fig. 8**G–J).

Key points to this case

1. Saddle nose deformities frequently require management of the bony hump separately from the saddle middle vault. In this case, rhinosculpture using the piezotome worked well. A bur could be used as well. I used surface preservation techniques to manage the bone deformity.
2. In this case, a shorter SDCG was needed as only the middle vault needed to be elevated. Complete release of the lateral keystone and division of the piriform ligament was important to allow anterior movement of the middle vault.

AUGMENTATION RHINOPLASTY

Augmentation rhinoplasty typically involves projecting the nasal tip and augmenting the nasal dorsum. Many ethnicities could benefit from increasing nasal tip projection and augmenting the nasal dorsum. As the nasal tip is projected, the need for dorsal augmentation becomes even more important to maintain balance between the upper and lower aspects of the nose. In most ethnic rhinoplasty patients, autologous costal cartilage will be needed to perform structural grafting to allow adequate, lasting increases in tip projection and dorsal augmentation.[8]

When performing dorsal augmentation, there are many options. Many of the methods used have significant drawbacks, including graft visibility, irregularities, and resorption over time. For these reasons, the use of a SDCG can have great advantages as there are no large dorsal grafts placed on top of the dorsum, shifting and visibility are unlikely over time, and natural features of the dorsum are modified yet preserved. Since the nasal bones and middle vault are "pushed up", the nasal bones are upper lateral cartilages provide the shape to the dorsum.

ASIAN AUGMENTATION RHINOPLASTY

Asian patients typically have a low dorsum and low radix with deficient nasal tip projection. A nuance to their management involves the changes made in the radix area. Some Asian patients do not


A
B
C
D
E
F
G
H
I
J

want their radix elevated or changed. This is an important feature that needs to be discussed preoperatively in front of the computer imager so the surgeon is clear on the patient's desires. If the patient would like the dorsum elevated to accommodate the increases in tip projection but not elevate the radix (or slight elevation of the radix), an SDCG-A is most appropriate. If the patient would like the radix elevated beyond 2 mm, then the SDCG-B is ideal and can provide up to 5 mm of radix elevation.[4] One of the key issues here is a natural transition from the glabella to the radix and then to the dorsum. The SDCG-B can provide this natural transition, which is difficult to create with the single solid dorsal onlay graft or diced cartilage fascia graft.

Case 2

This 34-year-old Asian patient presented requesting increased nasal tip projection and augmentation of the dorsum with minimal changes to her radix position (**Fig. 9**) (Video 4). She wanted only 1 mm to 2 mm of radix elevation and significant increases in tip projection.

Examination revealed an Asian patient with a wide dorsum and poorly defined tip with a low dorsum.

Augmentation of her tip and dorsum required using her seventh rib harvested from a 1.1 cm incision. A caudal septal extension graft was used to stabilize her nasal base (see **Fig. 9**A). She underwent a high septal incision to release the dorsum, and then placement of an SDCG-A with a trough in the midline of the graft to accommodate the subdorsal septal keel (see **Fig. 9**B). The SDCG-A was fixed to the caudal septal extension graft (see **Fig. 9**C). A shield tip graft with articulated rim grafts was used to increase her tip projection and support her alar margins (see **Fig. 9**D–F). The increase in tip projection created an imbalance between her dorsal height and her tip projection. This was managed using the SDCG and a strip of perichondrium over the dorsum (Video 4).

She is doing well 4 years postoperative with excellent dorsal aesthetic lines and appropriate nasal tip projection (see **Fig. 9**G–J).

Key points to this case

1. This case illustrates the importance of discussing positioning of the radix with the patient preoperatively. Asian patients have specific preferences when it comes to radix position. Computer imaging is very important to provide this information. In her case, the 4-year postoperative outcome is very close to her preoperative computer imaging (see **Fig. 9**K).
2. The SDCG-B can be used to raise the middle vault and caudal nasal bones to accommodate the increased nasal tip projection.
3. The SDCG should be narrower to allow adequate narrowing of the nasal dorsum and middle nasal vault.

Case 3

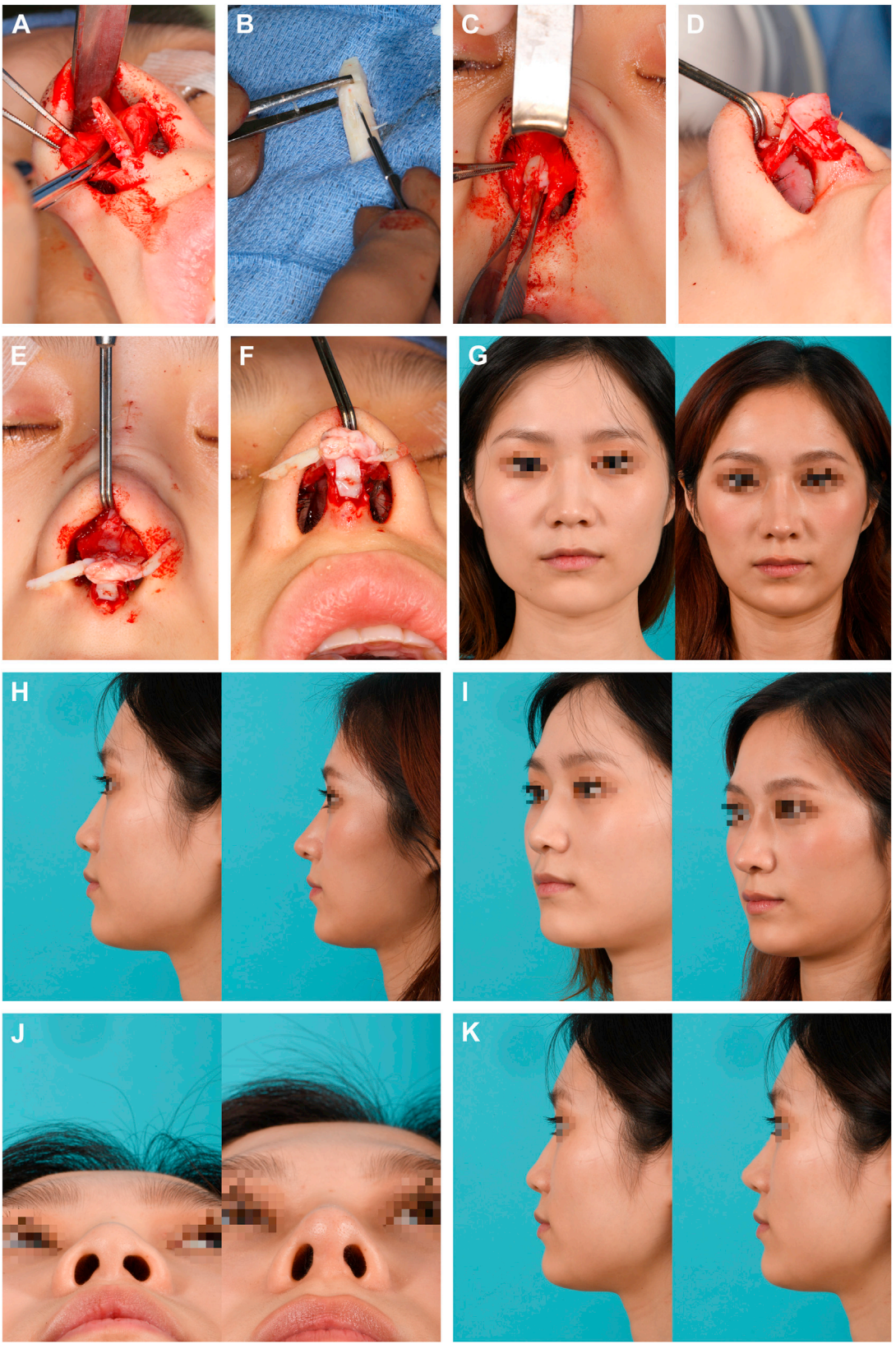
This 34-year-old Asian patient presented for augmentation rhinoplasty (**Fig. 10**). She had a very low radix and dorsum. Due to her lack of a dorsum, she could not wear sunglasses. She requested significant elevation of her radix with increased tip projection as well.

Examination reveals a very low dorsum and radix with a wide nasal base and thick nasal tip skin. Her skin is an amorphous skin envelope with little structural support. Her nose has little definition on the frontal view due to the lack of projection (see **Fig. 10**A).

Management required harvesting a large segment of her seventh rib with attached native costal perichondrium (see **Fig. 10**B). The SDCG-B was designed with a narrower anterior edge to promote a narrower bridge and native perichondrium attached to promote fixation, vascularization, and healing (see **Fig. 10**C, D). The caudal septal extension graft was placed end to end with her caudal septum and splinted with multiple thin slivers of cartilage (see **Fig. 10**E–G). The nasal tip was contoured and projected using a shield tip graft with articulated rim grafts for lateral wall support (see **Fig. 10**H, I). Her graft was well positioned subdorsally (see **Fig. 10**J).

Despite her thick tip skin, she has done very well with much improved dorsal aesthetic lines and

Fig. 8. Patient with a saddle nose deformity and bony dorsal hump managed with rhinosculpture and SDCG-A. (*A*) Splinted caudal septal extension graft. (*B*) Caudal septal extension graft splinted with thin slivers of cartilage. (*C*) Notched SDCG-A and caudal septal extension graft. (*D*) SDCG-A fixed to caudal septal extension graft. (*E*) Lateral crural repositioning with lateral crural strut grafts. (*F*) Tip with lateral crura repositioned. (*G*) Preoperative frontal view showing saddle nose deformity with bulbous tip (*left*). One-year postoperative frontal view showing straight nose with improved tip contour (*right*). (*H*) Preoperative lateral view showing bony dorsal hump with severe saddling of the middle vault (*left*). Postoperative lateral view showing straight profile with correction of saddling (right). (*I*) Preoperative oblique view (*left*). Postoperative oblique view (*right*). (*J*) Preoperative base view (*left*). Postoperative base view showing slight asymmetry of nostrils (*right*).


A
B
C
D
E
F
G
H
I
J
K

improved tip definition at 1 year postoperative (see **Fig. 10**K–N).

Key points to this case

1. This patient had a very low radix and needed significant radix augmentation. The SDCG-B provided appropriate elevation of the radix and dorsum and favorable narrowing of the dorsum. The cranial end of the SDCG-B extends through the radix bone cut and sits on the frontal bone, creating the radix elevation. This patient was an ideal case for the SDCG-B.
2. To make room for the SDCG-B, the existing septum was trimmed back to allow advancement of the graft into the space under the dorsum (see **Fig. 10**J). If needed, the cartilaginous septum can be trimmed as the entire support of the nose is provided by the caudal septal extension graft connected to the SDCG-B that is fixed to the nasal bones and cantilevered off of the frontal bone.

Case 5

This 56-year-old Asian patient presented requesting the removal of her nasal implant (**Fig. 11**). The implant is deviated and deformed. She had poorly defined tip and irregular dorsum.

Examination revealed an asymmetric nasal dorsum with an amorphous nasal tip. She had thickened scarred tip skin.

A large segment of the seventh rib was harvested with attached native perichondrium (see **Fig. 11**A). Reconstruction required removing the dorsal implant that was found to be an L-shaped Silicone implant (see **Fig. 11**B, C). After the removal of the L-shaped Silicone implant, the patient was left with a low wide dorsum and low radix (see **Fig. 11**D, E). The skin on the dorsum was thinned out and atrophic with irregular scarring. A large caudal septal replacement graft with attached native perichondrium was fixed into a notch in the nasal spine (see **Fig. 11**F). The SDCG-B was carved, leaving native perichondrium attached (see **Fig. 11**G) The SDCG-B was designed with a cranial tongue to fit into the radix osteotomy site (see **Fig. 11**H). The SDCG-B was fixed to the nasal bones through transosseous holes (see **Fig. 11**I). The SDCG-B was fixed to the caudal septal replacement graft, and then the base of the nose was advanced anteriorly to close the gap on the columellar closure and allow a tensionless closure (see **Fig. 11**J). A shield tip graft was sutured to the medial crura (see **Fig. 11**K). The shield tip graft was sutured to articulated alar rim grafts (see **Fig. 11**L,M). A composite graft was harvested to place into the marginal incision to close the vestibular skin deficiency (see **Fig. 11**N).

The patient is doing well over 1 year postoperative with much improved dorsal aesthetic lines, and a more refined nasal tip with good tip projection (see **Fig. 11**O–R).

Key points to this case

1. Removal of alloplastic implants can be difficult due to the potential damage to the skin envelope. The placement of another implant or graft will cause a high risk of visibility due to the atrophic skin envelope. Using an SDCG-B, the patient's nasal bones can be pushed up to increase dorsal height without placing a graft under the thin dorsal skin. This is an ideal method for removal of alloplastic implants with immediate reconstruction.
2. This case illustrates the unique shape of the SDCG-B with tongue of cartilage cranially to extend through the radix osteotomy site.

NON-CAUCASIAN AUGMENTATION RHINOPLASTY

When performing rhinoplasty in the black patient, adding structure to push into the thick skin allows narrowing of the frontal view and improved definition.[8] Black patients frequently have a low radix and low dorsum as well. This can leave the patient with a wide nose with poorly defined

Fig. 9. Asian augmentation rhinoplasty patient requesting increased tip projection with minimal elevation of the radix. An SDCG-A was used to align the middle vault with the increase in tip projection. (*A*) Caudal septal extension graft in position. (*B*) SDCG-A with trough carved in the leading margin to fit the subdorsal keel. (*C*) Placing the SDCG-A into the subdorsal space and extending up under the nasal bones and fixed to the caudal septal extension graft. (*D*) Shield tip graft stabilized with lateral crural grafts. (*E*) Articulated alar rim grafts sutured to the edges of the shield graft and camouflaged with perichondrium. (*F*) Shield tip graft from below with rim grafts. (*G*) Preoperative frontal view showing poorly defined dorsum and tip (*left*). Three-year postoperative frontal view showing improved dorsal aesthetic lines and improved tip definition (*right*). (*H*) Preoperative lateral view showing low dorsum and underprojected tip (*left*). Postoperative lateral view showing increased tip projection and augmented dorsum with minimal change in the radix (*right*). (*I*) Preoperative oblique view (*left*). Postoperative oblique view (*right*). (*J*) Preoperative base view (left). Postoperative base view (*right*). (*K*) Preoperative computer imaging showing minimal change in the radix position.

Fig. 10. Asian patient with very low radix and low dorsum with underprojected nasal tip, wide nasal base, and thick skin. This patient was treated with an SDCG-B and shield tip graft. (*A*) Intraoperative frontal view showing low flat dorsum and wide nasal base with thick skin. (*B*) Harvested 7th rib with attached native perichondrium. A segment of the 8th rib was harvested as well. (*C*) SDCG-B carved with tongue that will extend through the radix bone cut. (*D*) SDCG-B showing the narrow shape of the graft to avoid a wide dorsum. (*E*) Caudal septal extension graft for tip support. (*F*) Caudal septal extension graft sutured end to end with existing caudal septum. (*G*) Caudal septal extension graft fixed end to end and splinted with thin splinting grafts. (*H*) Shield tip graft with articulated rim grafts. (*I*) Shield tip graft from below. (*J*) Endoscopic view of the SDCG-B showing the graft (*yellow arrow*) and the gap in the septum (*green arrow*), making room for the graft. (*K*) Preoperative frontal view showing wide poorly defined dorsum and wide nasal base (*left*). One year and 4-month postoperative frontal view showing narrower dorsal aesthetic lines and improved tip definition (*right*). (*L*) Preoperative lateral view showing low radix and low dorsum (*left*). Postoperative lateral view showing augmented radix and dorsum with increased tip projection (*right*). (*M*) Preoperative oblique view (left). Postoperative oblique view (*right*). (*N*) Preoperative base view (*left*). Postoperative base view (*right*).

Fig. 11. This Asian patient presented with a deviated alloplastic implant on her dorsum. She underwent the removal of the L-shaped Silicone implant and immediate reconstruction using an SDCG-B. (*A*) Intraoperative view of the harvested rib cartilage. (*B*) Silicone implant noted in the nasal tip and dorsum. (*C*) L-shaped Silicone implant removed for the dorsum. (*D*) Intraoperative frontal view showing flat asymmetric dorsum. (*E*) Intraoperative lateral view showing low dorsum. (*F*) Caudal septal extension graft with attached native perichondrium. (*G*) SDCG-B with narrow contour to create narrower dorsum. (*H*) SDCG-B from side view showing tongue that extends through radix bone cut. (*I*) Fixation of the SDCG-B to the nasal bones via transosseous holes. (*J*) SDCG-B fixed to the caudal septal extension graft. (*K*) Shield tip graft sutured to medial crura. (*L*) Articulated alar rim grafts sutured to shield tip graft. (*M*) Shield tip graft with rim grafts from the view below. (*N*) Composite graft harvested to close vestibular skin deficiencies. (*O*) Preoperative frontal view showing deviated nasal dorsum and

dorsal aesthetic lines. A general principle of non-Caucasian rhinoplasty is to use structural grafting to enlarge the nose on lateral view to improve the definition on the frontal view.

The SDCG-B can be used to raise the radix and elevate the dorsum. The primary difference between the Asian and black patients is the positioning of the nasal starting point. In Asian patients, the nasal starting point is lower and should be located at the level of the midpupillary line. Meanwhile, in black patients, the nasal starting point can be higher depending on the prominence of the glabella. If the patient has a prominent glabella, the nasal starting point can be positioned closer to the supratarsal crease.

For the nasal tip, projection is a good parameter to increase as this will stretch the thicker nasal tip skin, improve tip definition, and narrow the nasal base.

Case 6

This 56-year-old black female presented requesting improvement in her nose and a higher dorsum (**Fig. 12**) (Video 5). She disliked the frontal view appearance of a flat nose, low bridge, and a wide nasal base (see **Fig. 12**A, B).

Management of her problem required harvesting both the 6th and 7th ribs (see **Fig. 12**C). Her caudal septal extension graft needed to be splinted to keep it straight and to prevent warping (see **Fig. 12**D and E). Her SDCG-B was specifically designed to provide her requested changes (see **Fig. 12**F–H). Her graft had a distinct tongue-like extension to fit through the radix bone cut and to sit on the frontal bone. A keel was left on the undersurface of the middle vault and fit into a trough carved into the anterior surface of the SDCG-B. The SDCG-B was positioned under the nasal bones through the radix bone cut and sutured to the caudal septal extension graft (see **Fig. 12**I). A shield tip graft with articulated rim grafts was used to project and shape the tip (see **Fig. 12**J and K). Her nasal base was narrowed using alar flaps (see **Fig. 12**L).

She has done very well and is now over 3 years postoperative (see **Fig. 12**M–P).

Key points to this case

1. To narrow her dorsum and nasal base, the dorsum was elevated using an SDCG-B, and the tip was projected using a caudal septal extension graft and a shield tip graft. This is a very effective combination when treating a wide nose with wide nasal base.
2. The SDCG-B was carefully carved with a tongue-like extension to fit through the radix bone cut and sit on the frontal bone.
3. A trough was curved into the anterior edge of the SDCG-B to accommodate the subdorsal keel, which is the remnant of septal cartilage on the undersurface of the middle vault. The keel sits in the trough of the graft to set the dorsum in the midline and stabilize the structure.
4. The dorsal augmentation provided is very natural-looking as the bones and the middle vault provide contour and do not require a graft or implant to be placed on the dorsum of the nose.

Case 7

This 60-year-old black female patient presented requesting rhinoplasty (**Fig. 13**). She had a poorly defined dorsum and amorphous tip. She has very thick skin and a poorly structured tip.

The examination revealed a poorly defined nose with very thick skin and little structural support (see **Fig. 13**A, B). She also had a wide nasal base and thick alar lobules.

She had calcified rib cartilage that required the piezotome to harvest and carve the cartilage (see **Fig. 13**C). A caudal septal extension graft was carved with the piezotome and fixed to the existing caudal septum (see **Fig. 13**D). The SDCG-B was carved with an extension to extend through the radix bone cut (see **Fig. 13**E, F). The SDCG-B was fixed to the caudal septal extension graft and then fixed to the nasal bones cranially using a transosseous fixation method (see **Fig. 13**G, H). A shield tip graft with articulated rim grafts were used to project and shape the nasal tip (see **Fig. 13**I). She underwent bilateral alar flaps to reduce the width of her nasal base (see **Fig. 13**J).

She is doing well over 2 years postoperatively with much improved dorsal aesthetic lines and improved tip definition (see **Fig. 13**K–N).

Key points of this case

1. This patient had highly calcified costal cartilage. This type of calcified cartilage is actually

amorphous tip (*left*). One-year postoperative frontal view showing improved dorsal aesthetic lines and improved tip definition (*right*). (*P*) The preoperative lateral view shows an underprojected nasal tip (*left*). Postoperative lateral view showing improved dorsal contour and increased tip projection (*right*). (*Q*) Preoperative oblique view (*left*), postoperative oblique view (*right*). (*R*) Preoperative base view (*left*), postoperative base view (*right*).

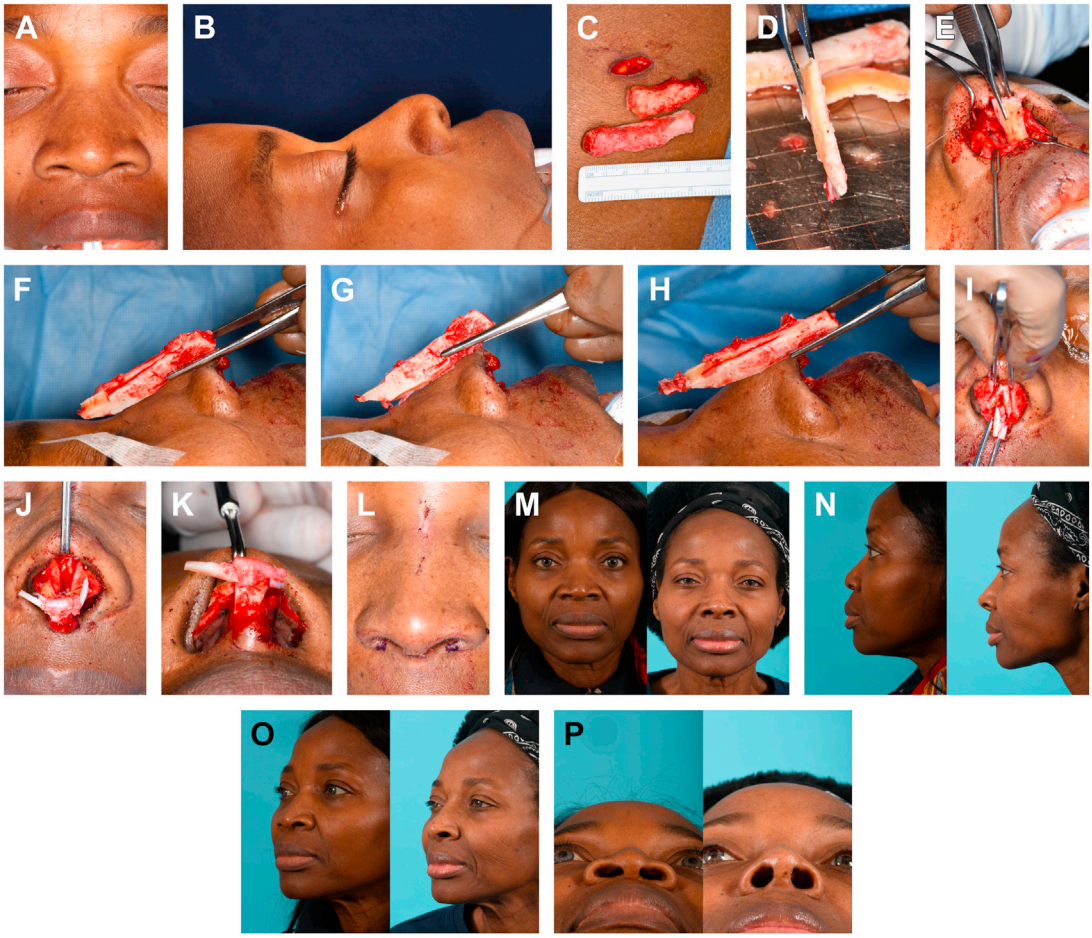


Fig. 12. Black patient with low radix and low dorsum and wide nose with wide nasal base. SDCG-B was used to augment her radix and dorsum. Shield tip graft was used to manage the nasal tip. (*A*) Intraoperative frontal view showing wide dorsum and wide nasal base. (*B*) Intraoperative lateral view showing low radix, low dorsum, and underprojected nasal tip. (*C*) Harvested 7th and 8th ribs with native perichondrium attached. (*D*) Caudal septal extension graft splinted with thin slivers to avoid warping. (*E*) Caudal septal extension graft fixed to nasal spine. (*F*) SDCG-B carved with tongue to fit through radix bone cut and trough in anterior margin to align with subdorsal keel. (*G*) SDCG-B from side showing tongue of graft. (*H*) Perichondrium sutured to tongue to help with camouflage and to avoid palpability. (*I*) SDCG-B fixed to the caudal septal extension graft. (*J*) Shield tip graft with articulated rim grafts. K. Shield tip graft with articulated rim grafts from below. (*L*) Alar flaps used to reduce the nasal base and downsize the nostrils. (*M*) Preoperative frontal view showing wide, poorly defined dorsum and wide nasal base (*left*). Three-year postoperative frontal view showing improved dorsal aesthetic lines and improved tip contour (*right*). (*N*) Preoperative lateral view showing low radix and low dorsum with underprojected nasal tip (*left*). Postoperative lateral view showing raised radix and augmented dorsum with increased tip projection (*right*). (*O*) Preoperative oblique view (*left*). Postoperative oblique view (*right*). (*P*) Preoperative base view showing wide nasal base (*left*). Postoperative base view showing narrow nasal base width (*right*).

ideal for the SDCG-B as it is stronger and more rigid. This added stiffness will better hold up the dorsum and not bend under the forces of the bones. If a patient has soft rib cartilage, it would be preferable to use a costochondral graft to use the strong bone for the support. It is imperative to keep the native perichondrium on the graft to aid in vascularization, preserve the integrity of the graft, and aid in fixation.

2. Fixation of the SDCG-B to the nasal bones is very important to preserve the position of the graft in a cranial position. If not properly fixated, the SDCG-B can migrate the caudally, lose its support and deform the nose.

Case 8

This 60-year-old black patient presented for secondary rhinoplasty after undergoing 2 prior

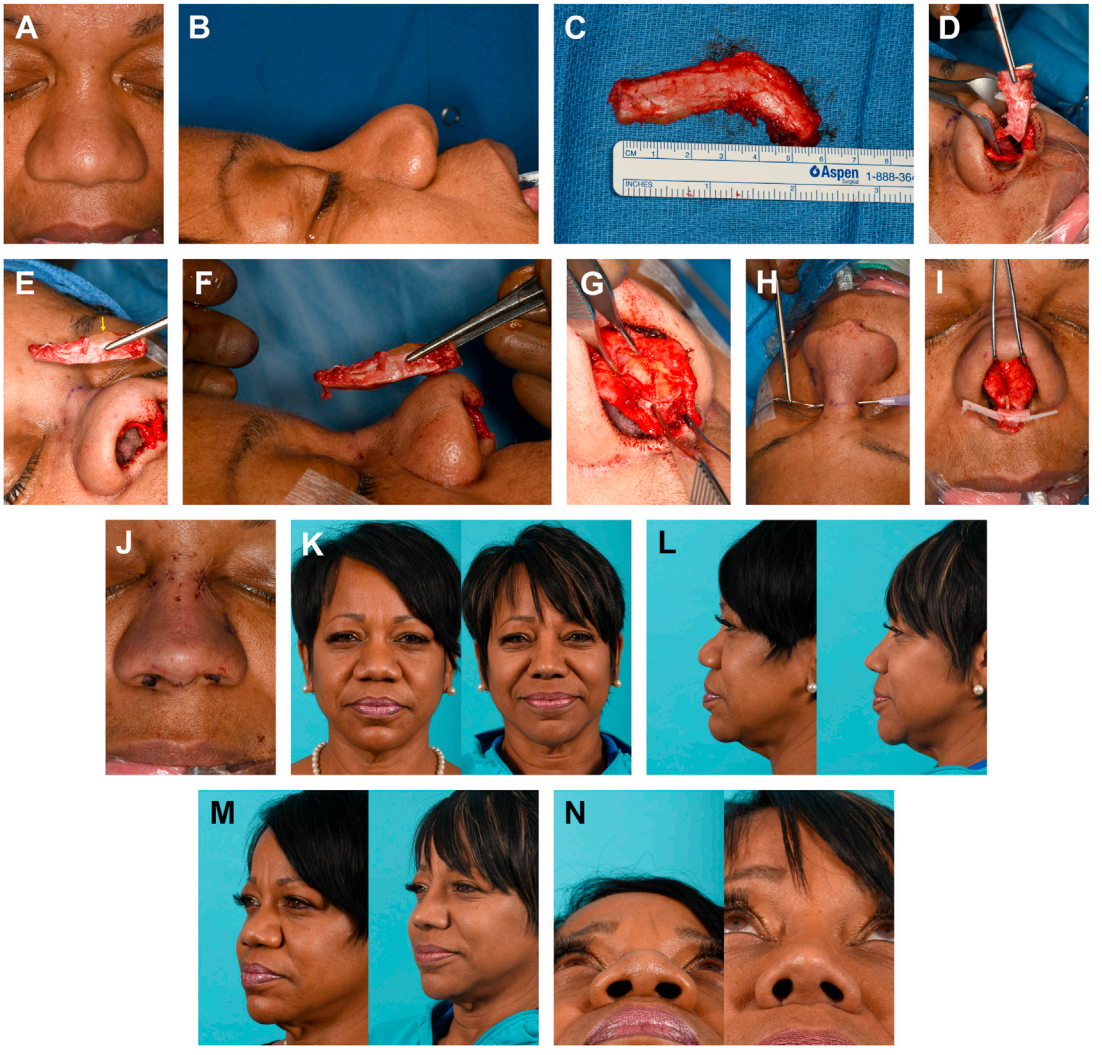


Fig. 13. This Black patient presented with a low radix and low dorsum with a wide nasal base with very thick skin. She had very little structural support. An SDCG-B was used to raise her radix and dorsum and a shield tip graft was used to project and shape her tip. (*A*) Intraoperative frontal view showing a wide dorsum, poorly defined tip with thick skin. (*B*) Intraoperative lateral view showing low radix and dorsum with poor tip projection. (*C*) Harvested segment of 7th rib with bone and cartilage (costochondral graft). (*D*) Caudal septal extension graft with attached native perichondrium. (*E*) SDCG-B with tongue to fit into radix bone cut. (*F*) Note the prominence (*yellow arrow*) of the SDCG-B to sit under the middle vault. (*G*) SDCG-B in position under the nasal dorsum and integrated with the caudal septal extension graft. (*H*) Fixation of the SDCG-B to the nasal bones by passing a 16-gauge needle to allow passage of a 4-0 PDS suture through the dorsum and the graft. (*I*) Shield tip graft with articulated rim grafts. (*J*) Alar flaps for alar base reduction. (*K*) Preoperative frontal view showing wide dorsum and wide base with amorphous tip (left). Two-year postoperative frontal view showing improved dorsal aesthetic lines and improved tip definition (*right*). (*L*) Preoperative lateral view showing low radix and dorsum with poorly supported tip (*left*). Postoperative lateral view showing improved balance, higher radix and dorsum, and increased tip projection (right). (*M*) Preoperative oblique view (*left*). Postoperative oblique view (*right*). (*N*) Preoperative base view (*left*). Postoperative base view (right).

rhinoplasties (**Fig. 14**) (Video 6). In the latest surgery, she had a Silastic implant placed. She is unhappy with the amorphous shape of her nose and the deviation of the tip and base of her nose.

Examination reveals a thick-skinned nose with deviation of the tip to the right and asymmetries of the nasal base. Her tip is poorly defined due to her thick skin. Her dorsum is poorly defined as well.

Reconstruction required harvesting her 7th rib with attached perichondrium. She underwent the removal of the Silastic implant, leaving her with a

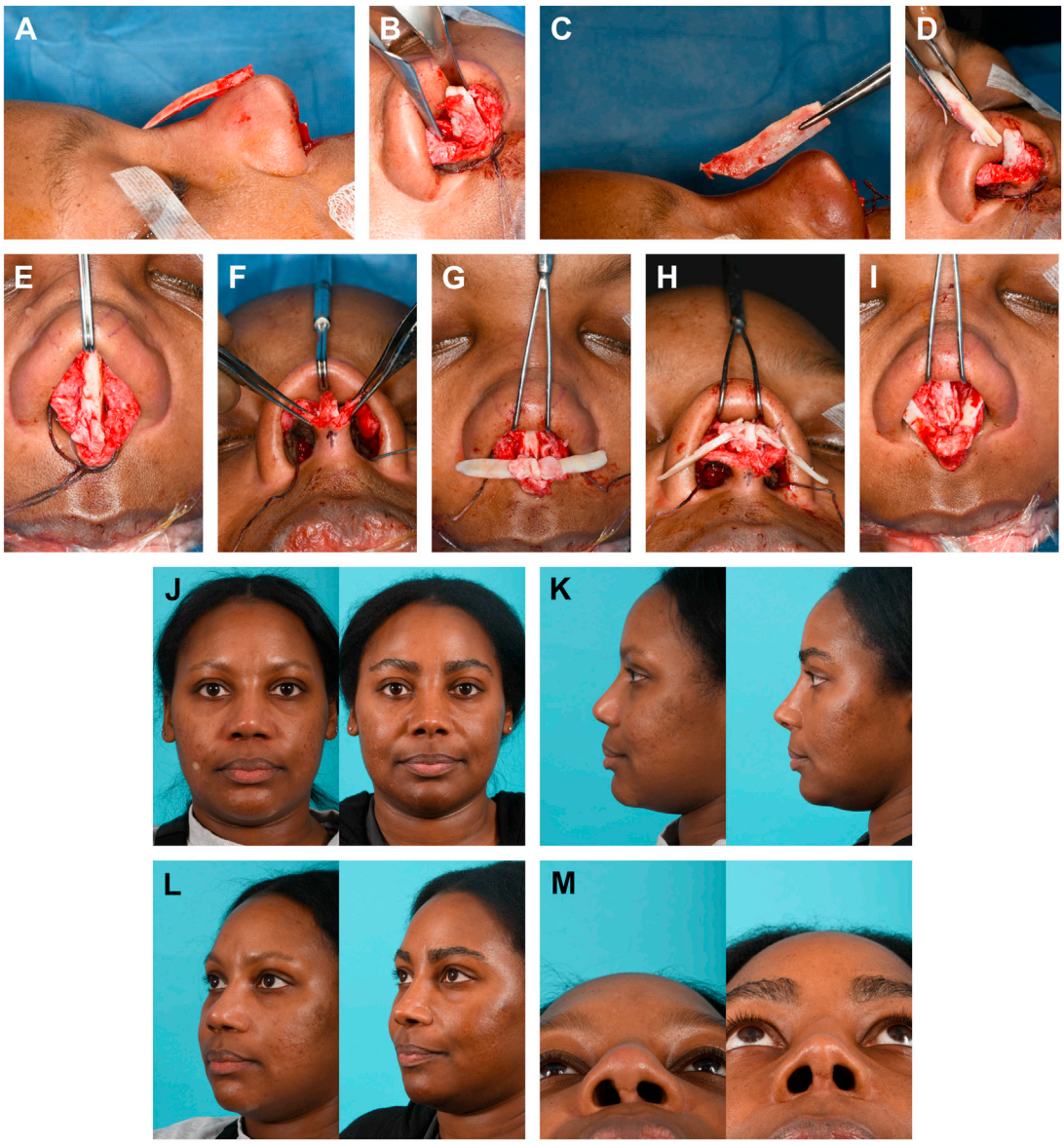


Fig. 14. A patient who underwent prior rhinoplasty with a Silastic implant on her dorsum. The implant was removed, and an SDCG-B was used to augment the radix and dorsum, and a shield tip graft was used to reconstruct her tip. (*A*) Silastic implant removed showing the low dorsum. (*B*) Caudal septal replacement graft used to stabilize the nasal base. (*C*) SDCG-B carved with tongue to fit into radix bone cut with native perichondrium attached for fixation. (*D*) SDCG-B with groove to fit onto caudal septal replacement graft. (*E*) SDCG-B fixed to the caudal septal replacement graft. (*F*) After wide release around the nasal spine, the nasal base was advanced anteriorly to allow a tension free columellar closure. This maneuver also acted to shorten her upper lip and improve the columellar upper lip junction. (*G*) Lateral crural replacement grafts with lateral crural strut grafts. (*H*) Lateral crural strut grafts from below. (*I*) Tip at end of procedure. (*J*) Preoperative frontal view showing deviated dorsum and amorphous nasal tip (left). Two-year postoperative frontal view showing improved dorsal aesthetic lines and improved tip definition (*right*). (*K*) Preoperative lateral view showing poorly defined dorsal lines (left). Postoperative lateral view showing improved definition of dorsum and supratip. (*L*) Preoperative oblique view (*left*). Postoperative oblique view (*right*). (*M*) Preoperative base view showing deviation (*left*). Postoperative base view showing improved symmetry (*right*).

lower poorly defined dorsum (see **Fig. 14**A). A caudal septal extension graft was placed, leaving the native perichondrium attached to enhance vascularization (see **Fig. 14**B). The SDCG-B was designed with the cranial end narrowed to fit through the radix bone cut and the caudal end split to easily integrate with the caudal septal extension graft (see **Fig. 14**C, D). Costal perichondrium was wrapped around the fixation point between the 2 grafts to "glue" the edges together (see **Fig. 14**E). The nasal base was aggressively advanced anteriorly to open the nasolabial angle, create a more favorable columella/upper lip junction, take tension off of the columellar closure, and to shorten the upper lip (see **Fig. 14**F). Lateral crural replacement grafts were placed with lateral crural strut grafts to reconstruct the nasal tip (see **Fig. 14**G–I).

The patient is doing well with excellent dorsal and tip definition over 2 years postoperative (see **Fig. 14**J–M). The nose is straightened, and the nasal base is symmetric. Her upper lip is shorter as well.

Key points to this case

1. This case illustrates how the SDCG-B can be used to recreate the augmented look of the dorsum after an implant is removed. The dorsal aesthetic lines are much more crisp, but not unnatural, as only the nasal bones and middle vault provide the contour of the dorsum. In the past, reconstruction after implant removal was much more difficult and required hours of fine-tuning of the graft and its camouflage. The SDCG-B is placed below the dorsum, and the precision is not as critical as the proper general concepts are followed.
2. These noses tend to improve over time in contrast to the onlay dorsal grafts, which look good and deteriorate over time. Similar to other dorsal preservation options, postoperatively, the outcomes are stable over time.

FINAL COMMENTS

The SDCG is a versatile graft that provides reliable repair of the saddle nose deformity and natural augmentation of the nasal dorsum and radix**. This is a complex technique that requires good experience with costal cartilage grafting and attention to detail.** The technique mirrors many other preservation techniques, using the patient's existing nasal bones and middle vault structures to augment and project from underneath the more superficial structures.

CLINICS CARE POINTS

- Preoperative computer imaging is crucial to ensure the surgeon and patient agree on the proposed aesthetic outcome. Dorsal height and radix position are the key points to discuss preoperatively.
- Autologous costal cartilage must be used and should be solid and not soft cartilage.
- Septal splints should be placed and left in position for three weeks to allow SDCG to fully fix into position and to help approximate the septal flaps.
- Ask the patient to avoid wearing glasses or sunglasses for one month postoperatively.
- Ask the patient to adhere to an anti inflammatory diet for one month postoperatively to minimize postoperative edema.

DISCLOSURE

The author have nothing to disclose and no conflicts of interest.

SUPPLEMENTARY DATA

Supplementary data to this article can be found online at https://doi.org/10.1016/j.fsc.2025.02.003.

REFERENCES

1. Daniel RK. The preservation rhinoplasty: a new rhinoplasty revolution. Aesthetic Surg J 2018;38:228–9.
2. Saban Y, Çakir B, Daniel R, et al. Preservation rhinoplasty. Istanbul, Turkey: Septum Publications; 2018.
3. Toriumi DM, Kovacevic M. Correction of the saddle nose deformity using the "push up" technique. Facial Plast Surg 2022. https://doi.org/10.1055/a-1803-6341.
4. Toriumi DM. Subdorsal cantilever graft for elevating the dorsum in ethnic rhinoplasty. Facial Plast Surg Aesthet Med 2022;24(Number 3):143–59.
5. Toriumi DM, Kovacevic M. Subdorsal cantilever graft indications and technique. Facial Plast Surg Clin N Am 2023;31:119–29.
6. Ishida LC, Ishida J, Ishida LH, et al. Nasal hump treatment with cartilaginous push-down and preservation of the bony cap. Aesthet Surg J 2020;40:1168–78.
7. Ferreira MG, Monteiro D, Reis C, et al. Spare roof technique: a middle third new technique. Facial Plast Surg 2016;32(1):111–6.
8. Toriumi DM. Lessons learned in thirty years of structure rhinoplasty. Chicago: DMT Solutions; 2019.